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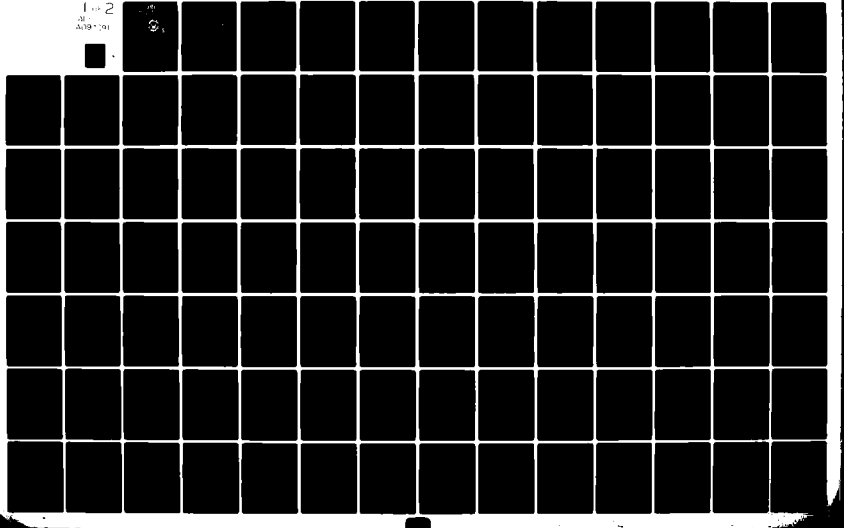

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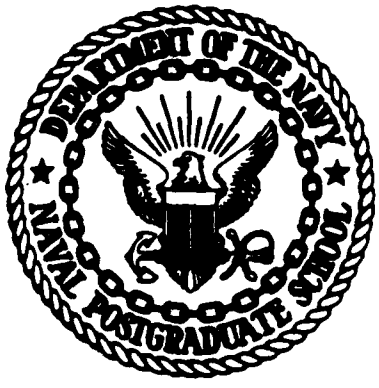

THESIS

AN ANALYSIS OF AND A PRESCRIPTION FOR THE CAPITAL IMPROVEMENT PROGRAMMING PROCESS FOR SMALL CITIES

by

Robert Lee Rachor Jr.
Lieutenant Commander, United States Navy

December 1980

Thesis Advisor: R.A. Bobulinski

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This thesis presents an analysis of and a prescription for the capital improvement programming process utilized in many small cities. In this study the author finds two major deficiencies in the literature and the prescriptive manuals. The first is the lack of alternative analysis at the time project requests are developed. The second is a lack of a method to prioritize projects given the political

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nature of the decision making process in a municipality. The first problem is countered by a proposal to utilize the principles of economic analysis when developing project requests. The second problem is countered by a proposal to utilize a weighted two-dimensional priority matrix to rank project requests. A political rational model of decision making is developed. Techniques for decision making with multiple objectives are reviewed. An example of a programming process currently in use is presented. The conclusion offers a prescription derived from the literature and the recommendations of the author.

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An Analysis of and a Prescription for the Capital Improvement Programming Process for Small Cities

by

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Lieutenant Commander, United States Navy
B.S. United States Naval Academy, 1969

Submitted in partial fulfillment of the requirements for the degree of

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ABSTRACT

This thesis presents an analysis of and a prescription for the capital improvement programming process utilized in many small cities. In this study the author finds two major deficiencies in the literature and the prescriptive manuals. The first is the lack of alternative analysis at the time project requests are developed. The second is a lack of a method to prioritize projects given the political nature of the decision making process in a municipality. The first problem is countered by a proposal to utilize the principles of economic analysis when developing project requests. The second problem is countered by a proposal to utilize a weighted two-dimensional priority matrix to rank project requests. A political rational model of decision making is developed. Techniques for decision making with multiple objectives are reviewed. An example of a programming process currently in use is presented. The conclusion offers a prescription derived from the literature and the recommendations of the author.

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I. INTRODUCTION

A. THE RESEARCH TOPIC

A thorough review of the literature concerning municipal capital improvement programming has indicated to the author that this area has become increasingly important to City Managers in this and other countries. Surprisingly however, relatively little has been written regarding the difficult capital budgeting decisions which municipal governments must face. Most of the literature specifically relating to capital expenditures in municipalities is prescriptive in nature and employs a "steps in the process" approach [White 1978]. Nonetheless, there appears to be a great weakness in the area of economic analysis of alternative courses of action. Furthermore, although there is a great wealth of information regarding managerial decision making in both business and the public sector, little has been written which offers a methodology to deal with the political realities involved in municipal capital budgeting prioritization.

Recent initiatives in the United States, particularly the Jarvis-Gann amendment to the state constitution in the State of California, which have attempted to limit government expenditures by reducing tax revenues, have created an unfavorable climate for the voter approval of bond financing for capital expenditures. Such pressures have caused cities to look to

their General Fund (an accounting fund for operations) as a revenue source for the financing of capital expenditures. The impact of the capital improvement budget has therefore become more keenly felt by city government [Ellis 1980].

Despite the effect of the voters' inclination to reduce government spending, the City Manager may still regard the capital budget as a part of the budget which should be expanded. The reason for such behavior can be attributed simply to the effects of inflation. Inflation psychology, the anticipation of ever-decreasing purchasing power, if adopted by the City Manager and the legislative body approving the City Budget, could result in behavior antithetical to voter preference. If strong price inflation is anticipated, it may be much more favorable to acquire needed capital resources in the near term than to wait and pay more. So, the City Manager is faced with a dilemma of attempting to provide for the sound financial management of the resources of a constituency which, by its voting preferences, may be limiting the City Manager's capabilities to best utilize resources.

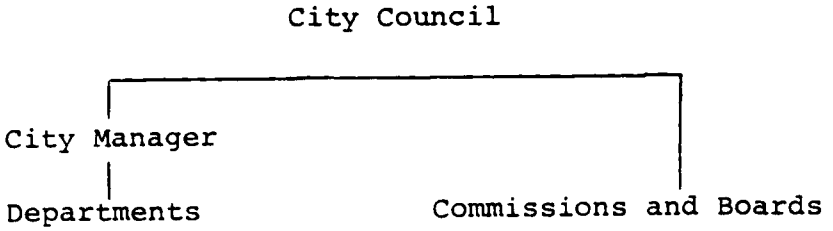
The capital budget, approved by a city's governing body either singularly or with the annual budget, is the result of some type of formal or informal programming process. This process is unavoidable because decisions must be made regarding the acceptability of proposals submitted in the budget request. In many cities the capital budget is therefore developed by

means of a formalized Capital Improvement Program (CIP). Vogt (1977) defines a CIP as a fiscal planning tool that lists public facility and equipment requirements, places these requirements in order of priority, and schedules them for funding and implementation. An example of a capital improvement program which meets Vogt's definition is employed by the City of Monterey, California.

The City of Monterey with a population of less than 30,000 can be classified as a "small city." The city management is divided into a department organization which includes the City Attorney, City Librarian, Finance Director, Police Chief, Public Facilities Director, and Public Works Director. There is a City Manager who has two immediate staff assistants. The City is a charter city with an elected City Council comprised of a Mayor and four Councilmen. The city organization is shown at Figure 1-1.

The city develops an annual CIP budget which is submitted by the City Manager through a CIP Committee to the City Planning Commission and then to City Council for approval (See Figure 1-2). The 1979-1980 CIP Budget scheduled $2.9 million in capital expenditures from the General Fund. The Gas Tax Fund, which is a restricted fund for highway and street improvement and repair, was allocated $3.9 million. An additional $1.9 million in restricted funds resulted in the annual 1979-1980 capital budget of $8.7 million [City of Monterey 1979].

City Organization



Departments

-- City Attorney

-- City Librarian

-- Finance Director

-- Fire Chief

-- Park and Recreation Director

-- Planning Director

-- Police Chief

-- Public Facilities Director

-- Public Works Director

Figure 1-1

CIP Organization

City Council	1 Mayor and 4 Councilmen
Planning Commission	7 Commissioners
CIP Committee	2 Councilmen, 2 Commissioners, 1 Library Board Representative and 1 Park and Recreation Commission Representative
City Manager	1 City Manager
CIP Coordinator	1 Coordinator from the Planning Department
Department Heads	9 Departments

Figure 1-2

The General Fund was authorized a total budget of $11.3 million for this year. It is significant to note that the capital budget was allocated slightly more than 25% of the total General Fund Budget. With this much of the General Fund budget allocated to capital improvements, city management should rigorously analyze the costs of proposed capital expenditures and any alternatives which can reduce such costs while still providing an appropriate level of service. It follows that the prioritization of the CIP must be carefully conceived during the programming phase of the budget. It is with an eye toward these factors and the magnitude of the CIP that this thesis is undertaken.

B. THE RESEARCH OBJECTIVE

Because of the recent tax initiatives in the State of California and other states, the effects of inflation on the size of municipal capital budgets, and the increasing dollar amounts of capital improvements funded from a city's General Fund, it is the author's opinion that it is an appropriate time to conduct an analysis of municipal capital improvement programming methods. Of particular importance is the need for a review of the manner in which requests are developed and prioritized within existing CIP's and the identification of any improvements which could be made in these areas. Therefore, it is the objective of this research to conduct such an

analysis, to identify needed improvements, and to propose a methodology to institute warranted improvements.

C. METHODOLOGY AND SCOPE

This study had its beginnings in an agreement between the City of Monterey and the author which involved the completion of a management audit of the CIP presently utilized by the city. City management had perceived a difficulty with the prioritization of items within the program and had expressed a desire for some assistance in this area. An agreement to provide such assistance was reached contingent upon city approval of the undertaking of a management audit of the CIP. This review was conducted as an Economy and Efficiency audit in accordance with the guidelines established for such audits by the General Accounting Office (GAO).

The basic purpose of the audit was to gather information regarding current capital budgeting procedures in the City of Monterey. As part of the audit, research was undertaken to develop a list of preferred management practices regarding capital expenditures. This list was tailored to account for the unique features and limitations associated with the management of a small municipality. Particular emphasis in the audit was placed on the organizational structure for the CIP, on the request for and justification and analysis of capital expenditure requests, and on the approval process for the CIP.

The departures from preferred practice which were discovered during the audit pointed to avenues for research which could result in recommendations for improvement particular to the City of Monterey, but which in the broad sense had applicability to any small municipality.

The research undertaken in this thesis involved two distinct areas with respect to scope. First there was research involving the general topic of capital budgeting. This topic has received thorough analysis and discussion in texts relating to business finance, managerial finance, and management accounting. The most notable (that is, the most often referenced) text on the subject is authored by Bierman and Smidt (1971). This text provides a grounding in the mathematical evaluation of the worth of the investment to a business firm and an evaluation of the cost of capital to a private business enterprise. The text also offers a prescriptive method of analyzing the investment decision. Unfortunately, this text and other texts discussing private sector capital budgeting do not propose a methodology to deal with the situation when quantitative models do not yield an explicit solution. Risk and uncertainty are treated quantitatively, but the dynamics of choice are omitted. This omission may be related to the profit maximizing motive assigned to the private sector.

In reality the private sector must deal with a variety of externalities, such as the environment and public pressure, which will affect the final capital budgeting decision. In the public sector, where there is no profit maximizing motive, the non-quantifiable aspects of the capital budgeting decision must be given greater emphasis. Because "politics" often has an unacceptable connotations, there is not a direct input under the label of political considerations, but the design of any system or model for capital budgeting in the public sector must show consideration of political factors.

The second area was related to the reality of non-quantifiable factors in the public sector decision process. Therefore, a thorough review of decision making in the public sector was included. Because the City Manager, the CIP Committee, the City Planning Commission, and the City Council review the proposed capital budget for the City of Monterey, research for appropriate models of individual and group decision making was also required. Because of the great amount of literature devoted to decision making research was limited to decision making models which could be applied within a small municipality without the expense associated with consultants or computers. Research regarding prioritization was also necessary. This involved a search for models which bridge the theoretical and the pragmatic and which deal with multiple objectives. An examination of this area is presented

by Easton (1973). Easton's analysis offers techniques with both private and public sector applications.

The analytical methodology for this thesis is therefore to first present a discussion of the capital investment problem and the problems of decision making in the area of public capital improvements. The results and an analysis of the management audit of the City of Monterey CIP will be presented as a case example. The conclusions derived from the research of municipal capital budgeting will be combined with the analysis of the audit to develop a prescription for use in municipal capital improvement programming.

D. THESIS ORGANIZATION

Chapter I introduces the reader to capital improvement programming and to the author's methodology and scope. The problems involved with capital improvement programming for a small city are presented in Chapter II. Decision making models applicable to small cities are discussed in Chapter III. In Chapter IV the CIP system presently used by the City of Monterey is outlined and discussed. A recommended system and conclusions are presented in Chapter V.

II. THE CAPITAL EXPENDITURE PROBLEM IN A MUNICIPALITY

This chapter presents a discussion of the various aspects of the problems associated with capital expenditures by a municipality. The initial part of this chapter is written to familiarize the reader with the terminology involved in municipal capital budgeting. The discussion begins with a review of the available literature concerning the topic. Following this the nature of capital expenditures and the capital improvement programming process will be examined.

A. TERMINOLOGY

To begin the discussion on capital expenditures there are several distinctions regarding definitions of terms which must be made. In Chapter I there appeared such terms as capital improvement programming, capital budgeting, capital expenditures, capital budget, and capital improvement program. The terms capital investment and capital project are also germane to this discussion. A clear understanding of these terms is important. The definitions which follow can be applied to municipalities and will be used throughout this thesis.

An expenditure is the payment for, or obligation to make payment for, a benefit. A capital expenditure normally applies to fixed assets which are either new, increased in value, or extended in life because of the expenditure. Capital

investments or capital investment projects are defined by Quirin (1967) as those which involve the outlay of cash in return for an anticipated flow of benefits. The benefits may be monetary or non-monetary. The capital investment or capital investment project requires a capital expenditure. These terms are therefore often used interchangeably.

Programming and budgeting are two management processes. Anthony and Herzlinger (1980) define programming as the process of deciding on the nature and size of several programs that are to be undertaken in order to achieve an organization's goals. Programming involves the development of project proposals, a full analysis of the proposals, and decision making regarding which proposals will be forwarded for approval in the budget. Programming is often a formalized process separate from budgeting. Budgeting is the process of allocating financial resources for the budget year. It often involves the translation of the programming effort into dollar allocations for the year. A distinctive difference between the two processes is time. Programming has a multi-year orientation, whereas budgeting applies to a one-year period. Programming results in the approval of projects; budgeting, in the distribution of dollars to approved projects.

From these distinctions flow the remaining definitions. Capital improvement programming is the process by which capital projects are developed and approved. The aggregation of these

projects can be found in the Capital Improvement Program (CIP). The projects are appropriated dollars for expenditures in the capital budget. The term capital budgeting overlays all of the others and refers to the search for capital investment opportunities or requirements, the programming of these requirements, and the appropriation of dollars via a budget.

B. THE LITERATURE

The author's review of capital budgeting literature shows that this topic has received extensive treatment in the literature. Bierman and Smidt (1971) and Quirin (1969) are two of the most often referenced texts concerning these topics. These texts are for the most part dedicated to the capital expenditure decision in the private sector, not in the public sector. Material relating to public sector budgeting is voluminous. Capital expenditures are common in the public sector, particularly at the federal level. There is therefore a wide variety of literature related to the analysis of public spending decisions, but this literature is for the most part related to federal expenditures which have little in common with municipal expenditures. Whereas the federal government may be programming the purchase of two hundred multi-million dollar aircraft, the municipal government may be programming the widening of a main roadway. Whereas the federal government may be prioritizing the purchase of land-based bomber aircraft versus land-based ballistic missiles, the municipal government

may be prioritizing the purchase of fire vehicles versus police vehicles. It is the author's opinion that there is little similarity between the impact of the decisions made in the federal programming process as compared to those made in the municipal programming process. The most important difference, however, is not in the number of dollars, but in the environment (or pressure) in which resources are allocated. At the local level the results of the programming process are more direct and visible. They have a more personal effect on the citizen. The process, therefore, is ordinarily closely scrutinized by the citizens of the city. However, there can be a great deal of similarity between the processes of programming and budgeting between federal and local governments.

Because municipal capital expenditures do not appear to impact the country on the same scale as do federal capital expenditures, it is not surprising that a review of the literature concerning capital budgeting in municipalities reveals rather sparse treatment of this subject. However, if the capital budgets of the municipalities of this country could be aggregated into a lump sum figure, the impact might appear in a different light. The Municipal Yearbook [International City Management Association 1980] reports that there are nearly 2000 cities with a population greater than 10,000 people. If these cities actually executed an average $1.5 million capital budget as did the City of Monterey,

California, during its 1979-1980 budget year, then the total capital expenditures of these cities would total $3 billion. This represents a substantial amount of expended dollars whose impact should not be ignored.

In 1978 the Government Finance Research Center of the Municipal Finance Officers Association (MFOA) developed a compendium of then current research regarding state and local government financial management [Petersen 1978]. Within this compendium an article specifically relating to the research since 1974 regarding local government capital budgeting was authored by White (1978). Several years prior to 1978 White conducted a literature search regarding capital programming and found reports on only two field studies which were conducted during the previous 15 years. In addition to the field studies there were a small number of manuals in print. The guidelines published by the MFOA which were in use during this period were authored in 1964.

White categorized the literature published since 1974 into the following categories: studies of federal government programs, capital budgeting and planning, capital budgeting and financial analysis, determinants of capital budgets, behavioral studies of capital budgeting, and manuals. White states that the studies of federal programs have provided a striking advance in the understanding of federal revenue sources. These studies are highlighted by a particular study of the Community

Development Block Grant Program. Capital budgeting and planning, which as categorized by White refers to the use of capital programming as an instrument of growth management, has been the subject of some research by the American Society of Planning Officials (ASPO) which has compiled a literature synthesis in this area. White discusses capital budgeting and financial analysis with respect to methods for the projection of revenues and expenditures relative to the capital budgeting process. He offers no reference for this topic in the literature. In discussing determinants of capital budgeting, White listed two sources, one regarding zoning and the other regarding growth management, which have offered a limited analysis of these determinants. Regarding behaviorial studies, White found little discussion of decision making by municipal officials, offering only his own study of four upstate New York municipalities as reference. White's study showed that, at least in these four cities, the prescriptive literature was ignored. The one area in which White found a sizeable amount of published material was in the category of manuals.

There were approximately 13 manuals or handbooks relating to municipal capital improvement programming written during the 1974-1978 period. The author has been able to identify two additional manuals written since 1978. White's review of the manuals written between 1974 and 1978 indicated that,with one exception, these manuals lacked any realistic consideration

of the political dynamics of the capital programming process. The author has reviewed the abstracts of most of these manuals and has reviewed Vogt (1977), Fajardo (1976), and Rosenberg (1978) in depth. Vogt, Fajardo, and Rosenberg give a broad treatment to the topic which is applicable to most small cities.

White (1978) does not define what he means by the term political dynamics. By this the author assumes that he means that the manuals lack any discussion of the difficult trade offs which must be made in the programming process and which are impacted by political considerations. White praises the Capital Improvement Programming Handbook for Small Cities and Other Governmental Units published by the MFOA [Rosenberg 1978] for due consideration of this and other factors. The author's review of this material indicates that, although it is a well-written normative presentation, it does not provide any substantive discussion of prioritizing the CIP. Vogt (1977) at least mentions the assignment of projects to various categories, whereas the MFOA handbook only discusses the criteria which should be considered during programming. Fajardo (1976) gives a slightly more expansive treatment of prioritization which will be discussed later.

The MFOA handbook and this author are in agreement that the most important step in capital budgeting is the evaluation and programming of capital projects. As indicated in the

preceeding discussion, the evaluation of a project has been given scant treatment in the literature. White's synopsis, however, failed to mention two articles by DeMoville (1977) and Simpson (1976) which provide some insight to project evaluation and prioritization. DeMoville offers a method of prioritization which uses a Delphi technique (an iterative process for achieving consensus). Simpson introduces a priority rating matrix. Both techniques offer promise for practical application and will be examined further in Chapter III.

The conclusions of the author's literature search is that there is adequate presentation of what the steps are in the capital improvement programming process, but not of what the steps should contain. White's research of his defined categories of capital budgeting and planning, capital budgeting and financial analysis, and decision making, which are germane to this thesis, showed little, if any discussion in the literature. The author agrees with White's analysis that additional research is needed in these areas.

The remainder of this chapter will discuss some of the areas which are not covered in the literature and some which are covered, but which must be included as part of this presentation. First, the nature of capital expenditures will be discussed and then the programming process will be addressed. In Chapter III some capital budgeting concepts

used in both the private and public sectors will be reviewed with respect to their applicability to municipal capital programming and decision making.

C. MUNICIPAL CAPITAL EXPENDITURES

At the beginning of this chapter capital expenditures were defined as payments for, or obligations to make payments for, a benefit normally associated with a fixed asset which is either new, increased in value, or extended in its useful life. In the private sector this benefit is normally an income stream caused in some fashion by the capital expenditure. In the public sector this benefit is often a non-monetary and non-quantifiable improvement or service caused in some fashion by the capital expenditure.

In the private sector the replacement of a machine tool might result in more efficient production which would result in profits which would justify the capital expenditure for the machine tool. In the public sector the dedication of dollars to improve municipal parks might provide better recreational facilities which would result in the fulfillment of the perceived desires of the citizens of the city which would justify the capital expenditure for park improvements. In the former example the benefit is measured in dollars of profit and it is easily quantified. In the latter case the benefit is measured by citizen satisfaction and it is nearly impossible to quantify. In the latter case it might even be argued that the benefit should be measured by the contribution

of the improvement in meeting certain city goals regarding beautification. But not all public sector capital expenditures have benefits which are so difficult to quantify. A city might purchase a printing machine which has the benefit of reducing costs to such a degree that the expenditure is justified on the basis of cost reduction alone. There are both similarities and dissimilarities between capital expenditures in the private and public sector.

A CIP and the capital budget may have line items which are not strictly, by definition, capital expenditures. The history of the City of New York and its use of capital budget debt financing to conduct annual operations is a well known example of misuse. On the other hand, the City of Monterey, California included an energy study in its CIP because the expenditure for the study was relatively large for that city and therefore competed for funds with proposals for strictly defined capital expenditures. It is important therefore to arrive at a definition of what expenditures should be subject to capital improvement programming and, if approved, included in the CIP and capital budget.

The MFOA handbook [Rosenberg 1978] provides a practical definition of what qualifies as a capital expenditure for purposes of municipal capital programming. An item qualifies if it is of sufficient dollar size to command special attention from decision makers. The item should also be a non-recurring

expenditure or an expenditure which recurs at intervals of no less than three years. Thus, a very large opearting expense, which was also nonrecurring, would qualify for inclusion in the programming process. For small municipalities Vogt (1977) suggests the use of $5000 as an approximate dollar cut off for rehabilitation, remodeling, or renewal projects.

The exact definition of what outlays should be considered in the capital improvement programming process should be tailored to the individual city. For a small city the following could be an example of expenditures or projects requiring a CIP request:

1. All purchases of new or replacement equipment with a total purchase price greater than $5000. Motor vehicles may be excluded if their individual purchase price is less than $10000. Multiple purchases of automobiles must be included regardless of purchase price.

2. All remodeling, renewal, or rehabilitation of existing facilities with a cost greater than $5000. All such rework of any capital asset which extends the useful life of the asset by more than five years and which costs greater than $2500.

3. Any nonrecurring operating expense which is greater than $5000.

4. All land purchases or construction projects with costs in excess of $5000.

5. Any project involving the leasing or renting of equipment which would, if purchased, exceed a cost of $5000.

6. Any project not funded by current revenues, i.e., any project requiring the use of a debt instrument (loan, bond, etc.).

7. Any project designated by the City Manager or the governing body of the City.

8. The cost of equipment and furnishings for a project involving new public facilities or for a project to remodel existing facilities.

D. THE CAPITAL IMPROVEMENT PROGRAMMING PROCESS

Before commencing a discussion of the municipal capital improvement programming process, it is necessary to first discuss programming as a management control process. As defined earlier, programming is the process of deciding on the nature and size of several programs (projects) that are to be undertaken to achieve an organization's goals. These goals are the result of the strategic planning process. Programming molds the program or project requests of the organization into a budget request which is consistent with the strategic plans of the organization.

1. Programming

Anthony and Herzlinger (1980) provide an overview of the steps in the programming process as they apply to individual projects. These steps are initiation, screening, analysis, decision, and selling. Initiation is simply the origination of the idea for a project. Screening is a step which is performed by a planning staff in which the idea is compared to the organization's goals for consistency with those goals. Analysis of those projects surviving the screening process consists of both a technical and a political

analysis. The technical analysis is an economic analysis of costs and benefits, whereas the political analysis gives consideration to the manner in which the project affects the participants. The next step is decision by top management. The process by which the decision is made is described by Anthony and Herzlinger in very brief terms. It is described as an iterative process in which top management discusses the proposal with the originator and the planning staff and then sends the proposal back for further work and resubmission It is contended by Anthony and Herzlinger that considerable emphasis is placed on the political aspects of the proposal. It is the author's opinion that the foregoing description is more germane to the federal programming process used by the Department of Defense than it is to municipalities. As with the literature concerning municipal capital budgeting, there is little or no description of how decisions are made. Anthony and Herzlinger do not even provide a complete description of the decision making process for an individual project, let alone an accurate description of how decision are or should be made for competing proposals. The final step in the process is the selling of the individual proposals to the legislative body which provides the resources. This effort is performed by top management.

2. The Municipal Programming Process

The process by which an entire municipal CIP is programmed is a much broader process than that just described.

The MFOA handbook [Rosenberg 1978] lists seven steps in the process as follows:

1. Establish the administrative and policy framework for the CIP process.
2. Prepare an inventory of existing facilities.
3. Determine the status of previously approved projects.
4. Perform financial analysis and financial programming.
5. Compile and evaluate project requests by agencies.
6. Adopt the CIP.
7. Implement the CIP.

These steps are in consonance with the purpose of the CIP in meeting the needs of the city to plan the purchase of new and replacement equipment and facilities, to plan fiscal requirements, and to service the requirements of the constituency. This study is most concerned with the steps of project evaluation and programming, however, all of the steps are deserving of discussion from at least two points of view. One is a discussion of what is entailed in the step. The other is an evaluation of the author's assessment of the content.

3. The Framework

The initial step in the process is the establishment of an administrative and policy framework for the capital improvement process. This involves the designation of a centralized coordinator. A member of the planning staff or planning department can be delegated this responsibility. Another alternative offered by the MFOA is the use of a CIP

Committee consisting of key department heads, elected officials, and private citizens. This form might be considered when the city has only a small staff and no planning department. During this step the city should administratively set the criteria which defines a capital improvement project (the author's example is part of the preceeding section) and should determine the capital programming period. The programming period is recommended by consensus within the literature to be five or six years. Both MFOA and Vogt (1977) cite experience as the basis for this determination. As a practical matter, projections beyond this time period are very tentative. Projections up to five years can account for the long term effects of some projects. Also contained in this first step is the need to develop a CIP calendar which outlines the sequence of events in the development of the capital budget.

Nothing that has been thus far proposed for use in the first step in the process presents any real controversy. The MFOA handbook [Rosenberg 1978] does recommend two additional undertakings in the first step which could arouse disagreement among practioners. The first is the recommendation to develop a publicly stated financial policy. This would include such items as the level of taxes, user charges, and debt. If the governing body in the municipality is the city council, it may be difficult to have this group publicly state policy on such sensitive issues. This is not to argue that such a statement

should not be made, for it would contribute some rational limitations to what can be very political process. Being able to convince a city council to do so can, however, be a significant hurdle. The author feels that the public statement of financial policy is not a necessary item in the first step. Rather, rational limitations can be added to the process if the city manager will provide some general written guidance for city employees as part of the initiation of the annual programming process. Such instructions can be explicit or vague depending on the city manager's approach to this topic. Vague guidelines can help to ensure that projects, which may not have been submitted because of strict guidelines, are submitted in accordance with more general guidance. Explicit guidelines can be a reflection of the city manager exercising managerial responsibility concerning policy setting. It is the author's contention that, regardless of the structure of the guidance, it is important to add some objectivity at the start of the process.

The second undertaking recommended by the MFOA which could cause disagreement is the determination of procedures for solicitation of citizen assistance in the CIP process. There are several ways in which the citizens of a municipality can make an input into the process. Vogt (1977) mentions that the governing body might want to hold public hearings to gauge community feelings on which direction the CIP should

take. Vogt also discusses the possibility of a citizen poll prior to the issuance of guidelines. The MFOA handbook [Rosenberg 1978] indicates that a local planning commission could be utilized to gather citizen input or to act as a citizen advisory board on community development. Matson (1976) describes the Sector Planning Program initiated in Fort Worth in 1969 for the purpose of actively involving citizens in decision-making activities related to the planning, development, and protection of the community. In each of the city's 14 sectors approximately 75 citizens work together to develop a list of needs (without financial constraint). The sector plan becomes the foundation for the long range planning for development in each sector. Each department head must be familiar with the Sector plan for each geographic area. Some cities, such as the City of Monterey, California have a General Plan for the overall development of the city. If CIP requests are in consonance with the General Plan and if the citizens have an input to the formulation or modification of the General Plan, then such an arrangement may provide adequate citizen input to the process of setting the policy framework for the CIP. The matter of citizen participation can therefore be approached in a variety of ways. The size of the municipality may be the determining factor in the selection of method.

4. Inventory and Present Status

The second step in the MFOA process is to initiate or review an inventory of existing facilities. This step requires the listing of target dates for the replacement or renewal of facilities. Such a listing provides a convenient cross-check of requirements which should appear in present or future CIP's and presents an overview of the condition of capital facilities operated by the city. With this action underway, the third step can be initiated. This is to determine the status of previously approved projects. Despite the best made plans, there may be some projects previously authorized which, for some reason, never even started. There will often be projects proceeding ahead of schedule and there will almost certainly be those which are behind schedule. Because change and budget execution seem to go hand in glove, it is important to reprogram last year's projects. The review also serves as a measure of effectiveness regarding implementation of the capital budget. Utilizing the preceeding two steps management can assess previous policy decisions and the execution of last year's CIP so as to better deal with this year's programs.

5. Financial Projection

The fourth step in the MFOA process brings to bear the fiscal realities which must be a part of the programming process. Here, the city must project revenues and

expenditures for the upcoming budget year and must determine the manner of financing which shall be utilized. The analysis of the fiscal capabilities of the city is outside the intent of this study. The author found Appendix A of the MFOA handbook [Rosenberg 1978] to be a fully detailed presentation of a method to analyze a city's fiscal capability and the reader is referred to this publication for information in this area.

The manner in which a city finances it's capital projects is important, but is likewise outside the intent of this study with two exceptions. First, the combination of the costs of various sources of financing can be combined to yield a cost of capital for the city. This cost of capital is important to the concept of economic analysis which will be discussed later. Second, in the light of citizen initiatives to reduce their tax burdens, certain types of financing may prove untenable for the city. A recent example was documented regarding the City of Seaside, California [Monterey Peninsula Herald 1980]. The Seaside Redevelopment Agency issued bonds in 1969 to finance an automobile dealership center. The bond retirement was based on tax increment financing. This type of financing uses the incremental taxes gathered from new development to retire bond interest. When California's Proposition 13 passed, property assessments were reduced and the rate of property

tax was frozen. The effect on the Seaside Redevelopment Agency has been that the revenue to pay the interest has been reduced to the point that a deficit of $15,000 is projected for 1982.

In a similar manner the ability of municipalities to finance general obligation bond issues may be lacking. All of this makes pay-as-you-go financing an attractive alternative. Short term notes financed from current revenues have also become attractive because revenues can be somewhat accurately predicted in the short term. State and federal assistance, although often requiring matching funds from the city, is an additional source of funding which should be examined.

6. Project Requests

The essence of the programming process begins with the fifth step: compile and evaluate project requests. As has been noted earlier in this study, much of the literature regarding municipal capital improvement programming has been focused on a steps-in-the-process approach. Much of this literature has been focused on the development and compilation of project requests, while little has explored the evaluation, or more specifically the prioritization, of those requests.

The development of CIP requests is begun in the individual departments of the city organization in consonance with the guidelines (if any) set forth by city management and in accordance with the instructions promulgated by the CIP coordinator. Nearly all of the prescriptive manuals regarding capital improvement programming have a discussion of the CIP request and contain forms for utilization by the reader. The items on a CIP request form are extremely important and should be selected and defined with care. The simply reason for this is that the request forms will contain provisions for entries upon which decisions regarding that project will be made.

Within the literature there appears to the author to be a general concensus regarding the nature of most of the items on any given CIP request form. Minor differences do exist. For example, some forms require department head prioritization of the project, whereas others do not. All forms reviewed by the author require a description and justification of the project and a summary of the costs involved. The substantive differences in the form are found in the instructions which discuss the type and amount of information required.

In general the following represents some of the elements common to CIP request forms:

1. Project title.
2. Location.
3. Description.
4. Justification.
5. Start and complete dates.
6. Annual costs for five fiscal years.
7. Proposed financing.
8. Effect on annual operating costs.
9. Effect on revenues.
10. Effect on other projects.

Items one through three contain the basic information of what the project is and where it will be located or contained. The description may require separate forms to adequately depict land or construction projects. The author's research found that the format for this item varied widely from a broad description left to the user's discretion to a "fill in the blanks" format which left no discretion to the user of the form. Similar diversity is found in the item for justification. Some forms required an outline of the need for the capital improvement, whereas others required a description of benefit. The form presented by Vogt (1977) provides approximately a one-half inch space for all description and justification. This item is used to briefly describe what the project is and why it is needed. The recommendation is to submit additional sheets as necessary.

Item five provides the necessary timing inputs. Item six is a summary of the annual costs for the programming period. Directions on how to develop these cost estimates also varied widely in the literature. Vogt separates the

costs into project elements of planning, land, construction: labor, construction:non-labor, and equipment and furnishings. Vogt's handbook provides some guidance on how to estimate costs and which costs should be included or excluded. Vogt also presents a discussion of how to handle inflation.

The MFOA handbook [Rosenberg 1978] provides no guidance as to how costs should be estimated or, in general, which costs should be included, but does require specific cost entries on the forms for construction or land acquisitions and for equipment purchase or rental. There is no guidance for handling inflation except for instructions to mention the rate used, if any. It is the author's opinion that the summary of annual costs should be supported by adequate documentation and that the requirements for this documentation should be explicit. If costs are to be a consideration in the decision making process, there must be some standardized instructions for their estimation. The author found only superficial treatment of the subject in the literature.

Item seven, proposed financing, is the department head's assessment of the best, the most available, or the necessary source of financing for the project. The entry here should be based on the department head's experience and the guidelines issued at the beginning of the process. This item is more along the line of a suggestion than anything else. Financing arrangements for capital improvements are dependent

on the content of the overall program and must be reviewed on the macro level. A project may be of very high priority, but may be of a slightly lower priority than another project using the same source of funds. If for example, the highest priority project involved a bond issue which brought the city to its realistic debt limit, the other project would be subject to a change in source of financing, if such a change was possible, and to at least a delay, if no other financing was feasible.

Items eight and nine, the effect on operating costs and revenues, represent changes caused by the capital improvement. These changes in costs or revenues can be either increases or decreases. For example, costs may decrease due to reduced personnel costs or reduced maintenance costs. Conversely, annual costs could increase dramatically when a new service is proposed. This new service could bring increased revenues due to user charges. Conversely, the new service could eliminate a source of revenue from another area. These changes involve the same problems as described for the estimating of costs for the programming period. The treatment of these items in the literature varied in an identical manner. The author's point is the same: if these costs and revenue estimates are to be used in the decision-making process they must be as accurate as possible. Given the tendency of project sponsors to occasionally overestimate

benefits and underestimate costs, such estimates should be developed in accordance with standardized instructions or a standardized manual.

The last item on the list is the effect on other projects. This is an important entry on the project form. This entry enables the coordinator and decision makers to tie this project to others and to overcome the problem which occurs when large projects are subdivided into smaller projects. When a project is not independent of other projects, the benefits, costs, and financing of that project must be considered when evaluating those projects which it may affect.

The author's review of CIP request forms found a deficiency in guidance for developing a justification for the projects and for developing and describing cost and revenue estimates. There is little else on the forms which can be related to an evaluation of and a decision regarding the project request. This deficiency is therefore very unfortunate. In no case did the author find a form which requested an analysis of alternatives. The project request merely describes the alternative selected by the department head for the accomplishment of a task or objective which may or may not be adequately described in the justification. It is the author's opinion that a full consideration of alternatives is important in the capital improvement programming process and that such consideration should be presented to the

decision-makers and not left to the discretion of the proponent of the proposal. The present prescription seems to offer the department head the choice of alternatives and a wide latitude in describing and documenting benefits and costs. This leaves much of the decision subject to the department head's ability to sell a proposal and to the purely political aspects of city government.

7. Evaluation, Adoption, and Implementation

The remaining portion of the fifth step of compiling and evaluating project requests is the decision making portion of the programming process. Several major questions arise here, such as, who performs the evaluation, how is the evaluation accomplished, what criteria are utilized to evaluate proposals, and how is ranking and selection achieved? These questions are at the heart of the programming process and are the subject of part of Chapter III.

The last two steps of the process are the adoption and implementation of the CIP. The approval of the CIP by the governing body can vary from a rubber-stamping to a detailed analysis depending on the procedures and quality of results associated with the fifth step. In those cities where the governing body participates in step five in some fashion the approach may be more of a formality than not. In those cities in which the City Manager simply conducts a personal review of department head requests and forwards a

recommendation to the City Council, the approval process may be quite involved. The implementation and monitoring of the approved CIP can be an extremely difficult process involving network models and other sophisticated tools of management science. It is a subject which is deserving of extensive discussion and research. It is a step which must be undertaken in a deliberate manner in order to ensure that the program is executed in accordance with the desires of the approving body and in a manner faithful to the development of the program.

This chapter has presented a discussion of the capital expenditure problem in a municipality. An outline and discussion of the capital improvement programming process has highlighted deficiencies in the development of project requests. The key to the process, decision making regarding proposals, has been shown to have had little attention in the literature. This essential part of the process will be examined next.

III. DECISION MAKING IN THE MUNICIPAL CAPITAL IMPROVEMENT PROGRAMMING PROCESS

This chapter presents a discussion of decision making regarding a municipal CIP. Because the CIP request is usually subject to decision making by the department heads, the City Manager, a committee, and the governing body of a municipality, Chapter III begins with a general discussion of decision making. Because the decision making in a municipality is conducted in a political environment, this environment and its effect on the rational model of decision making will also be discussed. Additionally, the types of models which can be applied to the programming process will also be presented.

Following the discussion of decision making this chapter will describe assorted evaluation and selection techniques which can be applied to the municipal process. In this regard, capital budgeting financial concepts, which are familiar to the private sector, will be reviewed for applicability to the municipal environment. Next, the broader topic of economic analysis will be studied. Within this topic the subjects of cost-benefit comparison, the social rate of discount, and inflation will be highlighted. Finally, techniques for decision making regarding complex decisions with multiple objectives will be analyzed.

A. DECISION MAKING

When one discusses decision making the question as to what type of decision making model is being presented often arises. Models (which are a representation or abstraction of reality) are broadly classified as being either normative or descriptive. Turban and Meredith (1977) define a normative (prescriptive) model as one which prescribes the course of action that a decision maker should take. Such models must necessarily possess a decision criterion for selecting the best alternative. A descriptive model, on the other hand, is defined as one which tells how a decision is made, not how to make the decision. Descriptive models state how it has been done, not how it should be done.

1. Models and Types of Decisions

Normative and descriptive models of decision making are applicable to two types of decisions. These types were first described by Simon (1970) as being either programmed or non-programmed decisions. A programmed decision is one which is a routine and repetitive decision for which an organization can develop specific procedures to effect a decision. A non-programmed decision is one which is novel and unstructured. This type of decision does not lend itself to standarized procedures to effect a decision.

2. The Rational Approach

There are several approaches to decision making which are dependent on the type of decision, either programmed

or unprogrammed, which must be made. These approaches are broadly categorized as rational (or economic), bureaucratic (or organizational) and political. Gordon (1978) discusses the quest for rationality in decision making and the make up of the rational model. This model of decision making is an approach most directly associated with normative models for programmed decisions. In the rational model Gordon asserts that decisions are made strictly on their merits, that objectives are well-defined, that a rigorous analysis of how each alternative relates to the desired objectives is undertaken, that a careful cost-benefit analysis is performed, that a comprehensive assessment of all possible outcomes is completed, and that the overall objective is the maximization of benefits as compared to resources utilized. This is in consonance with the description by Taylor (1970) of economic man, who has a complete knowledge of all alternatives and their consequences and who maximizes benefit.

3. The Bureaucratic Approach

In contrast to economic man, administrative man is limited by the principle of bounded rationality and by the processes of the organization. Taylor describes the principle of bounded rationality (originally proposed by H. A. Simon) as a restricting factor caused by the limitations of the human mind in meeting the requirements of rationality. It is not possible to know all consequences for various

alternatives and the range of alternatives which are even conceived may be but a fraction of those possible. Administrative man must also work within an organization which often has prescribed routines which affect not only the decision itself, but also the information gathered in the search for alternatives and the number of alternatives that may be considered. Thus, administrative man is limited in his rationality.

From these two concepts comes the bureaucratic model of decision-making. Lindblom (1959) describes the model in the following manner. The decision maker sets forth one principle objective which may be modified by a few stated values. Only a few alternatives are compared and these are only marginally different from current programs. Conflicting objectives are worked out by compromise in a sequential manner. There is some analysis of alternatives, but it is limited so as to exclude complexity (keep it simple). Decisions are compared to past successful decisions for conformity. This bureaucratic model is most closely associated with programmed decisions and lends itself to descriptive analysis.

4. The Political Approach

Another approach to decision making is the political model. This approach differs from the preceeding two approaches in the type of motivating influence on the decision

maker. In the rational model the emphasis is on best accomplishing clearly stated objectives. In the bureaucratic model the influence is maintaining the integrity of subunits within the organization. In the political model the motivator is power. The behavioral aspects of a power and position oriented model were first theorized by Cyert and March (1963).

In A Behavioral Theory of the Firm Cyert and March set out to develop a general theory of economic decision making in the firm. The normative theory at the time (1963) encompassed the rational approach with maximization of profit. Cyert and March engaged in a descriptive analysis which showed elements of the bureaucratic model and the beginnings of a political model. They found that organizations considered only a limited number of alternatives because the set of alternatives were dependent on organizational structure and the locus of search responsibility. They found that standard operating procedures determined the range of alternatives considered.

The objectives against which alternatives were compared were observed to be the result of a bargaining process among individuals with sufficient power and influence within the organization to effect the development of objectives. There was quasi-resolution of conflict and avoidance of uncertainty. The choice rule in the selection of an alternative

was that the alternative met all of the demands of the power coalition. Thus Cyert and March developed a bureaucratic/ political description of a private sector organization, the business firm.

If the political model was applicable to a business firm, there should be some implications for the public sector. Cyert and March indicated that the concepts needed for a theory of decision making by political organizations are not strikingly different from those needed in dealing with the firm. They further theorized that it is the differences in the character of their relations with control groups (such as governing bodies) and the nature of their standard procedures that should lead to differences in how decisions are made by business and non-business organizations.

A political model of decision making in the public sector is offered by Allison (1969) in his discussion of conceptual decision models. This work reviews the Cuban Missle Crisis of 1962 in the light of the three approaches to decision making. Allison's political model postulates that the decisions of governments result from compromise, coalition, competition, and confusion among government officials who see different faces of an issue and that the decisions are political in the sense that activity from which decisions emerge is best characterized as bargaining. This seems to echo the sentiment of Cyert and March (1963) that

the participants in the process are pushed and pulled by their own predilections and by the forces within their own organizations. The outcome is a trade-off among many forces.

Gordon (1978) discusses the differences between political and economic rationalities. He asserts, however, that even those decisions cast in the most objective economic quantitative criteria have a political nature. What benefits one will often work to the disadvantage of another. Because politics and the trade-offs which are part of its essence are by design woven into the fabric of governments, Gordon asserts that basing decisions on political factors is as valid as basing them on other grounds and that political rationality (the political model) is as defensible as economic rationality (the rational model).

5. Implications for the Budgeting Process

The preceeding three approaches to decision making have implications in the budget process. The models of Allison (1969) were reviewed by McNallen, et al. (1973) for such implications. The characteristics of a decision maker using the rational approach to budgetary decisions are paraphrased from McNallen, et al. as follows:

1. What is the problem?
2. What are the organization's objectives?
3. What is the desired output?
4. What are the alternatives?
5. What are the benefits and costs?
6. Which is the alternative that produces the desired benefit at the least cost? Or which is the alternative that provides the most benefit at a pre-determined cost?

The characteristics of the decision maker using the bureaucratic approach to budgetary decisions are paraphrased as follows:

1. What programs are current?
2. What was budgeted last year?
3. what was not funded last year and why?
4. What changes have occurred over the last year which will affect this year's budget request?
5. What possible new programs have top management support?
6. What is the absolute minimum budget needed to maintain each activity of the department?
7. Based on the above, what should be requested?
8. Based on the above, how can the request best be justified and prioritized?

The characteristics of the decision maker using the political approach to budgetary decisions are pharaphrased as follows:

1. Which programs funded last year are viewed favorably by top management and which are not?
2. Which programs support or are supported by the high priority projects of other departments?
3. What can be done to strengthen the position of needed, yet in the view of management less worthwhile, programs?
4. Which programs will receive the full amount requested for them by virtue of their popular support?
5. Based on the above, what should be requested?
6. Based on the above, how can the request best be justified and prioritized. What strategies, alliances, and pressures can be brought to bear on the process?

6. Implications for the Programming Process

The foregoing approaches to decision making and the analysis of these models by McNallen, et al. have implications for the capital improvement programming process in the municipality. As previously described there are a number of individuals and groups involved in the decision making process.

Those involved universally include the department heads, the City Manager, and the governing body. Depending on state law and on the particular process adopted by a city the following groups may also be involved: the planning commission, a citizens' committee, a CIP committee of various city officials. As discussed below, it is the author's opinion that it is the size of a city's population which is the major determinant of the make-up of a decision model.

The mayor of a large city sits atop a large bureaucratic organization which is controlled by a number of leaders who participate in the bargaining germane to politics. The mayor is not a unitary decision maker. A main management control process in the city, the municipal budget, is subject to the political pull of their constituents. The amount of political pressure on each councilman is dependent on whether he or she represents a geographic area or the city at large, with the latter councilman being less susceptible to extremely local pressures. It is the author's opinion that large cities are more likely than small cities to have entrenched bureaucracies which have been described as: "a conglomerate of semi-feudal, loosely allied organizations each with a substantial life of its own" [Allison 1969]. Small cities do not have sufficient numbers of people employed by the city to meet this definition. Small cities are, therefore, less likely to conduct themselves to any great extent in accordance with the bureaucratic model.

Small cities which are governed by a mayor/city council, by definition, do not have a unitary decision maker acting in accordance with the rational model. But municipal decision making can not all be attributed to the comprimise, coalition, competition, and bargaining associated with the political model. As discussed below, it is the author's judgment that the municipal decision making model is, for the most part, a political rational model.

As compared to large cities, small municipalities are ordinarily more politically cohesive due to the similarity (or less divergence) of lifestyle, the uniformity of environment, and the overall homogeneity of the population. Certainly, there is divergence in a small city. The point here is made with respect to the degree of divergence. This relative cohesiveness removes a great deal of fundamental disagreement which marks the rational political environment from the political environment of a small city. The city council, therefore, may exhibit behavior which can be more closely associated with the rational model than the political model. This is not to suggest that the political model is rejected at the small city level. It is still an important force in the decision making model.

7. Implications for the City Manager

The decisions of a City Manager can to a great extent reflect decisions made in the rational mode. Nonetheless, decisions made by city managers in the programming process must by tempered by both organizational and political considerations. Since the City Manager is a city employee ostensibly not a part of the political process, he or she is somewhat more free than council members to publicly (or at least in writing) state objectives. It is the public enunciation of objectives which is the keystone of the rational model. However, the City Manager's decision must demonstrate, in accordance with commonly accepted management practice, support for the goals and objectives of the various city departments. The City Manager must show support for each department or risk an alienation from these individual departments.

The City Manager must also remember the politics. After all, the City Manager is normally hired and fired by the City Council. In this light and in consideration of the fact that political rationality can not be ignored as a significant part of the decision making process, the City manager must translate the decisions of the council into the fabric of city management. The City Manager, therefore, must mold budgetary decisions in accordance with the principals of the political and rational models tempered by some bureaucratic considerations.

8. Implications for the Department Heads

The Department Heads have the greatest opportunity of all the players in the programming process to conduct themselves in accordance with the rational model. This is mitigated by their need to support their department in the bureaucratic mode. However, it is the author's judgment that both the City Manager and the department heads, are not so strongly affected by organizational pressures to justify a statement indicating that they operate in a bureaucratic mode. There is a little of this model present in their decision making, but not so much as to make it an important force. As stated earlier, this may not be the case in the large city.

Within the capital improvement programming process, it is the department heads who can be the standard bearers of economic rationality. This is not to say that they are. The author believes that the political model is more applicable in describing how department heads actually function. The rational model requires a contrasting of costs and benefits among competing alternatives. As will be discussed later, a strict cost benefit analysis requires a comparison of different alternatives to accomplish a single objective. In the author's review of the literature, alternative analysis was found to be a weak point in the process.

During the programming process the department heads submit a number of requests to accomplish different generalized

objectives. For example, the library department may submit a request for both a computer and a facility improvement. Both requests relate to improved service, a potential objective. But neither request discusses the alternative methods to achieve the intermediate objectives of both requests. If the request for a computer was to prevent loss due to theft, what other ways, perhaps less costly and exotic, could be employed to solve this problem? It is this type of improvement which should be subjected to alternative analysis and to careful scrutiny in the programming process.

9. Implications for the Review Committee

The remaining participants in the capital improvement programming process are the committee which review the CIP prior to submission to the governing body. It should be noted that these committees may pass on the CIP either prior to or after the City Manager depending on the process adopted by the city. It is the author's belief that any such committee will normally operate within the political model using a facade of rationality as much as possible. The possible combinations of members on a committee place a full analysis of their behavior outside the scope of this study. However, the author feels that it is fair to assume that the nature of a citizen's committee, a committee of elected officials, or a combination thereof will display political model behavior. A committee of department heads is assumed to exhibit behavior

in accordance with the bureaucratic model. In any case, if a committee reviews the CIP prior to the City Manager, the ability of the City Manager to inject economic rationality into the process will be severely limited.

The preceeding discussion has presented an overview of decision making and a descriptive analysis of the models of decision making as they are found in small cities. Before proceeding to a prescription for capital improvement programming in a small city, it is important to examine the techniques available for evaluating capital improvement project requests.

B. CAPITAL BUDGETING EVALUATION TECHNIQUES

Management decision making and evaluation techniques are viewed quantitatively by management scientists. The field of management science is associated with the programmed decision making which is common to a budgeting process. It can be used in either normative or descriptive analysis. Economic analysis, cost-benefit analysis, decision matrices, decision trees, utility analysis, and mathematical programming models are tools which are brought to bear on allocation problems such as programming a budget. There are severe limitations involved with these models which can restrict or eliminate the usefulness of these tools within a municipality. Nonetheless, some of the tools have application and will be discussed here.

1. Economic Analysis

If economic rationality is to be involved in any part of the decision making process for the CIP, then alternative analysis becomes an essential part of that process. When alternative methods of meeting a single objective are examined, that process is termed economic analysis. As defined in the U.S. Department of Defense Economic Analysis Handbook (n.d.), economic analysis is a conceptual framework for investigating problems of choice. True to the logic of a rational model, economic analysis is a step process related to an objective which utilizes a comparison of costs and benefits to rank and ultimately select an alternative.

The author refers the reader to an extensive discussion of economic analysis in the aforementioned handbook from which the following discussion is drawn and the following quotation extracted:

> Most of the tools and techniques comprising and supporting Economic Analysis are relatively simple--they are not sophisticated, esoteric, or far out--and they can be used by people with general as opposed to technical backgrounds and experience.

In economic analysis the first step is the formation of an objective. This is closely related to the definition of a problem which signifies the beginning of problem-solving. Objectives are broad and relate to a goal or mission. Buying a new printing machine is an alternative to the problem of

producing a poorly printed product. The objective might be to produce a product which is acceptable to the users in a timely fashion which meet the user's needs.

Once an objective is set by the manager, or once the manager has been given an objective to meet by higher authority, the next step in economic analysis is to define a number of alternatives. There may be constraints in dollars, authority, etc.which limit the number of alternatives. In the case of the printer some other alternatives are: accepting the present product and doing nothing, leasing a new printer, or contracting out.

The assumptionsof analysis follow next. Assumptions must be made regarding the economic life of each alternative and the period over which the alternative will be compared. Sometimes, in order to simplify the analysis it must be assumed that the alternatives are equally acceptable in meeting the objective. This is a rather broad assumption which may be required in the municipal programming process. This assumption will be treated in the discussion of the next step, setting the decision criterion.

The decision criterion is normally a prescribed relationship between cost and effectiveness (or benefits). There are three such criteria: minimum cost for fixed effectiveness, maximum effectiveness for a fixed cost, and the highest ratio of effectiveness to cost. The third criterion assumes that

the effectiveness is greater than some prescribed measure and the cost is less than a prescribed ceiling. The decision maker can make his analysis easier if he specifies either of the first two criteria. The third criterion is harder to handle and, because it is a ratio, tends to neutralize the size of the expenditure and the effectiveness measures. In the example of the printer the department head might specify a productivity (effectiveness) capability which is desired and a quality minimum which must be achieved. The first criterion of minimum cost for fixed effectiveness would apply.

The next step in the economic analysis process is to determine costs and effectiveness. Effectiveness or benefits often are impossible to quantify. Some are quantifiable, but only if the decision maker can afford to spend a great amount of time, effort, and money. It is here where the management practioner and the management scientist must reach compromise. At the federal government level or at the level of the very large corporation, it may be feasible to fully analyze and measure most benefits. It is the author's opinion that this is often not feasible at the small city level. Utiles of social value are too difficult to handle at this level. It is assumed in this thesis that the City Manager and the council would simply refuse to deal with such measures. The economic analyst therefore must use such measures as can be found conveniently. Such measures include productivity,

production, operating efficiency, reliability, accuracy, availability, service life, quality, and others. When such measures do not apply and benefits can not be measured, it may be appropriate to set an accept/reject criteria.

A measure of effectiveness must measure the extent to which an alternative meets an objective [Quade 1975]. Suppose in the case of a small city that the City Manager has tasked the Public Works Director to submit some capital improvement requests which should meet the objective of sustaining the tourism in the area. Certainly this is a legitimate objective. But how can the effectiveness or benefits be evaluated. Small cities do not have the staff or the dollars to perform an adequate analysis of the impact of each alternative. The only real recourse is expert judgment. That can and should be left to the ranking part of the programming process. In this case, the department head should submit a number of alternatives which have been fully costed. Those who select the projects might allocate a dollar figure to devote to the objective and then later pick which particular alternative might best accomplish the objective.

The estimation of benefits is accompanied by an estimation of the costs of each alternative. Careful attention must be paid here to ensure that only relevant costs are included. This means that sunk costs, those costs which have

already occurred or which will occur in the future regardless of the decision maker's action, should not be included in the analysis. Costs that should be included are R&D costs (normally the cost of a future study; the cost of a previous study is sunk), investment costs such as acquisition and startup costs, operating costs for maintenance and personnel among other things, and opportunity costs. Opportunity costs are those incurred when one alternative makes use of an item which one of the other alternatives does not. For example, the space used by a printer might have been used to house some storage items. If the organization must pay for that storage in any other way, the costs of that storage are relative to the analysis.

The method for obtaining cost estimates is a matter of choice and the amount of time and money available for that purpose. Parametric costing (costing with respect to described physical and performance criteria by use of a math model) is not practically applicable to a small city. Industrial engineering estimates (using the sum of the estimates from various cost components) are more easily made. For the small city the normal techniques will be the utilization of a number of contractor or vendor estimates, catalog pricing, and very often, subjective estimates based on experience.

There is one cost which should not be included in the analysis of annual costs. This is the interest expense

associated with any anticipated debt financing of the investment. Bierman and Smidt (1971) point out that these costs are taken into account by present value procedures. To include the interest costs would therefore result in the double counting of that expense.

The overall treatment of costs must utilize a net economic viewpoint. In the public sector cost savings are an important part of the analysis and are utilized in the same fashion as cash inflow in the private sector. The net economic effect of a project in any one year is therefore the revenue (if any) plus cost savings minus any outflows and opportunity costs.

The inflows in the economic analysis are the anticipated annual cash receipts from the project, the cost savings resulting from the difference in costs between the present and the proposed alternative, and the terminal or salvage value of the project. The analyst must take care in estimating cost savings. It may not be appropriate to assume that the present alternative will have constant recurring costs. If the present alternative is continued in service there may be incremental cost increases due to the extension of economic life. The cost savings of the proposed alternative may be increased by this factor.

The terminal value may not be realized until ten or more years in the future. Nonetheless, this value should be considered as an inflow when it is anticipated to occur. If, for example, the printer was anticipated to have a salvage value of one thousand dollars, that amount would be considered as an inflow at the end of the economic life. The manner in which all of the above costs are brought into the analysis is part of the next step in economic analysis: comparing and ranking alternatives.

2. Comparing Alternatives in Economic Analysis

The following discussion regarding the comparing and ranking of alternatives starts with the evaluation of the alternatives. The methods utilized in this discussion are drawn from the author's reading of Helfert (1977), Hunt (1969), Pardee, et al. (1969), and Bierman and Smidt (1971). There are several rough measures of investment worth which should be mentioned first so that they may be dismissed from the public sector analysis. The first of these is payback. Payback is simply the time in years in which the amount of the investment is returned in annual monetary benefit (revenues and cost savings). This method is partially rejected for use in analysis because it does not consider the timing or magnitude of the inflows after payback. It is also partially rejected because public sector investments are most often made not to return

dollars, but to return a non-quantifiable benefit. It is partially acceptable because it can be used to rank the alternatives considered when making a routine periodic replacement of a capital item.

The second of these methods is simple return on investment (ROI). The calculation of dividing the average annual monetary benefit by the net investment is the mathematical inverse of the payback formula. If two alternatives have the same economic life and a similar flow of benefits, this measure can provide a ranking between the two. Yet, this method suffers from the same drawback as the payback method. It is also insensitive to the amount of the investment if the amount of benefit increases in proportion to increases in the investment.

The third method involves the use of the present value technique. This technique is adequately explained in the literature of basic business finance and management accounting. The author will not discuss the mechanics of this method here except to note that inflows and outflows in the future are less valuable than the same amounts at the present time and that, to provide equitable treatment, they must be related to the present by some discount rate. The internal rate of return (IRR) method utilizes the present value technique. It relates the present value of the outflows to the present value of inflows. If flows are unequal, trial and error must

be used to solve for the IRR. A major assumption in this method is that all intermediate cash inflows are reinvested at the IRR. This assumption makes the use of this method untenable in the public sector. In addition this method has the same difficulty with the amount of the investment as do paybacks and ROI.

The remaining methods of evaluation are in the author's opinion more applicable for use in the public sector. These are net present value, present value index, benefit cost ratio, and annualized equivalent value. The net present value technique is employed by taking the present value of all costs as negative values and all inflows as positive values. The discount rate (discussed later) is selected by management. The present values are added to produce a positive or negative present value. Any amounts greater than zero represent the excess value earned over the standard discount rate. In the private sector negative values normally mean that the project fails to meet investment return requirements. In the public sector negative values mean only that the project is not making a monetary return vis-a-vis the discount rate. This does not necessarily eliminate a project, because monetary returns are not always available. Even with negative values alternatives can still be compared. The advantage accruing to the analyst is that the timing and magnitude of inflows and

outflows are being considered. The economic life of the alternatives and the salvage value are brought into the analysis. There is, however, the same disadvantage concerning the relative amount of the investment and, by itself, NPV should be used for investments of like magnitude. This difficulty, which arises when different size investments produce different inflows, can be alleviated somewhat by use of the present value index.

The present value index (also known as the profitability index) is the ratio of the present value of operating inflows (these are the net economic monetary benefits) to the present value of the net investment. The ratio of one to one is the cutoff point for acceptability in the private sector. The index helps to reduce the effect of the size of the investment given identical inflows. A larger investment which produces the same inflow as a smaller investment will be ranked lower than the smaller investment if this index is used. However, this provides only a common sense ranking. Why spend more for the same inflow? For ranking alternatives with different investments and inflows the ranking may prove incorrect if the index is used. The relative scale of the investment to net inflows can mathmatically alter the results. Bierman and Smidt do not recommend the use of the index because when the index is greater than one the investment is desirable and the accept/reject decision will be identical

to that derived by NPV analysis. This recommendation relies on the assumption of an unlimited source of capital when the scale of the investment is not a factor in the analysis and when all projects with a positive NPV are accepted. If there is a limit on available capital the size of the investment is still a factor whose impace remains unsettled.

Another ratio used in evaluation is the benefit cost ratio (BCR). This ratio relates the present value of inflows to the present value of outflows. It is mathmatically identical to the present value index. The difference is simply a difference in technique of computation. It must be emphasized that this ratio is an economic ratio. It is not benefits versus costs in the sense that non-quantifiable benefits or measures of effectiveness are related to costs.

Another method often used is the annualized equivalent value (AEV). Here, the NPV is divided by the cumulative present value factor for the entire economic life. This calculation averages the NPV on a yearly basis. It can result in the modification of the ranking of alternatives that are derived using the NPV ranking. It is utilized for examining alternatives which have different economic lives.

3. Net Present Value in the Public Sector

With the various methods of evaluating alternatives having been examined, the question remains as to which methods

should be used. In the private sector the NPV method has been recommended by all texts reviewed by this author. The rationale is that the time value of money must be considered in the analysis and that, more than any other method, NPV provides the correct ranking of alternatives. It must be remembered that in economic analysis the purpose is to select an alternative to meet a single objective. There will be a finite set of alternatives and the manager should have a fair idea of the capital constraints. With this constraint in mind the manager should be able to judgementally eliminate those alternatives whose scale of investment is too large. The manager therefore would neutralize the major drawback of the NPV methods.

In the public sector the evaluation and ranking is complicated by the lack of the profit motive. The ranking of alternatives must often be done by preference versus cost. Occasionally, the analyst is faced with pure economic benefits and costs (such as in the previously discussed printer situation). Here, the NPV method can be used for ranking and selecting. In the case where there is an accept/reject criterion above which the decision maker has no preference, then the ranking and selection can be done by NPV. This method can also be used when the decision criterion is minimum cost for fixed effectiveness (essentially an accept/reject criterion). In the case of maximum effectiveness for fixed

cost, the fixed cost must be in present value costs or on an annualized annuity basis and the effectiveness should be measurable. When the decision criterion is maximum effectiveness or benefit for cost, then the situation becomes more complex.

This is the point where the terminology in the literature becomes intertwined. At this point the analyst is engaged in a comparison of effectiveness or benefits versus economic costs or benefits in an attempt to rank alternative ways of meeting a single objective (economic analysis). This is not cost-benefit analysis as it is formally defined. "C/B analysis" is used for a broader treatment of selecting which programs or projects will be undertaken in the first place. The terminology is further duplicated if a BCR is used to derive the economic benefits and costs. For this reason, the author recommends "netting out" all economic benefits and costs into one NPV figure and then, if necessary, trading off those against non-economic benefits or effectiveness.

The comparison of non-economic benefits or effectiveness versus net economic benefits or, more normally, economic costs can be done by computing a comparison ratio or by graphical analysis (which is a physical display of the ratio). As long as the goal is a maximization of measurable non-economic benefits versus economic benefits or costs then the decision maker can choose. The situation is, however,

further complicated when benefits are not measurable. Here, the decision must be handled by another means.

In the case of the department head preparing the project request, all but a few of the alternatives should be eliminated via the previous techniques and managerial judgment. Some alternatives will simply be too costly. Others will obviously not provide the necessary benefit or effectiveness. The department head would, therefore, submit a small number of alternatives (preferably two or three) for accomplishing an objective. He or she should include an analysis of both the quantifiable and non-quantifiable aspects of the alternatives. In this case, the selection of an alternative enters the realm of political rationality and complex decision making. It is the author's opinion that, in the small city, it is best to construct a procedure which safeguards economic rationality at the department head level. In the case of multiple alternatives which must trade off non-economic benefits versus economic benefits and costs in an environment in which an accept/reject criterion does not exist or is not acceptable itself, the department head should submit the alternatives for consideration at the next level of decision making. It is also the author's opinion that this case will be the exception rather than the rule.

4. Uncertainty and Selection

The foregoing discussion has brought the presentation of economic analysis to its final steps. Thus far, the following steps have been discussed:

1. formulate a single objective
2. define alternatives
3. specify assumptions
4. set the decision criterion
5. determine non-economic benefits or effectiveness and economic benefits or costs
6. compare and rank alternatives

The final two steps are:

7. perform an uncertainty analysis
8. select the alternative

Uncertainty analysis is a method of checking the ranking of alternatives. The analyst must understand that estimates may be affected by his or her own biases and by judgments made concerning the certainty of the future. The analyst should review the impact of a change in the decision criterion. For example, does the ranking change if the productivity requirement is raised or lowered. This is contingency analysis. The analyst should also review the estimates of economic benefit or cost and determine if the ranking would change if these elements changed. This is known as sensitivity analysis.

The selection of an alternative follows the uncertainty analysis. If contingency and sensitivity analysis result in no change, an alternative is selected by the ranking.

If the analysis does change the ranking, it might be best, in the municipal case, to select two alternatives for submission.

5. Inflation

Before leaving the topic of economic analysis, there are two subjects which must be addressed. These are inflation and the discount rate. Inflation is a lot tougher question than just how it should be technically placed into the analysis. The question is should it be placed into the analysis. There are a number of arguments. The first is that, if the decision maker ignores inflation, he or she is probably overestimating real economic benefits and underestimating real economic costs (with "real" relating to the purchasing power of a dollar). But, second, is the argument that, if governmental entities start utilizing inflation in economic analysis, then that entity is institutionalizing inflation and contributing to inflationary psychology. The implication is that this is wrong. A local official might argue that a local government should act like an intelligent consumer, use inflation in its estimates, and leave the cure for inflation at the federal level. Another local official might argue that this is not intelligent behavior for a local government. In fact it might be argued that such behavior is socially irresponsible. It is the author's opinion that market forces are inadequate to stop inflation and that government fiscal policy must be used to curtail it. This is, of course, a federal responsibility.

But, fiscal constraints do not necessarily affect local city governments in the same fashion as local constituents and business. The city government often finds its revenues which finance operations and improvements buoyed by inflation. It is therefore the author's opinion that local government should not use inflation in its analysis of economic benefits and costs.

6. The Rate of Discount

The other topic to be discussed is the rate of discount to be utilized in present value analysis in the public sector. The importance of this discount rate is highlighted by the following quotation from Baumol (1969):

> At stake in the choice of an acceptable discount rate is no less than the allocation of resources between the private and public sector.

Lower discount rates enhance the relative value of inflows in the later years of a project (by not reducing their present value as much) and detract from the relative impact of costs in the later years. In local government, where cost is normally the economic factor, the costs in the future are not reduced sufficiently by a relatively low discount rate (if there are no economically quantifiable benefits and costs are used with a positive sign convention). The higher net present value will favor those projects which have shorter economic lives. The converse is true of relatively higher rates of discount. The objective is to use a correct rate of discount.

The choice of the "correct" rate of discount depends on how one views the position of local government in the economy. Musgrave (1976) sees the local government as being a part of a regional economy and affected by the rate at which it can borrow money. He therefore recommends using the rate at which the local government can borrow as the discount rate. The authors of Evaluating Public Expenditures [Freeman, et al. 1978] view the local government as a user of a variety of sources of funds and state that the discount rate should reflect the average costs of all public funds, whether acquired by borrowing or taxing. The authors further state that it is quite difficult to determine a community's exact discount rate and recommend using the same rate as the federal government. Baumol (1969) views the local government as using resources from particular sectors of the economy and recommends the use of a weighted average of the pre-tax rates of return in the various productive sectors from which resources would be withdrawn for the particular project under consideration. DeMoville (1977) viewing local government as an entity which maximizes social benefits states that the discount rate should be equal to the cost of capital in the private sector on a pre-tax basis. DeMoville further states that it may be appropriate to lower the discount rate a bit to give preference to the benefits which will accrue to the next generation from this generation's long-lived projects.

The author finds a middle ground. A government uses funds taken from the private sector that otherwise could have been used for investment. These funds would be available to the private sector for certain costs through the use of various debt and equity instruments. Such costs are used to develop a cost of capital and have certain risk premiums built into them. Bierman and Smidt (1971) devote much of their cost of capital discussion to the topic of risk and propose a risk premium approach to setting a cost of capital. These authors recommend removing the risk premium to derive the public sector discount rate. Baumol (1969) sees all investment as being riskless in the aggregate and recommends no reduction for risk at all. This author recommends that the public sector discount rate be somewhat less than the weighted cost of capital in the private sector to account for the unneeded risk premium that does not now have to be borne by the private sector. Furthermore, this author recommends that the rate be modified to a pre-tax basis because of the fact that the government is not taxed. The question which remains is: What is the numerical value of the appropriate discount rate?

In 1969 Jacob A. Stockfisch of the Institute for Defense Analyses developed a federal government discount rate using a weighted average of rates of return on business investment, that is, earnings before taxes and interest divided by earning assets such as receivables, inventory, net plant and

equipment, and land. The weights were derived on the amount of investment made by the corporate and non-corporate sections of the private sector. He found the rate to be 12.4 per cent. He compensated for inflation by using the Personal Consumption Expenditure Deflator to show a true non-inflated rate of return of 10.4 per cent. Three years later the federal government issued OMB Circular A-94 which set its discount rate at 10 per cent.

Stamper (1977) updated Stockfisch's work. He arrived at the same rate of 12 per cent for a pre-tax rate of return, but did not know what deflator to use for inflation. It is the author's opinion that the inflation of the past is not an issue. It is similar to a sunk cost. It has occured and nothing can be done about it. Stamper's figures show that a 1975 discount rate should have been deflated to 5.1 per cent, a figure which was clearly unusable in 1975. The problem here is that the discount rate should not be based on rates of return which are themselves based on past inflation or on the book entries involved with earning assets, but rather, it should be based on today's cost of capital which applies to society's estimate of the worth of today's investments.

Another estimate of the cost of capital was made in 1977. DeMoville (1977) used a random sample of stocks and bonds listed by Standard and Poors to derive an after-tax

cost of capital of 10.78 per cent. Using a 48 per cent tax rate, this represented a pre-tax cost of capital of 20.72 per cent. DeMoville adjusts this downward to 16 per cent to provide preference for long term investments.

In late 1980 the author discussed discount rates with the chief financial executive of a Fortune 500 manufacturing firm. The executive indicated that the present cost of capital used as a discount rate by his firm was 15 per cent and that this rate was under review with an eye towards increasing the rate. This figure and the proposed increase showed the effects of anticipated inflation in factors germane to his industry. The executive estimated his inflation premium at 3 per cent leaving a 12 per cent cost of capital if constant dollars were expected. Given an approximate two per cent risk premium built into this cost of capital, the after-tax government cost of capital would be 10 per cent. At today's tax rate of 46 per cent this translates to a pre-tax cost of capital of 18.5 per cent. It can be assumed that less well-established firms would have a higher cost of capital and would therefore raise the 18.5 per cent figure on the national average. This new average could be reduced slightly to give preference to long term investments. The author therefore offers a discount rate of 18 per cent as an appropriate figure for municipal use. This rate, although far from rigorously

developed, reflects the increase in capital costs since 1977 when DeMoville made his estimate of approximately 16 per cent (reduced from 21 per cent) and the overall increase in capital costs since Stockfisch made his 12 per cent estimate in 1969.

C. DECISION MAKING WITH MULTIPLE OBJECTIVES

The economic analysis performed by the municipal department heads results in the selection of an alternative to meet a single departmental or city objective. This alternative is submitted as a project request and is entered into the review phase of the capital improvement programming process. The requests are reviewed and summarized by the CIP coordinator. These are then ranked in order of priority. This ranking is performed by the City Manager, the planning staff in lieu of or for the City Manager, or the review committee depending upon the nature of local programming process.

Prioritizing and ranking the project requests involves the review of many alternative ways to meet the multiple objectives of city government. This type of task is a complex undertaking in the business community. It is an even more complex task in the public sector because of the injection of political rationality into the process. This section will discuss methods to deal with this complex task of prioritizing and ranking the project requests of a CIP.

1. C/B Analysis

One method for guiding choice between projects designed to accomplish widely differing objectives is to measure the benefits and costs in the same units in all programs, so that the difference between the benefits and the costs could be calculated for each program and compared with the corresponding difference for other possible actions [Quade 1975]. This method is known as C/B analysis.

There are a variety of viewpoints regarding C/B analysis. To emphasize this point authors quote Prest and Turvey (1965):

> One can view cost-benefit analysis as anything from an infallible means of reaching the new Utopia to a waste of recources in attempting to measure the unmeasurable.

Given the financial and staff recources of a local government, it is likely that the latter view is more closely held by city management.

C/B analysis requires that all economic and non-economic benefits to be measured and related to a single objective--economic efficiency [Maass 1966]. Furthermore, it requires that indirect consequences be included. Because complex projects will usually produce costs and benefits for many interests both internal and external to the entity, the analyst must identify the interests of every party and perform a C/B analysis from each viewpoint [Easton 1973]. The result

is a complex analysis of costs which can involve shadow prices, unemployment, market constraints, and distributional effects relating to the maximization of social welfare. Benefits can range from the alleviation of poverty to the provision of esthetic enjoyment. Wildavsky (1966) succinctly summarized the problem: "The further one pursues this analysis, the more impassable the thicket."

C/B analysis should not be dismissed immediately, however. Decision makers can not afford to ignore the quantifiable aspect of C/B analysis. And the benefit to cost comparisons of economic analysis, a subset of C/B analysis, can be used to great advantage when looking at single objectives. Fajardo (1976) proposes that every project in a municipal CIP be scrutinized by C/B analysis. Fajardo acknowledges the limitations of C/B analysis, but nonetheless recommends that projects be ranked according to net benefits so that benefits to the city can be maximized. Fajardo's example of a C/B analysis turns out to be an economic analysis of alternative means of achieving a single objective. This type of analysis is recommended by this author for use by department heads, but not as a method for ranking projects to meet multiple objectives. Unfortunately, C/B analysis does not provide the tool necessary to deal with alternative ways of meeting multiple objectives in the small city capital improvement programming process. It is too complex, costly, and time consuming and does not consider political rationality.

2. Management Science Techniques

There are other methods of prioritizing and ranking alternatives relating to multiple objectives which use the rational approach to decision making. These methods are found in the literature of management science or operations research. Three of these techniques suffer from the same drawback as cost-benefit analysis, that is, the inability to measure benefits in certain terms. The first technique is to express the objectives in terms of a single goal modified by several constraints usually expressed as a percentage. The second is to express all objectives by a single measure such as dollars. The third is to express one goal in terms of another. It is the author's opinion that the objectives and goals of public institutions are not amenable to such manipulation and these techniques will not assist in the development of a CIP.

A fourth technique from the field of management science is goal programming. This process is severly restricted by assumptions and by the need to measure deviations from ranked goals. Pardee, et al. (1969) recommended the use of mathmatical programming techniques for the ranking of investments by the private sector, but did not forsee the use of this technique in the public sector. Instead, these authors implied that the decision maker in the public sector must specify a preference function (such as an indifference map

or a utility curve] in order to determine appropriate trade-offs among alternatives. This author is of the opinion that mathmatical programming techniques are not appropriate tools for use in small city capital budgeting because of the restrictions discussed above.

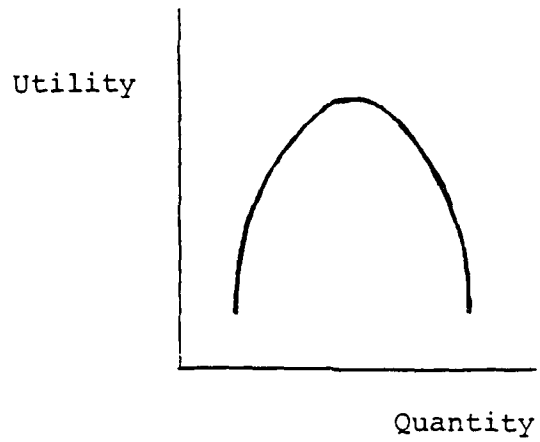
3. Utility Analysis

Because benefits are often not measurable, some other means of assessing satisfaction (or benefit) is desirable. Utility analysis is a method for ranking alternatives which, according to Easton (1973) and other authors, can provide this assessment. It is derived from the rational approach to decision making, but does contain elements of the political approach. The political aspect is introduced when a decision maker expresses less satisfaction with an alternative because in his or her thought processes he or she is discerning some undesirable political consequence associated with a particular level of satisfaction.

If a decision maker is willing and able to express ecstacy and absolute minimum levels of satisfaction, then a utility function can be derived. Utility functions are graphed versus quantity of a given item. The function can be non-linear. For example, more police protection may be desirable in accordance with the utility function graphed at Figure 3-1. Each added unit of protection may produce more

satisfaction, but at a decreasing rate. A point may be reached where there is too much police protection and each added unit produces less satisfaction. This utility function would graph as an inverted "U". Another example could involve park improvements. A decision maker may feel that it is desirable to have all the park improvements that can be accomplished in a given year. This utility function would graph as an upward turning curve, showing more utility for each added unit. On the other hand, the decision maker may still desire unlimited park improvements, but, after a certain point, each additional unit of improvement brings relatively less satisfaction. This function graphs as an upward turning curve to a point of inflection after which the curve turns more toward the side while still climbing (see Figure 3-1). Using the description of the decision makers' preferences utility curves can be selected which match their preference.

Sample Police Protection Utility Curve



Sample Park Improvement Utility Curve

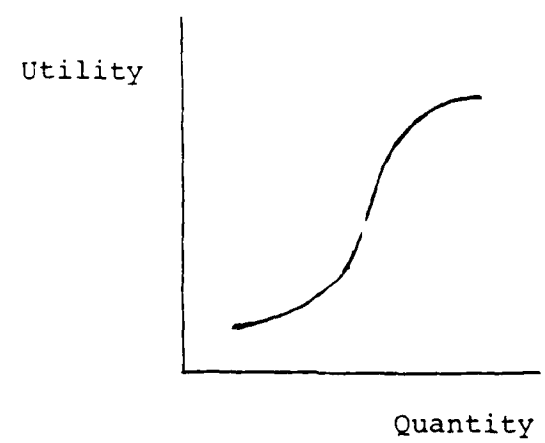


Figure 3-1

Once the utility curve has been selected the quantity is placed on a zero(minimum acceptable) to 100 (ecstacy) scale. The quantity of the alternative proposed is then placed against this scale and given a utility rating. This rating becomes the value of that alternative as weighed against one criterion for meeting the overall objectives. The alternative must then be valued in accordance with the utility functions derived for all rating criteria. Each criterion is assigned a weight in accordance with its importance in meeting the goals of the city. The various utility values are multiplied by the appropriate weights and given a composite score. Ranking is achieved in descending order from the highest numerical score.

If utility analysis were to be used in the municipal programming process, the application could be quite tedious due to the number of curves which would have to be derived. It would also require an extremely rational approach to a political process. To perform this analysis the city government would have to define the city's objectives and derive a list of criteria which purportedly would measure the objectives. Then these criteria would have to be represented by utility functions. Even if one were successful in having a city government establish its objectives in full and criteria for meeting objectives, whose utility functions would be used?

The political process involves diverse interests, many of whom would demand that their preference be the measure of value. The author has found no method which can accomodate this diversity in a prioritization methodology involving utility analysis. Vraciu (1977) offers a utility analysis (conjoint measurement approach) for capital budgeting in hospitals. However, the approach deals with a much less diverse population. Vraciu bundles his interest factions into three groups. Such grouping is not feasible in the political environment of a city. The author, therefore, does not recommend utility analysis as a means to rank CIP requests in a municipality.

4. Group Process Techniques

If the CIP is to be submitted to a committee either before or after City Manager review, it is possible to apply group process techniques in an effort to rank CIP requests. One process used to obtain concensus from a group is the Delphi technique. Linstone and Turoff (1975) provide a comprehensive reference regarding Delphi and define the technique as follows:

> Delphi may be characterized as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem.

In conducting a conventional Delphi (a real time Delphi uses an interactive computer) it is necessary to develop a questionnaire which gives a respondent (in this case a committe member) an opportunity to express an evaluation of a project's worth to the city. Following the completion of the questionnaire the results are statistically compiled and fed back to the participants. This feedback shows the individual responses while ensuring an appropriate degree of anonimity. It also shows the group mean and highlights those assessments in the upper or lower quartiles. Then another Delphi round is conducted followed by the same type of feedback. This continues until a group consensus is achieved in accordance with some predetermined criterion. The project or program is then assigned a rating of value or worth.

There are many variations of the Delphi technique and the preceeding offers only the barest description of the process. Linstone and Turoff (1975) discuss application areas for the Delphi technique. Among these are the evaluation of budget allocations and the exposing of priorities of personal values and social goals. With regard to application circumstances, these authors cite the need for a Delphi when a problem does not lend itself to precise analytical techniques, but can benefit from subjective judgments on a collective basis.

DeMoville (1977) proposes the use of a particular Delphi adaption for use in the municipal capital improvement programming process. In DeMoville's proposition the non-monetary benefits of proposed projects are quantified by a Delphi process. Urgent projects are passed through without analysis. Projects are ranked by NPV using an appropriate cost of capital. If there is sensitivity of the accept/reject decision to a variation of the benefit estimate, then DeMoville recommends another Delphi round which could include those benefits which could not be quantified. DeMoville's claim for the technique is that the results are superior to decisions made purely on whim or as a reaction made to personalities or political power.

The author agrees with DeMoville that this technique offers a method superior to those using whim and reaction. However, Delphi applications are severely criticized by many authors. Sackman (1975) finds conventional Delphi as often characterized by crude questionnaire design, lacking in minimal professional standards for opinion-item analyses, virtually oblivious to reliability measurement and scientific validation of findings, typically generating snap answers to ambiguous questions, and denigrating group and face-to-face discussion while claiming superiority of anonymous group opinion over competing approaches without supporting proof. In essence, Sackman states that Delphi is not scientifically rigorous

and should not be used by those who are not expert social scientists.

This author acknowledges the critique of Sackman and others, but, with relation to the municipal use of Delphi, does not feel that Delphi should be dismissed. This author does not feel the DeMoville proposed a scientific technique, but rather that DeMoville offers the polling of a committee with feedback to achieve consensus. With this in mind, the author feels that DeMoville's suggestion is worthwhile and could be explored by those cities who would care to experiment in this area. Scientific perfection is not the issue here; it is the improvement of the present process which is.

There are a number of other techniques which can be used by a committee to rank competing proposals. Toulmin and Clyburn (1980) report on a technique used by the City of Kent, Ohio known as Interpretive Structural Modelling (ISM). This technique, most recently applied to determining which items should be cut from a budget, uses a Delphi questionnaire to show group preference and then voting by the group using pairwise comparisons. For any number of proposals over 15 the comparisons are almost impossible to track by hand and must be handled by a computer.

Additional group process techniques involve scientific polling, confrontation, and brainstorming. A common feature of such techniques is the need for outside assistance.

This limitation, as well as those mentioned in the Delphi discussion, restrict the use of such techniques in a small city.

5. A One-Dimensional Ranking System

If projects have been economically analyzed such that all project requests represent the most economic means of meeting an objective, then the impact of cost becomes limited to the size of the investment with respect to the size of the overall capital budget. The main issue turns away from economic analysis and toward need and purpose.

With a list of the most economic means of meeting a variety of objectives before them, decision makers can achieve a one-dimensional ranking by grouping the requests into priority classifications. This type of classification methodology is recommended by Fajardo (1976) and Vogt (1977). Both authors recommend prioritizing by need or urgency. Fajardo recommends that the department heads rank their own proposals and gives an example of five categories. In brief these categories are:

1. Priority I - legal requirement or dangerous condition
2. Priority II - critically needed program or reduction of operating costs
3. Priority III - extension of service or replacement of obsolete facility
4. Priority IV - enhancement of public convenience
5. Priority V - postponable

The overall priority is then worked out through a series of budget hearings or study sessions during which the department heads are present.

The author's review of the literature indicates that the above ranking system is common to many small cities. Unfortunately, this system suffers from a number of faults. The most troublesome fault is that those items which fall into categories such as Priorities IV and V in the preceeding example may never be funded. The end result of this could be an increase in political infighting in order to have a project categorized as a critically needed program. Another problem here is that all critically needed programs are treated the same; that is, ranked equally. A critically needed park improvement may not be as critical as a certain social service program. The term "critical" becomes an arguing point, thereby leaving the ranking system only as a legitimization of some bargaining process which earned a program its label "critical".

Vogt (1977) suggests that a review panel (if it felt so inclined) could rank the requests into categories of need such as high, medium-high, medium, medium-low, and low. This technique has the same drawbacks as the somewhat more formalized priority grouping just discussed.

There are other one-dimensional methods used by different cities. The City of Santa Fe, New Mexico, for example, requires its department heads to assign their top priority project a priority on a zero to 100 scale. The remaining department projects are scaled below this. The tendency for the department heads might be to scale all projects

as close to the top as the department head felt one could successfully justify. Again, lower priority projects might become permanently excluded.

It is the author's opinion that one-dimensional ranking systems are little more than a convenient way of categorizing both obvious priorities and the results of politically successful arguments. Something that must be done because of a legal requirement is obvious. Something that has been labeled critical has been blessed by a reviewer as being critical on the basis of a successful argument (valid or not). What a one-dimensional system does not do is help in the middle area where a large number of projects are competing for the remaining available funds. A one-dimensional system is a step in the right direction, but it does not solve the problem.

6. A Two-Dimensional Priority Matrix

Easton (1973) noted that multiple objective decision problems involve criteria of differing importance to decision makers and to the parties affected. He further noted that some interests are more urgent than others and that some objectives must be given priority over others. If a problem can be classified in accordance with its urgency and its ability to meet an important objective, then there is a possibility that these two classifications can be used in a ranking system.

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AN ANALYSIS OF AND A PRESCRIPTION FOR THE CAPITAL IMPROVEMENT P--ETC(U)
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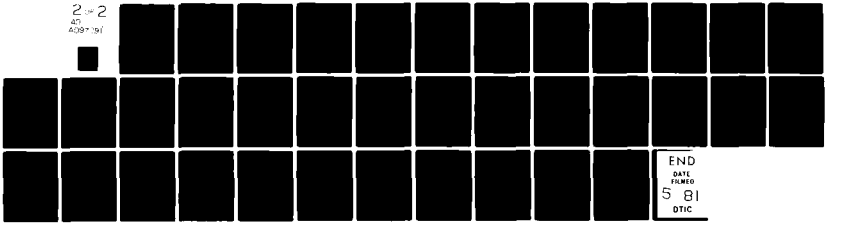

A question arises as to whether or not the classifications can be traded-off one for the other. In the case of a municipality the question is: can functional objectives be traded-off with urgency? The author's answer to the question is yes. For example, if decision makers viewed the functions of general road maintenance (which involves capital expenditures) and pollution control as equally important objectives, then it might be more important to repair a road hazard (high urgency) than to improve pollution control standards at a local water treatment facility (low urgency). But if upgrading pollution controls were required by state legislation, then a pollution control project might rank above a road hazard, even if the objective of pollution control was not as highly valued as general road maintenance. Trade-offs can be accomplished and are achieved in every day practice.

Simpson (1976) reports on a two-dimensional priority matrix used by the City of Ottawa, Canada (see Figures 3-2 and 3-3). This matrix uses function on the horizontal axis and urgency on the vertical axis. Simpson lists 13 functions and nine degrees of urgency. He labels two degrees of urgency as being indispensible. These are legislation and instruction by the City Council. These two degrees or urgency when combined with the 13 functions are assigned numerical values one through 26. The remainder of the system is scaled so that no combination of urgency and function can score lower than

Priority of Function or Objective

A. Protection and Safety
B. Pollution Control
C. Housing
D. Social Services
E. Vehicular Transportation
F. Pedestrian Transportation
G. Recreation
H. Land Use Control
I. Commercial Development
J. Resource Conservation
K. General Government
L. City Beautification-Tourism
M. Heritage and Culture

Degree of Urgency

R. Legislation-Legal Requirement-Contract
S. Council Instruction
T. Hazard
U. Intergovernmental Coordination
V. Standard of Service
W. Increase in Standard of Service
X. Obsolete Facility or Method of Operation
Y. Economic Advantage to Economic Base
Z. Convenience

Figure 3-2

modified from Simpson (1976)

Priority Matrix

Urgency	Function												
	A	B	C	D	E	F	G	H	I	J	K	L	M
R	1	-	-	-	-	-	-	-	-	-	-	-	13
S	14	-	-	-	-	-	-	-	-	-	-	-	26
T = 6	36	-	-	-	-	-	-	-	-	-	-	-	108
U = 7	-	-	-	-	-	-	-	-	-	-	-	-	-
V = 8	-	-	-	-	-	-	-	-	-	-	-	-	-
W = 9	-	-	-	-	-	-	-	-	-	-	-	-	-
X = 10	-	-	-	-	-	-	-	-	-	-	-	-	-
Y = 11	-	-	-	-	-	-	-	-	-	-	-	-	-
Z = 12	72	-	-	-	-	-	-	-	-	-	-	-	216
Values	6	7	8	9	10	11	12	13	14	15	16	17	18

Figure 3-3

modified from Simpson (1976)

26 (the lower the score the higher the ranking). The seven remaining degrees of urgency are therefore scaled numerically from six to 12. The 13 functions are scaled from six to 18. The criteria values are multiplied together making 36 the best score for those projects not automatically accepted because of urgency.

Simpson notes that the system is flexible and that the degrees of urgency and functions might be weighted to reflected changes in their relative importance. What Simpson did not note was that the system, as it is presently scaled, is implicitly weighted rather heavily in favor of protection and pollution control functions involving either hazards or projects requiring intergovernmental coordination.

Of all the methods examined by this author which could be applied to ranking municipal capital improvement project requests this system offers the most promise. In order to use this system a municipality would need to develop a list of city objectives. This may sound politically difficult, but, in this case, it is not as difficult as it might appear. The matter of degree is missing and this permits those who define the objectives to simply list functions which should be performed by the city. This will not eliminate all controversy, but it will make it manageable. The municipality would also have to define its urgency categories. This should likewise pose no problem. The really difficult aspect

to this system is the development of the weights or, if no explicit weights are used, the development of a numerical order of the functions and degrees of urgency.

There are two organizations which might become involved in the process of assigning weights. If the City Manager is going to prioritize the CIP before submitting it to a review committee, then the planning staff should assist in the development of the weights. In general consonance with the desires of the City Manager, three separate sets of weights might be used. The City Manager could choose that set which meets his or her purposes the best. Here the City Manager will use a political rational model of decision making. If the review committee will review the CIP before the City Manager, then the committee could develop its own weights. It may want to do this even if the City Manager had already applied weights. The committee could develop its weights by either being polled or by averaging the individual weighting provided by the members. For this purpose neither technique is difficult.

The question arises as to what type of scale should be used. It is recommended that an additive scale be used which measures the relative amount of concern, priority, effort, or money one would devote to that objective or apply to that degree of urgency. If the scale is zero to 100, then the sum of the weights should equal 100. This will force trade-offs

between the various elements. If the scale were zero to 100, but open-ended, then a committee member might choose to demonstrate that he or she is 99 to 100 per cent behind each objective. The additive feature of the scale makes someone who is 100 per cent behind pollution control and protection state, for example, that he or she is willing to devote 20 per cent of the city's capital resources to protection, 10 per cent to pollution control, and 70 per cent to the other objectives. It will not matter if the scales for urgency or function are different because the difference will not affect the ranking due to the multiplication that is performed.

It may at times become necessary for the committee to vote on a matter concerning a CIP request. The committee members, for example, may be split over a decision to change the category of function or urgency which has been applied to a CIP request by the department head, planning staff, or City Manager. This impasse may have to be rectified by a vote. The committee may also need to vote to establish agreement on the weightings. In such cases it is recommended that a simple majority vote be utilized. Birnberg, et al. (1970) specifically reviewed the voting behavior of capital budgeting review committees and the effect of voting rules on the value of the overall payoff as measured on a scale used by these authors. The conclusion here was that a majority voting rule, as opposed to a unanimity rule or a veto rule, provided the

most efficient mechanism for making resource allocation decisions.

Once agreement has been reached on the objective and the degree of urgency which applies to a particular project request that request is then valued by the multiplication of the weights of the two criteria. For example, if a project's primary function relates to the function of housing with a weight of eight and has an urgency relating to maintaining an existing service with a weight of five, that project's overall value is scaled at 40. It might be tied with another project which had a social service function with weight 10 and an urgency of economic advantage with weight four. If it becomes necessary to break such a tie, the considerations discussed below should be utilized.

7. All Things Considered

If a two-dimensional priority matrix is employed in the capital improvement process, the decision makers will have before them a ranked list by function and urgency of the most economic means of achieving a number of single objectives which relate to the multiple goals of the city. This listing is the result of reviewing project requests and should be divided by source of funding. Before closing the book on this ranking it is appropriate for the decision maker to consider a number of other factors. Each project should be examined in light of these factors and, where a final line must be drawn, it is these factors which will help make the decisions.

Among the literature reviewed by the author the MFOA handbook [Rosenberg 1978] was observed to provide the most comprehensive presentation of criteria and questions for use in evaluating and programming projects. MFOA offers five criteria as follows:

1. General Project Design
2. Relative Need and Cost
3. Scheduling
4. Financial Programming
5. Legal

This thesis has concentrated on an analysis of relative need and cost and on the development of a political rational model of decision making in a municipality. The considerations listed here bring to bear some of the political aspect of the process as well as some of the rational aspect.

General project design relates to such matters as effects on other projects, the environment, and the tax base. It further relates to the acceptability of design and to the appropriateness of the project itself, and its relation to the General Plan (if the City has such a plan).

Relative need and cost have been discussed in earlier portions of this thesis. However, the size of the investment with respect to the overall budget should be addressed when reviewing these considerations, as well as the effects (if any) on the tax rate. MFOA also recommends attention to the acceptability of the project to voters and interest groups.

The scheduling consideration should include discussion of the compatability of the implementation of a project with other projects and services. It may be that the utilization of manpower by a relatively higher priority project may make a lower priority, yet desirable, project infeasible.

The funding implications are reviewed when financial programming is considered. There are numerous factors which can affect this criterion. A complete discussion is outside the scope of this thesis. The interested reader is referred to the MFOA handbook for further discussion.

Finally, legal considerations are important to the review. This involves not only a determination relating to degree of urgency, but also to legal implications which must be met if a project is undertaken.

It is the author's thesis that an effective and efficient CIP can be programmed if projects, developed in accordance with the principals of economic analysis, are prioritized by a two-dimensional priority matrix and reviewed in accordance with the five criteria discussed in this section.

D. SUMMARY

This chapter has presented a discussion of decision making and developed a political rational model of decision making in a municipality. It has presented a review of

techniques for analyzing capital improvement projects and recommended the use of NPV and economic analysis by the department heads. This chapter has offered a discussion of a variety of methods of dealing with decisions involving multiple objectives and recommended the use of a two-dimensional priority matrix to rank CIP requests. A summary chart of these methods is presented at Figure 3-4. Finally, this chapter proposed a review of the ranking by five criteria in order to select an effective and efficient CIP in accordance with the political rational model of decision making.

Summary of Decision Making Methods

Method	Quantitative Orientation	Political Rational Orientation	Committee Use Orientation	Use of Non-Quantitive Considerations
C/B Analysis	YES	NO	NO	LIMITED
Management Science	YES	NO	NO	NO
Utility Analysis	LIMITED	LIMITED	NO	LIMITED
Group Process	NO	YES	YES	YES
1-D Ranking	NO	NO	YES	YES
2-D Matrix	NO	YES	YES	YES

Figure 3-4

IV. THE CAPITAL IMPROVEMENT PROGRAMMING PROCESS IN THE CITY OF MONTEREY, CALIFORNIA

This chapter presents a description of the capital improvement programming process presently utilized by the City of Monterey, California. This chapter will begin with a description of the manner in which Monterey is organized for the development of a CIP. Following this, a discussion of the development of project requests and a review of the decision making portion of the programming process will be undertaken. Finally, a summary of the findings of the management audit (discussed in the introductory chapter of this thesis) will be presented.

A. ORGANIZATIONAL STRUCTURE

The author's search of the literature has determined that the CIP organizational structure employed by the City of Monterey is typical of the structure used by many small cities. The organization chart for the city goverment was presented in Figure 1-1 (of Chapter I). The organization chart for the CIP was presented in Figure 1-2.

There is one common variation among small cities in the organizational chart for CIP. This variation involves the position of the review committee within the process and the makeup of that committee. Some cities have the committee review the project requests before the City Manager, whereas

others place the review by committee after the City Manager's review. The makeup of the committee can vary from all private citizens to all elected officials to a mix of both.

The City of Monterey has chosen to have the CIP review after the City Manager has compiled the project requests from the various departments. In this manner the City Administration presents a formal CIP to a committee for review. This CIP represents the administration's best estimate of what capital projects are required to provide appropriate municipal services now and in the future.

The City of Monterey had developed a unique composition of committee members to review the CIP submitted by the City Manager. The inclusion of two Planning Commissioners and two City Councilmen as CIP Committee members ensures that the City Planning Commission and the City Council have within them individuals who are already well versed on the merits of the CIP which will be placed before them. The inclusion of a Library Board and a Park and Recreation Commission member represents an unusual input to the committee structure which has not been encountered elsewhere by this author. On face value the inclusion of these two members is in favor of the interests which they represent.

Following the Committee review, the CIP is approved by the City Planning Commission. Within the State of California state law (Article 7 of the California Planning and Zoning Law) requires a Planning Commission to approve the CIP. The primary purpose of this review is to ensure that projects are in conformance with the General Plan of the city.

The City Council reviews and gives final approval of the CIP during the council's review of the annual budget. Since the annual budget receives public examination prior to its adoption; the CIP is, therefore, also subject to input from local citizens prior to its approval.

B. THE DEVELOPMENT OF PROJECT REQUESTS

The capital improvement programming process is begun in the City of Monterey with the issuance of instructions for department heads approximately six months before the beginning of the city's fiscal year which commences on 1 July. The instructions include the city's definition of a capital improvement project, that is, the criteria which must be met for a project to be classified as a capital improvement. These criteria are very similar to the example provided in Chapter II, Section C of this thesis.

In addition to the above criteria the instructions contain guidance for completing the city's Capital Improvement Project Request form. This form contains most of those items described in Chapter II, Section D of this thesis. In general, the guidance of the City of Monterey requires a complete description of and justification for the proposed project, as well as such financial data as estimated cash costs, proposed financing, annual expenditures for five years, annual budget costs or savings, and estimated annual average income from the proposed project. The City of Monterey additionally requires the department heads to prioritize their project requests in numerical

order. As with much of the literature regarding municipal CIP's which was reviewed by this author, the guidance regarding cost and benefit estimation is minimal and does not form the basis for a rigorous economic analysis.

The Department Heads are provided a two month period to develop the project requests. These requests are then submitted to the CIP coordinator who is a member of the Planning Department.

C. THE DECISION MAKING PROCESS

The third month of the process (in this case, March), is devoted to compiling the requests and to developing the CIP. This development is performed by the City Manager in conjunction with the Department Heads.

Upon receipt of the project request by the CIP coordinator the request is reviewed for completeness and for accuracy of estimates. If either item is deficient the request is returned for re-work. The request is also reviewed at this time for conformance to the city's General Plan. When the coordinator's review is complete the requests are compiled into program categories.

The separation of project requests into categories is a significant step in the prioritization process. These categories are as follows:

1. Recreation and Culture
2. Police and Fire
3. Public Utilities
4. Transportation

5. Harbor
6. Administrative Facilities

It is the author's observation that these categories are very similar to the objective or function element of the two-dimentional priority matrix discussed in Chapter III, Section C of this thesis.

With the project requests organized into program categories, the City Manager begins a series of staff sessions. The project requests submitted by each Department Head are reviewed by the City Manager during these sessions. Normally, all Department Heads are present. From these meetings a list of projects desired by the City Administration is produced. This list is prepared in order of priority and is separated by funding source.

During the fourth month (in this case April) the CIP proposed by the City Manager is reviewed by the CIP Committee. When it reviews the program submitted by the City Manager, the committee considers eight stated criteria which were also used by the City Manager to set priorities. These are as follows:

1. Meets an existing City contract or obligation
2. Implements adopted City plans and policies
3. Improves City services, quality of life, or aesthetics of the community
4. Provides a safety measure for employees or the public
5. Maintains a critical City service
6. Provides substantial cost savings
7. Provides a multiplier effect (matching funds or private development)
8. Provides energy or resource conservations

It is the author's observation that these criteria are similar to the degree of urgency element of the two-dimentional

priority matrix discussed in Chapter III, Section C of this thesis. However, not all of these criteria above relate directly to the degree of urgency. It is noted that criterion eight could be used as either function or degree of urgency. It is further noted that item four could be widely interpreted with respect to urgency and that item five could be also subject to wide interpretation as to what is critical and what is not critical.

The CIP Committee examines each request in the program and reviews which criteria apply to the request. Requests can meet either one or a number of the criteria. There is no weighting applied. Following discussion the City Manager's prioritization of the projects is either confirmed or modified. Those projects to be funded by the General Fund are categorized into four sections. These are contractual obligations, carry-over projects, Priority I (for which funding is projected) and Priority II (for which funding is not projected). The committee then votes to affirm the final CIP prioritization. The CIP is next forwarded to the Planning Commission.

At this point the process has entered the fifth month (in this case, May). The Planning Commission, as has been previously stated, has two of its own members serving as members of the CIP Committee. Because of this representation and because the function of the Planning Commission is to review the CIP for conformance with the General Plan, this approval is ordinarily obtained in a minimum amount of time. Follow-

ing this the CIP is consolidated with the remainder of the budget requests for the upcoming fiscal year.

As the process begins its sixth month (in this case, June) the preliminary budget for the upcoming fiscal year is presented to the City Council for approval. Here again the CIP is reviewed by a body which has had two of its members serving on the CIP Committee. During the budget hearings these two members are the council experts (along with the City Manager) on the makeup and prioritization of the CIP. The implementation of the CIP follows adoption of the annual budget by the City Council.

D. THE MANAGEMENT AUDIT OF THE PROGRAMMING PROCESS

The author was a member of a two-man team which conducted an operational audit of the City of Monterey CIP. This audit was conducted as an Economy and Efficiency Audit in accordance with the definition of the United States General Accounting Office (GAO). The audit was part of the requirements for completion of a course at the Naval Postgraduate School which was entitled "Auditing in the Public Sector (MN 4155)." The audit team assumed the role of internal auditors with the expressed intention of providing assistance to management.

The audit team directed its efforts to determine if the CIP was being conducted in an effective and efficient manner consistent with preferred management practices. The scope of the audit involved the CIP organizational structure, the development of project requests, and the approval process

for the requests. Each of these areas was compared to a list of preferred practices. This list was derived from Pomeranz, et al. (1976). Figure 4-1 depicts the sections of this text from which the list was drawn.

The author and his associate found the CIP programming process used by the City of Monterey to be in general conformance with preferred management practices and concluded that the City of Monterey conducts a thorough and professional program of CIP development [Rachor 1980].

When the process used by the City of Monterey is compared to the model developed in this thesis, the author notes three areas of potential improvement. These areas are the same as those reported in the findings of the audit [Rachor and Hertz 1980] and are listed below:

1. The member composition of the CIP Committee should be reviewed to ensure that all interests are equally represented.
2. The programming process should include a stronger review of alternative means of accomplishing projects.
3. The criteria used to evaluate CIP requests should be more stringently defined and applied.

The overall appraisal of the City of Monterey CIP by the audit team was favorable. The auditors found the system to be in general conformance with both the MFOA handbook [Rosenberg 1978] and the list of preferred practices. The following chapter will present some recommendations for small cities which would be of use to the City of Monterey in its efforts to continue meeting preferred management practices and to improve their capital improvement programming process.

Sections of Preferred Practices Utilized from Pomeranz, et al. (1976)

Chapter 6 Budget Management

I. Organization and Management

A. Executive Planning

B. Budget Organization

II. Budget Formulation

A. Budget Calendar

B. Revenue Planning

C. Expenditure Planning

D. Budget Procedures

E. Department Budget Formulation

F. Budget Review Staff

G. Submission of Budget for Chief Executive's Review

Chapter 10 Public Works

III. General Services

A. Capital Expenditures

B. Facility Additions

V. Property Management

A. Acquisitions and Replacements

V. CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the conclusions reached by the author as a result of this thesis research. These conclusions will be presented by a discussion of the major results found in Chapter II and Chapter III. This will be followed by recommendations for a capital improvement programming process in a small city and by some final remarks.

A. SUMMARY OF RESEARCH RESULTS

The author's review of the literature relating specifically to municipal capital improvement programming found that the literature contained a variety of prescriptive manuals regarding the process. The author's evaluation of these manuals is that they provide an adequate model for the steps in the programming process, but that they do not offer sufficient discussion of the methodology to be used in each step. Specifically, the author found the prescriptive manuals to be deficient in two areas. These are the analysis of alternative means of meeting an objective (economic analysis) and the nature and methodology of the decision making process in a municipality.

Outside of the area of manuals the author found little in the literature which related to either of the two areas which are considered by the author to be deficient. However, one of the few written articles that was found did contain

a description of a method for prioritizing captial improvement project requests which the author found to be particularly attractive. This article [Simpson 1976] received a thorough review in the discussion regarding decision making with multiple objectives in Chapter III. The conclusions regarding this article will be discussed later.

Having observed some deficiencies in the literature the author set out to determine some means to correct those deficiencies. The initial step taken was to examine the classification of municipal capital expenditures, that is, what criteria should be met by a project to classify that project as a capital improvement. The conclusion here is that the item should be a non-recurring expenditure whose size is large enough to deserve the special attention of decision makers. An example of a list of criteria which could be used by a small city is presented at the end of Chapter II, Section C of this thesis.

Following the discussion of classification the author examined the capital improvement programming process. After a brief discussion of the definition of programming the prescription offered for small cities by the MFOA [Rosenberg 1978] was highlighted and then contrasted with the views of this and other authors. This presentation looked at the process in depth to further examine the deficiencies in the literature which were found by the author. The conclusions resulting from this examination are discussed in the following paragraphs.

There is disagreement with respect to the type and amount of public policy statements which should be made by a city government and public input which should be made as a part of the process. The author found no need for public policy statements, but does recommend the use of written guidance from the City Manager at the start of the process. The author agrees with the need for citizen input, but, because of the variety of ways this input can be satisfactorily obtained, offers no specific recommendation as to how this should be accomplished.

When reviewing the development of project requests the author found that there is general agreement with respect to the type of information which should be included on project requests. Common items for CIP request forms are presented in Chapter II, Section D of this thesis. Missing entirely, however, are items relating to the alternatives considered by the Department Head. The author also found insufficient guidance with respect to the estimation of costs and revenues of a project, the manner in which inflation should be addressed, and method by which alternatives could be compared. The overall recommendation here is to develop a manual of standardized instructions within the city regarding the complete development of project requests.

Before analyzing the evaluation of project requests by city management, the author undertook a review of decision making in a municipality and decision making techniques which

could be applied to the development of individual project requests. The author reviewed three approaches to decision making. The conclusion here is that decision making in a municipality is performed in accordance with a political rational model. The author concludes that the small city, because of its potential to be more cohesive than larger political constituencies, is able to incorporate a great deal of economic rationality into the political rationality of government. The greatest potential for exercising economic rationality is determined to be at the department head level.

The author's inquiry into the use of economic rationality used the principles of economic analysis as a base. This method of analysis is considered appropriate because it provides the method for analyzing alternative means of meeting a single objective. It is concluded that this method is best suited for Department Head use in developing project requests.

Within economic analysis there are a number of means of compaing alternatives. The author reviewed the use of several of these methods. The recommendation here is that the NPV technique be utilized to compare alternatives when the decision criterion is minimum cost for fixed effectiveness or benefit. In the case of a maximum effectiveness for fixed cost criterion the cost should still be expressed in economic net present value terms. In the case where the criterion is maximum effectiveness or benefit for cost the recommendation is for the department head to submit two or three alternatives into the decision

making process. This submission should include a discussion of the non-quantifiable aspects of the alternatives.

The author presented two additional issues relating to economic analysis. These are inflation and the discount rate. The author's conclusion regarding inflation is that it should not be included in the analysis. The rationale here relates to the author's opinion regarding governmental responsibilities vis-a-vis inflationary psychology. The conclusion regarding the discount rate is that at this time a rate of 18 percent should be utilized. This recommendation is based on the opinion of this author and others that the appropriate discount rate for government should be based on the pre-tax cost of capital employed in the private sector.

Following the recommendations regarding economic analysis the author examined decision making with multiple objectives. In this portion of the programming process the political component of the political rational model is dominant. The author reviewed six methods to deal with multiple objectives. The conclusion of this research is that a two-dimensional priority matrix offers the best method of dealing with multiple objective decision making in the political rational model. It is recommended that objectives (or functions) and degrees of urgency be weighted and traded-off so that a prioritization of projects can be accomplished. A majority voting rule is recommended to break ties at the funding cut-off point and to select a best alternative when a department head has submitted more than one

alternative. The review of a number of non-quantitative factors (listed in Chapter III, Section C) is recommended for each project request. It is the author's overall conclusion that the foregoing conclusions and recommendations should be incorporated into a small city's captial improvement programming process.

B. RECOMMENDATIONS

The steps in the municipal capital improvement programming process as they are listed by the MFOA handbook [Rosenberg 1978] are considered by the author to be a consensus list of the steps which should be undertaken. The author, therefore, will not attempt to discuss an overall prescription for the process. Instead, the intention here is to review the steps in the process and to highlight those areas in which the author's conclusions and recommendations should be applied.

The first step is to establish the administrative and policy framework. In this step it is recommended by this author that the city planning staff develop a manual for economic analysis which is tailored to the requirements of the city. This manual should be developed in accordance with the discussion presented in Chapter III, Section B of this thesis. It is recommended that the manual illustrate an economic analysis and the manner in which the NPV technique should be applied.

As part of this step it is recommended that the City Manager issue written guidance to commence the annual process. This guidance should describe the general type of project which the City Manager considers significant to the objectives of government and should give a general feeling of the weights which will

be applied to various objectives. In this action the City Manager does not have to be specific; a general knowledge of the City Manager's priorities will greatly assist the Department Heads in the development of projects and priorities. At this point the City Manager should also provide the discount rate which will be utilized in developing estimates. An illustration of present value factors for the presently recommended 18 percent is provided at Figure 5-1. At this time and in addition to the City Manager's guidance the CIP coordinator should issue any changes to the instructions contained in the manual of economic analysis used by the city.

The second and third steps of the process are the preparation of an inventory of existing facilities and determination of the status of previously approved projects. The author has not developed specific recommendations relating to these steps, but does note that the inventory should be updated annually and that previously approved projects which will use funds from the upcoming budget should not be automatically continued without review in the prioritization portion of the process.

The author did not conduct a review of the fourth step, financial analysis and financial programming. This area is considered to be outside the intent of this thesis. The recommendation in Chapter II to refer to Appendix A of the MFOA handbook is reiterated.

18 Percent Present Value Factors

Year	Single Amount	Cumulative
1	.924	.924
2	.783	1.207
3	.664	1.870
4	.563	2.432
5	.477	2.909
6	.404	3.313
7	.342	3.655
8	.290	3.945
9	.246	4.191
10	.209	4.399
11	.177	4.575
12	.150	4.725
13	.127	4.852
14	.107	4.959
15	.092	5.050
16	.078	5.127
17	.066	5.192
18	.056	5.248
19	.047	5.295
20	.040	5.335
21	.034	5.369
22	.029	5.397
23	.024	5.421
24	.021	5.442
25	.018	5.459
26	.015	5.474
27	.013	5.486
28	.011	5.497
29	.009	5.506
30	.008	5.514

Single amount is the factor to be used when cash-flows occur at different times. Cumulative factors can be used when the cash-flows occur in the same amount each year. All factors are the arithmetic average of the factors which apply to the beginning and end of a year. This averaging assumes a uniform cash-flow over each one year period.

Figure 5-1

The fifth step, compile and evaluate project requests, is the subject of the prime area of analysis in this thesis. The strongest recommendation of this thesis is the incorporation of economic rationality into this step by use of the techniques of economic analysis. Following the preparation of requests, the evaluation and prioritization of the requests is recommended to be undertaken by the use of a two-dimensional priority matrix tailored to the city objectives, functions, and needs. The make-up of this matrix should be developed by the planning staff and approved by the City Manager, the CIP Committee, and the City Council. The composition of the elements of the matrix should be reviewed annually.

The particulars of this step should include an initial review by the CIP Coordinator of the project requests submitted by the Department Heads. Those requests which do not meet the standards of the city manual for economic analysis should be returned for re-work. Returns may have to be made through the Planning Department Head. The planning staff or the CIP Coordinator should then develop a ranking of the proposals in accordance with the weights of the matrix. If the proposals will next be reviewed by committee, the weights should be those decided on by the committee in accordance with a recent majority vote. If the City Manager will be the next reviewer and the committee afterwards, the weights should be those currently supplied by the City Manager. In either case the reviewers may wish the staff or coordinator to provide a ranking of

projects by two or more different sets of weights. In this manner the realities of the political rational model can be incorporated into the process and the choice will be in accordance with that model.

The sixth and seventh steps of the process are the adoption of the CIP by the city government and the implementation of the CIP. Neither of these areas has been reviewed in this thesis. However, the author notes that the inclusion of some members of the City Planning Commission and the City Council as members of a review committee (as in the case of City of Monterey) is a most practical means of reducing the overload of work normally encountered during budget review. By virtue of their positions these individuals are also very likely to be keenly aware of public sentiment regarding the nature of capital improvements which may be undertaken by the city. Finally, for the small city, the author regards the use of public hearings during the final budget review as adequate representation of the public provided that the review committee is composed of members as just described. If the review committee does not have such membership, a requirement for public hearings by the review committee should be considered.

C. REMARKS

During the research for this thesis the author has noted the need for a deeper examination of the capabilities of a city with respect to manpower, equipment, and time and their impact on the CIP programming process and the actual imple-

mentation of the CIP. Research into the methodology for executing and tracking the implementation of a CIP appears to the author to have the potential to be most useful and beneficial.

This completes the presentation of the conclusions and the recommendations of this thesis. It is the desire of this author that the conclusions and recommendations contained herein be given consideration for inclusion in municipal capital programming processes.

BIBLIOGRAPHY

Allison, G. T., "Conceptual Models and the Cuban Missle Crisis," American Political Science Review, p. 689-718, September 1969.

Anthony, R. N. and Herzlinger, R. E., Management Control in Nonprofit Organizations, Richard D. Irwin, 1980.

Baumol, W. J., "On the Discount Rate for Public Projects," The Analysis and Evaluation of Public Expenditures: The PPB System, U.S. Congress, Joint Economic Committee, v. 1, p. 489-503, U.S. Government Printing Office, 1969.

Bierman, H. Jr. and Smidt, S., The Capital Budgeting Decision, 3d ed., Macmillan Co., 1971

Birnberg, J. G., Pondy, L. R., and Davis, C. L., "Effect of Three Voting Rules on Resource Allocation Decisions," Management Science, v. 16, p. B356-B370, February 1970.

City of Monterey, California 1979-80 Annual Budget, City of Monterey, California, 1979.

Cyert, R. M. and March, J. G., A Behaviorial Theory of the Firm, Prentice-Hall, 1963.

DeMoville, W., "Capital Budgeting in Municipalities," Management Accounting, v. 59, no. 1, p. 17-20, 28, July 1977.

Easton, A., Complex Managerial Decisions Involving Multiple Objectives, Wiley, 1973.

Ellis,T. Assistant City Manager, City of Monterey, California, Interview, 3 September 1980.

Fajardo, R. P., Capital Budgeting: Guidelines for Procedures, University of California, Santa Barbara, 1976.

Freeman, T. A., Niemi, E. G., and Wilson, P. M., Evaluating Public Expenditures: A Guide for Local Officials, Massachusetts Office of Communities and Development, 1978.

Gordon, G. J., Public Administration in America, St. Martin's Press, 1978.

Helfert, E. A., Techniques of Financial Analysis, Richard D. Irwin, 1977.

Hunt, P. Williams, C. M., and Donaldson, G., Basic Business Finance, 4th ed., Richard D. Irwin, 1971.

International City Management Association, The Municipal Year Book, International City Management Association, 1980.

Lindblom, C. E., "The Science of 'Muddling Through,'" Public Administrative Review, v. 19, p. 79-88, Spring 1959.

Linstone, H. A. and Turoff, M., eds., The Delphi Method: Techniques and Applications, Addison-Wesley, 1975.

Maass, A., "Benefit-Cost Analysis: Its Relevance to Public Investment Decisions," The Quarterly Journal of Economics, v. 80, p., 208-226, May 1966.

Matson, M. C., "Capital Budgeting: Fiscal and Physical Planning," Government Finance, v. 5, no. 3, p. 42-47, 58, August 1976.

Mishan, E. J., Cost Benefit Analysis: An Introduction, Praeger, 1971.

Musgrave, R. A. and Musgrave, P. B., Public Finance in Theory and Practice, 2d ed., McGraw-Hill, 1976.

McNallen, J. B., Zand, D. E., and Lewin, A. Y., "The Use of Models for Analyzing the Budget Decision Making Process," Armed Forces Comptroller, v. 18 (2-4), Spring,Summer, and Fall 1973.

Pardee, F. S., et al., Measurement and Evaluation of Transportation System Effectiveness, The Rand Corporation, 1969.

Petersen, J. E., Spain, C. L., and Laffey, M. F., eds., State and Local Government Finance and Financial Management: A Compendium of Current Research, Government Finance Research Center, 1978.

Pomeranz, F., et al., Auditing in the Public Sector, Coopers and Lybrand, 1976.

Prest, A. R. and Turvey, R., "Cost Benefit Analysis: A survey," The Econmic Journal, v. 15, p. 683-735, December 1965.

Quade, E. S., Analysis for Public Decisions, Elsevier, 1975.

Quirin, G. D., The Capital Expenditure Decision, Richard D. Irwin, 1967.

Rachor, R. L., Working Papers: MN 4155 Audit Project, paper presented at the Naval Postgraduate School, 22 September 1980.

Rachor, R. L. and Hertz, D., Capital Improvement Program Management Audit City of Monterey, paper presented at the Naval Postgraduate School, 22 September 1980.

Rosenberg, P., A Capital Improvement Programming Handbook for Small Cities and Other Governmental Units, Municipal Finance Officers Association, 1978.

Sackman, H., Delphi Critique, Lexington Books, 1975.

"Seaside Faces Default on Auto Center Bonds," Monterey Peninsula Herald, p. 1, 24 October 1980.

Simon, H. A., "The New Science of Management Decision," Management Decision Making, edited by L. A. Welsch and R. M. Cyert, Penguin Books, 1970.

Simpson, C. R. "Municipal Budgeting--A Case of Prioities," Governmental Finance, v. 5, no. 3, p. 12-19, August 1976.

Stamper, L. J., Jacob A. Stockfisch and The Social Discount Rate Revisited, M. S. Thesis, Naval Postgraduate School, Monterey, 1977.

Taylor, D. W., "Decision Making and Problem Solving," Management Decision Making, edited by L. A. Welsch and R. M. Cyert, Penguin Books, 1970.

Toulmin, L. and Clyburn, J., Report of the June 1979 Conference on Local Financial Management, U.S. Government Printing Office, 1980.

Turban, E. and Meredith, J. R., Fundamentals of Management Science, Business Publications, 1977.

U.S. Department of Defense, Economic Analysis Handbook, 2d ed., [n.d.].

Vogt, A. J., Capital Improvement Programming: A Handbook for Local Government Officials, Institute of Government, University of North Carolina at Chapel Hill, 1977.

Vraciu, R. A., Capital Investment Decisions for Hospitals: A Conjoint Measurement Approach, Ph. D. Thesis, Cornell University, University Microfilms International, 1980.

Welsch, L. A. and Cyert, R. M., eds., Management Decision Making, Penguin Books, 1970.

White, M. J.,"Capital Budgeting", State and Local Government Finance and Financial Management: A Compendium of Current Research, p. 42-52, edited by J. E. Petersen, C. L. Spain, and M. F. Laffey, Government Finance Research Center, 1978.

Wildavsky, A., "The Political Economy of Efficiency: Cost-Benefit Analysis, Systems Analysis, and Program Budgeting," Public Administration Review, v. 26, p. 292-311, December 1966.

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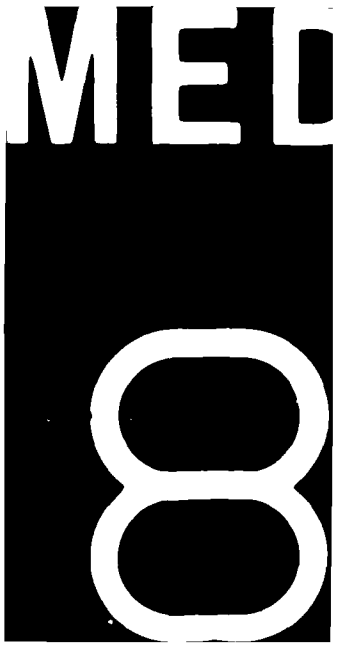
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