



CONSULTING ECONOMISTS

PN-AAU-056

42760

ASSESSING THE COST-EFFECTIVENESS OF PVO PROJECTS:
A GUIDE AND DISCUSSION

Prepared for

Office of Program Management Support
Bureau of Food and Voluntary Assistance
U.S. Agency for International Development

by

Robert R. Nathan Associates, Inc.
Consulting Economists
Washington, D.C.

August 1983

ACKNOWLEDGEMENTS

Ideas in this guide which turn out to be practical and useful are most likely to have originated from the personnel and participants of the more than a hundred PVO projects we have been privileged to work with or visit.

A number of people from U.S. PVOs and similar organizations discussed approaches to assessing cost-effectiveness and commented on a draft of this guide. I profitted especially from field trips and extensive discussions with Armin Schmidt and other personnel of Heifer Project International as we considered project cost-effectiveness in the recent HPI midterm evaluation. PVO and government participants in a seminar conducted by RRNA in June 1983 provided a thorough critique of a previous draft of this guide and offered many suggestions (see Appendix D). Other persons contributing to these discussions, mainly by phone, include Bill Farren of Technoserve; Peter Van Brunt of Save the Children; Carolyn Stremlau of PACT; Jeffrey Ashe of AITEC; John Rigby, formerly of IVS; and Peter Hakin of the Inter-American Foundation. We look forward to the opportunity for further discussion of this guide with representatives of other organizations.

Within the government sector, Judy Gilmore of the AID Bureau of Food and Voluntary Assistance initiated the preparation of this guide and has provided encouragement throughout. Ross Bigelow, Lowell Lynch, Thomas Luche, and Paul Bisek of the same bureau also assisted. Molly Hageboeck of the AID Office of Evaluation, Louis Kuhn of AID Asian Affairs, Robert Young of the AID Bureau of Science and Technology, Jerry Wolgin of AID Office of Economic Analysis, and Charles Vandervort of the Department of Transportation all provided useful information and comment. Gene Ellis discussed his work under government contract, in preparing computer programs for benefit-cost analysis with us.

Documents by Judith Tendler and others were important for this report and are discussed and referenced in Appendices A and B.

Linda Markey, my colleague at Robert R. Nathan Associates, Inc., was responsible for a full reworking of an earlier draft of the guide after the conference with PVO representatives. Caroline Fawcett contributed to the concept and outline of this work and wrote Appendix A on the World Bank experiences. Alan Ellison and Richard Gross of the firm also commented on drafts of the guide.

Theodore Wilde
Robert R. Nathan Associates, Inc.

TABLE OF CONTENTS

<u>Chapter</u>	<u>Page</u>
I. PVO CONSIDERATION OF COST-EFFECTIVENESS -- AN INTRODUCTION	1
Purpose of This Guide	1
Definitions	8
Contents of This Guide	10
II. A CHECKLIST OF COST-EFFECTIVENESS	12
Indicators of Impact on Intended Participants	14
Indicators of Administrative Awareness and Response	22
III. COMPARING COSTS AND MONETARY BENEFITS	26
A Methodology for Study of PVO Projects: Costs and Benefits	26
Interpreting the Results of PVO Performance	28
IV. COMPARING COSTS AND NONMONETARY BENEFITS	35
The Basic Options for the Comparisons	35
The Measurement of Benefits	36
The Measurement of Costs	38
The Calculation of the Cost-Effectiveness Ratio	46
Comparing Benefits and Costs	48
An Example	52
APPENDIX A. RELATIONSHIP OF COST-EFFECTIVENESS ANALYSIS TO OTHER ASPECTS OF PROJECT ASSESSMENT	63
Defining the Project	63
Benefit-Cost Analysis	65
World Bank Efforts	68
Relevant Studies and Literature	71
APPENDIX B. BIBLIOGRAPHY	73

APPENDIX C: SIMPLE AND MORE EXACTING MEASURES OF BENEFITS IN RELATION TO COSTS	76
The Project Model	76
The Time Value of Money	78
When Project Benefits are Higher in Earlier Years	81
When Project Costs are Increasing Over Time	83
When Project Benefits are Erratic	84
Project Design	85
Conclusion	85
APPENDIX D: REVIEW OF COST-EFFECTIVENESS SEMINAR	86

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1 Checklist: Indicators of Cost-Effectiveness	13
2 Estimation of Per Capita or Per Family Income	18
3 Possible Standards of Maximum Costs for PVO Service Projects	20
4 Example of Estimation of Service Project Cost Relative to Income	21
5 Steps in Methodology for Comparing Costs and Benefits in PVO Projects	27
6 An Example of Use of the Methodology for Comparing Costs and Monetary Benefits in PVO Projects	29
7 Examples of Ratios of Costs and Net Benefits in Selected PVO Projects, 1978	30
8 Ranges of Ratios of Benefits to Costs and Their Interpretation	32
9 Checklist of Considerations for Interpreting the Ratio of Net Benefits to Costs	34
10 Annual Cost per Participant Using a Constant Foreign Exchange Rate Throughout the Life of the Project	45
11 Annual Cost per Participant Using the Actual Foreign Exchange Rate Throughout the Life of the Project	45
12 Annual Cost per Participant Using No Adjustment for Inflation	47
13 Annual Cost per Participant Using an Inflation Adjustment Factor	47
14 Example: Measurement of Benefits	53
15 Example: Project Costs, Including Expenditures and Adjustments	55
16 Allocation of Local Agency Administrative Expenditure as a Project Cost	57
17 Example: Comparisons of Benefits with Costs	59

I. PVO CONSIDERATION OF COST-EFFECTIVENESS -- AN INTRODUCTION

Purpose of This Guide

This booklet offers practical guidance for appraising the cost-effectiveness of small development projects, especially those initiated by Private Voluntary Organizations (PVOs).

Users

The guide responds to the interests and needs of the following intended users:

- . PVOs that sponsor small development projects;
- . Local and foreign organizations that operate such projects;
- . The Agency for International Development (AID) which selects and funds projects proposed, sponsored and operated by other organizations.

Needs for Cost-Effectiveness Assessment

This interest in cost-effectiveness relates both to the survival of poor people and to the survival of PVOs:

- . Appraising cost-effectiveness can promote more effective use of resources and thereby increase services and benefits to the intended participants.
- . To remain competitive for private and public resources provided for development, PVOs must be able to test and support the claim that they can reach and serve poor people at lesser cost than large public-sector programs or commercial businesses.

PVOs need and want to improve the quality and quantity of benefits resulting from their expenditures. During site visits to 19 PVO projects in 1982, RRNA evaluators found projects generally performing satisfactorily according to a number of criteria, but the most frequent exceptions were in the area of cost-effectiveness. On the basis of mainly impressionistic considerations, the potential for outstanding PVO performance in cost-effectiveness was indicated by the fact that 11 of the projects were assessed as satisfactory in this regard, of which five appeared "excellent".¹ At the same time, eight of the projects were assessed as unsatisfactory or "borderline" in terms of cost-effectiveness. In an earlier study of 17 PVO projects, Development Alternatives, Inc. (DAI) found similar results: 9 projects having satisfactory or excellent benefit levels in comparison with costs, and 8 projects having low benefit/cost scores.² Certainly the methodologies used in these studies and the information available did not yield precise results for each particular project, but we believe the summary conclusions reflect the larger picture quite reliably.

There seems also to be general agreement within the PVO community on PVOs' need to improve their ability to appraise cost-effectiveness; many PVOs are not able to judge how well they are doing. Even basic information on the number of participants and the level of their benefits is often lacking. And when PVOs do gather the data on project effects, they do not compare these results with costs in a systematic way. In Judith Tandler's widely read report on how well PVOs realize their "articles of faith," she did not even address the claim that PVOs can benefit the poor at relatively low cost. She omitted an assessment of this important claimed PVO advantage "mainly because of the lack

1. Robert R. Nathan Associates, Inc., "An Evaluation of Private Agencies Collaborating Together," prepared for PACT and AID Office of Private and Voluntary Cooperation, June 1982, pp. 89-94.

2. Development Alternatives, Inc., The Development Impact of Private Voluntary Organizations: Kenya and Niger, pp. 20-30, and Figure 7, p. 46. According to the DAI assessment, 7 of the 17 projects had annual benefits to participants of 10 percent or less of the total externally funded project costs over the years. Although not all benefits were quantified, for these particular projects it appears that consideration and quantification of secondary benefits would not likely change the overall conclusion.

of data in the evaluations I read, and the lack of significant evidence on the subject in other literature."¹

PVO Strengths and Problems in
Awareness of Cost-Effectiveness

As stated above, our impression in visiting a broad range of PVO projects is that some perform in an exemplary cost-effective way. Most others can overcome the causes for unsatisfactory performance.

PVOs often bring a number of strengths to the consideration of cost-effectiveness and how to improve it:

- . Most PVO staff members show a willingness to avoid expensive styles of operations. Most personnel work on relatively low salaries, at least by U.S. standards, out of crowded and frugally furnished offices.
- . Most PVOs exhibit a commitment to producing beneficial results for poor participants.
- . PVO staff members are generally frank in discussing project problems and are open to discussing ways to improve performance, including more useful information systems and considerations for achieving better cost-effectiveness.

Problems in achieving acceptable cost-effectiveness performance seem to originate in choices of inappropriate and inefficient approaches to meeting needs. The extent to which project designs and operating methods may be inappropriate is often not fully appreciated because PVO leaders are unaware of cost-effectiveness considerations and lack technical knowledge for appraising cost-effectiveness. Such problems are not hopeless; the causes are amenable to change.

Some specific problems related to cost-effectiveness, which we have encountered, illustrate PVO needs in this regard and also serve as an informal agenda of the kinds of

1. Judith Tendler, Turning Private Voluntary Organizations Into Development Agencies: Questions for Evaluation, AID Program Evaluation Discussion Paper No. 12, Office of Program and Management Support, Bureau of Food and Voluntary Assistance, and Office of Evaluation, Bureau for Program and Policy Coordination, U.S. Agency for International Development, April 1982, p. 6.

issues which this guide addresses. The problems are not peculiar to PVOs, however.

- . Some funding agency or sponsoring organization personnel are unaware of the full project costs or even uninterested in knowing such costs. They count as project costs only the funds the agency has invested itself; resources supplied by other funding organizations, local governments, and participants are incorrectly considered as benefits of the agency's leverage of funds, rather than as costs.
- . The increased and welcome emphasis of the participants' role in evaluation does not help much in assessing cost-effectiveness. Participants who will report on effectiveness of agency performance are often less reliable in assessing cost-effectiveness because they also tend to consider the use of outside funds as having no cost to themselves. (Participants can, however, provide important information on their own costs.)
- . Some PVO representatives fail to consider the opportunity cost of funds, that is, they fail to consider alternative approaches or uses of the funds to produce similar or other benefits. This failure is most common for capital investments in buildings and sometimes in vehicles. Because funds for such investments often come from donations, the implicit opportunity costs are not as apparent as in situations where funds are secured by loans and the accompanying interest payments serve as an immediate reminder of the cost of capital. Rather, PVO personnel speak of "savings" from a capital investment as being equal to the rental and transportation costs that are avoided by the investment, without netting out the investment costs and depreciation.

1. Leverage is no benefit, other than a bureaucratic one. For example, whether five funding agencies each fund a different project in a country or whether they each fund 1/5 of five projects makes no difference to the participants, other than the additional paper work. However, in the latter case, each of the funding organizations might claim that it leveraged four times its own contribution on five different projects. There is some legitimate claim to fame for a funding agency to have been the first or an early major funder of a successful project which other agencies subsequently funded as well, but not in leverage per se.

- . PVOs often operate projects designed to provide subsidies to poor participants; the PVO representatives want to make sure that the intended people get the benefits, but are often less concerned to see whether other forms of subsidy might produce a higher value of benefits or whether other approaches requiring less subsidy might allow more people to be served by the expenditure of resources.
- . Some PVO personnel appear unaware of the level of subsidy implicit in services provided by a salaried staff, both promoters and agency management and support persons.
- . Some PVO personnel provide a highly personalized service to a relatively small number of participants. Although such a project design can result in extremely high built-in cost per participant, PVO personnel may be accustomed to overlooking the negative implications, since they see this mode of operation as providing a positive alternative to larger, less personalized government programs.
- . When the costs of subsidized inputs and services are identified and the question is raised of participant contribution toward these costs, some PVO personnel reply that poor people cannot afford to pay such costs; such personnel may fail to consider the implications of this response for the viability and replicability of the project.
- . Some PVO representatives view continuance and replication of the project in terms of the attraction of further donor funds, rather than of the internal viability and economic sense of the effort.
- . Some PVOs provide monthly financial reports which are unrelated to monthly progress reports; managers fail to consider a comparison of progress and of expenditures as a management tool.
- . In being aware of the difficulties and "dangers" of trying to quantify certain benefits related to institution building, participation, health and education, the PVO personnel fail to collect information on effects that could be readily quantified and even valued, such as increases in production and consumption enjoyed by project participants.

- . PVC representatives often do not consider the implications which the timing of expenditures relative to benefits has on cost-effectiveness; thus, they fail to recognize the true cost of delays in implementation once expenditures have begun.

Uses

The sense of how to assess cost-effectiveness can be useful throughout the life cycle of projects:

- . During the planning phase of project identification, project design, project feasibility analysis, and proposal review;
- . During the implementation phase in monitoring project progress; and
- . For the evaluation of the project at its termination or at regular intervals in deciding whether and how to continue and whether to start similar new efforts.

This guide does not present all aspects of planning, operations, and evaluation, but rather only the considerations of cost-effectiveness that are applicable throughout these project phases.

During the planning phase an awareness of cost-effectiveness concerns and techniques can assist in screening projects to be considered in detail, in identifying and selecting alternative approaches to reach objectives, in defining objectives in quantifiable terms, in determining what target must be set if the project is to be feasible, and in deciding whether proposed project expenditures have the potential for producing proportionate benefits.

During implementation, an awareness of cost-effectiveness considerations can serve to monitor expenditures and program progress in an interrelated way and to identify adjustments in project operations which can improve the level of benefits. Cost-effectiveness analysis can assist in specific management decisions such as whether to rent or build facilities.

During evaluation, the assessment of cost-effectiveness indicates whether a project is "worth" the continued expenditure of funds and whether it would be "worth" the expenditure of funds to start other such projects -- these are

separate decisions. Also, since most evaluations are aimed at improving project performance, rather than at deciding whether or not to continue a project, the cost-effectiveness assessment may help in identifying design changes which can reduce costs or increase benefits.

Limits

Cost-effectiveness analysis is only one concern among many facing project funders and project directors. There can be no cost-effectiveness without effectiveness. An almost single-minded determination to involve and assist participants is certainly a more important characteristic for project leaders than the inclination and ability to collect and analyze information. While an awareness of cost-effectiveness considerations and techniques should certainly be useful to every project funder and leader, it will not be the main skill required to understand poor people's expressions of needs, ascertain root causes of problems, suggest creative solutions and alternatives, enlist community and staff enthusiasm, and implement plans according to schedule.

A recognition of these limits of cost-effectiveness analysis places it in perspective as one tool and skill among a number of others. It is rather misguided to view cost-effectiveness analysis in conflict with central but less quantifiable PVO concerns for the processes of participation and community organization. Assisting participants to understand the long-term financial and economic implications of proposed and ongoing projects helps them have realistic expectations and make implementable plans. It increases poor people's control of the effort. For example, one agricultural loan program assisting community farmer groups not only has its representatives help in calculation of expected costs and revenues, but also has them express these financial results and the loan amount on a per-participant basis. All members are expected to understand the magnitude of obligation undertaken and all, including a substantial number of illiterates, provide their signatures or marks to the agreement.

A concern for project implications in community organization should make PVO leaders avid promoters of cost-effectiveness assessment. Projects which absorb undue resources in comparison with results dampen the group spirit. Even if outside funders can be found to pay the cost of such

projects, local leader and other participants will ultimately recognize the waste. This situation creates cynicism among those involved and leads to an unhealthy kind of dependence on the funding group, rather than community mobilization. Profitable economic development efforts and other cost-effective projects promote organizational success.

Definitions

Working Definitions of Cost-Effectiveness Analysis

Basically, the analysis of cost-effectiveness is the consideration of whether the anticipated or actual results of a project are worth the cost. A more completely stated working definition is as follows:

Cost-effectiveness analysis of a project or enterprise is the systematic comparison of the costs -- that is, the value of the resources used to secure goods and services -- in relation to the effectiveness -- that is, the magnitude and quality of the benefits resulting from the goods and services.

Given the intention that cost-effectiveness analysis should be useful throughout the life of the project, we use the term "analysis" as being appropriate for planning, operations, and evaluations.

In this guide, the application of this working definition of cost-effectiveness analysis relates to and also expands the traditional usage of the term. The expansion in turn carries some practical implications for inclusion of cost-effectiveness considerations in PVO projects.

Traditional Usage

Traditionally, cost-effectiveness analysis is used when project benefits cannot be given a monetary value. This approach to cost-effectiveness analysis avoids the difficult and often imprecise valuation of benefits; sometimes it avoids even their quantification. Its purpose is to ascertain only what is the "least-cost" means to achieve a given level of benefits or outputs. Occasionally the formulation of the cost-effectiveness question is reversed: given alternative means of achieving a certain kind of output or benefit, which of the means will produce the most. Alternative methods or projects can be defined also in terms of cost per unit of some standard output or benefit, with the preferred alternative being the one with lowest unit cost.

This traditional cost-effectiveness analysis does not require any assessment of the "worth" or even of the usefulness of the outputs in relation to the costs. That is, this approach does not try to answer the question: Does this represent a justifiable use of scarce resources; is it worth doing at all?

The discussion of project analysis in AID Handbook 3 indicates an expectation that cost-effectiveness analysis will relate measured outputs and costs in a more specific way. The AID Handbook presents cost-effectiveness analysis in contrast with benefit-cost analysis. Benefit-cost analysis in the AID presentation is the "rate-of-return" analysis for economic or productive projects, to compare the monetary value of input over time with the monetary or market value of product and service outputs. The AID guidance presents cost-effectiveness as the appropriate analytical tool for "social" projects, when the products and services do not produce a dollars-and-cents income, but can still be quantified. The AID guidance also recognizes cost-effectiveness analysis as being appropriate at times for nonquantifiable results, such as technical assistance and institution building.¹

Usage in This Guide

This guide attempts to expand the traditional scope of cost-effectiveness analysis. It uses the term to describe a considered review of benefits in relation to cost by a number of means, including application of qualitative criteria. For PVO projects, cost-effectiveness analysis may well be a practical and preferred tool even when benefits can be valued and benefit-cost analysis would be possible theoretically. In turn, the approach of benefit-cost analysis is important for all assessments of cost-effectiveness. Thus this guide includes considerations of the changing value of money and other resources over time, as does benefit-cost analysis. The difference between benefit-cost and cost-effectiveness analysis is not as great as the formal definitions may indicate. Cost-effectiveness analysis works to make judgments on the basis of less definitive, precise, or complete information than is required by benefit-cost analysis. The relationship of cost-effectiveness analysis to benefit-cost analysis is discussed further in the appendix.

1. AID Handbook 3, Part I, Appendix 5G, February 15, 1978, pp. 5G-2, 5G-3.

A Few Other Terms

Consistent with the use of "analysis," the "analyst" can be engaged in planning, management, or evaluation. We use the term "sponsoring agency" to refer to the umbrella PVO organization, such as a U.S. private non-profit corporation, which funds and possibly administers projects in developing countries. We use "project agency" to refer to the local organization responsible for the management of a given PVO project.

We distinguish between "participants" and "beneficiaries." "Participants" are the people who are directly reached by a project. For example, in an agricultural training program, the farmers who learn about new techniques are the participants. "Beneficiaries" are the people who are indirectly reached by the project. Using the same example, the farmers' families, who benefit from increased yields, are the beneficiaries.

Contents of This Guide

The remaining chapters present three different approaches to assessing the cost-effectiveness of a project. Chapter II offers a checklist of criteria which can be used in a short-term assessment to make initial judgments about project cost-effectiveness. The criteria apply to the benefits for and impact on participants in the first instance; in addition, a second set of criteria refers to indicators of project administrators' awareness of and response to cost-effectiveness considerations. This method of analysis is qualitative and requires a minimum of research.

Chapter III offers an approach for determining the ratio of net benefits to costs based on a number of simplifying assumptions which make it more readily applicable than a full-fledged benefit-cost analysis. This approach requires the valuation of benefits in monetary terms and the use of PVO funding as costs. In terms of information required it is easier than the approach suggested in Chapter IV.

Chapter IV then offers guidance on the analysis of cost-effectiveness when the benefits do not have a monetary value. The chapter presents the calculation of benefits and of costs and means for relating these two variables. The approach presented in this chapter is the most difficult of the three since it requires detailed research.

Appendix A relates the assessment of cost-effectiveness to related issues of project analysis in planning, management, and operations. It discusses the definition of project boundaries, formal benefit-cost analysis, and work in project assessment by the World Bank. Appendix B is a bibliography. Appendix C discusses technical interpretations of the approach presented in Chapter III. Appendix D reviews the AID Cost-Effectiveness Seminar, which gave representatives from PVOs an opportunity to critique the guide.

II. A CHECKLIST OF COST-EFFECTIVENESS

Even without the conduct of a detailed analysis, evaluators and program administrators can consider some indicators of project effectiveness. They can use these indicators to make initial, although not definite, judgments. The indicators can help the evaluator to assess whether the project results achieved are proportionate to costs incurred; or at least the indicators can help check whether the project leadership is trying to make such assessments.

The indicators suggested are organized as a checklist (Table 1). Two kinds of indicators are considered: "Impact on Intended Participants" and "Administrative Awareness and Response." A positive response to any one of the checklist items provides an indicator of cost-effectiveness. Although additional positive responses offer further confirmation, no cumulative scoring system is appropriate, since the checklist is not equally applicable to different kinds of projects, and the indicators are not of equal value. Indicators of "Impact on Intended Participants" should be considered as generally having a higher value than those of "Administrative Awareness and Response."

In any case, more important for the evaluator than a yes-no determination on any checklist item is an understanding of the different factors which contribute positively or negatively to an improvement of project cost-effectiveness. We therefore review the considerations underlying each of the checklist items, especially the indicators of beneficiary impact. In addition, the discussion of each item includes considering the availability of required information. Criteria suggested in the checklist are based on information which can be secured readily, even during a brief field visit. This requirement leads to approximations and rule-of-thumb estimates which will sometimes be off target. Critiquing these indicators may stimulate the analyst to develop her own indicators of cost-effectiveness appropriate to her particular situation.

Table 1. Checklist: Indicators
of Cost-Effectiveness^a

Impact on Intended Participants

1. Farmers or other small businessmen assisted by the project increasingly invest their own funds in their own operations.
2. Cooperative farms and businesses continue without subsidy of their operating budget, while providing payments to members.
3. In projects to increase employment and incomes, annual wages and earnings of participants are greater than operating expenses.
4. Costs per participant are proportionate to the incomes and resources of the participants and their communities.

Administrative Awareness and Response

1. Project agency leaders demonstrate most of these attitudes:
 - . Consider outside funds expended by the agency as part of real cost;
 - . Count participants' expenses as real cost;
 - . Consider investment alternatives;
 - . See management's task as stretching resources rather than expending fixed budget;
 - . Calculate the full range of subsidies involved in assistance to participants;
 - . Consider subsidies as an issue for long-run viability;
 - . View viability in terms of local productivity achieved;
 - . Are interested in information on participant effects and participants' net gains;
 - . Understand impact of delays in decreasing benefits.
2. Operate according to budget reviewed and adjusted annually.
3. Have developed own indicators of project cost-effectiveness.
4. Review progress reports and expenditure reports together.

a. The text is an integral part of this table. Criteria are more fully stated with appropriate qualifications in the text.

Indicators of Impact on Intended Participants

Indicator of Impact #1

Farmers or other small businessmen assisted by the project increasingly invest their own funds in their own operations.

Comment

Verification will have to be second-hand, since investment by participants will not be reflected in the books of the project agency. Nevertheless, such investment is generally well-known in the communities in which it exists; physical signs of such investment are observable as well. For example, farmers may have cleared more land or purchased more livestock than was funded by a project. Small businessmen may have purchased additional equipment or hired additional employees. Repayment of loans is another kind of participant investment.

Although the investment of participants is a cost to the project, it represents their vote of confidence. It indicates that they have made their own positive assessment of the economic viability of the activity promoted by the project, that the benefits can cover the costs. It also indicates that gains for participants represent more than an absorption of subsidies. To be sure, participants' investments can represent their own subsidy of an unviable project. Members of one agricultural coop sold livestock to help pay the debt on a seldom-used tractor. But this incident has been an exception in our experiences which generally have confirmed that poor participants will be shrewd in the investment of their own funds.

Indicator of Impact #2

Cooperative farms and cooperative businesses receiving direct project assistance continue after a few years without subsidy of their operating budget, while returning either payment for labor or a net operating profit to member participants, and while maintaining their capital.

Comment

Cooperatives may continue in unprofitable operations by living off their initial investment and subsequent subsidies. So it takes some care to ascertain whether a continuing operation will be sound and feasible in the long run.

Although it may seem that the evaluators must gain an in-depth knowledge to apply this criterion, the required information is usually readily available. The sponsoring agency can usually confirm direct subsidies. The project administration should know about wages or cash distribution paid by the cooperative to members. Without any such payment, that is, with only unpaid labor from participants, the project may break even, but is really being subsidized by the intended participants. Two factors may mitigate this requirement: the possibility that unpaid participants may realize profits as long-range capital gain; and the lower expectation for the start-up years of the project. We consider each of these factors briefly.

Instead of receiving cash, coop members may be benefitting from an improvement in the value of the coop (a kind of long-range capital gain). This requires the maintenance of capital, which is essential for the economic viability in any case. Among the different signs of maintenance of capital are the following: maintenance of equipment such as trucks and farm machinery; maintenance of a replacement fund; and being current in repayment of capital loans. Being current in capital loan repayment is the equivalent of maintaining a replacement fund, since with a repaid loan it is possible to borrow again when equipment needs replacement.

In the early years of a coop, various kinds of subsidies may be part of the original project plan. For projects less than three or four years old, the indicators of cost-effectiveness can be a sharp decrease in subsidies each year, rather than the attainment of self-sufficiency. This standard reflects the unlikelihood that the kind of projects supported by PVOs could meet the test of economic feasibility if the period between investments and initial operating losses on the one hand precedes by too long a time the attainment of positive net benefits.

Indicator of Impact #3

In projects to increase employment and incomes, such as employment training programs or craft promotion, annual wages and earnings of previously unemployed or underemployed persons are greater than current operating expenses.

Comment

Application of this criterion requires some information on the employment results of the intended participants after

their graduation from the project. This information would be required in any case for any evaluation of employment training or craft promotion projects.

A determination of the number of training graduates employed at any given time should be based on persons who have been hired soon after leaving the program. (Including persons employed at some later time is likely to overstate employment at any one time, since people move in and out of employment; also delayed employment is less likely to be caused by the project.) The determination of the number of persons employed in handicrafts after involvement in the craft promotion and training project should be based on those working at a given time, not on the sum of those who have subsequently worked in crafts at one time or another.

Precise data on the annual earnings of program graduates will not be available. The number of persons who have been hired soon after leaving the training program can be multiplied by the usual minimum wage in the area and then by the expected days of annual work for such employees.

The number of people employed in crafts at any given time can be multiplied by the estimated earnings of a typical craftsperson (based on at least a few interviews). Some craft promotion programs which provide marketing for all participants' production may be able to use information on participants' gross revenues to estimate earnings net of producers' material costs.

Once a program has been operating five or more years, the estimated current annual earnings of all graduates or participants should approximate or exceed the current annual operating costs of the program. Or the annual rate earnings of the past year's graduates should be at least one-fifth the annual project operating expenses.

This may seem like a harsh standard, since the operating cost represents an investment in human capital with a hoped-for flow of benefits over a period of years. However, before achieving full operation, employment promotion programs usually require one or two years of preparation so that facilities can be prepared, equipment purchased, and project staff trained. Such investment costs are in addition to the annual operating costs. Under such circumstances in an economic sense the annual benefits must reach the level of annual operating expenses within a half decade or so. Otherwise, once the value of time is considered as well, the return on investment will be so delayed as to be of less value than the initial expenditure.

Indicator of Impact #4

In projects which are delivering services effectively to participants, costs per participant are proportionate to the incomes and resources of the participants and their communities.

Comment

The identification of who is and is not a project participant can be especially difficult in various types of service projects, although this question is part of all planning, monitoring, and evaluation, not just of cost-effectiveness assessments. Each project has to determine its own realistic standards of which persons have benefitted in some describable way. The number of beneficiaries can be expressed in terms of families or of total persons in these family units, with the choice depending on the type of project. A community anti-malaria campaign benefits all the people in the community. A project to help families grow more vegetables or build latrines should count all family (or household) members as beneficiaries. A literacy course or well-baby clinic should count participants, even though families and communities benefit in an indirect way from all such efforts. A thorough discussion on the potential inconsistencies of participant and beneficiary counting lies outside the scope of this guide.

We would prefer to measure costs against the intended results, not just against the number of project participants. For example, we want to know how many persons became functionally literate, not just how many enrolled in a literacy course. However, the measurement of such a program's results in relation to costs generally requires more exacting information than is available for preliminary assessments. (Such analysis is the subject of the cost-effectiveness ratios discussed in Chapter IV.)

We suggest that project cost per participant or beneficiary be expressed as a percentage of the average individual or family income. The average income can be estimated from general data sources (Table 2). It can be expressed in terms of national average income or of average for the poorest population. The steps for calculating the suggested percentage relationship are as follows:

- . Select whether it is appropriate to express costs in terms of number of participants or of beneficiaries;

Table 2. Estimation of Per Capita
or Per Family Income

National or poor population	Participants	Families as Beneficiaries
<p>Gross National Product: If the government or a similar institution from society-at-large is to continue paying for the project service after PVO support ends.</p>	<p>1. Take national GNP per capita.</p>	<p>2. Multiply (1) by national average household size. Or just use national per household GNP if available.</p>
<p>Poor population income: If poor participants or a local community organization are to continue the project after PVO support ends.</p>	<p>3. Take (1), multiply by 0.8 to estimate national income^a and then by 0.33 to account for the fact that people in the poorest fifth of the population generally do not have the average income.^b The combination of both steps is a multiplier of approximately 0.25. That is, multiply (1) by 0.25.</p>	<p>4. Multiply (3) by the average family size in project area. (Use figure from national census, if available.)</p>

a. Generally per capita income is approximately 80 percent of per capita GNP.

b. In most developing countries, the poorest 20 percent of the population have approximately 6.5 percent of the income. That is, their actual 6.5 percent of income is about one-third of the 20 percent of income which would be an average share.

- . The cost per participant or beneficiary: annual project cost (including depreciation) is divided by reported number of participants or beneficiaries;
- . Average income: Select average for nation or for poor population group based on expectation of who is later to supply the resources for the continuance of the project; select per capita or per family average consistent with expression of project cost (Table 2).;
- . The criterion as a whole: divide annual cost per participant by the average income per participant.

What percentage of project per capita cost to participants' average income is "proportionate" for a cost-effective project? The expectation for long-range continuance gives a clue. Most service programs, such as adult literacy, health care, agricultural extension, and community organization, are initiated with the intention by PVO leaders that the projects will be supported eventually by the participants or by indigenous governments. Therefore, the costs during the "demonstration" period must be in line with what individuals and local organizations might later be able to and want to spend for such services. Costs of project services could hardly be "proportionate" if they are as high as 50 percent of income, for example, since poor families and poor communities will have to spend more than half their income on basic food and shelter. Realistically, the percentage has to be much less, since families and societies must divide their income among many needs. We could take as an example of the maximum reasonable proportion of income expended for a given service the percentage of national product spent for that service in selected developing countries. We chose as examples those countries which commit the relatively highest levels of resources for such purposes. For sectors of education and public health, the percentage of national resources expended would invariably be less than 10 percent (Table 3).

Table 3. Possible Standards of Maximum Costs for PVO Service Projects

<u>Service</u>	<u>Maximum percentage of cost per person in relation to income per person</u>	<u>Source of standard</u>
Education	8 percent	Jamaica, expenditure for public education as percentage of GNP, 1978
Health	4 percent	Panama, central government expenditure for health as percentage of GNP, 1978

Source: World Bank, Development Report, 1981; RRNA calculations.

There are flaws in such a rule-of-thumb standard, but they do not appear fatal, provided the analyst regards it as offering an illustrative and not an absolute criterion. Good education and health projects which cost relatively more than the suggested limits might still be cost-effective in temporarily focusing a greater-than-average share of resources to produce potentially permanent benefits, such as in adult literacy education or pre-natal care. But such refined judgments could not be made without considerable additional study. So we are left with a rule-of-thumb which is, after all, quite liberal. The standard proportions are selected from high-spending, relatively high-income developing countries. Still, many PVO projects will not meet this standard.

It is possible that the comparison of project costs with per capita income will result in especially stringent assessments of the cost-effectiveness of projects addressed to the lowest income groups and poorest countries, since the expenditure will be a higher proportion of such participants' and beneficiaries' income. Likewise assessments will be more stringent for efforts in which the participants themselves are finally to continue the services. In such instances, the potentially available future resources for continuing the project will be even less than the developing country average national per capita income. Thus for a given level of expenditure per participant or beneficiary, a project will appear less cost-effective if it is in a poor country and if poor people are expected to assume the cost (see Table 4).

Table 4. Example of Estimation of Service Project Cost Relative to Income

- . . Annual costs of a successfully implemented nutrition education program = \$50,000, including depreciation of 2 vehicles.
- . . Participants are 400 mothers from households with very low incomes; since whole families benefit, multiply by estimated average household size of 5; $400 \times 5 = 2,000$ beneficiaries.
- . Annual costs per beneficiary = $\$50,000 \div 2,000 = \25 .
- . Only income figure known is national per capita GNP = \$600.
- . Since poor participants are expected to carry on this program by themselves after 3 years, adjust national per capita GNP to estimate per capita income of poorest fifth of population. Multiply per capita GNP of \$600 by 0.25 (see Table 2, item 3) to yield estimate of \$150 annual per capita income of relatively poorest population.
- . Cost per beneficiary as percentage of income; $\$25 \div \$150 = 0.167$, or approximately 17 percent.
- . Test of standard: this 17 percent is much more than 4 percent maximum standard for health programs (see Table 3), so project does not appear cost-effective by this criterion. This does not mean that the project is not a cost-effective effort, only that it cannot be ascertained as such by this rule-of-thumb indicator.
- . Comment: 17 percent is a significant proportion of beneficiaries estimated income. The project must certainly continue to yield substantial benefits in food savings, and identifiable improvements in family health if local participants are to assume the costs out of their own resources within a few years.

However, this is not the perverse result it might appear to be. It is precisely in the poorest countries that project design and operations must provide an especially low-cost, economized approach to service delivery if local participants and organizations are ever to support their own services. Projects in such situations must translate the potentially lower staff costs and other potential cost advantages in poor communities into actual lower per capita costs for delivering services. Once this adaptation to the local resources is accomplished, the projects in poorer countries will display lower costs per participant than can usually be achieved in higher income locations. Then, if the sponsoring organization directs its resources into projects where greater numbers of poor people can be assisted for a given expenditure, the results of applying such cost-effectiveness criteria can be to make poor communities far more "competitive" for program funds.

Indicators of Administrative Awareness and Response

Often, the analyst concerned about cost-effectiveness must rely on indicators concerning the project organization and its administration, rather than on indicators concerning the impact on intended participants. In such instances, the analyst can still check whether the project agency leaders are aware of issues of cost-effectiveness and how they are trying to translate this awareness into cost-effective practices. We list these administrative indicators and then comment on them together.

Indicator of Administration #1

Project leaders demonstrate most of these attitudes:

- . Consider both outside and local funds expended as real costs of the project;
- . Count participants' expenditures as real cost as well, even if they are not channelled through the local agency; try to ascertain the amount of participants' costs;
- . Consider costs of investments in terms of other uses of investment funds foregone, including interest earnings which would be available if funds were deposited in a savings account;

- . Are aware of and have calculated magnitude of project subsidies to individual and cooperative enterprises assisted; consider as subsidy to participants the salary costs of personnel who provide services;
- . Have a sense of the project managers' responsibility to "stretch" a given amount of resources to improve benefits or broaden the number of participants, rather than a sense of having a fixed sum budget which must be spent;
- . Consider implications of subsidies for the long-run viability of the project and for participants' ability to achieve ultimate self-support of the project;
- . View viability in terms of value of productivity and social benefits generated, rather than in terms of ability to attract further outside resources;
- . Are interested in obtaining information on effects on participants and their own contributions to enterprises assisted by the project; calculate economic impacts in terms of net benefits;
- . Understand that delays in implementation decrease the value of benefits relative to costs incurred previously by the project.

Indicator of Administration #2

The project agency leaders operate according to a budget which is reviewed annually; the annual review includes consideration of operational changes to better meet project objectives and adjustment of plans and budgets to implement changes selected.

Indicator of Administration #3

Project agency leaders have developed or adapted indicators of project cost-effectiveness. These indicators need to be based on the collection and analysis of basic data on project results.

Indicator of Administration #4

The project agency director and leaders personally review progress reports and expenditure reports which are

submitted to the sponsoring agency and funding agencies; the progress and expenditures are reviewed together by the same person or group.

Comment

The kind of checklists proposed in this guide can serve as an agenda for an internal staff seminar. Evaluators from outside the project and other outside analysts will generally have to infer the project leadership's awareness of cost-effectiveness considerations from interviews. The processes used for budgeting, budget review, and management information are indicated in part by the project agency's documents, including its programmatic and financial progress reports. However, assessing how project staff actually use such documentation and information will again depend on interviews of the staff. The analyst can review budgets and progress reports with staff members, letting the staff members explain the significance of various items and the conclusions and applications they draw from the information they have gathered.

The first indicator concerns the awareness of some basic cost-effectiveness factors. These items complement the problems of insufficient awareness of such factors identified in the introductory chapter. We have visited a number of local PVO agencies in which the project leadership may not have had a sophisticated education in management and accounting, but had a strong sense of the need for cost-effective approaches and an ability to implement them. Such leaders view each new proposal and its proposed budget in terms of what else could be accomplished with the same use of funds. Such leaders often seem to come from organizations which operated on minimal outside funds for many years. They exemplify the sense of stretching a given amount of resources to improve benefits or broaden the number of participants.

The other indicators concern the application of this awareness throughout the project administrative cycle in planning and budgeting, in determining information needs and obtaining the required information, and in using the information to assess results and make necessary administrative changes. The last indicator concerns an essential administrative step. Unless one administrative person or possibly a staff group is reviewing the outflow of expenditures and comparing these with the progress made in the program, there is little opportunity for all the carefully collected information to result in project design changes and operational changes for improved cost-effectiveness in serving participants. Many PVOs have greatly upgraded their

accounting staffs and improved their keeping of financial accounts in recent years. This in itself can have some beneficial effect in raising awareness of cost factors. But this specialization of accountants and bookkeepers may lead the project administrative staff to "over-delegate" responsibility for reviewing financial reports. The improved financial information viewed must be applied in conjunction with programmatic progress reports. The summary financial and programmatic information might best appear together on the same report page to encourage consideration at one time by those responsible for the project performance as a whole.

III. COMPARING COSTS AND MONETARY BENEFITS

A Methodology for Study of PVO Projects: Costs and Benefits

The analyst can usefully compare costs and benefits which are expressible in monetary values, even if resources of time and analytical experience do not allow for a full benefit-cost study in the technical sense. In an AID-sponsored study of PVO effectiveness, Development Alternatives, Inc., presented a streamlined approach for assessing project monetary benefits in relation to costs. This approach compares the value of net benefits in the most recent year with investment costs based on the total external funds received by a project over the years. Evaluators tested the approach in short-term field work with PVO projects in Kenya and Niger. Procuring the information required for such an assessment of cost-effectiveness is a reasonable, although demanding, task. This approach has components which an analyst can assemble in days or perhaps a few weeks of study (Table 5). The total of external funds received to date by a project are generally the most secure data available. The proposed approach does not ignore investment resources raised locally and contributed by project participants, but rather counts all expenditures from local contributions as a component (to be subtracted) of net benefits for the most recent project year.

The focus on net benefits occurring in the most recent year, rather than in the entire project period to date eases the data collection effort. Information for this most recent period -- both on gross benefits and on current costs -- is gathered from current records, or at least can be estimated on the basis of discussion with the current participants and project field staff. Nevertheless, estimating benefits and project values is difficult -- more difficult than the estimations required for the checklist indicators

1. Development Alternative, Inc., The Development Impact of Private Voluntary Organizations: Kenya and Niger, Development Alternatives, Inc., 1979.

Table 5. Steps in Methodology for Comparing Costs and Benefits^a in PVO Projects

- . The analyst expresses all costs and benefits on a per participant (or per beneficiary) basis.
- . The analyst takes as the project investment cost per participant all contributions of outside funds to the project to date, divided by number of participants.
- . The analyst calculates gross benefits per participant (before subtraction of costs) as the value of all benefits in the most recent year (or the current rate of total benefits projected to a 12-month period), divided by number of participants.
- . The analyst takes as recurring costs the operational expenditures anticipated in the current annual budget of the project, plus expenses incurred by participants which are not incorporated in the project budget, divided by the number of participants.
- . The analyst calculates net benefits per participant for the most recent year as gross benefits per participant minus recurring cost per participant.
- . Dividing net annual benefits per participant by the investment cost per participant yields a ratio of benefits to costs.^a

a. Although the measure of comparison used is a ratio of benefits to costs, we avoid the term "benefit-cost ratio" in this instance because that is a technical term, implying use of discounted benefits and cost streams.

Source: Development Alternatives, Inc., The Development Impact of Private Voluntary Organizations: Kenya and Niger, 1979. (Adapted by RRNA).

in the previous chapter. Estimating the monetary value of benefits requires digging out available information.¹ The estimations require care and a certain conservatism as well, since the results are sensitive to the assumptions made in valuing the benefits. The Development Alternatives study had to make a number of bold assumptions about which observed increases in agricultural productivity were attributable to the projects. For example, the analysis of an agricultural project where new high-yielding seeds are distributed to the participating farm families counts benefits of increased yields of millet, sorghum, and legumes. Benefits accruing to the PVO's investment are the difference between the farmer's normal yields and the higher yields he realizes by using the new seeds. It would be incorrect to take the value of the farmer's entire crop in the year of the evaluation as benefits, since he would have harvested crops even without the project. In this case, an estimate must be made of the value of the crop without the project. This sometimes requires guesses about past years.

An example from the Development Alternatives study illustrates the application of the steps in the methodology (Table 6).

Interpreting the Results of PVO Performance

Interpreting the results of PVO project performance using ratios of net benefits to costs is a task which must be approached cautiously. A set of different projects, based on projects assessed in the DAI study illustrates the possible use of this tool for project planning and evaluation (Table 7). All of the projects listed were undertaken in the same region of a developing country. Therefore, the local conditions were similar. More importantly, all of the

1. The analysis of projects without production benefits, i.e., those which can not be given a currency value, should follow the guidelines set up in Chapter IV. Examples would be potable water projects or training projects. These types of projects are so disparate in intent and result from projects which yield productive benefits, such as increased yields, that using the same method to compare them is rather like comparing apples and horses.

Table 6. An Example of Use of the Methodology
for Comparing Costs and Monetary
Benefits in PVO Projects

Estimation According to Steps in Methodology

Project to promote garden agriculture irrigated by shallow wells and to organize participants for sale of produce:

- . Project has 494 household participants.
- . Outside funding received 1974-78 = \$470,000; divided by 494 = \$951 per participant.
- . Of 494 existed gardens, 164 were attributed as reopened due to the project; output for two crops annually valued @ \$826 per plot (on basis of known plot size and yields experienced by crop). Total gross value of reopened plots = $(164 \times 826) = \$135,464$. Of remaining 330 gardens, 20 percent increases in production and market value were assumed due to the project, valued for two crops @ \$276 per plot. Total gross value of increases in these remaining plots = $(330 \times 276) = \$91,080$. Total gross value = $(\$135,464 + 91,080) = \$226,544$. Total gross value per participant = $(\$226,544 \div 494) = \459 per participant.
- . Recurring costs attributable to the project = \$101 per participant.
- . Net benefits = $(459 - 101) = \$358$ per participant.
- . Ratio of annual net benefits per participant to total cost per participant = $(358 \div 951) = 0.38$.

Source: Development Alternatives, Inc., The Development Impact of Private Voluntary Organizations: Kenya and Niger, 1979. (Adapted by RRNA).

Table 7. Examples of Ratios of Costs and Net Benefits^a in Selected PVO Projects, 1978

Project	Type of Project	Number of beneficiaries	Year of project	Outside cost per beneficiary to date of study	Net annual benefits per beneficiary in most recent year ^b	Ratio of net benefits to cost
A	Agriculture	1960 households	4	29	23	0.79
B	Agriculture	494 households	4	951	358	0.38
C	Livestock, agriculture, transportation	251 households	2	554	54	0.10
D	Animal husbandry	120 households	3	2,617	200	0.08

a. Although the measure used is a ratio of net benefits to costs, we avoid the term "benefit-cost ratio" in this instance, because the technical usage implies the use of discounted benefit and cost stream, which has not been done in these examples.

b. Annual benefits per beneficiary less the recurring costs per beneficiary by the project and by the beneficiary themselves.

Source: Development Alternatives, Inc., The Development Impact of Private Voluntary Organizations: Kenya and Niger, 1979, Figure 3 and 4, pp. 22-23 and Appendix A.

projects have benefits which can be given a currency value (crops in the cases of Projects A and B; livestock in the cases of Projects C and D).¹

The example illustrates the great variation in levels of costs, benefits, and the ratios of these two variables. This difference will be common in most PVO assessments that compare different projects. The differences in project size should not preclude a comparison of the ratios of net benefits to costs. In other words, despite the fact that we are comparing small and large projects, the ratios will indicate real differences in comparable cost-effectiveness.

The results of the ratio analysis can be interpreted in two ways. First, they can be interpreted as indicating a greatly simplified annual rate of return of investment; that is, .51 would indicate that 51 percent of the project costs are paid back by one year's net benefits, not accounting for any value of time elapsed. A second way of interpreting these ratios is to view them as indicating the number of years necessary to produce net benefits which in aggregate would be equal to outside funds invested in the project. Thus a ratio of .51 implies that it would take approximately two years for the projects to break even, provided that the project is self sufficient thereafter and no longer receives outside funds. (This number of years is calculated by dividing .51 into 1.00.) As with the first interpretation, the issues are greatly oversimplified. For a full explanation of the implications of these interpretations, see Appendix C.

When comparing projects, the analyst should interpret ratios in terms of the general scale of differences as in Table 8, and not in terms of small variations from one project to the other. Using the scale to interpret the sample projects in Table 7 produces the following results. Projects A, with a ratio of .79, and B, with a ratio of .38, are probably cost-effective. Project A requires less than two years of full benefits to "repay" the outside funding while Project B would require approximately three years of full benefits. Since both are agricultural projects additional years of full benefits are likely. Project C, with a ratio of .10, and D, with a ratio of .08, are probably not cost-effective. Project C would have to produce benefits for ten years in order to cover project investment costs. It seems

1. The result of the evaluation of these projects is specific to them. It should not be interpreted as meaning that in all cases agricultural projects are more productive than livestock projects.

Table 8. Ranges of Ratios of Benefits
to Costs and Their Interpretation

Ratio value	Interpretation
Ratios greater than 1.0:	The project is an excellent one. Full benefits, if they continue for several years, are more than adequate to cover outside funding.
Ratios from .31 to .99:	The project is probably cost-effective. The more years that the project is able to generate full benefits without additional infusion of outside funds, the better the project looks.
Ratios from .0 to .31:	The project is probably not cost-effective in an economic sense when the impact of inflation and the value of time are taken into account (see Appendix C). It would require many years of full benefits to cover outside funding.
Ratios less than .0:	The project is not cost-effective. The benefits can not even pay for local operating costs.

Source: RRNA.

unlikely that the transportation component of the project could continue to function for that long a time without new outside contributions. Project D would require nearly 13 years of full benefits to cover project costs. Given the nature of the project, it may be possible that substantial benefits from the initial investment could continue that long. However, it seems unlikely that benefits in the distant future would be mainly attributable to the initial investment.

After the calculation and interpretation of project results, a final step completes the analysis. Because of the limits of the ratio of net benefits to costs (explained in detail in Appendix C), further considerations should be part of the analysis as indicated in the checklist provided (Table 9).

Applying the criteria to the sample projects in Table 7 shows how a careful analyst can avoid some biases when comparing projects. For example, Project C was evaluated in its second year. Possibly, a full level of benefits had not yet been reached. Perhaps all the targeted households had not yet been contacted or transportation infrastructure was not yet completed. The same limitations apply to the interpretation of the ratio for Project D. Project A and B are relatively mature projects where all outside contributions have been made. For these projects an analyst must determine whether or not the level of benefits observed in the year of the evaluation are sustainable over time.

The ratio of net benefits to costs is an easy-to-calculate indicator of the relative cost-effectiveness of a project. When used carefully it can add to the pool of other inputs which go into the decision making process. However, the ratio should not be used in isolation as the only criterion for judging project acceptability nor should it be used as a tool for distinguishing among projects whose ratios fall into the same range. Nevertheless, this method helps interpret available information and can raise cost consciousness.

Table 9. Checklist of Considerations for
Interpreting the Ratio of Net Benefits to Costs

Question	Interpretation
<u>Benefits</u>	
1. Was the project evaluated in a year when benefits had reached their full level?	If projects in early stages of implementation are compared with mature projects which have reached full benefits, a newer project may appear relatively less favorable than it really is.
2. Will benefits continue at a similar level for a substantial number of years?	To the extent that a given project's benefits continue considerably longer than for other projects, the project's current ratio will understate its true relative value.
3. Were benefits larger in years prior to the evaluation than during the year of the evaluation?	If the project returned larger benefits in earlier years it may have already reached the breakeven point and the ratio may understate the level of benefits relative to other projects with similar ratios.
<u>Costs</u>	
1. Have all outside contributions to the project been completed at the time of the evaluation?	If this is not the case, the ratio may overstate the relative cost-effectiveness of the project since total outside costs are not included in the calculation.
2. Are the outside contributions large in the first year and gradually reduced?	If this is not the case, the ratio may overstate the relative real benefits in an economic sense when considering the time value of money (see Appendix C).

Source: RRNA.

IV. COMPARING COSTS AND NONMONETARY BENEFITS

The Basic Options for the Comparisons

The traditional method of cost-effectiveness analysis is the comparison of nonmonetary benefits in some ratio to costs. We consider ways of drawing such comparisons in this chapter.

As indicated in the definition of cost-effectiveness analysis (Chapter I), project effectiveness in producing benefits can be assessed through a number of ratios, all of them basically related:

- . The analyst compares the differing levels of benefits which can be reached by various approaches for a given cost;
- . The analyst compares the differing costs of various approaches to reach a given level of benefits; or
- . The analyst compares a cost per unit or measure of benefits (in nonmonetary terms).

For a given ratio to be interpreted, it needs to be compared with some other ratio or standard. A given result can be compared with the following:

- . With other known factors or ratios;
- . With changes over time in a given project;
- . With alternative approaches within a given project;
- . With other projects.

This requires the following analytical tasks:

- . The measurement of benefits;

- . The measurement of costs; and
- . The comparison of the two.

The Measurement of Benefits

Definition of Benefits

Assessing cost-effectiveness requires a quite careful definition of benefits and of quantified indicators, which begins in the project planning stage. Planning for PVO projects -- at least for those projects receiving AID funds -- generally includes some definition of expectations arranged according to a logical framework or similar structure. The project plan defines objectives for numbers of participants and kinds of benefits, the anticipated levels of these benefits, measurements or indicators of these benefits, and ways of verifying the required information. Furthermore, the framework specifies the logical relationship between the project activities and the benefits, and ways of ascertaining whether benefits observed have been caused by these activities.

Obtaining the kind of quantified information required to assess cost-effectiveness will require many PVOs to supplement their concern about quality of service with attention to quantifying the degree to which a project has met its objectives.

However, a large-scale academic exercise is not necessary. Each project staff will have to work out indicators in light of what it wants to know for its management needs. The choice of indicators must also reflect what the agency can find out without incurring great expense, without taking too much time of operational staff for recordkeeping, and without imposing too much on participants and their privacy. Certainly the development of such indicators is as much an art as a science. The seven-page listing of benefit indicators in the AID Draft Evaluation Handbook¹ provides many possibilities, but experience in specific projects will suggest additional indicators as well.

It is possible and generally theoretically correct to discount future nonmonetary benefits, in the same way that monetary ones are discounted in benefit-cost analysis and in

1. AID, Program Evaluation Systems Division, Office of Evaluation, Bureau for Program and Policy Coordination, Draft AID Evaluation Handbook, August 1980, pp. G-5 to G-13.

the calculation of the break-even year.¹ The essential point is that current benefits are more desirable than future ones. For example, a child being nourished this year is preferred to a child being nourished 5 years in the future, just as a dollar of current earnings is worth more than a dollar received five years later. This discounting of benefits is generally impractical, however. Nevertheless, the analyst can keep the greater value of current benefits in mind as a qualitative consideration.

The Choice of Indicators

Consider, for example, a PVO project to establish and maintain child nutrition centers. Initially the agency may be concerned only with keeping track of the number of villages establishing a center. However, agency personnel soon will want to know whether the resources expended are providing services and are utilized by community people. More importantly, they will want to know whether the project is improving children's nutrition. The agency may collect some of the following kinds of information about access to the program:

- . Number of visits the staff director has made to each village;
- . Number of days the village para-professional has had a given center open;
- . The number of mothers who have visited;
- . The number of times the mothers have visited;
- . The number of these mothers' children age 6 and under;
- . The number of nutrition courses given;
- . Attendance at nutrition courses; and
- . The number of packages of vegetable seed distributed.

1. Dean T. Jamison, Steven J. Klees, Stuart J. Wells, Economics and Educational Planning Group, Educational Testing Service, Cost Analysis for Educational Planning and Evaluation Methodology and Application to Instructional Technology, AID Studies in Educational Technology, Office of Education and Human Resources, Bureau for Technical Assistance, 1976, pp. 20-26.

To assess achievement of project objectives of improving children's nutrition, the agency may collect some of the following kinds of information:

- . Number of mothers initiating certain preferred nutritional practices, such as serving local vegetables;
- . Number of families initiating vegetable gardens;
- . Produce harvested from such vegetable gardens;
- . Weight gain of children in the program, expressed in kilos or a percentage change;
- . Number of children moving out of malnourished classification;
- . Number of children moving out of malnourished classification who are still satisfactorily nourished 6 months later; and
- . Mortality rate of children under 6 years of age.

The agency will not collect all these data. It will want to secure some information on staff performance and access of participants to services because this is the cheapest and most verifiable information to collect. It will want to know the number of different participants involved. The agency will want some additional data on achievement of project objectives which it can compare with the project costs.

These indicators alone do not provide a framework for scientific verification of causality. It will usually not be practical, for example, to weigh children not participating in the program as well as those in the program so that difference in weight gain between the two groups can be determined. For many projects, the link between program activity and benefits observed will have to be inferred or based on the judgments of project field staff and participants.

The Measurement of Costs

Measurements and Adjustments

Usually financial records of expenditures by the local or sponsoring organization provide the basis for determining

costs; but the analyst of cost-effectiveness may need to make some adjustments to the figures received. The possible decisions and adjustments in relation to costs reported by the project agency are as follows:

- . Determination of the source of financial records;
- . Confirmation of project boundaries;
- . Determination of the period to be considered;
- . Allocation of shared costs of local agency and of sponsoring agency;
- . Allocation of direct cost of the sponsoring agency;
- . Inclusion of expenditure of funds from all sources;
- . Valuation of in-kind contributions;
- . Treatment of capital and depreciation;
- . Adjustment for changes in foreign exchange rates;
- . Adjustment for inflation; and
- . Accounting for value of time.

We now consider each of these items. Considerable detail is appropriate for the purpose of this analysis, since working through these issues can raise awareness of cost factors.

Determination of the source of financial records. Use local agency audited accounts, if possible, otherwise local agency unaudited accounts. In some instances, sponsoring agency records of local expenditure may be more reliable, but usually these are less complete than the local organization's own accounting records. Of course, sponsoring agency records are the source of data on sponsoring agency costs to be charged to the project, as discussed below.

Confirmation of project boundaries. When the project agency operates more than one project or when the project has a number of components, it is important it define the limits of the assessment at the start (see Appendix A).

Determination of the period to be considered. Generally, use the most recent completed year or fiscal year, even if an audited report is not available. Alternatively, for locally incurred costs, estimate the current level of weekly or monthly expenditures, and express them on a 12-month basis.

Allocation of shared costs of local agency. Where a local project agency administration supports a number of projects, organizational costs will have to be allocated among the various projects, including the project being assessed. Allocation can be on the basis of the relative operational costs of the various projects being served:

- . Add the total agency operational cost for all its projects;
- . Take the cost of the project being assessed as percent of the above total;
- . Apply this percentage to the agency administrative cost; and
- . Add the result to the operational cost of the project being assessed.

Although this conventional allocation procedure is not a wholly satisfactory method, alternatives are usually complex and do not necessarily yield a better estimate. In planning for a new project, the project agency should allocate as an administrative cost of the project only the additional agency administrative costs incurred because of the new project (not the proportional share). Once a group of projects is in operation, however, it is impossible to designate which projects bear responsibility for the bulk of agency administrative costs and which are marginal. So the averaging procedure becomes appropriate (see Table 16).

Allocation of direct costs of sponsoring agency. It is essential to allocate to the project the costs of an outside sponsoring or parent agency which are directly related to project operations. If the analyst fails to make such an allocation, independent local agencies with no outside sponsor, which have to absorb all their administrative expenses, may erroneously appear relatively more expensive administratively than agencies auxiliated with overseas parent organizations, which have some administrative expenditures covered under the budget of the parent agency. Expenses of the sponsoring agency which are purely for the administration of grant funds need not be counted, for such costs of grant administration by funding agencies would not

fall within the accounts of an independent agency either. However, the following sponsoring agency expenditures on behalf of a local agency should be added to the local project costs: technical assistance, training, consultation and staff conferences, purchase and shipping of equipment, and evaluation. An estimate by the sponsoring agency should be adequate to value the staff time, travel and communications expenditure in support of a project.

Inclusion of expenditure of funds from all sources. All expenditures of the project, whether from the main funding agency or other sources, should be counted. Expenditures of individual farms, businesses or coops supported by the project need not be counted if benefits are calculated only net of such expenditures. However, if benefits are to be measured in nonmonetary terms, then all the expenses incurred by participating groups and individuals in support of the project objectives must be included in the cost calculation (since they can not be subtracted from benefits).

Valuation of in-kind contributions. In-kind contributions represent a kind of expenditure which can take many forms. Participants and other local persons may contribute substantially to the project in donated labor and also sometimes in land and materials. National in-kind donations may be in the form of the use of heavy machinery for road building or in time of extension personnel. Foreign contributions may be in the form of food. The problem is to value such contributions realistically without exaggeration. The possibility of exaggeration is heightened by the need of agencies to demonstrate a local share to match outside grants. (For example, a social agency reported the outdoor space behind its offices as an "in-kind parking lot", valued at commercial rates.) Some suggested "rules" follow. Do not include as in-kind contribution the work which participants apply to their own farms, businesses and coops when they themselves also gain the income from this labor. Value labor and goods at what the project agency or participants would pay or receive locally for such labor and goods if they were exchanged for cash. Do include the transportation cost of donated materials, such as international surplus food and locally contributed construction materials if the agency does not pay these out of its own budget.

Treatment of capital investment and depreciation. For a discussion of these cost factors, we need to clear up some of the possible confusion in terminology. Fixed costs are those which do not change with the level of services provided or benefits achieved. Examples are expenses for initial staff and leadership training, the annual staff planning

retreat, and annual office rental. The complement of "fixed costs" is variable costs, those which do change with the level of services provided or benefits achieved. Gasoline for travel is an example. Capital costs, for purposes of this guidance and many accounting exercises, are those costs for goods or services which are useful beyond the year in which they are purchased. These capital costs will often be buildings, vehicles and other equipment. The staff and leadership training expenditures at the start of the project would also be capital costs. The complement of "capital costs" is recurring costs, those which are incurred again each year the program is operating. Salaries and wages are recurring costs, as are maintenance of equipment, fuel, the aforementioned rent and annual planning retreat.

The concepts of fixed and variable costs are important for planning. They are useful for assessing the costs or savings of marginal increases or decreases in project activity levels; only the additional variable cost is usually considered as the marginal cost. Thus, consideration of variable costs provides the planner with a more refined cost indicator than just average cost. However, for cost-effectiveness assessments other than initial project planning, we are generally dealing just with average costs, both fixed and variable, whatever their shortcomings.

Since for analytical purposes we usually consider project benefits and costs on an annual basis, the immediate question is how to treat the costs for capital investments which are useful for multiple years. Clearly, to count the whole of a capital expenditure in the year it occurs would overstate the average cost in the investment year and understate these average costs in subsequent years. The simplest method of placing a capital cost on an annual basis, that is, to annualize it, is to estimate the number of years of usefulness of the capital good and divide this into the cost. This is, in effect, a "straight-line" depreciation which is charged each year of the lifetime of a given investment:

$$\frac{\text{Cost of capital item}}{\text{Expected life}} = \text{Annual Depreciation}$$

$$\text{Life of jeep} = 3 \text{ years}$$

$$\text{Cost of jeep} = \text{P\$}300,000$$

$$\frac{\text{P\$}300,000}{3} = \text{P\$}100,000 = \text{Annual depreciation charge to project}$$

An annual cost of P\$100,000 would be charged to the project in each of its first three years.

Likewise the costs of the preparation year should be divided by the number of years expected life of the entire project:

Cost of preparation year = P\$100,000

Life of project after
preparation year = 4 years

$\frac{P\$100,000}{4} = P\$25,000 = \text{Annual cost to project}$

In this case P\$25,000 would be charged to the project in each year of its life.

For some investments, especially vehicles and other equipment, the project accountant may already be charging depreciation or he may be setting funds aside in a "replacement fund," which is essentially the same thing as depreciating the value. In such instances, the analyst should take care to avoid double counting the capital cost; he should not count an annualized cost in addition to depreciation or a replacement fund contribution.

The project accounts will usually include interest charges. Technically, even when the resources for investment purchase come from a grant, an implicit interest charge should be included as a capital cost. Such a calculation is really a form of discounting the value of funds over time. Again, the discount rate chosen would be about the same as the interest rate paid for long-term borrowing in the country. However, including an implicit interest charge is foreign to the normal practice of PVOs and even of private businesses. Therefore, we do not expect this to be calculated in most assessments of PVO projects. Since various alternatives or projects being compared will often have similar patterns of early capital costs followed by some years of recurring costs, omitting an implicit interest charge usually causes no great bias. Nevertheless, the serious PVO analyst will want to become familiar with the technique of discounting both capital costs and recurring costs and benefits.

Adjustments for changes in foreign exchange rates. Generally, it is easiest to value all costs in local currency. Receipts and purchases from outside the country should be valued at the exchange rate actually charged or received by

1. The World Bank guide to economic analysis explains discounting right to the detail of which keys to press in what order on a pocket calculator. Gittinger, cited in Appendix A, pp. 400-408.

the project agency. Expenditures in dollars or other international currency by the sponsoring agency chargeable to the project can be valued at the same exchange rate as was received on the grant to the project during the same period. This suggested means of handling foreign exchange may not correspond to actual agency practice; instead, outside grants often may be recorded on the books at the official exchange rates, but exchanged at non-official rates. Focusing on expenditures in local currency at the actual amounts paid out should lead to the overall recording of full value of project costs because eventually the agency will use its windfall profits from non-official exchange for other expenses in the same or other projects.

A common foreign exchange problem is that many PVCs use the exchange rate at the time of the grant throughout the life of the project. This introduces a bias which is best illustrated through an example. In Table 10, annual per unit costs are calculated by converting dollars to pesos using the same exchange rate for each project year. The cost per participant appears to be the same in each year of the project.

In Table 11, each year's dollar costs are converted at the appropriate annual exchange rate. In this case, the per participant cost becomes more expensive in each succeeding year.

An evaluator looking at the results in Table 10 may conclude that the project is cost-effective because the costs per participant stay the same in each year. However, a more accurate interpretation of the data in Table 11 is that the project may not be cost-effective.

These examples do not encompass the full complexity of foreign exchange rates. In developing countries exchange rates may fluctuate rapidly, making even the use of an annual exchange rate inaccurate. Possible solutions to this problem include using a weighted annual average based on the change from month to month or valuing each transaction at the actual rate used. In some cases even these suggestions may not solve the problem. Awareness of this issue in evaluations and caution in converting dollars to local currency will improve the accuracy of the general per unit cost measure.

Adjustments for Changes in Inflation. The discount rate which would be applied in complete costing of capital

Table 10. Annual Cost per Participant Using a Constant Foreign Exchange Rate Throughout the Life of the Project

Year	Foreign project costs in dollars	Foreign exchange conversion factor ^a	Project costs in pesos	Annual number of participants	Annual cost per participant
	(1)	(2)	(3)=(2)x(1)	(4)	(5)=(3)÷(4)
1	3,000	2.0	6,000	500	12
2	3,000	2.0	6,000	500	12
3	3,000	2.0	6,000	500	12

a. Assuming \$1 = P\$2 in each year.
Source: RRNA.

Table 11. Annual Cost per Participant Using the Actual Foreign Exchange Rate Throughout the Life of the Project

Year	Project costs in dollars	Foreign exchange conversion factor	Project costs in pesos	Annual number of participants	Annual cost per participant
	(1)	(2)	(3)=(2)x(1)	(4)	(5)=(4)÷(3)
1	3,000	2.0 ^a	6,000	500	12
2	3,000	3.0 ^b	9,000	500	18
3	3,000	4.0 ^c	12,000	500	24

a. Assuming \$1 = P\$2.
b. Assuming \$1 = P\$3.
c. Assuming \$1 = P\$4.
Source: RRNA.

will include an adjustment for inflation,¹ which is, in effect, an extra charge against the project. When the analyst compares ratios of benefit indicators and costs for the same year, no further adjustments of the operating costs for inflation are required. However, when the analyst is comparing differences in ratios of benefit indicators to costs for different years, she will want to make a quantitative adjustment for inflation or at least a qualitative one. The qualitative adjustment is this: If there are similar cost-effectiveness ratios for two different years, the performance in the more recent year is more cost-effective, since the costs are relatively less in terms of constant dollars.²

Quantitatively, adjusting projects costs for inflation makes the following difference in annual costs per participant. In Table 12, the project costs are given in unadjusted pesos. It appears as if the annual cost per participant goes up in each year. In Table 13, adjusting the same annual project costs for a ten percent annual rate of inflation makes the annual per participant cost the same in each year. Without the adjustment for inflation, the analyst may have concluded that, over time, the project was not cost-effective. In reality, when adjustments for inflation are made, the analyst finds that the project is probably cost-effective.

The Calculation of the Cost-Effectiveness Ratio

When all of the cost information has been collected and a measure of benefits has been determined, the analyst uses this information to calculate the ratio of cost per unit.

1. Again, the analyst involved in project planning must keep in mind that, by convention, project plans are usually projected in "real dollars," that is, without the calculation of possible inflation. Actually it improves the usefulness of a project plan for local planning if financial needs with the anticipated effects of inflation are included. Local agencies often do include an "inflation and contingency" factor to increase the funds requested for the second and subsequent years of the project.

2. In the unlikely event that a developing country were experiencing deflation, the qualitative adjustment would be just the opposite.

Table 12. Annual Cost per Participant Using
No Adjustment for Inflation

Year	Total project cost in pesos	Annual number of participants	Annual cost per participant
	(1)	(2)	(3) = (1) ÷ (2)
1	1000	20	50
2	1100	20	55
3	1210	20	61
4	1331	20	67

Source: RRNA.

Table 13. Annual Cost per Participant Using
an Inflation Adjustment Factor

Year	Total project cost in pesos	Ten percent Inflation adjustment factor ^a	Total project cost adjusted for inflation	Annual number of participants	Annual cost per participant
	(1)	(2)	(3) = (1) x (2)	(4)	(5) = (3) ÷ (4)
1	1000	.909	909	20	45
2	1100	.826	909	20	45
3	1210	.751	909	20	45
4	1331	.683	909	20	45

a. The inflation adjustment factor is the discount factor for a ten percent interest rate. It was taken from J. Piece Gittenger's book, Compounding and Discounting Tables for Project Evaluation published by the World Bank.

Source: RRNA.

The analyst uses the following formula to compare costs and benefits:

$$\frac{\text{Annual Costs}}{\text{Quantitative Measure of Annual Benefits}} = \text{Per Unit Cost}^1$$

Comparing Benefits and Costs

The Options

Once the analyst has some quantified measure of project performance and has calculated and adjusted costs on an annualized basis, she can then compare the two. But how? We now review the three options mentioned in the introduction to this chapter.

Comparison of differing levels of benefits which can be reached by various methods at a given cost is one approach. For example, an annualized expenditure of P\$20,000 for child nutrition can be used for the following: food distribution in villages; training of village health workers to make regular home visits for weighing children and giving nutrition education and advice; or using community organization techniques to encourage growing and consumption of local vegetables. To continue the example, for each approach the analyst can measure the number of malnourished children helped to gain sufficient weight so they are no longer malnourished; or the analyst can measure the total weight gain of malnourished children. (For project planning the analyst would be projecting these results rather than measuring them.) While this approach offers a useful form of conceptual thinking about project alternatives, it certainly demands a great deal of information or projections

1. Instead, the comparison could be based on a division of benefits by cost:

$$\frac{\text{Quantitative Measure of Annual Benefits}}{\text{Annual Costs}} = \text{Unit of Benefit Per dollar}$$

For example, if a child care project reached 10 participants and its annual costs were \$100, the equation would be:

$$\frac{10}{100} = .1 \text{ children per dollar}$$

The other formula is preferred since the measure is expressed in currency making it easier to compare with other projects or other indicators.

on more than one program approach. Furthermore, some alternative approaches, such as establishment and operation of a residential center for malnourished children and their mothers, may require a much greater minimal size expenditure.

Comparison of differing costs for a given level of benefits is much the same process. To help bring 100 malnourished children above the malnourished weight level or to help attain a 20 percent weight gain (or 500 pounds of total weight gain, as non-human as such a statistic may appear to be) would cost how much by the four approaches named above. Again, as in the previous example, the analyst faces the same problems of estimation for multiple approaches and of minimal size level of effort for some approaches.

The remaining method for comparing costs and non-monetary benefits is the cost-effectiveness ratio. The cost-effectiveness ratio is a kind of benefit-cost ratio, with the benefits represented by non-monetary indicators. For example, helping 100 malnourished children gain weight to above the malnutrition level for P\$20,000 yields a cost of P\$200 per child assisted (P\$20,000 divided by 100). Likewise, a 500 per pound weight gain yields a cost of P\$40 per pound gained. We now discuss the use of such ratios and cautions concerning their use.

Use of a Cost-Effectiveness Ratio

The main question about a cost-effectiveness ratio is what use to make of it once it is calculated. Unlike a benefit-cost ratio or the simplified ratio of net benefits to costs presented in Chapter III, this ratio has no self-evident interpretation. It does not indicate whether a project should be started or continued. Is P\$200 per child assisted successfully a cost-effective performance? It seems reasonably good. Is P\$40 per pound of weight gain a cost-effective performance? It seems quite expensive. Following are some approaches to interpreting the results.

Comparison with other known factors. Compare the results with other known or intuitively understood factors. For example, check how the program costs per child assisted compare with the cost for hospitalized medical care of a malnourished child; or check with the cost of feeding a child a well-balanced diet for a month.

Comparison with changes over time within a given project. The analyst can view the trend in the project cost per unit of benefit over the years of the project. Two or

more indicators may show opposite trends indicating tradeoffs among objectives reflected in the indicators.

Comparisons with alternative approaches within a given project. The project agency may be trying two or more approaches to improve child nutrition. The operating cost of these approaches will be merged in the same amount. The analyst recalculates costs by function to calculate separate cost-effectiveness ratios for each approach. The analyst then treats each approach as a subproject within the larger program. One qualitative decision by the analyst is to assess whether, in fact, each subproject makes demands on general overhead and staff proportionate to its share of the total agency budget. If the cost-effectiveness ratios are similar for the two approaches, the subproject placing the least demands on the resources of the whole agency would be the more cost-effective.

Comparisons With Other Projects

This comparison with other projects can encompass any of the above approaches as well as comparison of changes over time, comparison of the same approach in different projects, or comparison of alternate approaches in different projects. Project agencies and sponsoring agencies often view such comparisons with distrust and it is difficult to separate their valid criticisms from the more defensive ones. The careful costing and a consistent allocation of overhead and sponsoring agency costs as proposed in this chapter are a prerequisite to any inter-agency comparisons. Otherwise the analyst is faced with an apples-oranges analysis. So we close this chapter with a listing of cautions. However, more frequent and careful comparisons of performance among agencies and projects should be healthful for PVOs. The analyst should not wait for perfect comparability to venture a judgment.

Cautions in Use of Cost-Effectiveness Ratios

The analyst using cost-effectiveness ratios will want to observe the following cautions:

- . Make a qualitative assessment of the accuracy of the reported performance data and of the likely direction of any bias for a given approach or project: that is, are true benefits likely to be less or more than indicated, given the system for collection and verification of information.

- . Take the time to make a careful determination and adjustment of costs; this is somewhat tedious work for most of us and it is tempting to just hope the first figures received from agencies are applicable a comparable. This is unlikely to be the case.
- . The last caution is do not be too cautious. Consider with agency personnel the reasonableness of figures received and the comparison with other known factors or ratios, as suggested above. The whole purpose of this exercise is to improve project performance, and to improve the choice of new approaches and projects. Only when the cost-effectiveness ratios are provocative for reflection and revised action can the assessment effort be worth the trouble -- and the cost. Only then can the resources spent on cost-effectiveness assessment be cost-effective.

An Example

We now follow through a fictional example of the steps of calculation and analysis in the use of a cost-effectiveness ratio.

A children's residential nutrition center project has been operating for three years in a rural town. Its basic approach is to have women's clubs, sponsored by the same local agency in the area, identify families with young weaned children suffering from malnutrition. These are children falling below the minimum Gomez-scale age-weight standards. The children and their mothers are invited to stay in the nutrition center until the children reach a weight above the malnutrition level. Children and mothers are fed a balanced diet of locally purchased foods, supplemented by powdered milk. Mothers continue to care for their children, participate in food preparation and nutrition courses, and work a short time each day in the center vegetable garden.

Measurement of Benefits in the Example

The project leadership originally stated the basic purposes as the "cure" of malnourished children in the area and the improvement of nutritional practices by their families. Although the plan indicated many quantified objectives, collecting information showing long-run weight gain and the number of families which had begun growing vegetables proved too difficult. The project was able to maintain reliable information on the number of families which had taken part in the center program, the number of children graduating, the length of time in the program, and the weight gain of children at graduation from the program (Table 14).

The project collected information on children, including age, initial grade of malnutrition, and other diseases noted by a regularly visiting nurse. The individual records were substantially complete, but the project tabulated the information only infrequently and incompletely. The project also initially collected information on families and children who enrolled in the program. However, no follow through reports were kept. Most families leaving the

Table 14. Example: Measurement of Benefits

Year	Participants		Average time in program	Weight gain of graduates	
	Families	Malnourished children gain- ing to above malnutrition level		Total, all children	Per child
	-----number-----		----weeks----	-----pounds-----	
1	40	60	5	500	8
2	55	80	4	450	6
3	70	100	3	500	5

Source: RRNA, fictitious example.

program did so in the first days of their participation, and data for these participants were not included in the regular information reports.

Measurement of Costs
in the Example

The basic expenditures of the project amounted to P\$35,000 over three years, which was the sum of the grant to the local agency from an outside funding organization. The measurement of the expenditures and other costs according to the decisions and adjustments suggested in this chapter is outlined below and the results recorded in the summary statement (Table 15). The adjustments add about a third to the reported expenditures of the project.

- . Determination of the source of financial records. The analyst uses the financial records of the local agency. The records of cash receipts and disbursements are maintained separately only for the funds from the outside funding source. Presentation of this example in which the local agency accountant mainly keeps the financial records of the expenditures related to the outside funding does not indicate approval of this procedure; it is common in small projects administered by local independent agencies.
- . Confirmation of project boundaries. The local agency supports two programs, the organization and maintenance of homemakers' clubs in many villages; and the residential nutrition center, which is seen by the club members as their own project. There is some programmatic overlap; the women's clubs also promote and give loans for vegetable gardens and the agency's staff of promoters for the clubs assist in outreach for the center. Nevertheless, it is preferable to analyze the two projects separately, since their goals and program are quite different and most resources used are quite readily allocable to one project or the other.
- . Determination of the period to be considered. The analysis covers the three previous calendar years. Agency and project accounts are audited, but not for the most recent year, for which the accountant's annual summary report was used.
- . Allocation of shared costs of local agency. By Year 3, the nutrition center accounts for 25

Table 15. Example: Project Costs, Including
Expenditures and Adjustments
(Pesos)

Year	Expenditures out of main grant	Allocation of local agency administrative expenditures	Expenditures from local grant	In-kind donations used	Capital costs, depreciation	Total cost
1	9,000	1,600	100	300	1,000	12,000
2	11,000	2,000	100	300	1,000	14,400
3	15,000	3,000	100	900	1,000	20,000

Source: RRNA, fictitious example.

percent of the total local agency costs for its two programs (Table 16). The analyst allocates this proportion of the P\$12,000 total annual administrative expenditure of the local agency as a cost to the center project.

- . Allocation of direct costs of the sponsoring agency. The local agency is independent with no foreign sponsoring agency. Representatives of the funding organization providing the outside grant have made a number of visits to the project, but these travel costs are really part of the grant administration and should not be charged to the nutrition center account.
- . Inclusion of expenditure of funds from all sources. A local church provides P\$100 annually for special needs of center participants. This is handled as a petty cash fund and is not included by the local agency accountant in his regularly reported expenditures.
- . Valuation of in-kind contributions. Homemaker groups in the area donate linens, utensils, and some food to the center. A modest value is reported for each year in the project program reports to the funding source (the accountant does not record these amounts). Volunteers from the homemaker groups also provide many services at the center in helping to care for children, etc. but the analyst decides not to value this volunteer service as a cost. While the work is important to the operation of the center, it does not have a clearly defined market value. The volunteer work is, however, valued as an in-kind contribution which is a legitimate and anticipated part of the required local share promised in the project funding agreement with the outside funding agency.
- . Treatment of capital and depreciation. The local agency's main capital asset used in the project is the residential building. In fact, it was the donation of the building, a rather large private residence, to the agency which triggered the idea of the residential nutrition program. The building has an estimated local value of P\$20,000. The local agency accountant does not include a depreciation charge on the building, since he only includes cash transactions from the grant in his accounts. The analyst uses a straight-line

Table 16. Allocation of Local Agency Administrative Expenditure
as a Project Cost
(Pesos)

Year	Local agency administrative expenditures	Local agency project expenditures			Nutrition Center	
		Total	Women's clubs	Nutrition Center	As proportion of total project expenditures ^a	Proportionate share of administrative expenses ^b
	(1)	(2)	(3)	(4)	(5) = (4) ÷ (2)	(6) = (5) x (1)
1	9,000	50,000	41,000	9,000	18	1,600
2	10,000	55,000	44,000	11,000	20	2,000
3	12,000	60,000	45,000	15,000	25	3,000

Source: RRNA, fictitious example.

20-year depreciation on the building to determine a P\$1,000 annual cost chargeable to the project. The project has no vehicles.

- . Adjustment for changes in foreign exchange rates. The project outside grant is received quarterly in U.S. dollars kept in a U.S. checking account and then exchanged for local currency as required. Since local currency expenditures recorded in the books of the agency are reported to the funding agency in pesos valued at the same exchange rate at which they were actually exchanged, no adjustment is needed.
- . Adjustment for inflation. Since the example is expressed in local currency, it is appropriate to keep in mind the local inflation rate averaging approximately 8 percent a year. If we applied this rate of inflation to the project cost calculations, we would find that costs rose substantially from year 1 to year 3, but not as much as stated by the figures unadjusted for inflation.
- . Accounting for the value of time. The analyst notes that there have been no undue delays in the project implementation. Also, the flow of benefits for the three years is quite proportionate to the pattern of expenditure. In this instance, the analysis requires no adjustment for time.

Comparing the Benefits and Costs in the Example

The indicators of project benefits and the adjusted costs can be combined into ratios of cost per unit of benefit. Dividing the cost each year by the benefits, yields series of these cost-effectiveness indicators (Table 17). Cost per child graduating from the program was P\$200 in year 3 with a cost of P\$40 per pound for the five pound average weight gains.

These results can be interpreted in a number of ways:

- . Comparison with other known factors. The cost per child and the cost per pound of weight gain can be compared with family incomes in the area and with costs of high protein food (and the weight gain which might be expected to result). The cost per child does not appear unduly high per se. It does represent the equivalent of a full year's per

Table 17. Example: Comparisons of Benefits with Costs
(Pesos)

Year	Total costs	Malnourished children gaining to above malnutrition level		Weight gain of graduates		
		Number	P\$ per child	Total pounds	Pounds per child	P\$ per pound
1980	12,000	60	200	500	8	24
1981	14,400	80	180	450	6	32
1982	20,000	100	200	500	5	40

Source: RRNA, fictitious example, based on Tables 9 and 10.

capita income for poor families in the region, that is, about one-sixth the annual income of a family of six. Because of other benefits in improved family nutrition which are expected, but not measured or demonstrated in a rigorous way, family members who do not participate directly in the Center program, may be considered as beneficiaries as well, at least as partial beneficiaries. This consideration would have the effect of substantially lowering the cost per beneficiary in comparison to the cost per participant. Nevertheless, the analyst concludes that the costs per participant are "high" in comparison with the level of local resources.

A second possible comparison relates the cost per pound of weight gain, P\$40 per pound in year 3. This amount would buy substantial amounts of quality food: the equivalent of 8 dozen eggs and 10 pounds of beef at prices in the area. At expected food conversion ratios for children, such amounts of food would produce much more than a pound of weight gain for the target population, provided the food reached poor families and was consumed by the malnourished children. However, without further information on the patterns of food consumption and the distribution of available food within families, the analyst cannot confidently use this comparison to judge the project as being cost-ineffective.

Comparison with changes over time within a given project. The analyst notices that costs per child were highest in the start-up year, but have decreased since then, even when the effect of inflation is factored in. Cost per pound of weight has increased, however, reflecting a higher weight gain per child in the first year when the program worked longer and more intensively with a smaller group of children. The two indicators show different trends in the resulting cost-effectiveness ratios, indicating a tradeoff between number of children reached and the magnitude of assistance given each child participant. Ultimately, the analyst chooses the pounds of weight gain as being the measure more indicative of progress in combatting malnutrition. In this case, the analyst decides that the trend of increasing cost represent not some change in the efficiency of the project operation, but more a change in the project environment, caused in part by the success

of the program. Because the cases of most severe malnutrition in the surrounding communities have been treated in the first years, the residential center is now taking in children whose malnutrition is not as severe and for whom results are still substantial, but somewhat less dramatic.

Comparison with alternative approaches within a given project. The analyst considered whether it would be possible to assess separately the program of the residential center in feeding malnourished children and the nutrition education for their mothers which was conducted at the same time. Separating the cost of the two activities would be difficult, but estimates would be possible. Such separation would be worthwhile, however, only if it were possible to separate the effects of the activities as well. The analyst decided not to pursue this line of analysis, since most of the weight gain of children until graduating from the center would be attributed to the feeding program in any case. The analyst raised with the local agency staff the possibility of collecting information on a sample of participant children and their siblings after they have left the program. Such information would make possible some separate analysis of the effects of the two activities.

Comparison with other projects. The cost per child treated successfully, P\$200 in the third year, can be compared with other actual or anticipated programmatic approaches for which information is available or can be projected. There were no similar residential nutrition programs operating in the region. The analyst did compare the center costs with those of hospital care for malnourished children. The administrator-doctor of the district hospital estimated hospital care per patient at about P\$30 per day, with an average stay for malnourished children of 10 days, or P\$300 per stay for each child. The doctor reported that malnourished children usually did not gain enough weight to be classified above the malnourished level, only enough to be out of immediate danger. Although the analyst realized the two programs were not fully comparable and information was incomplete, she judged the center more cost-effective than the hospital in treating malnourished children.

When the analyst asked about alternative approaches considered by the project agency, one of the agency staff members reported that the staff had discussed the possibility of addressing the problems of malnutrition through a nutrition education program conducted in each village by the promoters of the homemakers' clubs. These promoters already had some training in nutrition education and could take a series of short courses dealing specifically with malnutrition. There would be some initial distribution of food to affected families. Volunteers from the local homemakers' clubs would provide follow-up in homes to weigh children and discuss results with parents. Agency promoters estimated that 200 malnourished children could be reached annually by this approach, although the effectiveness of the approach was untested. Promoters expected that this village-based approach could have a potential impact on the whole family which might be somewhat higher than from the residential center project. The cost for the proposed program was estimated at about P\$10,000 cash per year for a part-time nutrition specialist working with the promoters, additional travel cost, training materials, the purchase of food, and transportation cost and the allocated share of agency administrative expenditure. This would be P\$50 per malnourished child contacted, with the effectiveness of the contact unknown.

The analysts recommended at least a half year trial of the suggested approach, using a portion of the Center funds and staff.

APPENDIX A. RELATIONSHIP OF COST-EFFECTIVENESS ANALYSIS TO OTHER ASPECTS OF PROJECT ASSESSMENT

This appendix reviews how cost-effectiveness analysis relates to other issues and aspects of project assessment. This guide does not attempt to review all the analytical issues of planning, monitoring, and evaluation. Therefore, for example, this guide does not consider such vital evaluation issues as the determination of whether the project activities caused the benefits observed. Consideration of such questions is an integral part of any evaluation, whether or not there is a focus on the cost-effectiveness of the project.

However, this appendix does review briefly some issues of project analysis of particular importance to the assessment of cost-effectiveness. Also, it includes a note on other literature and work.

Defining the Project

The first task of the analyst is to define the boundaries of the project or activity to be planned or evaluated. The concern for assessing cost-effectiveness usually should not require changes in the definition of what set of objectives and activities are to be considered as one project. However, a few guidelines and cautions are in order.

Focusing the Study and Some Limits

A cost-effectiveness analysis should, if possible, encompass only one major objective or closely related group of objectives and the activities and services which contribute to it. This limited group of objectives and activities defines a project. For analysis, more complex programs should be broken down into their component parts. This focus is desirable for any kind of project analysis, but is even more important for cost-effectiveness analysis than for

either purely qualitative assessments or for benefit-cost analysis. The purely qualitative assessment can describe a number of different effects. The benefit-cost analysis can sum the dollars-and-cents results. In contrast, a cost-effectiveness assessment seeks to relate a given result to a given expenditure. On both the cost and benefit sides, there are practical limits to the breaking down of programs and even complex projects into components.

In the specification of costs, if the various activities related to different project components are so intertwined in the work of the same personnel and the purchase of the same materials that only arbitrary decisions permit the allocation of the expenditures among the components, then it is preferable to treat the activities as one project and try to deal with the possibly complex results.

An Example

For example, a program to improve the community organization, income, and home food consumption of Central American Indians in a fishing village included the promotion of a village organization encouraging a number of activities, especially in agriculture and fishing. The agricultural promotion effort of the village organization consisted mainly of technical assistance from a visiting extension agent to assist in the growing of rice in communal plots and of vegetables in individual home gardens. A newly formed fishing pre-cooperative received a grant for purchase of a boat motor to be used cooperatively and twine for nets to be made by individual fishermen.

The division of the program into projects to reach specific objectives is not clear cut. It would be possible to assess progress in community organization from all program efforts as a whole. Nevertheless, the major part of the objectives, including organizing the community, can be analyzed in terms of the separate efforts in agriculture and fishing and the costs related to each effort. Both the agricultural and the fishing projects are also complex, but it would be impractical to analyze them in terms of sub-projects. There are two distinct kinds of agricultural benefits in rice production and in vegetables (in addition to the benefits of the community becoming organized). It would be somewhat artificial, although not impossible, to differentiate the value and the time spent by the extension agent for one agricultural activity or the other. For the fishing

cooperative, the costs of the inputs of the motor and the net are separable, but it is impossible to attribute increased shrimp production separately to one input or the other.

Benefit-Cost Analysis

Although a PVO sponsor might want to provide for the benefit-cost analysis of income-producing projects, there are some practical reasons why this has been done so infrequently.

The greatest attraction of benefit-cost analysis is that it accounts for the varying relative values of the streams of project costs and benefits over a period, depending on the times when the costs are incurred and the benefits are received. The resulting analysis provides quantified standards for judging a proposed project or evaluating an operational project. The net discounted benefit and the benefit-cost ratio indicate whether the project is "profitable." The calculated internal rate of return measures a kind of return-on-investment profit rate for the project. These factors indicate which of two or more projects is preferred in terms of financial and economic return. Also, the analysis indicates whether a project is worth doing if the analyst can determine the expected minimally acceptable rate of return on investment of the project decision makers.

PVOs which chose, in light of these advantages, to conduct full benefit-cost analyses for their income producing projects have a wide choice of guidance materials to help in this task. One of the most useful is the recently revised edition of the Economic Analysis of Agricultural Projects by J. Price Gittinger of the World Bank.¹ The applications are much more comprehensive than the title indicates. The book presents financial benefit-cost analysis for individual farms and agricultural projects, with a separate section illustrating applications for agro-industries. The techniques are applicable for all projects in which income generation either collectively or for individuals is the main benefit. The book also describes economic benefit-cost analysis in which the project organization goes beyond consideration of the results for the project organization

1. J. Price Gittinger, Economic Analysis of Agricultural Projects, Second Edition, published for the Economic Development Institute of the World Bank by Johns Hopkins University Press, 1982.

and participants themselves to analyze the results for the broader regional and national economies as well.

The AID Training and Development Division has also prepared a guide, Cost-Benefit Analysis and Project Design.¹ The package of materials prepared by John D. Donahue offers a videotape introduction, a selection of readings, and a workbook. The workbook shows how to calculate a discounted flow of costs and benefits, applying the simplifying assumption that annual net benefits of a project will be the same in the years after the start-up year.

Under contract with the Peace Corps and AID, Gene Ellis has developed a microcomputer program for preparing benefit-cost analyses.²

Despite the considerable material on and interest in benefit-cost analysis, PVO representatives seldom try to conduct a full benefit-cost analysis. Consciously or unconsciously, they probably have generally acted with good sense in this regard since there are a number of reasons why such analysis may not be feasible or appropriate. The application of a full benefit-cost analysis is usually more demanding of funds, time, and technical experience than available personnel at the project and sponsoring agency level can provide. PVO's professional permanent staff members, with many priority demands on their time, are seldom able to give the required attention to learn and apply benefit-cost analysis. With hired analysts, the cost of a benefit-cost analysis may be inappropriately high relative to the entire funds expended in a small PVO project. And if such an analysis were completed, personnel would not be available to interpret and apply the results.

1. John D. Donahue, Cost-Benefit Analysis and Project Design, 1980. Prepared by The Training and Development Division, United States Agency for International Development and PASITAM, the Program of Advanced Studies in Institution Building and Technical Assistance Methodology of MUCIA, the Midwest Universities Consortium for International Activities, 400 E. Seventh Street, Indiana University, Bloomington, Indiana 47405, 1980. In addition to the book of readings, the following documents also bear the same title: "Study Guide;" "Tape Complement;" and "Workbook: Quantitative Procedures and Applications."

2. Information on this computer program can be obtained by contacting Judy Gilmore.

Furthermore, PVO projects often have important goals related to processes of organization and participation which cannot be encompassed readily by benefit-cost analysis. Benefit-cost analysis requires such concentration on the quantified earnings, it may even encourage the slighting of other results. Even when the benefits of PVO projects are potentially expressible in monetary values, information on the benefits is generally limited to estimates and guesses. This situation may well constitute a recommendation for improving the quality of quantifiable information on participants' benefits; however, turning approximate data into very specific calculations is often misleading as to the precision of the results.

Benefit-cost analysis may also be distracting in focusing on aggregate results and, in effect, on average impact. PVO projects are likely to give special attention to benefits for the poorest population and to the meeting of basic human needs. Although priorities for targeting on the poorest population can also be handled somewhat within a benefit-cost framework, this is not a part of the basic benefit-cost methodology.¹ In terms of assessing progress toward these PVO project goals, the effort demanded by benefit-cost analysis of a project might be spent in collecting information on specific questions of target population impacts.

The less sophisticated approaches to cost-effectiveness analysis included in this guide are nevertheless informed by the techniques and emphasis of benefit-cost analysis. The primary contribution of benefit-cost analysis to all other kinds of project assessment is to highlight the importance of the timing of the investments and the start-up of benefits. Even when the analyst is not discounting all benefits and costs by some rate which indicates the value of time, the sense of this value can be applied. This guide returns to this subject in the following section. An awareness of benefit-cost analysis can also help PVO projects which give insufficient attention to measuring and quantifying benefits, valuing them in money terms, and then comparing them with costs. This need will increase if PVO projects promote economic development and income gains for participants. Benefit-cost analysis is a reminder of the needs and possibility of such measurements and comparisons.

1. Donahue summarizes and includes a reading on World Bank attempts to weight goals of improved equity and meeting basic needs in benefit-cost analysis; Anadarup Ray and Herman G. van der Tak, "A New Approach to the Economic Analysis of Project," in Donahue, *op. cit.*, pp. 64-70.

Benefit-cost analysis also reminds the analyst that program decision-makers are seldom satisfied with results that merely provide a relative picture of a group of projects. The decision-makers usually want to know not only which of a group of projects ranks highest, but also whether a given project is worth starting or continuing. Having a sense of the benefit-cost analytical approach can encourage the analyst to consider such judgments. Even though the income-producing results represent only a part of objectives, a simple ratio of such benefits to costs or the comparison of annual benefits to average local income may enable the PVO analyst to venture a judgment as to whether a project is likely to be worth doing. Such a result from the analyst can help a decision-maker consider more clearly what costs are attributable to the nonquantifiable objectives.

World Bank Efforts

The World Bank has made significant contributions in the development of project evaluation tools, many of which are relevant to our discussion of cost-effectiveness. The efforts of the Bank can be viewed at two levels: (1) an annual performance review of all types of projects; and (2) specific analysis of sector or subsector projects and programs.¹ In many of these evaluations, the Bank has turned to practical approaches in assessing project effectiveness and cost-effectiveness. Such approaches may prove helpful in designing a cost-effectiveness framework for PVOs.

The annual review of project performance evaluates all types of World Bank projects.² Audit results, discussions with project and mission staff, baseline data, and contractual agreement information are the data used in this review. Economic rates of return, project overruns and delays, and the completion of stated objectives and activities are the primary indicators of project performance. Given that all types of projects from all major sectors are included in this review, intersectoral comparisons can be made. For education projects, no rate of return calculation is performed, based on the assumption that benefits from these projects are not yet measurable.

1. The World Bank also supports development research which considers reasons why projects are or are not effective. To the extent that this research is useful for PVOs, it will be presented in this section.

2. This section is based on discussion with World Bank personnel and on World Bank, Seventh Annual Review of Project Performance and Results (Report No. 3640), October 9, 1981.

These annual project evaluations have pointed to a number of problems in World Bank project design. Especially in rural development projects, cost overruns and project delays are definitely tied to the complexity of the multiple-objective projects. The integrated rural development project with its multiple support services and inter-agency coordination has extremely high expectations. Based on the annual audit evaluations, integrated rural project design should reduce the scope of work and the number of implementing institutions, thus establishing more realistic expectations for the project.

In the Bank analysis, project performance is defined as the ability of the project to meet its design and organizational expectations, or simply put, "to be on track." Development projects without easily quantifiable benefits, such as in non-formal education, health, nutrition, and rural development, often rely on performance evaluation as a primary indicator of project success or failure. However, there are considerable limitations to performance evaluations, especially when assessing the cost-effectiveness of a project. For example, one central question pertaining to a project's cost-effectiveness relates to alternative uses of resources; "is the project more cost-effective than an alternative project (or use of resources)?" To answer this question, the project designer or evaluator must compare different types of projects within the same sector or subsector.

In a number of research studies and project evaluations, the World Bank has examined the cost-effectiveness of different projects, all of which share the same objective. One such example is the sites and services housing evaluation program. The collection of baseline data on social and economic variables allowed for rigorous analysis of the physical and social costs and benefits. From this analysis, it was observed that a cooperative mutual-help component is cost-effective in a housing program. For example, an El Salvador sites-and-services project included a mutual-help component and is an excellent example of a cost-effective approach: the project reached down to the 20 percent decile income group; it was 90 percent of the quality level found in more traditional housing projects; and it was much more affordable than other housing projects.¹ Although this extensive and costly evaluation would not be feasible for

1. Douglas Keare and Scott Paris, Evaluation of Shelter Programs for the Urban Poor: Principal Findings from El Salvador, the Philippines, Senegal and Zambia, World Bank Staff Working Paper No. 547, September 1982.

small projects, the lessons learned and the issues examined can certainly feed into the small project planning and evaluation.

One example of a more practical cost-effective method is that used in an evaluation of health, nutrition, and family planning programs in India.¹ The purpose of the survey was to examine the effectiveness of a World Bank-sponsored health project. The information for the survey was gathered at a national health conference in New Delhi and from published reports and articles. The 14 projects evaluated represented recent projects even though better documentation was available on older, more established projects.² While the availability of data varied tremendously among the projects, the survey does summarize the costs and impact of the projects, examining:

- . Annual cost per capita;
- . Annual total cost;
- . Cost of statewide replication; and
- . Reported impact.

While the study contends that "benefit-cost analysis is impossible because of the difficulty in measuring benefits; cost-effectiveness analysis is possible, however, and it appears to be a useful tool." Based on the comparative analysis, three conclusions regarding cost-effectiveness have been drawn:

- . The integration of health, nutrition, and family planning services is more cost-effective than separate delivery systems for these three types.
- . The per capita expenditure in smaller integrated projects is fairly low, but still higher than in government programs.

1. Rashid Farukee and Ethna Johnson, Health, Nutrition, and Family Planning in India: A Survey of Experiments and Special Projects, World Bank Staff Working Paper No. 507, February 1982.

2. Often evaluation and project analysts examine the better documented, older projects. These projects often address issues or employ techniques that are outdated; thus the findings are of little relevance to current projects.

- . Community participation in the program leads to a more effective service delivery, a greater acceptance of the services, and a more equitable distribution of benefits.

These survey findings are excellent lessons to be applied to future projects. Moreover, the survey could be undertaken by the small projects themselves. Through a workshop or conference, representatives of similar small projects could evaluate cost-effectiveness issues using their respective projects as examples.

Finally, as noted in this guide, much of the World Bank experience in teaching good analyses of proposed projects is shared in J. Price Gittinger's revised new edition of Economic Analysis of Agricultural Projects.

Relevant Studies and Literature

Literature on benefit-cost analysis is cited above.

The Agency for International Development (AID) has produced and supported a considerable literature of guidance and recommendations on planning, monitoring, and evaluation.

The AID Project Officers' Guidebook, June 1982, covers all aspects of the project cycle, including planning and the use of the logical framework, and project proposal analysis from financial and economic perspectives. It also contains an extensive bibliography of other government-issued guidance.

The AID Office of Evaluation has been through at least two drafts of an AID Evaluation Handbook and will soon publish a more permanent guidance. The Office has also sponsored a number of specific studies of AID project impact in which the issue is not how well the project carrier did what it promised to do, but how well the intended beneficiaries did, in fact, benefit.

The AID Office of Private and Voluntary Cooperation (PVC) has funded a number of studies and development of guidance related to assessment of PVO projects, including this one, as well as many evaluations of specific projects which serve as the testing ground for the improvement of awareness of evaluatory and cost-effectiveness considerations. Of particular note is Judith Tendler's assessment of previous evaluation work, Turning Private Voluntary Organizations Into Development Agencies: Questions for Evaluation, and specific evaluations which she has prepared for AID and for the World Bank. These too are listed in the bibliography.

This guide owes a special debt to other studies supported by PVC. The Development Alternatives, Inc. report by A. H. Barclay, Jr. and others of Development Alternatives, Inc. on The Development Impact of Private Voluntary Organizations: Kenya and Niger formed the basis of much of Chapter III.

Also cited in this report is the work of Dean T. Jamison, Steven Kess, and Stewart Wells for the Economics and Educational Planning Group of Educational Testing Service, Cost Analysis for Educational Planning and Evaluation: Methodology and Application to Instructional Technology.

Our familiarity with relevant materials prepared by PVOs themselves is certainly incomplete. A Technoserve manual on project monitoring is instructive for other PVOs in that it combines data on expenditures and on program progress in a common reporting framework: "Monitoring and Social Impact Analysis as Applied to Enterprise Development."

APPENDIX B. BIBLIOGRAPHY

- Development Alternatives, Inc., Barclay, A.H. Jr., and others. The Development Impact of Private Voluntary Organizations: Kenya and Niger. Prepared for AID Office of Private and Voluntary Cooperation, 1979.
- Development Associates, Inc., Malcom Young and others. Evaluating Cooperative Development Projects: A System For Planners, Project Staff, and Evaluators. Prepared for AID Office of Private and Voluntary Cooperation, 1982.
- Donahue, John D., Cost-Benefit Analysis and Project Design, 1980. Prepared by The Training and Development Division, United States Agency for International Development and PASITAM, the Program of Advanced Studies in Institution Building and Technical Assistance Methodology of MUCIA, the Midwest Universities Consortium for International Activities, 400 E. Seventh Street, Indiana University, Bloomington, Indiana 47405, 1980. In addition to the book of readings, the following documents also bear the same title: "Study Guide;" "Tape Complement;" and "Workbook: Quantitative Procedures and Applications."
- Gittinger, J. Price. Economic Analysis of Agricultural Projects. Second Edition, World Bank; The Johns Hopkins University Press, 1982.
- Jamison, Dean T., and others. Cost Analysis for Educational Planning and Evaluation: Methodology and Application to Instructional Technology. Economics and Educational Planning Group, 1976.
- Keare, Douglas and Scott Paris, Evaluation of Shelter Programs for the Urban Poor: Principal Findings from El Salvador, the Philippines, Senegal and Zambia, World Bank Staff Working Paper No. 547, September 1982.
- Klees, Steven and Wells, Stuart. Cost-Benefit Analysis of Non-Formal Education Techniques for Agricultural Development: A Case Study of the Basic Village Education Project in Guatemala. Academy for Educational Development, Inc., 1978.

- Korten, David C. Community Organization and Rural Development: A Learning Process Approach. The Ford Foundation and The Asian Institute of Management, April 1980.
- Pyle, David F. Framework for Evaluation of Health Sector Activities by Private Voluntary Organizations Receiving Matching Grants. Prepared for AID Bureau for Food for Peace and Voluntary Cooperation, May 1982.
- Purakee, Rashid and Ethna Johnson, Health, Nutrition, and Family Planning in India. A Survey of Experiments and Special Projects, World Bank Staff Working Paper No. 507, February 1982.
- Robert R. Nathan Associates, Inc. "An Evaluation Scope of Work for P.L. 480, Title II Country Programs." Prepared for AID Office of Food for Peace, November 15, 1977.
- Robert R. Nathan Associates, Inc. An Evaluation of Coordination in Development, Inc. (CODEI). Prepared for AID Office of Private and Voluntary Cooperation, April 1978.
- Robert R. Nathan Associates, Inc. An Evaluation of Pact: Private Agencies Collaborating Together. Prepared for AID Office of Private and Voluntary Cooperation, June 1982.
- Stephens, Betsy, Charles G. Vandervoort, Judith W. Gilmore, and Jose Rodriguez, "Outreach Grant Project Evaluation" (Draft), International Science and Technology Institute, Inc., prepared for AID Office of Program, Policy and Evaluation, Bureau of Food for Peace and Voluntary Assistance, October 1982.
- Subcommittee on PL 480 Title II Analysis and other agencies. Nutritional Analysis of Public Law 480 Title II Commodities. National Academy Press, 1982.
- Technoserve. Monitoring and Social Impact Analysis as Applied to Enterprise Development. May 21, 1981.
- Tendler, Judith. Turning Private Voluntary Organizations Into Development Agencies: Questions for Evaluation. AID Program Evaluation Discussion Paper No. 12. April 1982.

- Tendler, Judith. Ventures in the Informal Sector, and How They Worked Out in Brazil. Prepared for the AID Office of Private and Voluntary Cooperation, August 1982.
- United States Agency for International Development. Project Evaluation Guidelines. Third Edition. August 1974.
- United States Agency for International Development. A.I.D. Evaluation Handbook. August 1980 (Draft).
- United States Agency for International Development, Project Officers' Guidebook: Host Country Contracting. June 1982.
- Wholey, Joseph S. Evaluation: Promise and Performance. The Urban Institute, 1979.
- World Bank. Seventh Annual Review of Project Performance Audit Results (Report No. 3640). October 9, 1981.

APPENDIX C

SIMPLE AND MORE EXACTING MEASURES
OF BENEFITS IN RELATION TO COSTS

A number of concerns have been expressed about the results of the approach suggested in Chapter III. This approach compares the value of net benefits of a project in the most recent year with outside funds expended to date. Some commentators within the PVO community point out that the broad range of non-monetary benefits of some of the projects were not incorporated into the main analysis. Others criticize the absence of any consideration of the time value of money. Another problem is the varying degree of certainty and verification for the different estimates. Finally, some PVO representatives feel that the method invites misuse. Decision-making processes will rely too heavily on the results of this type of analysis, leading to the implementation of a narrow range of projects. As a result of these considerations, some PVO representatives believe that comparisons among projects using ratios of net benefits to costs are misleading and unfair.

These criticisms are valid. Nevertheless, the measure is a useful one. While not perfect, it does indicate ranges within which projects fall. The objective of using it is not to separate good from very good projects but rather to weed out bad projects. The following discussion should help PVOs interpret the ratios of net benefits to costs.

Project Model

The method presented in Chapter III assumes that PVO projects with monetary benefits, such as agricultural, small business, and handcraft projects, follow a continuing pattern of behavior concerning the timing of costs and benefits. An outside grant of about three years begins with a preparation year. Some benefits begin by the second or third year, growing to their full level attributable to the project in about the fifth year. After 8-10 years the

benefits attributable to the initial investment end as new participants and agency staff become involved in other community projects.

We now consider this pattern in some detail with examples. First, it generally takes a year or more of preparation before the first benefits are generated. For example, a project which distributes high yielding seeds, fertilizer, and tools to groups of subsistence farmers requires a year to train staff and extension people to get materials to the project site, to involve and inform the groups of farmers, and to train the staff. Investment costs will be higher in this first year. After the project has been initiated, outside funding will decline in subsequent years,¹ both in terms of real and inflated dollars, and cease entirely after the fourth year.

Second, benefits begin to be generated in the second year of the project. They gradually increase over the third and fourth years and reach full levels by the fifth year. In the following years, benefits attributable to the initial outside funding will begin to taper off although this effect may be masked by inflation, as is the case in our examples. Agricultural projects, in particular, follow this pattern since six months to a year are required to harvest a crop. Also, full net benefits are usually not achieved until farmers have perfected new techniques and until all targeted farmer groups have been initiated in the new methods.

Finally, the life of the project is restricted to 8 to 10 years. Although agricultural project benefits may continue into the indefinite future as farmers become increasingly confident about using new farming methods, any heavy equipment or tools will have to be replaced at least every 8-10 years. The replacement costs actually require a new investment whether provided by PVO contributors or the farmers themselves. This is also true of capital goods (jeeps, trucks, buildings) used by the PVOs in implementing the project. In addition, initially enthusiastic staffs and participants may leave and go on to different projects. New inputs of substantial new capital are better considered to be the start of a second project.

Although each project is unique and has its own special timing characteristics, the proposed measure of benefits and

1. In developing countries and in the United States, rapid inflation may mean that costs of inputs will rise substantially between the first and the last year of funding. However, we feel that even with inflation, in most cases, the absolute amount of funding will decline.

costs is insensitive to slight deviations from the set pattern. If a project deviates markedly from this model, the analyst should use caution in interpreting the results of the analysis, particularly when comparing projects.

All of the projects in Table C-1 follow this basic pattern. Outside funding steadily declines; net benefits gradually increases until year five and, thereafter, remain at a constant level. Ratios of net benefits to costs have been calculated for these six projects by dividing net benefits in the fifth year by costs. These ratios grow smaller as project costs increase. Project A, which has the lowest costs, has the highest ratio of net benefits to costs, 1.0; Project F, which has the highest costs, has the lowest ratio, .10.

However, it is only in the ideal world that interpretations will be so unambiguous. The remainder of the appendix will deal with some of the problems which will confront analysts applying this measure to real projects.

Time Value of Money

At the core of traditional benefit-cost analysis is the concept of the time value of money, the idea that a dollar today is worth more than a dollar tomorrow. This concept grows out of the understanding that money has earning power. For example, if a dollar is put in a bank account which pays 10 percent annual interest, it will have earned \$.10 cents in one year's time. Because of this additional earnings, \$1.00 today is said to be worth \$1.10 in a year's time. Conversely, \$1.10 a year from now is worth \$1.00 today. Therefore, money invested in projects this year is worth more than money generated as project benefits in three years, for example. This is because the same money which was invested in the project this year could have been invested in a bank for three years, earning annual interest payments.

Inflation works in much the same way. One dollar today will buy more than the same dollar in two years. For example, 20 years ago a coke cost \$.05, today it costs \$.50. Imagine the surprise of someone who stored \$100 under his mattress for the last ten years when he sees how much less that \$100 can buy him today than it could have ten years ago.

The bank interest example illustrates how the earnings of money over time and inflation work together. The dollar put in the bank earned \$.10 in a year. Five cents pays the saver for the use of the money; it is like rent. The other five cents compensates the user for the effects of inflation.

Table C-1. Hypothetical Project Flows of Costs and Net Benefits

Year	Hypothetical projects											
	A		B		C		D		E		F	
	Costs ^a	Net benefits ^b	Costs ^a	Net benefits ^b	Costs ^a	Net benefits ^b	Costs ^a	Net benefits ^b	Costs ^a	Net benefits ^b	Costs ^a	Net benefits ^b
	-----thousands of pesos-----											
1 (preparation)	4.0	0.0	8.0	0.0	10.0	0.0	12.0	0.0	20.0	0.0	40.0	0.0
2 (1st of operation)	3.0	2.5	6.0	2.5	7.5	2.5	9.0	2.5	15.0	2.5	30.0	2.5
3	2.0	5.0	4.0	5.0	5.0	5.0	6.0	5.0	10.0	5.0	20.0	5.0
4	1.0	7.5	2.0	7.5	2.5	7.5	3.0	7.5	5.0	7.5	10.0	7.5
5	0.0	10.0	0.0	10.0	0.0	10.0	0.0	10.0	0.0	10.0	0.0	10.0
6	0.0	10.0	0.0	10.0	0.0	10.0	0.0	10.0	0.0	10.0	0.0	10.0
7	0.0	10.0	0.0	10.0	0.0	10.0	0.0	10.0	0.0	10.0	0.0	10.0
8	0.0	10.0	0.0	10.0	0.0	10.0	0.0	10.0	0.0	10.0	0.0	10.0
Total outside cost	10.0	--	20.0	--	25.0	--	30.0	--	50.0	--	100.0	--
Ratio: Fifth year net benefits/total outside costs	1.0		.50		.40		.33		.20		.10	
Internal rate of return (percent)	76.00		36.00		26.00		19.00		3.00		(15.00)	

a. Outside funds expended by the project.
 b. Benefits net of locally contributed costs.
 Source: RRNA.

The tools used by economists for correcting these distortions in money over time are called compounding and discounting factors. Determination of the appropriate rate to use when using compounding and discounting factors is a difficult and time consuming task. Therefore, the Chapter III method looks at costs and net benefits in actual currency value. Not taking account of the time value of money may bias the results of this analysis, although it will not necessarily do so.

If projects being compared behave in a similar way and take place in the same county over a similar time period, the effect of ignoring the time value of money will be minimal. To understand why this is the case, an understanding of the internal rate of return is helpful.

Internal Rate of Return

The measure most commonly used by international bankers (and economists) for determining the cost-effectiveness of project designs and for evaluating projects is the internal rate of return (IRR). The internal rate of return is the interest rate of benefits generated by a project. An oversimplified explanation of the IRR is to think of a project as though it were a purchase of common stock. The cost of the stock is the PVO's contribution to the project. The profit earned from selling the stock are the project's benefits. If stock is bought for \$100 today and sold for \$100 tomorrow, the investor made no money and lost no money. His cost of buying the stock was equal to the benefit he earned selling the stock. Projects can behave the same way. If the benefits and costs over time of implementing a project are equal, then all costs have been paid but no profit is earned. The IRR of a project like this would be 0.

If the investor bought the stock for \$100 and sold it a year later for \$150, he has repaid all costs (\$100) and made some money for himself (\$50). When a project behaves in this way (benefits outweigh the costs), the IRR will be greater than zero, for example, 50 percent. This figure indicates the interest rate the project is paying back to the investors who paid the cost of the project.

Added to this simple idea is the effect of the time value of money. For example, if total cost of a project is \$100 spent in the first year and the project earns total benefits of \$100 in the second year, it has lost money. As explained above, this is because the \$100 in the first year is worth more than \$100 in the second year. To break even,

the project's benefits in the second year would have to be larger than \$100; to make money, they would have to be still larger.

Although the calculation of the IRR does not take account of the time value of money, the way it is used for measuring the worth of projects does. When using the IRR as a criterion for the implementation of projects, an analyst compares it to a cut-off rate, commonly 12 percent in developing countries. This cut-off rate can be thought of as the borrowing rate which would be paid if project participants were taking out a loan to finance the project. Clearly, a project with an internal rate of return of 10 percent would not be able to pay back a loan at 12 percent interest. Therefore, the project should not be implemented. By comparing the IRR to an interest rate (or, more formally, the discount rate), the time value of money is considered implicitly.

It is useful to compare the results of analyzing projects using the ratio of net benefits to costs with the results of analyzing a project using the IRR. The same project characteristics which make a good IRR generally also contribute to a good ratio of net benefits to costs. They are: low costs relative to benefits, early start of benefits, and benefits which are sustained over time. Table C-1 illustrates that the IRR gives the same comparison among projects as does the ratio of net benefits to cost.

Moreover, the IRR can indicate the places where the ratio of net benefit to costs may lead the analyst astray.

When Project Benefits Are Higher in Earlier Years

It may happen that a development project may yield decreasing rather than increasing annual benefits, as depreciating capital may not be replaced and as the initially enthusiastic community and staff leadership moves on to other activities and other locations earlier than expected. In this case the project will deviate from our model project. Full benefits will come in the early years and, then, taper off. Table C-2 compares such a project with Project A from Table C-1.

Table C-2. A Project With Early Benefits vs. a Project With Gradually Decreasing Benefits

Year	Project A		Project G	
	Costs	Benefits	Costs	Benefits
	-----Thousands of pesos-----			
1	4.0	0	4.0	0
2	3.0	2.5	3.0	5.0
3	2.0	5.0	2.0	7.5
4	1.0	7.5	1.0	7.5
5	0	10.0	0	2.5
6	0	10.0	0	2.5
7	0	10.0	0	2.5
8	0	10.0	0	2.5
Total	10.0	--	10.0	--
Ratios of net benefits to costs (in each of years 5-8)	1.00		.25	
IRR (percent)	74.00		88.00	

Source: RRNA.

The ratio of net benefits to costs indicates that Project A is far superior to Project G because Project A is able to pay off all its investment costs with just one year of benefits. Project G, on the other hand, would require four years to pay off its investment costs and, thus, falls into the range of questionable projects. However, the IRR tells quite a different story. It shows both projects to be very profitable largely because the benefits are large in comparison to costs. Project G is somewhat better than Project A because it returns large benefits in the early years. Due to the time value of money, the later years, when Project A's benefits are large while Project G's benefits are reduced, are much less significant than the earlier years when the benefit pattern is reversed. The possibility of projects behaving like Project G is an important consideration and must be remembered when using the ratio of net benefits to costs. However, most successful projects with monetary benefits more closely follow the pattern of Project A than of Project G.

When Project Costs Are Increasing
Over Time

It may happen that a project's investment costs do not follow the pattern shown in the examples in Table C-1. For example, delays in implementation due to problems getting materials, staffing problems, and problems with generating the enthusiasm of local participants may cause expenditures to increase over the investment years rather than decline as shown in our examples. Table C-3 compares two projects to illustrate the effect of this possibility.

Table C-3. A Project With Increasing Investment Costs
vs. a Project With Decreasing Investment Costs

Year benefits	Project C		Project H	
	Costs	Net benefits	Costs	Net
	-----Thousands of pesos-----			
1	10.0	0	2.5	0
2	7.5	2.5	5.0	2.5
3	5.0	5.0	7.5	5.0
4	2.5	7.5	10.0	7.5
5	0	10.0	0	10.0
6	0	10.0	0	10.0
7	0	10.0	0	10.0
8	0	10.0	0	10.0
Total	25.0		25.0	
Ratio of net benefits to costs	.40		.40	
IRR (percent)	26.00		41.00	

Source: RRNA.

According to the ratio of net benefits to costs, Projects C and H are of equal merit. Both require four years of full benefits to pay back project investment costs. The IRRs of the two projects tell a different story. Project H is significantly better than Project C because high costs occur in later years when the time value of money reduces their impact. When a project has an investment pattern which follows that of Project H, a careful interpretation of the ratio of benefits to costs is necessary.

When Project Benefits Are Erratic

The assumption regarding the flow of project benefits is that they start out slow, gradually increase, reach full levels in the year after the investment is completed and retain that level throughout the project's life. In reality, the benefits of many projects with monetary benefits will not be so well behaved. For example, an agricultural project producing crops for market may be faced with crop prices which fluctuate from year to year. In this case the ratio of net benefits to cost is very sensitive to the year selected for the evaluation. Table C-4 illustrates this type of project.

Table C-4. A Project With Fluctuating Net Benefits

Year	Project I		Ratio of net benefits to costs
	Costs	Net benefits	
	-----Thousands of pesos-----		
1	8.0	-	
2	6.0	2.5	
3	4.0	7.5	
4	2.0	5.0	.25
5	0.0	6.0	.30
6	0.0	7.5	.38
7	0.0	15.0	.75
8	0.0	2.0	.10
Total	20.00	-	
IRR (percent)	31.00		

Source: RRNA.

The results of the ratio of net benefits to costs analysis vary significantly depending on the year of the evaluation. In year 7, the ratio indicates that three-fourths of the project's costs are paid back in one year. However, if the evaluation were conducted in year 10, the ratio would imply that it would take 10 years to pay back the project's investment costs. The IRR, which considers all years of the project, indicates that the project is

pretty good. To overcome this limitation of the ratio of net benefits to costs it is necessary to have some sense of what the benefits look like in all years of the project. A feel for the state of the local economy, (i.e., are agricultural prices high or low in the year of the evaluation), also will help interpret the ratio. In reality, few projects will behave as erratically as our example.

Project Design

Most of the discussion of the ratio of net benefits to costs is concerned with its use as a tool for evaluation purposes. Perhaps its greatest value lies in its ability to help planners make project implementation decisions. Table C-1 illustrates its usefulness as a planning tool.

The benefits of all the projects are the same. In project planning these would be the target benefits. The different cost scenarios can be viewed as different methods for generating the same benefits. The ratio of net benefits to costs gives a clear indication of which method is most cost-effective. Of course this tool will only be one of many inputs in the decision-making process.

Conclusion

Despite the many problems which may be encountered with the ratio of net benefits to costs, its use is still advocated. It is a quick, easy and inexpensive method of measuring a project's cost-effectiveness. Using the ratio in conjunction with the checklist in Chapter III will minimize its biases. Also, remember that this ratio is not a final solution to the decision-making problem. It is only one of many factors which may be considered when planning and evaluating projects.

APPENDIX D

REVIEW OF COST-EFFECTIVENESS SEMINAR

On June 1 and 2, 1983, AID sponsored the AID Cost-Effectiveness Seminar, attended by representatives of PVOs, AID personnel, and led by Robert R. Nathan Associates' staff members (Table D-1). The first day of the seminar was devoted to a discussion of the three methods of cost-effectiveness analysis presented in Chapters II through IV. During the second day, participants applied the methods to practical case studies and critiqued the guide and the seminar (Table D-2). The seminar participants offered many helpful suggestions, comments, and criticisms, which have been incorporated into the final version of the guide.

Table D-1. AID Cost-Effectiveness
Seminar Participants

June 1-2, 1983

Private Voluntary Organization

Heifer Project International
Armin Schmidt

International Voluntary Services
Nan Borten
Jim Crawley

National Rural Electric Cooperative Association
Phil Costas

Partnership for Productivity
James Hoochshwender
Paul Rippey

Private Agencies Collaborating Together
Eric Oldman

Salvation Army World Service Office
Alex Costas
Joan Robinson

Save the Children Foundation
Jeff Saussier

Technoserve
John Hatch

Table D-1. (Continued)

U.S. Agency for International Development

Steve Bergen
Ross Bigelow
Judy Gilmore
Louis Kuhn
Debbie Mace

Robert R. Nathan Associates, Inc.

Alan Ellison
Linda Markey
Ted Wilde

John Beyer, President
Robert Nathan, Chairman of the Board

Table D-2. AID Cost-Effective Seminar: Agenda

<u>Wednesday, June 1</u>	
10:00 a.m. to noon	<u>Introduction:</u> Presentation of guide. Discussion of current state-of-the-art in cost-effectiveness assessment for PVO projects.
Noon to 1:00 p.m.	<u>Lunch</u>
1:00 p.m. to 3:30 p.m.	<u>Methods of Cost-Effectiveness Assessment:</u> A checklist of indicators. Comparing costs and monetary benefits. Comparing costs and non-monetary benefits.
3:30 p.m. to 4:00 p.m.	Break
4:00 p.m. to 6:00 p.m.	<u>Practical Examples Using Cost-Effectiveness Assessment Methods:</u> Application of methods to examples based on actual PVO project and to examples bought by PVO participants.
<u>Thursday, June 2</u>	
9:00 a.m. to noon	<u>Workshop:</u> Application of methods to case studies (small work groups for first half of session).
Noon to 1:00 p.m.	<u>Lunch</u>
1:00 p.m. to 2:00 p.m.	<u>Plenary Session:</u> Critique of guide by participants. Suggestions for AID's continuing work with PVO's on cost-effectiveness assessment.