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D R A F T

ECONOMIC ANALYSIS OF NONFORMAL EDUCATION:
FOUR CASE STUDIES

by

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I. Introduction:

This paper examines the economic costs and benefits of four nonformal education projects to:

- a) determine minimum data needs for more accurate economic analysis of nonformal education projects in the future; and
- b) identify, to the extent possible, common factors that seem to contribute to positive economic returns.

Well over half of the rural families in the developing world still lack the most rudimentary educational and related skills for primary health care, safe and convenient water supply, family planning, agricultural improvement, locally relevant occupational training and effective programs for improving the status of women and welfare of children. For most illiterate adults in the developing world, nonformal education programs are the only alternative for gaining these necessary skills.

Despite the large number of NFE activities in developing countries (e.g., a recent survey showed some 10,000 such activities in Colombia), relatively little is known about the economic costs and benefits of these projects. Without this information, it is difficult to determine what economic contributions NFE programs make to: the economies they are intended to serve, the agencies that design and fund them, and the individuals who are meant to benefit from them. This paper attempts to explore these issues.

The paucity of good quantitative data for NFE programs has severely limited past efforts to assess the economic gains from investments in these programs. There seems to be a perception that data collection is too costly and time consuming to be justified in NFE programs. Ex post, it is extremely difficult to isolate the resources used in or quantify the benefits gained from NFE projects. First, compared to formal education projects, the management of nonformal education projects is diffuse. Since there is no central agency, such as a ministry of education, that controls and directs the activities within a country or a region, there is no single budget, source of revenue, norm of expenditure, or financial control arrangement. Second, many nonformal programs are not independent activities, but are part of broader programs designed for a variety of different sectors. For example, an extension service may be introduced as part of a larger agricultural project. The costs as well as the benefits of such an activity are inseparable from those noneducational elements of the project. Third, the clientele served, locations of learning, objectives pursued, duration of courses, methodology used, and kinds of personnel employed are extremely varied for nonformal education. Physical facilities, equipment, and instructors are often borrowed, part-time or multipurpose. Finally, the benefits

to be gained from NFE projects are varied and difficult to quantify. These benefits can range from quantifiable benefits such as increased income due to skills acquisition to unquantifiable benefits such as improved nutrition practices or increased self confidence.

In the absence of good data, most economic analyses of NFE projects tend to understate project costs and over-estimate project benefits. With more accurate information about opportunity costs of volunteer labor and participant's time, estimates of NFE project costs are likely to be higher. Similarly, better baseline data regarding incremental benefits from NFE programs will probably show current estimates to be overly optimistic. In this paper, we attempt to adjust for these distortions by making conservative rather than optimistic assumptions about both costs and benefits.

Conservative guesses cannot, however, substitute for actual data. One important objective of this paper is, therefore, to identify those data that can be collected with minimum effort and expenditure and which are most critical for determining project costs and benefits. Though costs and benefits measurable in economic terms are not the only measures of a project's viability or potential impact, they are important for a number of reasons. Economic analysis can provide useful information about the viability of planned projects and success of past projects, as well as about the costs of replicating projects elsewhere and how efficiencies of current projects can be improved.

In this paper we attempt to identify which data are most important for conducting an economic analysis of NFE project and which could feasibly be collected and analyzed by the wide variety of groups responsible for design and implementation of NFE projects. These data and the subsequent economic analyses would be useful in: convincing potential donors (whether international, bilateral, or host government) of the relative merit of a particular project; improving the effectiveness of the current project; and in designing new projects to be more effective. A second objective of this paper, then, is to demonstrate the usefulness of economic analysis in evaluating and improving NFE programs.

Section II discusses the methodology used in the analysis of project costs and benefits. Section III summarizes the economic analyses of four existing or completed nonformal education projects. Section IV gives conclusions about the economic viability of the four projects and summarizes minimum data needed to carry out future economic analyses of NFE projects.

II. Methodology:

For this analysis, NFE projects which have both training and income-generating components were considered. The sample was limited in this way to make the calculation of economic benefits more straightforward. In addition, the sample of projects considered were further narrowed to those with adequate documentation of sources and uses of project resources, and of net increase in benefits. From this somewhat narrowed sample, projects were

identified that varied by: target population , geographical location, sector of assistance, type of assistance, type of implementing agency and in administrative organization of the project. Table 1 below summarizes the characteristics of the four NFE projects examined in this paper.

Table 1
Salient Features of Selected Nonformal Education Projects

| | (A) | (B) | (C) | (D) |
|------------------------------|------------------------------------|---|------------------------------------|--|
| <u>Target Population:</u> | Urban men, Ave.Ed.,10 yrs. | Rural men, | Rural women, 84% illiterate. | Rural men, 65% illiterate |
| <u>Geographic Location:</u> | Latin America | Asia | Africa | Latin America |
| <u>Sector of Assistance:</u> | Informal, urban, cottage industry. | Agriculture. | Informal, rural, cottage industry. | Agriculture. |
| <u>Type of Assistance:</u> | Mgt. Training, loans. | Ag. Training, people used to disseminate information. | Skills training, some literacy. | Ag. Training, radio used to disseminate information. |
| <u>Implementing Agency:</u> | Local PVO | Local PVO. | Local women's PVO. | Central government. |
| <u>Approach:</u> | Bottom-up | Bottom-up. | Bottom-up. | Top-down. |

A = Microenterprises Project, Dominican Republic;

B = Upland Rice Project, Philippines;

C = Tototo Rural Development Program, Kenya;

D = Basic Village Education Project, Guatemala.

PVO = Private Voluntary Organization

Before proceeding to the description of the methodology used in calculating project costs and benefits, a few general comments are needed regarding the sources and completeness of data used in this analysis. As noted earlier, good, quantitative data are generally scarce for nonformal education projects. Though projects chosen were those where relatively more data were available, none of the projects had control groups that could be used without reservation. In the absence of control groups, it is difficult to predict the extent to which benefits are actually due to the project. Further, due to time and resource constraints, all of the data used in this analysis were necessarily taken from secondary sources. Without site visits or very reliable baseline data, it is difficult to say with certainty that the data presented here accurately reflect what actually happened in the field. We can, however, predict what would happen under certain assumptions about prevailing conditions.

The methodology used to examine project costs and benefits has been treated extensively in many forums (Levin, 1983; Gittinger, UNIDO, Mishan, 1976). Despite the extensive treatment of the subject, the quality of many economic analyses is disappointing and is often inadequate for use by policy makers in decision making. One of the major pitfalls is the failure to recognize the total resource costs and such failure inevitably deflates the cost estimation of the project. As noted earlier, we have attempted to address this problem by estimating opportunity costs for participants wherever possible. The other side of the problem is the tendency to attribute all net gains occurring during the life of the project to the sponsoring agency's inputs of the project. The absence of control groups in most project designs makes it nearly impossible to separate changes in individuals' behavior or income from those occurring due to other external events. A similar problem, which is specific to NFE projects with an income-generating component, is the difficulty in determining what portion of benefits is a result of the new skills or practices taught through the educational component and what portion are a result of the incremental physical inputs that invariably accompany such training. Given the nature of the data, it is impossible to separate the effect of either one of these inputs on the benefits. We must, therefore, bear in mind that net gains identified in these four studies are a result of both training and physical inputs even though the latter may not be one of the ingredients formally provided by the project.

Most evaluation studies single-mindedly, and understandably focus on the perspective of the sponsoring agency. Sponsoring agencies often use benefit/cost analyses to determine if a project is an appropriate investment of the agency's resources. Though sponsoring agencies usually define benefits as the economic returns to the economy as a whole, the costs considered are usually only their own. While this kind of evaluation serves a very important internal function, it does not provide adequate information for making prudent policy decisions about NFE programs.

This paper attempts to create a more complete picture by looking at project costs and benefits from two additional perspectives. These perspectives

include those of individual participants and those of society as a whole. It is important to evaluate project costs and benefits from the individual perspective, because these are the people NFE programs are intended to serve. It is especially imperative to detail all cost ingredients which are borne by the participants, and not necessarily covered by the sponsoring agencies. The evaluation of programs from this perspective gives a clearer picture of whether or not a program will prove acceptable to its clients, a critical ingredient for long term project success.

Evaluation from a social perspective can be viewed as all encompassing. No evaluation study from either the perspectives of sponsoring agency or the individual participant includes all the costs associated with and the benefits generated from the program. Yet it is important for policy makers to have this broader evaluation before making a decision about which projects should be replicated to achieve the most economic development given the limited resources available for social investments.

For each of the four NFE projects examined, the paper examines economic costs and benefits to society as a whole, to the sponsoring agencies and to the individual participants. For society and sponsoring agencies, both the cost of the project with development costs (i.e., design and planning costs) and without development costs (i.e., the cost of replicating a pilot project elsewhere) have been considered. In all four cases, the effect of the NFE intervention is assumed to sustain benefits a period of five years after the completion of the program.

Once the inputs are identified over the life of the program, the values of these inputs are documented into a cost stream. This cost stream is converted into the net present value discounted by a series of four alternative rates which reflect different assumptions about future conditions under which the project may have to operate. Benefits are treated similarly. For each of the four discount rates, a ratio of net present value of project costs to that of benefits is calculated. This benefit-cost ratio serves as a tool for assessing the economic viability of the four nonformal education projects examined in the paper.

III. Economic Analysis of Selected Nonformal Education Projects

(A) Microenterprise Project, Dominican Republic

Project Description

The Microenterprise project provides credit and management assistance to small artisan manufacturers in Santo Domingo, the capital and major urban center of the Dominican Republic. The main objectives of the project were to enhance income and increase levels of employment for small businesses with six or less employees. The assisted enterprises were engaged in a variety of activities such as shoemaking, repair work, baking and rope making.

The project was designed by Accion/Aitec International, a small U.S. organization, and was administered by the Dominican Development Foundation (DDF). The DDF, a private non-profit community service organization established in 1966, provides assistance to poor, small-scale farmers through credit and technical assistance. DDF extended its program to the urban areas where it now provides technical assistance and credit to individual microenterpreneurs and informal associations known as "solidarity groups." This became DDF's "Program for the Development of Microenterprises" (PRODEME) in May 1981. In this study, we consider only the costs and benefits of the Microenterprise component of that project.

For the first three years of operation, the Microenterprise project was funded by grants from three international donors: the U.S. Agency for International Development in DR (USAID/DR); the Inter-American Foundation and Appropriate Technology International. USAID/DR funds covered most of the operating costs, the credit fund and technical assistance to DDF through Accion/Aitec International. A full-time resident advisor from Accion/Aitec assisted in program design, trained DDF personnel and provided technical assistance in program development and training.

Under the Microenterprise project, only small manufacturing and service firms were eligible for assistance. The average microenterprise assisted under this project had 2.4 full-time equivalent employees and RD \$5,397 total investment. The average age of participating Microenterprise owners was 38, their average educational level was 10 years; 80% were male.

The owners of these small urban businesses were characterized by lack of access to institutionalized credit and poor management practices. The project was designed to give appropriate training in bookkeeping, marketing, and management to microenterprise owners before and after they were granted a loan. Potential clients learned of the program either through word of mouth, from other project participants, or through announcements in the newspaper.

The loan application process contained several components and entailed many visits to the firm. The completion of the initial application required an average of four visits to the firm. If questions arose on the application during review by the DDF analyst, return visits were undertaken to resolve the matter. Additionally, a simple bookkeeping system was initiated and management advice given to the owner. The maintenance of records was required throughout the program, and the DDF coordinator returned to the assisted firm to ensure compliance.

After the approval of a loan, the staff coordinator continued his visits to the firm on a weekly basis to provide further technical assistance in bookkeeping, marketing and managing employees, as well as to monitor the progress of the loan which is generally disbursed 30 to 60 days after approval. Additional formal technical assistance courses were also offered. Between the period of July 1981 to June 1984, 247 loans were made amounting to RD \$440,322 (Otero and Blayney, 1984, p. 9).

Data Collection

Accion/Aitec International was the main source of data for this project. The average monthly net gain of gross profits and total increase in number of full-time equivalent employees were major measures of project benefits. These measures were collected by DDF between the start of the project and September 1982. Complete data on the monthly performance of the assisted firms were available for only 32 of the 48 owners that were surveyed. Estimated total annual incremental income from the project is calculated from the increase of each of these 32 businesses. Cost data were obtained from Accion/Aitec, AID, and the Inter-American Foundation.

One of the major problems encountered with the data from this project was the insufficiently comparable control group. In the Microenterprise project, members of the control group were, on the average, 45 years old or about 7 years older than those participating in the program. More importantly, the average educational level of the control group was 5.6 years which is about half that of the participating microenterprise owners. These differences lead one to expect that participating owners will perform better than control group owners, *ceteris paribus*. In the absence of a comparable control group, benefits are measured as the average monthly net gain of gross profits of the participating owners between their first contact with the Dominican Development Foundation and the time of data collection in September 1982. The inadequacy or nonexistence of control groups is a common problem among many social programs. A possible explanation may be that it is too expensive to identify and monitor control groups that adequately meet the rigorous demands of research design.

Project Costs and Benefits

In our economic analysis of the Microenterprise project, project costs and benefits are considered from three different perspectives: sponsoring agencies, assisted microenterprises, and society as a whole. From the perspective of society and sponsoring agencies, benefits are measured as the value of increased income to assisted businesses and of new employment created by the project. Increased income is the difference between assisted businesses' gross profit before their first contact with DDF and after the loan was given until September 1982. Gross profit is measured by subtracting the costs of raw material and salaries from the sales revenue. The average net gross profit is simply the difference between the average monthly gross profit before the first contact with the DDF officials and that up to the data collection on September 1982. (See Appendix A.1).

The increase in employment is the difference between number of full-time equivalent employees before first contact with DDF and after assistance. The economic benefit of increased employment is calculated by multiplying the number of increased full-time equivalent employees by the difference between the average salaries of the employees and their opportunity cost. The opportunity cost of new employees of the microenterprises is the salaries

individuals could expect to earn elsewhere and is estimated by multiplying the average salaries of the employees by their employment rate. (See footnotes in Appendix A.2 for more detailed explanation). It is assumed that economic conditions remained stable over the period (i.e., the unemployment rate was relatively constant) and that net gains in gross profit and marginal increases in salary were due entirely to the project inputs -- training and loan money. Multiplier effects that may occur because of the net gains in profit and marginal salaries are not included.

Benefits from the perspective of the assisted microenterprises differ from those perceived by society as a whole and sponsoring agencies. Because society's and sponsoring agencies' concerns are broader, it is assumed they are interested in all benefits that the project may bring to the economy, regardless of who the recipient might be. From the perspective of the assisted businesses, benefits are narrowly defined as the incremental increase in gross profits. To the firm owner, increases in the number employed means higher production costs which may or may not represent a benefit to the owner. Appendix A.2 summarizes benefits from incremental gross profits and marginal salary increases over the life of the Microenterprises Project.

Costs of the Microenterprise project are also considered from the same three perspectives. The derivation of alternative cost streams for sponsoring agencies and assisted microenterprises is described in Appendixes A.3 and A.4.

From the perspective of sponsoring agencies there are three alternative cost scenarios. The first alternative includes: costs related to project design and planning (i.e., development costs), costs related to operating the project, and costs from unrecovered loans. It was reported that approximately 25% of the loans were never repaid. These unrecovered loans represent a loss to the sponsoring agency and are included as a cost. Interest paid by businesses represent DDF income and is therefore subtracted from total costs.

The second cost scenario for sponsoring agencies is exactly the same as the first, except development costs have been excluded. This is an approximate measure of how much it would cost to replicate the project elsewhere under the same assumption of a 25% rate of default on loans.

The third and final cost scenario from the sponsoring agency perspective estimates what it would cost to replicate the project elsewhere if one could ensure that 100% of the loans were repaid.

From the perspective of the assisted microenterprise, two cost scenarios are considered. The main costs to the microenterprises are repayment of the principal on the loan plus interest on the loan. Under the first scenario, it is assumed that the 25% unrecovered loans will eventually be repaid. Under the second scenario, it is assumed that the defaulted loans are never repaid. Since assisted firms were only eligible for one loan under this project, failing to make the repayment would have no long term ill effect and could be considered a net gain of income for the microenterprise. Both cost scenarios

assume that there is no opportunity cost to the owners for participating in the training program. The major reason for this assumption is that no data are available regarding the duration of these training programs. Because the training in bookkeeping and management offered under the project had an almost immediate impact on the productivity of the firm, the time spent acquiring these skills was not calculated as an opportunity cost. Given a discount rate of 25% and the full cost scenario, the owners will still realize a return of two and a half times their costs in six years.

Two cost scenarios are considered under the social perspective. The first scenario includes both development and operating costs plus the cost of loans, while the second includes only operating costs plus the cost of loans. The second alternative attempts to measure the cost to the economy of replicating the project elsewhere. Both interest payments and unrecovered loans are excluded from society's costs as they merely reflect a transfer of resources from one group to another.

The following section describes the conclusions that can be drawn about the economic viability of the Microenterprise project.

Conclusions

Table 2 summarizes the net present values of costs and benefits for the Microenterprise project under alternative assumptions about perspective, cost components, and discount rates. Within each scenario, benefit/cost ratios have been calculated using four different discount rates to determine the degree to which external economic factors might affect the economic viability of the project. Alternative assumptions about perspectives and cost components have been described in detail in the preceding section.

Three general observations can be made about the results of the preceding economic analysis. First, for all three perspectives, the difference between benefit/cost ratios under scenarios where development costs are included are not great compared to those where development costs have been excluded. It may be that all costs associated with the design and planning of this project have not been identified. The Microenterprise project was part of a larger AID effort to examine appropriate forms of assistance to microenterprises. The lessons from other projects under this program may have been applied to the design and planning of this project. It was not possible to make an estimate of the value of these development costs from the secondary data that were available. The benefit/cost ratios would likely decrease for the scenarios that include development costs if these additional planning and design costs were considered. From available data, it is, however, impossible to determine if benefit/cost ratios would fall enough for the project to become an inefficient use of resources.

Table 2: Benefit-Cost Ratios for Microenterprise Project¹

| <u>Sponsoring Agencies</u> | <u>Discount Rates</u> | <u>Net Present Values</u> | | <u>B-C Ratio</u> |
|--|-----------------------|---------------------------|----------------|------------------|
| | | <u>Cost</u> | <u>Benefit</u> | |
| Dev. + Operating + Unrecov. Loans - Interest | 12% | 286,549 | 1,616,903 | 5.64 |
| | 15% | 273,710 | 1,448,009 | 5.29 |
| | 20% | 254,559 | 1,218,467 | 4.79 |
| | 25% | 237,803 | 1,038,500 | 4.37 |
| Operating + Unrecov. Loans - Interest | 12% | 200,060 | 1,616,903 | 8.08 |
| | 15% | 189,449 | 1,448,009 | 7.64 |
| | 20% | 173,687 | 1,218,467 | 7.02 |
| | 25% | 159,966 | 1,038,500 | 6.49 |
| Operating - Interest | 12% | 112,571 | 1,616,903 | 14.36 |
| | 15% | 106,432 | 1,448,009 | 13.61 |
| | 20% | 97,327 | 1,218,467 | 12.52 |
| | 25% | 89,417 | 1,038,500 | 11.61 |
| <u>Assisted Business</u> | | | | |
| Interest + Loans | 12% | 391,951 | 1,207,288 | 3.08 |
| | 15% | 371,917 | 1,081,180 | 2.91 |
| | 20% | 342,091 | 909,789 | 2.66 |
| | 25% | 316,055 | 775,413 | 2.45 |
| Interest + Loans - Default Loans | 12% | 304,462 | 1,207,288 | 3.97 |
| | 15% | 288,900 | 1,081,180 | 3.74 |
| | 20% | 265,731 | 909,789 | 3.42 |
| | 25% | 245,507 | 775,413 | 3.16 |
| <u>Social Perspective</u> | | | | |
| Dev. + Operating + Loans | 12% | 591,011 | 1,616,903 | 2.74 |
| | 15% | 562,011 | 1,448,009 | 2.57 |
| | 20% | 520,290 | 1,218,467 | 2.34 |
| | 25% | 483,310 | 1,038,500 | 2.15 |
| Operating + Loans | 12% | 504,522 | 1,616,903 | 3.20 |
| | 15% | 478,349 | 1,448,009 | 3.03 |
| | 20% | 439,418 | 1,218,467 | 2.77 |
| | 25% | 405,472 | 1,038,500 | 2.56 |

Second, the Microenterprise project appears most beneficial from the perspective of sponsoring agencies. Even when costs of project development and unpaid loans are included under the highest assumed discount rate, sponsoring agencies could expect a benefit/cost ratio of 4.37. Under the most optimistic scenario for sponsoring agencies, where it is assumed that there are no development costs and all defaulted loans are recouped, the benefit/cost ratio increases to 14.36. From the perspective of the sponsoring agency, then, the returns on this investment appear very impressive. Resources expended on training under this project were not large and most of the expenditures on loans were recouped through repayment of the loan principal and interest. What is not clear is whether the benefit stream would have remained as high if the assisted microenterprise owners were illiterate or had fewer years of education. Under circumstances where the target group has minimal education, the same mix of project inputs - i.e., a little training in management and bookkeeping skills and an injection of physical inputs through loans - might have a very different effect.

Finally, benefit/cost ratios for the assisted businesses are considerably lower than those of the sponsoring agencies. Under all cost scenarios considered for assisted businesses, the benefit/cost ratios were 2.5 or larger, suggesting that the project is still a good use of participants time and resources. The difference between sponsoring agency and assisted businesses' benefit/cost ratios highlights the fact that, either directly or indirectly, a significant proportion of NPE project costs are borne by the participants themselves.

(B) Upland Rice Project, Philippines

Project Description

The main objective of the Upland Rice project was to assist the farmers of Cavite Province to produce higher yields of rice in the highlands through adoption of improved farming practices and use of C-22, a high yielding variety of upland rice. The project was designed and implemented as part of the People's School, a larger project introduced to the Philippines by the International Institute of Rural Reconstruction (IIRR) in 1975. The People's School project is a system designed to transfer new knowledge, skills and technology to farmers and others through trained village scholars, known in the Philippines as Barangay Scholars. After a period of intensive training, these volunteers, selected from and by their own communities, return to their villages to give courses in one of the following areas: agriculture, literacy education, family planning, nutrition, and community organization. Between 1976 and 1980, over 1,000 such Barangay Scholars were trained in IIRR's People's School in 23 disciplines. Among these were 34 farmers from as many villages trained to disseminate the advantages and technology of planting new high-yielding varieties of upland rice.

After receiving instruction in how to adopt the C-22 variety of upland rice, the Barangay Scholars demonstrate the advantages of new techniques and

seed varieties in their own fields. They are supported by IIRR field workers over a period of several years while they share the new techniques with other farmers in their home communities.

During the period from 1975 to 1980, the years for which cost data were available for the Upland Rice project, a total of 623 farmers adopted the new technology. The original 34 Barangay Scholars shared their new knowledge and skills with a number of farmers who then became Barangay Scholar "Associates" and who in turn shared the new information and skills with an additional number of farmers who then became Barangay Scholar "Cooperators."

The Upland Rice project did not provide loans for purchase of the additional inputs needed to adopt the C-22 variety of rice and new techniques. It is assumed, however, that participating farmers in the Cavite Province did have access to credit of some sort. For many of the Farmers, however, the source was money lenders who charge interest rates as high as 50 to 100%.

Data Collection

Data used in this study are taken from an earlier study conducted by Edward Reed at the IIRR in the Philippines, "Preliminary Analysis of the People's School Approach." Primary data were collected from the field visits of the plant production specialist working on the project and from a 1979 baseline study.

In completing this economic analysis of the Upland Rice project, three general problems were encountered with the data used in Reed's preliminary analysis. First, though a baseline study was completed for the project in 1979, no control group was identified and monitored. As was the case for the Microenterprise project, it is difficult to attribute benefits solely to the Upland Rice project without a control group.

Second, Reed calculated project costs as a proportion of the operating expenditures for the entire People's School. In doing so, all costs related to the design and planning of the project have been excluded, substantially underestimating the actual overall project costs. Finally, in Reed's preliminary analysis of the Upland Rice project, the increased production costs which will invariably accompany the adoption of new varieties of rice have not been included.

Unfortunately, it proved impossible to estimate development costs for the Upland Rice project from available data. It was, however, possible to make some assumptions about incremental direct and opportunity costs borne by participating farmers. It is assumed that costs to participating farmers include the additional costs incurred in the production of the C-22 variety of rice, the interest payments incurred on the loans needed to cover increased production costs, and the opportunity cost of time spent in training. A detailed description of how farmers' costs are calculated follows in the section on project costs and benefits

Project Costs and Benefits:

Project costs and benefits were considered from three different perspectives: IIRR, the sponsoring agency; participating farmers; and society as a whole. Benefits to participating farmers and society are assumed to be equal and are simply the increased value of rice production due to the adoption of new farming techniques, the planting of C-22 rice, and the increased use of fertilizer and other inputs. Specifically, these benefits are measured as the total increased yield per hectare times the price times the area shifted to the new variety of rice.

Benefits from IIRR's perspective are the total increased value of production after switching to C-22 minus the additional production costs, interest payments on loans incurred by farmers to buy additional needed inputs and the indirect cost of training. From the sponsoring agency perspective, these costs are viewed as essential inputs for the increased production, but are not considered direct costs to IIRR.

As noted in the previous section, costs for the Upland Rice project are based on operating expenditures only. In other words, all costs related to project design and planning have not been accounted for in this analysis. From the perspective of IIRR, the administering agency, the cost of the project is the proportion of the People's School's operating expenditures allocated to the management and implementation of the Upland Rice project. These costs include costs related to training the original 34 Barangay Scholars, which were mainly indirect costs associated with transportation, meals and opportunity cost of time Barangay Scholars spend in training. (Appendix B.3.) From IIRR's perspective of project costs, it appears that the net total value of increased rice production is due entirely to the training effort of this project. However, an examination of the project from participating farmers' perspective shows this to be a substantial understatement of actual project-related costs.

The cost to the farmer of switching to the C-22 variety rice includes the additional cost of production, the interest payment incurred on loans to cover the additional production costs during the planting season, and the indirect cost of training (i.e., opportunity cost of time spent in training). As far as the farmers are concerned, it is all these inputs which have contributed to the increased value of production.

The opportunity cost for farmers' training is assumed to be similar to the indirect costs associated with the training of Barangay Scholars. Though the costs of transportation and meals are likely to be negligible, it will probably take the farmers longer to learn the new techniques for adoption of C-22 because, in the absence of institutional resources, the Barangay Scholars may not be as effective as the People's School.

Total increased production costs are defined as the average incremental production cost per hectare times the number of total cumulative adopters per year and number of hectares per adopter. It is assumed that the majority of

farmers will borrow enough money to cover additional production costs during the planting and will pay the loan back after the harvest. (Derivation of farmers' costs are given in Appendices B.2 and B.3. Total farmers' costs can be calculated from summary cost streams given in Appendix B.4.)

Most farming communities in developing countries face dual financial markets. Farmers in the Philippines are of no exception. While some farmers will be able to borrow money at the agricultural loan rate from formal credit institutions, many will have to borrow from various sources in the informal sector at rates ranging from 50% to over 100% per annum. Under the farmers' perspective, three alternative cost scenarios are considered which vary according to three possible interest rates that farmers may face: the market rate (at 12-14% during the life of the project), 50% or 100%.

Project costs from society's perspective, consist of the share of the administrative cost of the People's School, the increased cost of production and the indirect or opportunity cost of training. Interest payments on farmers loans are not included under society's perspective of costs as they merely represent a transfer of resources from one group to another.

Conclusions:

Table 3 summarizes the net present value of costs and benefits for the Upland Rice project. Under all cost scenarios, the benefit/cost ratio was found to be positive, ranging from a low of 2.01 to a high of 10.56. The addition of cost scenarios that include development costs under society's perspective could very well push the benefit/cost ratio below one. In the absence of necessary data, however, it is impossible to project these costs; the analysis of this project must remain less complete than the analysis of the other three projects.

What is most interesting about this analysis is the relatively high costs for participating farmers. Farmers' costs are consistently higher than IIRR's costs and even higher than overall costs to society in two out of three cases. Assuming the farmers have to rely on informal sources to finance the increased production costs associated with planting C-22 rice, the cost/benefit ratios decrease from 2.8 at the market rate of interest to 2.4 at the 50% rate and approximately 2 at the 100% rate. (See Table 3.) It is surprising to see that the benefit/cost ratios remain quite respectable even when farmers have to finance increased production costs at interest rates of 50 to 100 percent.

What is more interesting is that the farmers actually decreased the average area planted in C-22 rice from 0.89 hectares in 1976 to 0.54 hectares in 1980. One explanation is that because rice was traditionally a subsistence food crop for farmers and their families, they were able to increase the area of land planted in cash crops such as coffee and pineapple and reduce the area planted in rice without reducing the amount of rice produced for direct consumption due to the higher per hectare yields of the new C-22 variety of rice. Another possible explanation is that the interest rates charged by

Table 3: Benefit-Cost Ratios of Upland Rice Project

| <u>Perspective</u> | <u>Discount Rates</u> | <u>Net Present Values</u> | | <u>B-C Ratio</u> |
|---|-----------------------|---------------------------|----------------|------------------|
| | | <u>Cost</u> | <u>Benefit</u> | |
| <u>Sponsoring Agency</u> (IIRR ^{1/}) | 12% | 99,597 | 1,052,012 | 10.56 |
| | 15% | 92,752 | 925,184 | 9.97 |
| | 20% | 83,033 | 756,752 | 9.11 |
| | 25% | 75,013 | 628,235 | 8.38 |
| <u>Farmers</u> | | | | |
| Paying Interest on Agri. Loan Rate | 12% | 604,046 | 1,656,058 | 2.74 |
| | 15% | 528,919 | 1,454,103 | 2.75 |
| | 20% | 429,436 | 1,186,189 | 2.76 |
| | 25% | 353,836 | 982,071 | 2.78 |
| Paying Interest on 50% Ann. Rate | 12% | 697,294 | 1,656,058 | 2.37 |
| | 15% | 610,248 | 1,454,103 | 2.38 |
| | 20% | 495,052 | 1,186,189 | 2.40 |
| | 25% | 407,577 | 982,071 | 2.41 |
| Paying Interest on 100% Ann. Rate | 12% | 825,427 | 1,656,058 | 2.01 |
| | 15% | 721,916 | 1,454,103 | 2.01 |
| | 20% | 585,028 | 1,186,189 | 2.03 |
| | 25% | 481,173 | 982,071 | 2.04 |
| <u>Society</u> | | | | |
| | 12% | 668,758 | 1,656,058 | 2.48 |
| | 15% | 591,331 | 1,454,103 | 2.46 |
| | 20% | 488,109 | 1,186,189 | 2.43 |
| | 25% | 408,994 | 982,071 | 2.40 |

¹ From the IIRR perspective, it is assumed that the marginal benefit of the upland rice project is the difference between the total increased value of production and the sum of increased cost of production, interest payment on increased cost of production, and the training cost.

informal money lenders were much higher than the rates assumed in our analysis. Increased production costs and prohibitively high interest rates may have caused farmers to discontinue use of the new C-22 variety of rice after a few years. If this were actually the case, the benefit/cost ratios for the farmer would have been much lower than those calculated from the assumptions used in this analysis. While data on number of farmers adopting the C-22 rice and new techniques was fairly complete, there is no information on the number of farmers that actually continued to use the new methods.

(C) Tototo Rural Development Program, Kenya

Project Description

The Tototo Rural Development program extends training and technical assistance in small enterprise development to rural women's groups in Kenya's Coast Province. The Coast Province is one of Kenya's poorest regions, and those participating in the program are among the poorest in the area. Ninety-eight percent of the participants are women, of which 84% have never been to school. Though the region is not productive in agriculture, approximately 83% of group members are engaged in some form of subsistence agriculture. In 1978, 73% of the participants had an average annual family income of less than \$240; the need for off-farm income was great.

World Education, a private American organization, was responsible for most of the Tototo Rural Development program design and planning. Tototo Home Industries of Mombasa, Kenya, a non-profit voluntary women's organization, was responsible for project implementation. Established in 1963 by the National Christian Council for Kenya (NCCCK), Tototo Home Industries has been active in the Coast Province for over twenty years encouraging local cottage industries and helping women to acquire technical skills to improve their income earning ability. Many of the women's groups assisted under the Tototo program were existing groups already involved in handicrafts production for Tototo. The need for the Tototo Rural Development program became apparent when a number of women from existing groups requested that Tototo help them start more profitable income-generating activities.

In response to these requests, Tototo Home Industries and World Education began work on an innovative program for nonformal education in 1977. In the program that was ultimately implemented, women's groups were encouraged to come to a consensus about an income-generating activity they would like to start and to then determine the project-related skills they would need to carry out the project. The economic activities thus became the focal point for learning.

The program commenced in 1978 with funds from USAID. This first phase of the project, which focussed on six groups and a total of 163 women, was aimed at providing women with the skills needed to establish small-scale economic enterprises. Of the six groups receiving training in this first phase of assistance, five were still operating in 1983. Income-generating activities included poultry production, construction of rental property, day care centers, firewood and charcoal production, a bakery and farming. In addition to training, Tototo assisted some groups in identifying local resources for technical assistance. For the most part, these resources were comprised of in-kind and in-cash contributions from various government Ministries. In general, the project provided no credit to the groups during either the first or second phases. Nor were loans from outside sources readily available: Tototo's groups generally did not have sufficient collateral, and even if they did they were not capable of absorbing a loan of this size. In effect, the groups had no access to existing sources of credit.

In 1982, World Education received a Matching Grant from AID and private funding from Chase Manhattan and other private donors to continue their work with Tototo and to begin a second phase of the Tototo Rural Development program. As a result, the program was extended to a total of approximately 20 groups in 1983. By the end of the second phase, in 1984, Tototo had given assistance to 26 groups for a total of 800 women.

The Tototo program runs on a yearly cycle. During the first quarter, the Tototo staff visits new project areas and, with the assistance of village chiefs and community development officers, identifies groups for project participation. A three-week workshop is then conducted for group coordinators, who are selected by their own groups. These coordinators receive a small stipend from Tototo for the work they do. The workshop trains coordinators to lead group discussions, solve group problems and assist groups in planning income generating activities and in setting up group accounting procedures. Group members often contribute small sums for initial capital investments in their enterprise or use proceeds from a small group effort in activities such as handicraft production. Tototo staff then provide regular follow-up visits to groups.

The Tototo Rural Development program faces the particularly difficult task of assisting rural women. Most development programs require a minimum of literacy and numeracy skills for project participation. Because literacy rates for women are much lower than for men in most developing countries, women are often bypassed by development projects. In addition, women's economic roles in their own communities are often overlooked even when they make a significant contribution in critical economic activities such as farming, food processing and marketing. As a result, past development activities for women have mainly focussed on the traditional female roles of wife, mother and homemaker. Relatively few projects have concentrated on enhancing women's economic roles. A project such as Tototo Rural Development, where 98% of the participants are women and the focus is on income-generating activities, is therefore likely to face many problems.

Data Collection:

Data used in this analysis was provided by World Education, Inc. and taken from existing project documents for both phases of the TRD program. The years covered in this analysis are 1978-1983. From 1978 to 1981 World Education was funded by USAID's Office of Education: Tototo Home Industries funding was provided by a subcontract under the same project. From 1982 to 1983, the project was funded primarily by a Matching Grant from AID's Office of Private and Voluntary Cooperation.

As in the Microenterprise project, some control group data was collected for the Tototo project. Data on both project participants and nonparticipants were collected in 1978, during phase one of the project. Two approaches were used in data collection: village coordinators and assistant field supervisors kept logs of weekly group meetings, and field staff conducted pre-project and post-phase one surveys of group members and a number of women not involved in

the project. Though very comprehensive, these data tended to be qualitative rather than quantitative and were targeted at measuring behavioral rather than income changes.

Benefit data were available for only one year of the Tototo Rural Development program. These data, which were recorded in a 1983 End of Year Progress Report, varied in quality and completeness from one women's group to another. Though it was probably safe to assume that the groups' before-project income was zero, there is no record of this in the project document and we have to assume that average per group incomes found in the 1983 report are somewhat representative of annual earnings. In examining this income data, it became apparent average annual revenues were higher for those groups that had been in operation longer. From this limited data, it was necessary to make assumptions about groups' income earnings at various stages in their development. A more detailed description of how a benefit stream is projected from these data follows in the next section.

Project Costs and Benefits:

Analysis of project costs and benefits for the Tototo Rural Development project are considered from three perspectives: sponsoring agencies, individual members of the women's groups, and society. Benefits for the program are narrowly defined in this analysis as the net increase in profit to individual group members as a result of their participation in income-generating activities, and are assumed to be the same for each of the three perspectives. The 1983 End of Year Progress Report gives information on annual profits by group and number of members per group from which per member profits per annum are calculated. (Appendix C.3 summarizes this information.)

A preliminary estimate based on the data given in Appendix C.3 showed the overall average annual profit earned per member to be US\$11.40. This overall average does not account for the difference between the profits of those groups that have been active for several years. The first year, group activities are usually focussed on group dynamics and project identification. Hence, benefits are not likely to occur in the first year. The second year of group activities is spent in actually establishing the small enterprise. By the end of the second year, Tototo expects the groups to be economically self-sufficient, and to be making a small profit. Appendix C.3 summarizes groups' per member profits by the number of years a group has existed. The average per member profit for those groups established in 1983 and 1982 was approximately us\$5.00. For those groups in existence for three or more years, the average per member annual profit was US\$21.00. It appears that it takes at least two years for the full benefit from economic activity to be realized. For purposes of calculating total project benefits then, it is assumed that no benefits occur in the first year of assistance. Further, it is assumed that all benefits actually found in years one and two of assistance are deferred to year two, for an average annual per member benefit of US\$10.00. Maximum per member benefits of US\$21.00 are realized in year three and the years following. (See Appendix C.4.) Project documentation shows that these per member benefits represent an average of 1.5 days per month of

work on the group's economic activity. Appendix C.4, therefore, also considers alternative benefit scenarios under different assumptions about the number of days per month each member works on the group activity. The second scenario assumes 3 days per month and the third scenario assumes 6 days per month. It must be noted that with increased levels of economic activity, additional expenditures on physical inputs or capital investments may be required. We have not attempted to quantify these costs and they have not been included in the alternate scenario. The benefits in these scenarios may be overstated.

Cost data for this project consists of World Education's personnel and operating costs expended for the design and planning of the project and in consulting with Tototo once the project was underway. In the consideration of project costs from various perspectives, these are assumed to be the project's development costs. In addition to World Education's costs, the cost data for the project also include: Tototo Home Industry's operation costs for the project, grants and contributions given to various groups, the opportunity cost to the participants, and operating costs to be borne by the groups once project assistance ceases. It is assumed that Tototo's assistance to the groups ends after 1983 and that the effect of training and implied capital injunctions continue for five years thereafter. Appendix C.2 summarizes total economic costs for the Tototo Rural Development program by project year.

Costs by project year, as given in Appendix C.2, reflect an unusual pattern in the timing of project expenditures. In most projects, cost outlays are higher in the early years of the project. Appendix C.2 shows this is not the case for the TRD program: total costs are relatively high in years one and two of the project and then fall dramatically in years three and four. This has to do with the financial difficulties World Education faced in 1980 and 1981. Because of financial problems, project expenditures were cut significantly. Tototo's operating costs in 1980 were comprised of local private contributions and a very small amount of funding to conduct a training workshop from the subcontract with World Education. While some would argue that this is not a realistic picture of how much it would cost to run the project if it were replicated elsewhere, it is, in fact, more realistic to use actual cost data. It reflects the ability of the project to continue under adverse conditions through the mobilization of private resources. It must also be argued that these were, in fact, the actual costs of the project to the sponsoring agencies and to society.

Project costs are considered from the perspective of three different groups: the sponsoring agencies, the individual group members, and society as a whole. Costs to sponsoring agencies are considered under two scenarios. In scenario one, both development costs and Tototo's operating expenditures are included. In the second scenario, only the operating costs are considered. The second scenario is an estimate of the cost to sponsoring agencies of replicating the project elsewhere. In both cases, all private contributions and grants, opportunity costs to participants, and groups' operating expenditures are excluded as they do not draw on sponsoring agencies' resources. The same two cost scenarios are considered for society as a

whole: one, development plus operating costs and two, operating costs alone. From society's perspective, however, all costs including grants and contributions, opportunity costs and group operating expenditures have been included. In economic analysis, it is assumed that if the resources (including opportunity cost of participants time) were not being used in this project, they could be used for other purposes elsewhere in the economy.

The third cost perspective examined is that of the participating group member. Costs to the individual include opportunity costs in all years of the project and group operating expenditures for 1984 through 1988. The opportunity cost per group member is calculated from the amount of time the women spend in group meetings and receiving training times the rural wage rate prevalent in 1983. The opportunity cost of the time women actually spend engaged in the income-generating activities has not been included: project documentation shows that, on the average, women spend only 1.5 days per month on these activities. Most women are likely to be engaged in alternative productive activities only during planting and harvest. We assume that the 1.5 days per month spent on group activities will not interfere with the seasonal demands of subsistence farming. It is not likely that an increase to 3 days per month for a total of 36 days per year would interfere with the women's agricultural responsibilities. This assumption becomes less valid in moving to the 6 days per month scenario. Appendix C.2 gives the detailed assumptions underlying the estimate of opportunity costs.

Total group operating expenditures were calculated from an estimate of average annual operating expenses per group times the number of groups in existence at the time that Tototo assistance is assumed to terminate. The estimate of these costs was made difficult by the lack of quantitative data on individual group income and expenditure. For the per group estimate of annual operating expenditures, it was necessary to rely on Tototo's 1983 End of Year Progress Report which included varying amounts of information on 19 of the 20 groups that were assisted in that year. Information regarding a group's direct costs of running a small enterprise were given for only three groups. Of the three groups, two had been in existence since the first phase of the project; the other had been started more recently. Though group membership ranged from 18 to 50 members for the two older groups, operating expenditures were very similar at approximately Ksh.3,100 per year. Annual operating expenditures for the new group were considerably higher at Ksh.18,000. It seems from these two examples, that operating costs need not vary drastically with group size (this is probably because only a few women tend to be engaged in a given activity at any one time) and that they probably stabilize over time, after initial investments have been made in plant and equipment. For these reasons, per group annual operating expenditures are assumed to be Ksh.3,100 or US\$233.

Conclusions:

A present value is calculated for each cost and benefit scenario under four different assumptions about interest rates. Appendix C.5 gives a complete comparison of costs and benefits by project year for each scenario

and for each of the assumptions about interest rates. This information is summarized in Tables 4, 4a and 4b of this section.

Table 4 concludes that benefits outweigh costs from only one perspective, that of the individual group members. Even for the individual participants, the benefits ranging from 1.04 to 1.07 are not great. For all other scenarios the benefits are outweighed by costs. It is interesting to note that from the perspective of the individual, the benefit/cost ratio improves as one moves from lower to higher interest rates, which is opposite of what is found for the other scenarios and counter-intuitive to what is known about discount factors. The reason is that the only costs in the early years of the project are opportunity costs while in later years the groups take on the burden of operating costs as well. The larger the rate of discount (i.e., the interest rate) the larger the effect on benefits and costs occurring later in the project.

Despite the very small benefit/cost ratios to group members, there is every evidence that the women involved in TRD find the project worthwhile: in 1985, Tototo will expand its program to approximately 20 new groups bringing the total assisted to 46 groups. One has to speculate that there are other benefits occurring in the project that are not measured by the net increase in the participants' profits. It is beyond the scope of this paper to quantify those benefits that are not apparent. In those groups where poultry raising was chosen for the economic activity, there is evidence that the nutrition of the women and their families has improved due to increased consumption of eggs and chickens. In the original six groups, the percent of participants who were able to read before project assistance rose from approximately 14% before the project to 25% after the project. In addition, all of the groups participating in the Tototo Rural Development program have opened bank accounts. Clearly, the project has been successful from the participants perspective.

This raises questions about what measures might be taken to make the project look more successful from the perspective of society as a whole or from the perspective of donor agencies. A number of measures suggest themselves. Unlike the other three projects, the income-generating activity introduced to the groups is a completely new endeavor for the women. In the other cases, agriculture or other economic activities had been participants' main source of income for some time. There was no credit provided under the TRD project, nor were loans readily available from other sources. Early documentation of the project (Clark, 1981) suggests lack of resources to carrying out the new income-generating activities as one of the biggest problems the groups faced. World Education is currently in the process of redressing this problem: a revolving loan fund has been designed and financial assistance will be made available through Tototo's Rural Development program later this year. On the cost side, the personnel costs far outweigh other costs. The approach used in the Tototo project is very labor-intensive, with a village coordinator for each group plus an assistant field supervisor for every five groups on Tototo's payroll.

Table 4: Benefit-Cost Ratios for Tototo Rural Development Project
(Scenario I)*

| <u>Sponsoring Agencies</u> | <u>Discount Rates</u> | <u>Net Present Values</u> | | <u>B-C Ratio</u> |
|-----------------------------------|-----------------------|---------------------------|----------------|------------------|
| | | <u>Cost</u> | <u>Benefit</u> | |
| Dev. + Operating Costs | 12% | 272,396 | 43,167 | 0.16 |
| | 15% | 259,797 | 36,332 | 0.14 |
| | 20% | 241,866 | 27,797 | 0.11 |
| | 25% | 227,013 | 21,755 | 0.10 |
| Operating Costs | 12% | 74,750 | 43,167 | 0.58 |
| | 15% | 69,802 | 36,332 | 0.52 |
| | 20% | 62,880 | 27,797 | 0.44 |
| | 25% | 57,270 | 21,755 | 0.38 |
| <u>Group Members</u> | | | | |
| Opportunity Cost + Operating Cost | 12% | 37,948 | 43,167 | 1.14 |
| | 15% | 32,097 | 36,332 | 1.13 |
| | 20% | 24,774 | 27,797 | 1.12 |
| | 25% | 19,582 | 21,755 | 1.11 |
| <u>Social Perspective</u> | | | | |
| Development + Operating Costs | 12% | 325,519 | 43,167 | 0.13 |
| | 15% | 305,448 | 36,332 | 0.12 |
| | 20% | 277,951 | 27,797 | 0.10 |
| | 25% | 256,115 | 21,755 | 0.08 |
| Operating Costs | 12% | 127,873 | 43,167 | 0.34 |
| | 15% | 115,452 | 36,332 | 0.31 |
| | 20% | 8,964 | 27,797 | 0.28 |
| | 25% | 86,373 | 21,755 | 0.25 |

*Assumes each member spends 1.5 days per month on the group's economic activity.

Table 4a: Benefit-Cost Ratios for Tototo Rural Development Project
(Scenario II)*

| <u>Sponsoring Agencies</u> | <u>Discount Rates</u> | <u>Net Present Values</u> | | <u>B-C Ratio</u> |
|-----------------------------------|-----------------------|---------------------------|----------------|------------------|
| | | <u>Cost</u> | <u>Benefit</u> | |
| Dev. + Operating Costs | 12% | 272,396 | 86,334 | 0.32 |
| | 15% | 259,797 | 72,665 | 0.28 |
| | 20% | 241,866 | 55,594 | 0.23 |
| | 25% | 227,013 | 43,510 | 0.19 |
| Operating Costs | 12% | 74,750 | 86,334 | 1.15 |
| | 15% | 69,802 | 72,665 | 1.04 |
| | 20% | 62,880 | 55,594 | 0.88 |
| | 25% | 57,270 | 43,510 | 0.76 |
| <u>Group Members</u> | | | | |
| Opportunity Cost + Operating Cost | 12% | 37,948 | 86,334 | 2.28 |
| | 15% | 32,097 | 72,665 | 2.26 |
| | 20% | 24,774 | 55,594 | 2.24 |
| | 25% | 19,582 | 43,510 | 2.22 |
| <u>Social Perspective</u> | | | | |
| Development + Operating Costs | 12% | 325,519 | 86,334 | 0.27 |
| | 15% | 305,448 | 72,665 | 0.24 |
| | 20% | 277,951 | 55,594 | 0.20 |
| | 25% | 256,115 | 43,510 | 0.17 |
| Operating Costs | 12% | 127,873 | 86,334 | 0.68 |
| | 15% | 115,452 | 72,665 | 0.63 |
| | 20% | 98,964 | 55,594 | 0.56 |
| | 25% | 86,373 | 43,510 | 0.50 |

*Assumes each member spends 3 days per month on the group's economic activity.

Table 4b: Benefit-Cost Ratios for Tototo Rural Development Project
(Scenario III)*

| <u>Sponsoring Agencies</u> | <u>Discount Rates</u> | <u>Net Present Values</u> | | <u>B-C Ratio</u> |
|-----------------------------------|-----------------------|---------------------------|----------------|------------------|
| | | <u>Cost</u> | <u>Benefit</u> | |
| Dev. + Operating Costs | 12% | 272,396 | 172,668 | 0.63 |
| | 15% | 259,797 | 145,330 | 0.56 |
| | 20% | 241,866 | 111,189 | 0.46 |
| | 25% | 227,013 | 87,019 | 0.38 |
| Operating Costs | 12% | 74,750 | 172,668 | 2.31 |
| | 15% | 69,802 | 145,330 | 2.08 |
| | 20% | 62,880 | 111,189 | 1.77 |
| | 25% | 57,270 | 87,019 | 1.52 |
| <u>Group Members</u> | | | | |
| Opportunity Cost + Operating Cost | 12% | 37,948 | 172,668 | 4.55 |
| | 15% | 32,097 | 145,330 | 4.53 |
| | 20% | 24,774 | 111,189 | 4.49 |
| | 25% | 19,582 | 87,019 | 4.44 |
| <u>Social Perspective</u> | | | | |
| Development + Operating Costs | 12% | 325,519 | 172,668 | 0.53 |
| | 15% | 305,448 | 145,330 | 0.48 |
| | 20% | 277,951 | 111,189 | 0.40 |
| | 25% | 256,115 | 87,019 | 0.34 |
| Operating Costs | 12% | 127,873 | 172,668 | 1.35 |
| | 15% | 115,452 | 145,330 | 1.26 |
| | 20% | 98,964 | 111,189 | 1.12 |
| | 25% | 86,373 | 87,019 | 1.01 |

*Assumes each member spends 6 days per month on the group's economic activity.

Another potential problem is the relatively small amount of time the women seem to be spending on the groups' income-generating activities. Tables 4a and 4b summarize how benefit/cost ratios might change if days per month on tasks were increased to three and six days respectively. In Table 4a, group members benefits double from 1.14 under the original assumptions to 2.28 under the assumption that three days per month are spent on the income-generating activity. In addition, under the operating expenditure only scenario, the benefit/cost ratio for sponsoring agencies changes to greater than one. In the third scenario, group member benefits increase further to 4.55, and the project begins to look like an efficient use of resources from the social perspective, under operating expenditures only assumptions. It is interesting to note that even under the most optimistic benefit scenario, the benefit/cost ratio never exceeded 1 when development costs are included. This would suggest that development costs were too high for the benefits realized under the Tototo Rural Development program. Yet, current information shows that many women's groups in Kenya are now adapting Tototo's approach, suggesting that development costs should be spread among these many activities to properly reflect their cost effectiveness. The assumptions about increased time spent in group income-generating activities does not address the issue of market size. It is possible that the paucity of markets for selling group members' products in the area is the real cause of the small benefits found in the project.

Yet, the project seems to have potential of increasing the already positive benefits to individual members as well as improving the economic viability of the project to donors and society if solutions are found for some of these problems. The difficulty and expense of reaching the poorest of the poor should, however, not be underestimated.

(D) Basic Village Education Project, Guatemala

Project Description:

The Basic Village Education project (BVE) in Guatemala experimented with radio-based delivery systems as an alternative to a traditional agricultural extension system. Given the large portion of the rural population heavily dependent on small, subsistence farms, it was hoped that the use of a technology such as radio in agricultural extension would contribute positively to Guatemala's agricultural productivity of these subsistence farms.

The BVE Project was designed to be a controlled field experiment of several alternative system treatments in two contrasting environments. After a 1972 study supported the feasibility of a project of this nature, agreement was reached with the Guatemalan Ministry of Education to proceed with an agricultural training project in February 1973.

The two regions selected for the BVE experiment included a Spanish-speaking Latino population in southeastern Guatemala (the Oriente) and a Quiche-speaking Indian population in the western Highlands (the Occidente). Both regions had a preponderance of small subsistence farms and a high proportion of illiterate farmers (60-70 percent). Three different treatments and a control area were initially planned for in each region: one that relied principally on radio (R); one that added interpersonal contact by training a local person to act as a "monitor," working with farmers in his own and nearby communities (RM); and one that supplemented the RM treatment by adding an agronomist to work with monitors and farmers (RMA). In 1975, a fourth treatment was added to test the abilities of a monitor working alone (M) in areas where the radio signal was not received. All areas were chosen to be as comparable as possible to the other areas, and, the control group was selected from an area where the radio signal was difficult to receive.

Educational radio programming began in the Oriente in March 1974 and in the Occidente in September 1975. The experiment continued through the end of 1976 in the Oriente and through 1977 in the Occidente. A 1000-watt radio transmitter was installed in each area, but broadcast at reduced power throughout the course of most of the experiment in order to maintain relatively effective control and monitor-alone areas. The radio stations broadcast eight hours a day (5 A.M. - 9 A.M., 4 P.M. - 8 P.M.) on Monday through Saturday. Only 20 percent of the programming was directed towards agriculture, with the remainder devoted to ordinary radio programming (music, news, etc.) in the interest of attracting and maintaining a listening audience.

The agricultural programs produced and broadcast under the BVE experiment recommended the following improvements to current farming practices:

- a) adequate preparation of land;
- b) disinfection of soil;
- c) correct application and increased use of fertilizers;
- d) use of improved varieties of seed;
- e) following recommended planting densities for crops;
- f) planting a second crop where appropriate;
- g) adopt or increase use of herbicides and insecticides.

Monitors were agriculturally oriented individuals chosen from the communities served by the RM, RMA, and M treatments. They were given some initial training, had considerable on-the-job training, and by the end of the experiment were felt to have achieved a para-professional level of competence. A full-time monitor was responsible for working with between 150 and 250 farm families. Their principal duty was to run a weekly radio forum meeting in each community for which they were responsible. At these meetings they played a cassette tape of that week's radio forum program (which had already been broadcast) and, using graphic materials, gave a presentation, encouraged discussion, and answered questions.

For the RMA treatments one full-time agronomist was assigned to two full-time monitors. The agronomist periodically attended radio forums and accompanied monitors on visits to farmers. He also served as an instructor for the monitors and was the key person in identifying and diagnosing agricultural problems of farmers in the area. Agronomists, and later in the project, monitors, supervised the numerous crop demonstration plots that were established to show farmers (and to test) the effectiveness of following BVE recommended practices.

Although the BVE Project was set up under the auspices of the Guatemalan Ministry of Education, intersectoral cooperation with other ministries was promoted, particularly with the Ministry of Agriculture. The U.S. Agency for International Development provided a substantial degree of financial support and technical personnel, through a contract to the Academy for Educational Development (AED), to help in initiating and operating the experiment. The level of foreign technical support was reduced as the experiment progressed and was withdrawn at its termination.

The adoption of all or some of the recommended practices was shown to increase farmers' production costs. The BVE project did not provide participating farmers with credit to purchase additional required inputs. BVE project documents do show that loans were available to some farmers at concessional interest rates of 5% through existing Ministry of Agriculture programs. For many of the poorest farmers, only traditional sources of credit were available at a 24% rate of interest.

Total project costs for BVE were large compared to those of the other three projects. Two observations can be offered regarding the magnitude of BVE project costs. First, in a project such as BVE where local radio stations were introduced to the Occidente and Oriente regions, one would expect the proportion of project funds allocated to equipment to be considerably higher

than in projects where no such technology is involved. Though total project costs were high, equipment and other recurrent nonpersonnel costs taken together were less than 7% of total costs in each region. These low equipment costs assume that BVE can be expanded to serve the entire Oriente and Occidente regions without an increase in the number of radio transmitters. In fact, preliminary government plans for project expansion included the installation of an additional five to eight radio transmitters. These costs have not been included in Klees and Wells projections of region-wide costs and would, no doubt, make equipment costs a substantial portion of total project costs.

The imputed cost of the project to participating farmers (i.e., direct costs plus the opportunity cost of time spent in project activities) was the second largest cost item at 28.7% of total costs in the Occidente and 41.9% of total costs in the Oriente. This raises questions about who actually bears the cost burden of nonformal education projects and about the equity of this arrangement. The contribution of time and resources by participants is a salient feature of many nonformal education projects.

A second observation about the relatively large costs of the BVE project is the extent to which project size has determined the organization and administration of BVE. The administrative approach used in the BVE project was basically a top-down approach. The concept of the BVE project was initiated and developed by USAID and the Guatemalan government; USAID contributed substantial funds and technical personnel to the project. The Ministry of Education was responsible for the project's administration and implementation. Indeed, the financial effort and technical expertise required to carry out a project of this size necessitated substantial foreign assistance and central government involvement..

Data Collection:

For the BVE project, this study has for the most part adopted the economic analysis of the very thorough study completed by Steven Klees and Stuart Wells at the end of the BVE experiment in 1978. Those readers desiring a more detailed description of how project costs and benefits were derived should consult Klees and Wells' 1978 paper, "Cost-Benefit Analysis of Nonformal Educational Techniques for Agricultural Development: A Case Study of the Basic Village Education Project in Guatemala." This paper has pulled together and rigorously examined an impressive amount of information pertaining to BVE; the authors do not believe they could have improved on the data and methodology used in this paper.

There seem to be both positive and negative implications of the controlled field experiment design used in the BVE project. On the one hand, because of the rigorous design and the substantial attention given to evaluation, data for BVE were much more complete than they were for the other nonformal education projects we examined. On the other hand, this experimental design seems to have contributed to a divergence of goals between those conceptualizing BVE in Washington and those involved in the

implementation of BVE in Guatemala. A primary objective for the people in Washington was testing the effectiveness of the four treatments (i.e., R, RM, RMA, M) in transmitting a message designed to effect change in agricultural practices. The Guatemalans probably placed a higher priority on a second order of change, the impact of improved agricultural practices on agricultural yields and income. AED documentation of the project reflects a priority to measure the behavioral changes resulting from reception of the BVE radio message rather than the measure of increased agricultural productivity. In the economic analysis that follows, only the measure of increased farmer income resulting from the BVE project is considered. Given AED's emphasis on behavioral change, it is likely that the data, though rigorously collected, do not pay adequate attention to measurement of changes in income.

In this paper we are more interested in assessing the contributions of nonformal education to economic development than in assessing the impact of alternative treatments on learning. For this reason, we have chosen to simplify Klees and Wells' analysis by considering only one of the BVE treatments in our economic analysis of the project. Of the four project treatments, we chose to examine the Radio + Monitor (RM) treatment. The Klees and Wells analysis concludes that the RM, RMA, and M treatments seemed to have a greater impact on agricultural practices than the Radio alone (R) treatment. Of the three effective treatments, RM represents an alternative that is neither the most or the least expensive treatment.

Before proceeding to the discussion of project costs and benefits, it is important to note the necessary differences between the methodology used in this analysis and in the other three. Unlike those projects which are analyzed on the basis of actual project costs and benefits, BVE is analyzed in terms of what the project would contribute to society if expanded from the experimental phase to serve the entire Occidente and Oriente regions. The use of projected rather than actual data is due largely to the inadequacy of benefit data collected during the BVE experiment. The inadequacy of the benefit data stems from a combination of the complex nature of agricultural projects and severe weather conditions prevailing in Guatemala during at least some of the years when benefit data were collected. Current literature on agricultural projects shows there is a five- to ten-year lag between the introduction of agricultural innovations and subsequent increases in yields. Data on agricultural yields were collected for three years in the Oriente region and only two years in the Occidente region. During 1976, one of the years when data were collected on crop yields in both regions, severe conditions on drought prevailed. In the Oriente, there was an abrupt drop in yields in all treatment areas during this year. The large decrease in yields during one of a small sample of years made necessary the projection of benefits that were likely to accrue to the region over a longer period of time. A more detailed description of how project benefits were derived will be given in the following section.

Project Costs and Benefits:

As in the other three projects, costs and benefits of the Basic Village Education project are examined from three different perspectives: sponsoring agencies, participating farmers, and society. Unlike the other projects examined, separate benefit/cost ratios were calculated for the Oriente and Occidente regions.

Benefits for the BVE project are measured as the increased value of agricultural production due to the adoption of the new farming practices advocated through radio programs and agricultural monitors. In this analysis, it is assumed that project benefits are exactly the same from all three perspectives. This differs from the methodology used in the Microenterprise and Upland Rice projects due to the absence of a precise breakdown of additional production costs to the farmer. The following three sources of information were used in estimating benefits for the BVE project: a) the best estimates of agronomists and project personnel; b) the results of small scale crop demonstrations, a proxy for the maximum practical impact of BVE practices; and c) actual survey data collected from BVE farmers.

The best estimates of agronomists and project personnel were examined in two papers, Aldana (1978) and Pena et. al., (1976). Both papers calculated a net return per manzana for the new versus the old farming methods, and concluded the additional costs of the new practices were more than compensated for by the resulting increase in productivity. According to Aldana and Pena's estimates, the new farming practices introduced by BVE were likely to lead to 2-4.5 times the original profitability.

The crop demonstration plots were farmed by cooperating farmers in the RM and RMA treatment areas from 1974 until 1977. For corn and bean production in the Oriente in 1974 and 1975, the demonstration plots using improved seed and additional fertilizers produced more and yielded higher profits than traditional seed and fertilizer plots. For the three crop types monitored (i.e., corn, beans and sorghum), the improved seed and fertilizer plots averaged Q18/mz higher profit. In the Occidente region of the BVE experiment, the demonstration plots were planted almost exclusively in corn in March and again in May. Control groups using traditional farming practices were monitored in the Occidente region in 1976. The March plantings showed that BVE-related farming practices increased productivity and profitability substantially. The May planting, however, suffered considerably from the drought, highlighting the riskiness of new investments to subsistence farmers. Despite the adverse weather conditions in some years of the experiment, on the average all demonstrations reported in the Occidente actually exceeded the projections made by the Guatemalan Economic Planting Council for those farmers following traditional vs. improved practices. On the whole, the crop demonstration plots pointed to a substantial increase in profitability when improved practices recommended by BVE were followed.

A third source of information used in predicting BVE benefits was survey data collected from BVE farmers. In general, Klees and Wells concluded from a regression analysis conducted on this survey data that there was no significant area-wide agricultural productivity benefit due to BVE treatments during the experimental period. This finding was not surprising given the five-to-ten year lag time expected between the introduction of new methods and the first evidence of increased agricultural productivity.

Based on the empirical results of the three data sets described above, Klees and Wells concluded it was likely that BVE had a positive impact on some farmers. Though the authors concluded that net agricultural benefits to some BVE treatments were likely, it was difficult to estimate what exactly those benefits would be if the BVE system were continued. Different results were obtained from agronomists' best guesses, crop demonstrations and actual experimental period data, and these results differed between regions, crops and year. It was necessary to make some assumptions about the benefits likely to occur if the project were expanded to cover two entire regions and to continue for a period of ten years. Using the evidence from the three studies, Klees and Wells arrive at a measure of the maximum potential impact (MPI) that could be expected over time from improved versus traditional agricultural practices. Total benefits for each region are calculated by taking estimates of benefits per manzana (Appendix D.4) times the total number of manzanas in each region. Total manzanas per region are assumed to be 288,000 mz. in the Oriente and 204,000 mz. in the Occidente. These numbers are based on the assumptions of 90,000 farms at 3.20 mz. each in the Oriente and 150,000 farms at 1.36 mz. each in the Occidente. Total incremental benefits are given by project year by region in Appendix D.5.

Klees and Wells use actual expenditures on BVE during the pilot phase to make annual region-wide cost projections for both the Oriente and the Occidente. (Appendix D.1.) These average annual costs are derived from a cost function that allows for the calculation of several project cost scenarios for each region depending upon the assumptions made about the type of treatment to be introduced. The use of such a cost function in projecting average annual project costs, allows us to easily calculate the cost of expanding the RM treatment to cover the entire Oriente and Occidente regions.

From this cost function, the economist is able to estimate the costs of a fully operating regional BVE system. With this information, one can quickly calculate total costs to the region if any one of the alternative treatments were introduced on a large scale. Appendix D.2 summarizes total regional costs for the Oriente and the Occidente under six alternative treatments. In this analysis, only the cost of introducing the RM treatment on a region-wide scale is considered.

Within this single treatment, project costs for the Oriente and the Occidente are examined from three perspectives: total cost of the project to society; total cost of the project to the donor organization; and total cost of the project to participating farmers. Appendix D.3 summarizes each of these cost perspectives for the RM treatment by region.

From the perspective of sponsoring agencies, two cost scenarios are considered. The first scenario includes both development and operating expenditures. Development costs refer to all project costs related to start up, research and technical assistance for project design and planning. The second scenario includes operating expenditures only.

Participating farmers' costs are an estimate of the farmers' opportunity cost of time spent learning new skills from the monitor or through listening to the radio. Increased production costs are not included under this estimate, but instead have been deducted from total incremental benefits.

Costs to society are also considered under two scenarios: including and excluding development costs. Costs to society are defined in the same way as sponsoring agency costs, except for the inclusion of farmers' opportunity costs. Opportunity costs of farmers are not included in sponsoring agencies' costs. Appendix D.5 summarizes total project benefits by project year and cost scenario.

Conclusions:

Tables 5 and 6 summarize the benefit/cost ratios calculated for the Occidente and Oriente regions. An examination of benefits and costs at the prevailing interest rate of 12% show the BVE project to be very beneficial. Benefits exceed costs by a respectable margin for all five cost scenarios in both the Oriente and the Occidente. Benefits to individual farmers are substantial in both regions under all assumptions about interest rates. These benefits are likely to actually be somewhat smaller due to the exclusion of certain direct or opportunity costs because of insufficient data. Yet, even after these costs have been taken into consideration, benefits are likely to remain very positive for farmers. Though the breakdown of costs as summarized in the cost section suggests that the burden on individual farmers is relatively high in BVE, the benefits seem to more than compensate for the increased costs.

It is noteworthy that BVE, according to the benefit/cost ratios given in Tables 5 and 6, was far more successful in the Oriente region than in the Occidente region. In the Oriente, benefits exceed costs for all five cost scenarios and under each of the four alternative assumptions about interest rates. In the Occidente, on the other hand, costs to society outweigh benefits at the assumed interest rate of 20%. Costs were considerably higher in the Occidente than in the Oriente. The difference in costs can be linked to the higher cost of using a monitor in the Occidente due the larger populace and the greater difficulty in access due to the mountainous terrain of this region. In addition, there were two language versions, Spanish and Quiche', for the same program in the Occidente. The expense involved in translating the materials from Spanish to Quiche' have also contributed to higher costs in this region. Though the per manzana benefits are higher in the Occidente, total manzanas in this region are fewer with overall impact of lower total incremental benefits for the region. The difference in results between the two regions leads to two observations: (a) There may be a minimum size

Table 5: Benefit-Cost Ratios for the Basic Village Education Project
Oriente Region

| <u>Sponsoring Agencies</u> | <u>Discount Rates</u> | <u>Net Present Values</u> | | <u>B-C Ratio</u> |
|--|-----------------------|---------------------------|----------------|------------------|
| | | <u>Cost</u> | <u>Benefit</u> | |
| Dev. + Operating Costs | 12% | 10,958,238 | 55,399,943 | 5.06 |
| | 15% | 9,917,727 | 46,145,047 | 4.65 |
| | 20% | 8,556,156 | 34,643,816 | 4.05 |
| | 25% | 7,531,275 | 26,560,520 | 3.53 |
| Operating Costs | 12% | 9,656,124 | 55,399,943 | 5.74 |
| | 15% | 8,739,252 | 46,145,047 | 5.28 |
| | 20% | 7,539,469 | 34,643,816 | 4.59 |
| | 25% | 6,636,371 | 26,560,520 | 4.00 |
| <u>Participating Farmers</u> | | | | |
| Opportunity + Direct Costs ^{1/} | 12% | 4,442,349 | 55,399,943 | 12.47 |
| | 15% | 4,020,537 | 46,145,047 | 11.48 |
| | 20% | 3,478,571 | 34,643,816 | 9.99 |
| | 25% | 3,053,096 | 26,560,520 | 8.70 |
| <u>Social Perspective</u> | | | | |
| Dev. + Operating Costs | 12% | 15,395,266 | 55,399,943 | 3.60 |
| | 15% | 13,933,449 | 46,145,047 | 3.31 |
| | 20% | 12,020,573 | 34,643,816 | 2.88 |
| | 25% | 10,580,715 | 26,560,520 | 2.51 |
| Operating Costs | 12% | 14,098,473 | 55,399,943 | 3.93 |
| | 15% | 12,759,789 | 46,145,047 | 3.62 |
| | 20% | 11,008,041 | 34,643,816 | 3.15 |
| | 25% | 9,689,467 | 26,560,520 | 2.74 |

1/ Direct costs refer to the cost to farmers of replacing radio batteries. Other direct costs, i.e., the costs of adopting the new techniques, seeds, increased levels of fertilizers, have been deducted from the benefits under all perspectives. This is appropriate for the sponsoring agency perspectives, but, according to our methodology, understates benefits to the farmers and society as well as the costs.

Table 6: Benefit-Cost Ratio for the Basic Village Education Project
Occidente Region

| <u>Sponsoring Agencies</u> | <u>Discount Rates</u> | <u>Net Present Values</u> | | <u>B-C Ratio</u> |
|------------------------------|-----------------------|---------------------------|----------------|------------------|
| | | <u>Cost</u> | <u>Benefit</u> | |
| Dev. + Operating Costs | 12% | 30,654,868 | 40,866,694 | 1.33 |
| | 15% | 27,744,116 | 34,039,123 | 1.23 |
| | 20% | 23,935,219 | 25,554,494 | 1.07 |
| | 25% | 21,068,192 | 19,591,440 | 0.93 |
| Operating Costs | 12% | 29,796,989 | 40,866,694 | 1.37 |
| | 15% | 26,967,695 | 34,139,123 | 1.26 |
| | 20% | 23,265,390 | 25,554,494 | 1.10 |
| | 25% | 20,478,597 | 19,591,440 | 0.96 |
| <u>Participating Farmers</u> | | | | |
| Opportunity + Direct Costs | 12% | 5,403,971 | 40,866,694 | 7.56 |
| | 15% | 4,890,841 | 34,039,123 | 6.96 |
| | 20% | 4,219,403 | 25,554,494 | 6.06 |
| | 25% | 3,713,991 | 19,591,440 | 5.28 |
| <u>Social Perspective</u> | | | | |
| Dev. + Operating | 12% | 36,058,839 | 40,866,694 | 1.13 |
| | 15% | 32,634,967 | 34,039,123 | 1.04 |
| | 20% | 28,154,622 | 25,554,494 | 0.91 |
| | 25% | 24,782,183 | 19,591,440 | 0.79 |
| Operating Costs | 12% | 35,200,961 | 40,866,694 | 1.16 |
| | 15% | 31,858,546 | 34,039,123 | 1.07 |
| | 20% | 27,484,793 | 25,554,494 | 0.93 |
| | 25% | 24,192,588 | 19,591,440 | 0.81 |

required to achieve economic viability in a project of this kind. (b) Project success is dependent on external as well as internal factors. No doubt, the differences in culture, geographic terrain and language contributed heavily to differences in the economic results of BVE in the two regions.

IV. Conclusions:

Introduction

Table 7 summarizes the benefit/cost ratios obtained for the four NFE projects examined in this paper. The benefit/cost ratios given in Table 7 assume a 12% discount rate, and for the sponsoring agency and social perspectives, assume the "operating costs only" scenario. In all but two cases, the summary benefit/cost ratios were positive. A discussion of possible reasons for the relatively low benefit/cost ratios found under sponsoring agency and social perspective for the Tototo Rural Development Project can be found in Section III.C.

It is interesting to note that all cost/benefit ratios are positive under the individual participants' perspective. The benefits of NFE programs which include an income generation component were found to be quite high for the individuals participating in them. This remained true even when the individual participants contributed substantial amounts of personal time and resources. From this limited examination of economic costs and benefits of NFE programs, NFE projects do appear to contribute positively to economic development insofar as they increase the income earnings of the target groups they serve.

Common Factors

From the four analyses completed in this paper, several factors emerge as contributing to the NFE projects' success.

The combination of skills training with essential additional investment in physical inputs emerged as a key factor in project success. The most favorable benefit/cost ratios were found under the three projects where credit was provided by the project itself or was readily available to project participants. In the Tototo Rural Development Project, loans were generally not available to the women's groups as they had no history of borrowing money and would not be able to absorb the minimum loans available through traditional credit institutions. The lack of credit and ultimate inability to obtain needed physical inputs was identified as a key constraint by both participants and Tototo staff. It would seem that the success of NFE projects with income generating components could be enhanced if credit were provided together with skills training by the project.

The benefit/cost ratios were not much lower for the two out of three cases where credit was available, but not through the project perse. While it is not obvious that all sponsoring agencies involved in NFE should also become involved in giving loans to participants, it does seem clear that in many instances the sponsoring agency will be the only source of credit for the marginal population they aim to serve. In most cases, the participants in NFE projects are the people who do not have access to regular financial institutions, either because they have no credit history or because there are few financial institutions in rural, remote areas. In the BVE project, which

Table 7: Comparison of Benefit/Cost Ratios Among Selected NFE Projects

| <u>Project</u> | <u>Sponsoring Agency</u> | <u>Individuals</u> | <u>Society</u> |
|--------------------------------------|--------------------------|--------------------|----------------|
| I. <u>Microenterprises</u> | 8.08 | 3.97 ^{a/} | 3.20 |
| II. <u>Upland Rice Project</u> | 10.56 | 2.37 ^{b/} | 2.48 |
| III. <u>Tototo Rural Development</u> | 0.58 | 1.14 | 0.34 |
| IV. <u>Basic Village Education</u> | | | |
| (A) Oriente: | 5.74 | 12.47 | 3.93 |
| (B) Occidente: | 1.37 | 7.56 | 1.16 |

^{a/} Scenario for Assisted Businesses including Interest plus Loans minus defaulted loans.

^{b/} Scenario for Farmers assuming they pay 50% interest on their loans.

Note: A 12% discount rate is assumed for each perspective. For the sponsoring agency and social perspective, operating costs have been considered without development costs.

did not give credit through the project, there were loans available at concessional rates to peasant farmers under other Ministry of Agriculture programs. In the Upland Rice project, farmers were probably able to get short-term loans at interest rates many times higher than the market rate. The lesson that seems to emerge for NFE project planners is that credit with skills training is essential. If there are no viable existing sources of credit in the project area, the project itself should provide for these loans. The results of the Microenterprise Project show that a project with a small loan component can be quite successful. In fact, the highest benefit/cost ratio under this project was from the sponsoring agency's perspective. If incentives to pay back the loans are high, such a project could be very beneficial from a sponsoring agency perspective.

The development of clear and shared project objectives is another factor that seemed to contribute positively to the economic success of the NFE projects examined in this study. The idea of shared project objectives points to the need for those who design/plan NFE projects to work closely with those who are intended to benefit from the project to identify the participants needs. At the outset of the Tototo Rural Development project, it was not clear that the World Education designers and the project participants had the same priorities. Though both groups were generally interested in raising incomes for the women's groups, the planners placed a higher priority on first establishing a participatory process for group decision making. The women's immediate priority was, however, to begin earning money through the new group activity. Clearly, the sponsoring agency should ultimately be responsible for pursuing the broader goals of society, but not at the sacrifice of the participants' needs. If the participants see that the project is genuinely serving their interests, there will be more incentive for them to take an active role in the project. Ultimately, this will be essential for the project's success.

A final observation somewhat related to the notion of shared objectives is that the bottom-up approach used in three of the four projects enhanced participant involvement. For NFE projects to be successful, they must accomplish more than accurate identification of participants' needs and goals. They must go further to involve the participants in decisions pertaining first to the project and ultimately to their own future. The Tototo Rural Development and Upland Rice projects are two examples of NFE projects that have succeeded in mobilizing this level of participation. A tangential point regarding the Tototo project is that involving participants in the project may take a long time, making the economic benefits appear smaller in the early years of the project. If one can assume a less modest timeframe for benefits than the five years used in this analysis, the economic returns are likely to be quite positive over time.

Minimum Data Needs

In general, it is very difficult to separate the effect of investment in education from other factors which contribute to an individual's increase in income. In this respect, the evaluation on NFE projects is not very different

from the evaluation of formal education projects. Therefore, in some respects, the minimum data needs for economic analysis of NFE projects will parallel those of formal education.

To isolate the effect of training from the accompanying injection of physical inputs, projects need to identify and monitor good control groups. In three out of the four projects we examined, there was, in fact, an attempt to survey a control group. In all cases, the control groups were not chosen carefully enough or evaluated extensively enough to render the resulting data useful in our analysis. The types of problems encountered with control groups in this study illustrate some common problems with the identification and evaluation of control groups for NFE projects.

One problem is identifying which characteristics are important in both assisted and nonassisted groups and then setting up a control group that will allow for holding these characteristics constant. In the Microenterprise project, a control group of several entrepreneurs was set up and carefully surveyed. But the average level of education was considerably lower among control group members than project participants. In this project, then, it became impossible to determine what portion of the benefits were linked to the training and credit offered through the project and what portion was linked to some earlier investment in human capital.

The control groups surveyed in the Basic Village Education project suggest another problem. In this project, the control groups were carefully chosen but were not monitored long enough for the results of the observation to be valid. The results of the control versus assisted groups' experiences were finally supplemented with theoretical papers and other best guess observations in order to determine project benefits.

Finally, the control groups surveyed under the Tototo Rural Development project illustrate the problem of deciding before the project begins what types of questions and evaluator will want to answer in the future. In the Tototo project, the control group was surveyed in a way that allowed evaluation of behavioral changes, but not of changes in income earnings.

A second data problem that emerged in this study is the need for more participant-related data. Few economic benefit/cost analyses attempt to quantify the economic costs of NFE programs to the participants. Most evaluations of education programs focus only on sponsoring agency perspective. Because the success of NFE programs ultimately rests on those the project attempts to serve, the collection of participant-related data is essential. In this study with sparse data on the participants' direct and opportunity costs, it was found that the costs to the individuals are substantial. With more complete data participants' project-related costs, the economic returns on projects may begin to look less favorable. To accurately evaluate the economic viability of NFE projects in the future, data on participant costs are essential.

A final minimum data requirement is the need for more specific classifications of project costs and benefits. In the four cases we studied, benefits were defined as the net increased income after subtracting additional costs incurred in the new production process which was adopted as a result of the NFE training. The costs are simply the costs incurred by the sponsoring agency for the training. These definitions of costs and benefits are appropriate from the sponsoring agency perspective, but are not so from the participants' perspective. For example, to the farmers in the Philippines that adopted the new variety of upland rice, the costs were not only the opportunity cost of time spent in training, but also the additional costs of purchasing C-22 seeds, fertilizer and paying interest on money borrowed to buy these inputs. The benefit to the farmers would then be the gross incremental income from the increased sale of rice before deducting the additional production costs. Though the benefit and cost components are similar for both participants and sponsoring agencies, how the components are calculated will have an impact on the resulting benefit/cost ratios.

In the future, NFE project evaluation could be greatly strengthened by the addition of economic analysis. Past efforts to analyze NFE projects have been problematic because of inaccurate and incomplete cost and benefit data. In the future, economic analyses of NFE projects could be greatly improved if the effort were made to build mechanisms into project designs for collection of cost and benefit data. This effort must become an integral part of the project development process, and finally of project implementation.

APPENDIX A:

THE MICROENTERPRISES PROJECT
Dominican Republic

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Appendix A.1

Average Monthly Performance of Microenterprises (1981-82)

| | Total Average for N = 32 | | | |
|---------------------------------------|--------------------------|------------|----------------------|------------|
| | <u>First Contact</u> | <u>Now</u> | <u>First Contact</u> | <u>Now</u> |
| Total Investment | 172,703 | 221,334 | 5,397 | 6,917 |
| Value Machine/Equip. | 86,995 | 123,561 | 2,719 | 3,861 |
| Sales (Gross) | 53,204 | 68,196 | 1,663 | 2,131 |
| Raw Material | 19,633 | 25,231 | 614 | 788 |
| Aggregate Value (Sales - Raw Mat.) | 33,571 | 42,965 | 1,049 | 1,343 |
| Salaries | 9,785 | 15,611 | 306 | 488 |
| FTE | 76.5 | 137.3 | 2.4 | 4.3 |
| Gross Profits (Ag. Value-Salaries) | 23,785 | 27,353 | 743 | 855 |

Source: Data provided by Accion International

Appendix A.2

Benefit Streams of Microenterprise Project

| | Gross Profits Increased (a) | Marginal Salaries Increased (b) |
|---------|--------------------------------|------------------------------------|
| 1980-81 | | |
| 1981-82 | 84,672 | 28,728 |
| 1982-83 | 208,320 | 70,680 |
| 1983-84 | 331,968 | 112,632 |
| 1984-85 | 331,968 | 112,632 |
| 1985-86 | 331,968 | 112,632 |
| 1986-87 | 331,968 | 112,632 |
| 1987-88 | 247,296 | 83,904 |
| 1988-89 | 123,648 | 41,952 |

NPV

| | | |
|-------|-----------|---------|
| e 12% | 1,207,288 | 409,615 |
| e 15% | 1,081,180 | 366,829 |
| e 20% | 909,789 | 308,678 |
| e 25% | 775,413 | 263,087 |

Notes: (a) From Appendix A.1, the average increased gross profit is RD\$ (855-743) — RD\$112 per month per assisted business owner. The increased gross profit stream can be constructed by the product of RD\$112 per month per assisted business * 12 months per year * accumulated number of assisted businesses at any year. Assuming that the effect of the loan and training will have similar impact on the microenterprise for a period of up to five years after the intervention. The benefit table can be constructed as the following.

| | # of New Assisted Business | Accumul. # of Assisted Business | Increased Gross Profit |
|---------|-------------------------------|------------------------------------|---------------------------|
| 1981-82 | 63 | 63 | 84,672 |
| 1982-83 | 92 | 155 | 208,320 |
| 1983-84 | 92 | 247 | 331,968 |
| 1984-85 | | 247 | 331,968 |
| 1985-86 | | 247 | 331,968 |
| 1986-87 | | 247 | 331,968 |
| 1987-88 | | 184 | 247,296 |
| 1988-89 | | 92 | 123,648 |

The number of new assisted business is obtained from Otero and Blayney (1984, p. 9, Table 4).

(b) The benefit of additional employment to society takes into account of the opportunity cost of individuals. It was estimated by U.S. Country Team for Dominican Republic that the average unemployment rate between 1982-84 ranged from 22% to 25%. Since the employees of microenterprise project is relatively young and inexperienced (Ashe, 1983, p. 67), the high estimation of 25% unemployed is used for the calculation of the expected opportunity cost. The minimum wage rate was estimated at DR\$125 per month (Ibid., p. 64). Thus the expected opportunity cost per individual per month is $DR\$125 * (1-25\%)$ or DR\$94. The marginal benefit of joining the microenterprises is DR\$114 (Appendix A.1) - DR\$94 or DR\$20. Since the average increase in employment is 1.9 person per assisted business. Therefore the additional impact is the marginal increase over the expected opportunity cost. This equals to 1.9 persons * DR\$20 per person month * 12 months * accumulated number of assisted business at any year. Such benefit streams are as follows:

| | # of New Assisted Business | Accumul. # of Assisted Business | Marginal Wage Increase |
|---------|----------------------------|---------------------------------|------------------------|
| 1981-82 | 63 | 63 | 28,728 |
| 1982-83 | 92 | 155 | 70,680 |
| 1983-84 | 92 | 247 | 112,632 |
| 1984-85 | | 247 | 112,632 |
| 1985-86 | | 247 | 112,632 |
| 1986-87 | | 247 | 112,632 |
| 1987-88 | | 184 | 83,904 |
| 1988-89 | | 92 | 41,952 |

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Appendix A.3

Cost Streams of Microenterprise Project (a)

| | Sponsoring Agencies | | Assisted Business | | | |
|---------|---------------------|-----------|-----------------------|-------------|-------------------|-------------------|
| | Development | Recurrent | Unrecovered Loans (a) | Loan Amount | Interest Paid (b) | Default Loans (c) |
| 1980-81 | 28,882 | 1,461 | | | | |
| 1981-82 | 32,542 | 39,144 | 29,787 | 119,146 | 14,298 | (29,787) |
| 1982-83 | 35,815 | 82,827 | 43,814 | 175,256 | 21,031 | (43,814) |
| 1983-84 | | 73,233 | 36,480 | 145,920 | 17,510 | (36,480) |
| NPV | | | | | | |
| @ 12% | 86,489 | 154,566 | 87,490 | 349,956 | 41,995 | (87,490) |
| @ 15% | 84,261 | 146,280 | 83,018 | 332,069 | 39,849 | (83,018) |
| @ 20% | 80,872 | 133,980 | 76,360 | 305,438 | 36,653 | (76,360) |
| @ 25% | 77,837 | 123,281 | 70,548 | 282,192 | 33,863 | (70,548) |

Notes: (a) The cost data are obtained from Otero and Blayney (1984, p. 25, Table 6). The figures in Table 6 of Otero and Blayney are the total costs for both the microenterprise and solidarity components. According to the estimation of Ashe (1983, p. 73), the costs of administering the loans and providing management and training assistance are more than twice those of the solidarity group component. Therefore, a factor of 0.7 is used to calculate the operating cost of microenterprise project. It is also assumed that similar effort is required of the development effort provided by Accion AITEC.

(b) It was reported that late payments totalled 42 percent of the loan amount (Ashe, 1983, p. 73), and it was estimated by Blayney (conversation, March 13, 1985) that 20 to 30 percent of the loan portfolio were never paid back. Thus a factor of 0.25 is used to calculate the cost of unrecoverable loans. The loan amounts to RD\$119,146 in 1981-82, RD\$175,256 in 1982-83, and RD\$145,920 in 1983-84 (Otero and Blayney, 1983, p. 9, Table 4).

(c) Interest payment is the opportunity cost of using the loans. Interest rate charged is 12 percent (Ashe, 1983, p. 73).

(d) When loans are defaulted and not paid back, the losses are incurred to the sponsoring agencies. Meanwhile the assisted business will gain the identical amount as a result of the default. As such there is a negative cost stream for default loans for the assisted business.

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Appendix A.4

Distribution of Costs Among Participants

| | Sponsoring Agencies | Assisted Business | Total (a) |
|-------------------|--|--|--|
| | cc | cc | cc |
| Costs Development | a | | a |
| Recurrent | b | | b |
| Loans | | e | e |
| Recoverable | | | |
| Unrecoverable | c | (c) | |
| Interest Paid | (d) | d | |
| Total | a+b+c-d | e-c+d | a+b+e |

Notes: From a social perspective, unrecoverable loans are simply treated as cash transfers in which the loss of unrecoverable loans of the sponsoring agencies is the gain of the owners of the assisted business defaulting the loans.

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APPENDIX B:
THE UPLAND RICE PROJECT
Philippines

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Appendix B.1

Benefit Streams of Upland Rice Project (a)

| Year | Total Cumulative Adopters (a) (1) | Average Increased Yield (Cavans/ha.) (2) | Plot Holding Per Farmer (ha.) (3) | Price (P/cavan) (4) | Total Inc. Value Production (P) (1-2-3-4) |
|-------|--------------------------------------|---|--------------------------------------|------------------------|--|
| 1975 | | | | | |
| 1976 | 13 | 21.1 | 0.89 | 55 | 13,427 |
| 1977 | 205 | 21.1 | 0.89 | 55 | 211,733 |
| 1978 | 425 | 30.3 | 0.54 | 55 | 382,462 |
| 1979 | 696 | 18.8 | 0.54 | 65 | 459,276 |
| 1980 | 657 | 18.8 | 0.54 | 70 | 466,890 |
| 1981 | 657 | 18.8 | 0.54 | 70 | 466,890 |
| 1982 | 644 | 18.8 | 0.54 | 70 | 457,652 |
| 1983 | 452 | 18.8 | 0.54 | 70 | 321,209 |
| 1984 | 232 | 18.8 | 0.54 | 70 | 164,868 |
| 1985 | 59 | 18.8 | 0.54 | 70 | 41,928 |
| NPV | | | | | |
| @ 12% | | | | | 1,656,058 |
| @ 15% | | | | | 1,454,103 |
| @ 20% | | | | | 1,186,189 |
| @ 25% | | | | | 982,071 |

Notes: (a) The data from this appendix is from Reed (1984, Table 3).

(b) It is assumed that the effect of training will last five years after they first learned to adopt the C-22 variety. Since the total number of new adoptors was 13 in 1976, the number of cumulative adoptors will be decreased by the particular amount every year after 1981 except the last two years. In both 1979 and 1980, some adoptors left the program (Reed, op. cit., Table 3). So we simply use the number of new adoptors in 1980 as the number of adoptors left in the program in 1985.

Appendix B.2

Increased Production Cost Streams of Upland Rice Project (a)

| Year | Average Increased Production Cost (P/ha.) | Total Increased Production Cost (a) (P) | Interest Rate on Agricul. Loan (b) | Interest on Incr. Product. Cost (P) | Interest on Incr. Prd. Cost @ 50% (c) (P) | Interest on Incr. Prd. Cost @ 100% (P) |
|-------|---|---|------------------------------------|-------------------------------------|---|--|
| 1975 | | | | | | |
| 1976 | 225 | 2,603 | 0.12 | 156 | 651 | 1,302 |
| 1977 | 283 | 51,633 | 0.12 | 3,098 | 12,908 | 25,817 |
| 1978 | 341 | 78,260 | 0.12 | 4,696 | 19,565 | 39,130 |
| 1979 | 400 | 150,336 | 0.14 | 10,524 | 37,584 | 75,168 |
| 1980 | 459 | 162,844 | 0.14 | 11,399 | 40,711 | 81,422 |
| 1981 | 459 | 162,844 | 0.14 | 11,399 | 40,711 | 81,422 |
| 1982 | 459 | 159,622 | 0.14 | 11,174 | 39,905 | 79,811 |
| 1983 | 459 | 112,033 | 0.14 | 7,842 | 28,008 | 56,016 |
| 1984 | 459 | 57,504 | 0.14 | 4,025 | 14,376 | 28,752 |
| 1985 | 459 | 14,624 | 0.14 | 1,024 | 3,656 | 7,312 |
| NPV | | | | | | |
| @ 12% | | 512,533 | | 34,885 | 128,133 | 256,266 |
| @ 15% | | 446,674 | | 30,340 | 111,669 | 223,337 |
| @ 20% | | 359,904 | | 24,360 | 89,976 | 179,952 |
| @ 25% | | 294,383 | | 19,855 | 73,596 | 147,192 |

Notes: (a) The cost data from this appendix is from Reed (1984, Table 3).

(b) Total increased production cost is the average increased production cost per hectare times the total cumulative adoptors of the year and the plot holding per adoptor.

(c) The interest rates used here are the rates charged by Rural Banks in Cavite Province at Philippines (Reed's correspondence to Srinivasan of Creative Associates, 1984). Interest calculated in the next column assumes that it takes about half a year from the beginning of securing a loan for the additional production cost of growing C-22 variety to selling all the crop after harvest. Thus interest payment equals additional production cost times the interest rate and 0.5 for half a year of the loan period.

(d) Assuming interest rate is 50% a year, the interest is calculated by multiplying the additional production cost by the interest rate (.5) and the time period (.5).

Appendix B.3

Training and Shared Administrative Cost Streams of the Upland Rice Project(a)

| Year | Training Cost per Adoptor (P) (1) | Total New Adoptors per Year (2) | Total Training Cost (P) (1 - 2) | Shared Administrative Cost of People's School (P) |
|-------|--|--|--|--|
| 1975 | | | | 12,100 |
| 1976 | 72 | 13 | 936 | 15,200 |
| 1977 | 84 | 192 | 16,128 | 24,200 |
| 1978 | 96 | 220 | 21,120 | 22,700 |
| 1979 | 108 | 348 | 37,584 | 33,400 |
| 1980 | 120 | 59 | 7,080 | 30,400 |
| NPV | | | | |
| @ 12% | | | 56,628 | 99,597 |
| @ 15% | | | 51,905 | 92,652 |
| @ 20% | | | 45,173 | 83,033 |
| @ 25% | | | 39,599 | 75,013 |

Notes: Training cost data is from Table 3 of Reed (1984), while the shared administrative cost of the People's School for the Upland Rice Project is from Table 2 of the same document.

Appendix B.4

Summary of Cost Streams of Upland Rice Project (a)

| | Total Increased Production Cost (P) | Agri. Loan Rate (P) | Increased Payment of Increased Production Cost | | Total Training Cost (P) |
|-------|---|---------------------------|---|-----------------------|----------------------------------|
| | | | @ 50% Rate (P) | @ 100% Rate (P) | |
| NPV | | | | | |
| @ 12% | 512,533 | 34,885 | 128,133 | 256,266 | 56,628 |
| @ 15% | 446,674 | 30,340 | 111,669 | 223,337 | 51,905 |
| @ 20% | 359,904 | 24,360 | 89,976 | 179,952 | 45,173 |
| @ 25% | 294,383 | 19,855 | 73,596 | 147,192 | 39,599 |

Notes: These data are summarized from Appendix B.2 and B.3.

APPENDIX C:
TOTOTO RURAL DEVELOPMENT PROGRAM
Kenya

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Annex C.1
TOTOTO RURAL DEVELOPMENT PROGRAM
ASSUMED NUMBER OF GROUPS AND MEMBERS BY PROJECT YEAR

| <u>Project Year</u> | <u>Number of Groups</u> | <u>Number of Members</u> |
|---------------------|-------------------------|--------------------------|
| 1978 | 6 | |
| 1979 | 6 | 163 |
| 1980 | 6 | 163 |
| 1981 | 6 | 163 |
| 1982 | 6 | 230 |
| 1983 | 10 | 353 |
| 1984 | 19 | 664 |
| 1985 | 26 | 800 |
| 1986 | 26 | 800 |
| 1987 | 26 | 800 |
| 1988 | 26 | 800 |

Data for years 1978 - 1981 taken from 1981 Final Report of Tototo Rural Womens Development Project. Data for 1982 - 1983 are calculated from total number of groups and recorded number of members given in 1983 End of Year Progress Report prepared by Tototo. Data for 1984 and the years following are taken from unpublished World Education document, "Training in Income Generation for Rural Women's Groups - Coast Province, Kenya" April 15, 1984.

Appendix C.2

TOTOTO RURAL DEVELOPMENT, TOTAL COSTS BY PROJECT YEAR (Current US \$)

| COST ITEMS: | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| DEVELOPMENT COSTS: (World Ed) | | | | | | | | | | | |
| Salaries/Benefits | | | | | | | | | | | |
| Travel | 52,735 | 53,645 | 13,032 | 6,000 | 36,746 | 18,663 | 0 | 0 | 0 | 0 | 0 |
| Other Direct Costs | 12,960 | 12,960 | 2,300 | 1,342 | 8,220 | 4,175 | 0 | 0 | 0 | 0 | 0 |
| | 2,250 | 7,250 | 1,575 | 553 | 3,384 | 1,719 | 0 | 0 | 0 | 0 | 0 |
| SUBTOTAL | 67,945 | 73,855 | 16,907 | 7,895 | 48,350 | 24,557 | 0 | 0 | 0 | 0 | 0 |
| OPERATING COSTS: (Tototo) | | | | | | | | | | | |
| Salaries/Benefits | | | | | | | | | | | |
| Travel | 13,450 | 13,450 | 0 | 9,229 | 19,363 | 19,363 | 0 | 0 | 0 | 0 | 0 |
| Supplies/Equipment | 1,050 | 1,050 | 0 | 0 | 3,745 | 9,493 | 0 | 0 | 0 | 0 | 0 |
| Communication | 2,200 | 1,200 | 0 | 0 | 492 | 572 | 0 | 0 | 0 | 0 | 0 |
| Local Workshops | 400 | 400 | 0 | 0 | 905 | 359 | 0 | 0 | 0 | 0 | 0 |
| Business Meetings | 0 | 0 | 1,200 | 0 | 2,088 | 2,088 | 0 | 0 | 0 | 0 | 0 |
| Audit/Finance Charge | 0 | 0 | 0 | 0 | 456 | 491 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 341 | 0 | 0 | 0 | 0 | 0 |
| Tototo Grants | 0 | 0 | 1,500 | 0 | 289 | 647 | 0 | 0 | 0 | 0 | 0 |
| Private Contrib. | 0 | 0 | 0 | 0 | 11,163 | 11,163 | 0 | 0 | 0 | 0 | 0 |
| Part. Opp. Costs | 1,467 | 1,467 | 1,467 | 2,070 | 3,177 | 5,976 | 7,200 | 7,200 | 7,200 | 7,200 | 7,200 |
| Groups Operating Costs | 0 | 0 | 0 | 0 | 0 | 0 | 6,058 | 6,058 | 6,058 | 6,058 | 6,058 |
| SUBTOTAL: | 18,567 | 17,567 | 4,167 | 11,299 | 41,678 | 50,493 | 13,258 | 13,258 | 13,258 | 13,258 | 13,258 |
| TOTAL COSTS: | | | | | | | | | | | |
| To Society (w/dev.costs): | 86,512 | 91,422 | 21,074 | 19,194 | 90,028 | 75,050 | 13,258 | 13,258 | 13,258 | 13,258 | 13,258 |
| To Society (op.costs only): | 18,567 | 17,567 | 4,167 | 11,299 | 41,678 | 50,493 | 13,258 | 13,258 | 13,258 | 13,258 | 13,258 |
| To Donors (w/dev.costs): | 85,045 | 89,955 | 18,107 | 17,124 | 75,399 | 57,264 | 0 | 0 | 0 | 0 | 0 |
| To Donors (op.costs only): | 17,100 | 16,100 | 1,200 | 9,229 | 27,049 | 32,707 | 0 | 0 | 0 | 0 | 0 |
| To Individuals: | 1,467 | 1,467 | 1,467 | 2,070 | 3,177 | 5,976 | 13,258 | 13,258 | 13,258 | 13,258 | 13,258 |

Cost data given in Annex C.2 are taken directly or calculated from the following sources:

- (a) Data for both WEI and Tototo Home Industries' 1978 - 1981 costs are calculated from budgets given in AID project contracts and PIO/Ts. AID funding was for a project split between the Philippines and Kenya. Hence, 50% of the budget has been assumed for the Kenya portion in all documents. The first contract with AID was to have terminated September 13, 1979. For a variety of reasons, the project completion date was extended to May 31, 1981 though additional funding during the two extra years was minimal.
- (b) After May 1981, the funding of World Education and indirectly Tototo's funding was picked up by another AID office under a matching fund arrangement which was terminated in 1983. World Education's costs during these years are taken from World Education's financial status reports and income statements.
- (c) Tototo's costs in 1982 and 1983 are 12 month estimates derived from 9 months of 1982 cost data and 11 months of 1983 data. This data was provided by World Education. Information regarding private contributions was given as a 1982 - 1983 total. For purposes of this analysis, total private contributions were divided equally between 1982 and 1983.
- (d) Assumptions for participants opportunity costs are as follows:
 - each participant meets 4 days per month or 48 days per year;
 - participants actually spend .25 of a day in each meeting or a total of 12 full days per year ($48 \times .25 = 12$);
 - rural wage rate is Ksh 20/day (Source: East Africa, Agriculture projects, World Bank, 1985);
 - assume there is only an opportunity cost during planting and harvesting of crops, or generously during 50% of the year (i.e., actual opportunity cost is assumed to be half the rural wage rate, Ksh 10).
 - per member opportunity cost is calculated by number of days (12) times assumed wage rate, (Ksh 10), or Ksh 120 per member per year or US\$9.00 per member per year. (Ksh 13.312 = US\$1.00, source: IBRD, 1983 exchange rate.)
 - total opportunity costs are per member costs times number of members per project year as given in Annex C.1.

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Annex C.4
TOTOTO RURAL DEVELOPMENT PROGRAM
TOTAL BENEFITS ASSUMED PER PROJECT YEAR
(US\$)

| <u>Project Year</u> | <u>Scenario I: Benefits</u> | <u>Scenario II: Benefits</u> | <u>Scenario III: Benefits</u> |
|---------------------|---------------------------------|----------------------------------|-----------------------------------|
| 1978 | 0 | 0 | 0 |
| 1979 | 1,630 | 3,260 | 6,520 |
| 1980 | 3,423 | 6,846 | 13,692 |
| 1981 | 3,423 | 6,846 | 13,692 |
| 1982 | 4,093 | 8,186 | 16,372 |
| 1983 | 6,060 | 12,120 | 24,240 |
| 1984 | 10,523 | 21,046 | 42,092 |
| 1985 | 15,304 | 30,608 | 61,216 |
| 1986 | 16,800 | 33,600 | 67,200 |
| 1987 | 16,800 | 33,600 | 67,200 |
| 1988 | 16,800 | 33,600 | 67,200 |

Calculated from total number of members by project year given in Annex C.1. Scenario I assumes per member benefits are 0 in year 1, US\$10.00 in year 2 and \$21.00 in year 3 and thereafter. Each woman is assumed to spend 1.5 days per month engaged in the small enterprise of their respective groups.

Scenario II assumes per member benefits are 0 in year 1, US\$20 in year 2 and US\$42 in year 3 and thereafter. This is based on a 3 days per member per month assumption.

Scenario III assumes per member benefits are 0 in year 1, US\$50 in year 2 and US\$84 in year 3 and thereafter. This scenario is based on a 6 days per member per month assumption.

Appendix C.5

TOTOTO RURAL DEVELOPMENT, PRESENT VALUE COSTS AND BENEFITS
(Current US \$)

| YEAR | For Society: w/Development Costs | | For Society: Operating Costs | | For Donors: w/ Development Costs | | For Donors: Operating Costs | | For Individual Participants | |
|------------|-------------------------------------|----------|---------------------------------|----------|-------------------------------------|----------|--------------------------------|----------|--------------------------------|----------|
| | COSTS | BENEFITS | COSTS | BENEFITS | COSTS | BENEFITS | COSTS | BENEFITS | COSTS | BENEFITS |
| 0 | 86,512 | 0 | 18,567 | 0 | 85,045 | 0 | 17,100 | 0 | | |
| 1 | 91,422 | 1,630 | 17,567 | 1,630 | 89,955 | 1,630 | 16,100 | 1,630 | 1,467 | 0 |
| 2 | 21,074 | 3,423 | 4,167 | 3,423 | 18,107 | 3,423 | 1,200 | 3,423 | 1,467 | 3,032 |
| 3 | 19,194 | 3,423 | 11,299 | 3,423 | 17,124 | 3,423 | 9,229 | 3,423 | 1,467 | 3,032 |
| 4 | 90,028 | 4,093 | 41,678 | 4,093 | 75,399 | 4,093 | 27,049 | 4,093 | 2,070 | 3,032 |
| 5 | 75,050 | 6,060 | 50,493 | 6,060 | 57,264 | 6,060 | 32,707 | 6,060 | 3,177 | 4,966 |
| 6 | 13,258 | 10,523 | 13,258 | 10,523 | 0 | 10,523 | 0 | 10,523 | 5,976 | 6,566 |
| 7 | 13,258 | 15,304 | 13,258 | 15,304 | 0 | 15,304 | 0 | 15,304 | 13,258 | 12,350 |
| 8 | 13,258 | 16,800 | 13,258 | 16,800 | 0 | 16,800 | 0 | 16,800 | 13,258 | 12,350 |
| 9 | 13,258 | 16,800 | 13,258 | 16,800 | 0 | 16,800 | 0 | 16,800 | 13,258 | 12,350 |
| 10 | 13,258 | 16,800 | 13,258 | 16,800 | 0 | 16,800 | 0 | 16,800 | 13,258 | 12,350 |
| 12.0% | 325,519 | 43,167 | 127,873 | 43,167 | 272,396 | 43,167 | 74,750 | 43,167 | 37,948 | 39,425 |
| C/B Ratio: | 1: | 0.13 | 1: | 0.34 | 1: | 0.16 | 1: | 0.58 | 1: | 1.04 |
| 15.0% | 305,448 | 36,332 | 115,452 | 36,332 | 259,797 | 36,332 | 69,802 | 36,332 | 32,097 | 33,609 |
| C/B Ratio: | 1: | 0.12 | 1: | 0.31 | 1: | 0.14 | 1: | 0.52 | 1: | 1.05 |
| 20.0% | 277,951 | 27,797 | 98,964 | 27,797 | 241,866 | 27,797 | 62,880 | 27,797 | 24,774 | 26,263 |
| C/B Ratio: | 1: | 0.10 | 1: | 0.28 | 1: | 0.11 | 1: | 0.44 | 1: | 1.06 |
| 25.0% | 256,115 | 21,755 | 86,373 | 21,755 | 227,013 | 21,755 | 57,270 | 21,755 | 19,582 | 20,987 |
| C/B Ratio: | 1: | 0.08 | 1: | 0.25 | 1: | 0.10 | 1: | 0.38 | 1: | 1.07 |

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APPENDIX D:
BASIC VILLAGE EDUCATION
Guatemala

APPENDIX D.1.

SUMMARY OF ACTUAL BASIC VILLAGE EDUCATION PROJECT COSTS
(1978 QUETZALAS)

| | ORIENTE | | | | | | OCCIDENTE | | | | | |
|----------------------|---------|---------|---------|---------|------|--------|-----------|---------|---------|---------|---------|--------|
| | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 |
| Design & Planning | 123,604 | 4,022 | - | - | - | - | 80,323 | 2,320 | 242 | - | - | - |
| Administration | 55,948 | 104,293 | 74,626 | 55,600 | - | - | 13,429 | 28,282 | 60,446 | 54,861 | 44,842 | - |
| Overhead | 42,627 | 66,358 | 53,066 | 43,488 | - | 5,768 | 10,517 | 10,840 | 34,548 | 40,836 | 38,612 | 5,768 |
| Content Dev./Prep. | 16,696 | 34,569 | 14,571 | 5,053 | - | - | 4,298 | 42,975 | 7,853 | 3,982 | 6,267 | - |
| Production | 22,224 | 101,539 | 68,382 | 51,659 | - | - | 4,280 | 9,941 | 35,077 | 61,214 | 58,888 | - |
| Transmission | 13,675 | 49,548 | 51,427 | 28,843 | - | - | 598 | 9,497 | 56,028 | 29,710 | 30,326 | - |
| Formative Evaluation | 350 | 23,178 | 12,212 | 17,767 | - | - | 146 | 473 | 18,073 | 13,132 | 6,653 | - |
| Research | 123,343 | 147,958 | 136,037 | 125,786 | - | 48,088 | 7,836 | 27,336 | 87,817 | 92,692 | 86,759 | 48,088 |
| 1/Farmer Costs | - | 139,390 | 209,356 | 348,206 | - | - | - | - | 169,860 | 254,610 | 424,110 | - |
| TOTAL COSTS | 398,467 | 670,855 | 624,677 | 676,402 | - | 53,856 | 121,427 | 131,664 | 469,944 | 551,047 | 696,454 | 53,856 |

Source: Summary of project costs by year given in Table II.3, pp. 23-25 of Kless, Steven and Stuart Walls, "Cost-Benefit Analysis of Non-Formal Educational Techniques for Agricultural Development: A Case Study of the BVE Project." 1978

1/Farmer costs include: opportunity cost of time spent listening to the radio, receiving BVE message from project monitors and agronomists, and estimated cost of radio batteries. Increased production costs resulting from adoption of new BVE practices are considered in net incremental benefits.

APPENDIX D.1, page 2

The following assumptions underlie the summary cost data given above in Appendix D.1:

- a) Costs in Table III.2 are given in 1978 quetzales where Q1.00 = US\$1.00. Expenditures in years 1973-1977 were converted by using the US consumer price index for those years.
- b) All loan arrangements, interest payments, taxes and duties are ignored as they represent a cash transfer and not a cost of resources to society.
- c) Joint costs that are not specifically incurred for either region are assigned 60% to the Oriente and 40% to the Occidente.
- d) For the BVE experimental period it was assumed that 20% of the farmers listen to all programs in the first year, 30% of farmers listen in the second year and 50% in the third year. Based upon the low power broadcast, it was assumed that programs were available to a maximum of 50% of the population during the experimental period.
- e) Overhead expenses are assumed to be 22% of AED expenditures and 18% of Guatemalan Ministry expenditures.
- f) Monitors in the Oriente region were assumed to have 1,600 contact hour with farmers in forums and 1,000 contact hours with farmers on an individual basis. Monitors in the Occidente region are assumed to have 1,060 contact hours with farmers in forums and 700 contact hours for meetings with farmers on an individual basis. Agronomists in the Oriente region are assumed to have 2,500 contact hours with farmers in the Occidente region. This assumption is based upon the project experience of farmers reached by the agronomist and is hence clearly an average.
- g) Farmer time is costed at Q .10 per hour. Batteries for radios are assumed to cost Q .01 per hour. Hence the total cost to farmers for one hour of listening to the radio is Q .11.

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APPENDIX D.2

TOTAL AND AVERAGE ANNUAL COST PROJECTIONS FOR IMPLEMENTATION AND OPERATION OF A REGIONAL BVE PROGRAM^a

| Treatment | Region I ^b | | | Region II ^c | | |
|---|-----------------------|----------------------------|---------------------------------------|------------------------|----------------------------|---------------------------------------|
| | Total \$ | Per farmer family \$ | Per farmer listening hour \$ | Total \$ | Per farmer family \$ | Per farmer listening hour \$ |
| <u>Radio only:</u> ^d | | | | | | |
| Including farmer cost | 1,015,800 | 11.08 | 0.15 | 1,011,500 | 6.74 | 0.13 |
| Without farmer cost | 385,700 | 4.21 | 0.06 | 269,000 | 1.79 | 0.03 |
| <u>Radio - Monitor:</u> ^e | | | | | | |
| Including farmer cost | 2,315,000 | 25.26 | 0.34 | 5,422,200 | 36.15 | 0.69 |
| Without farmer cost | 1,647,800 | 17.98 | 0.24 | 4,609,600 | 30.73 | 0.58 |
| <u>Radio - Monitor - Agronomist I:</u> ^f | | | | | | |
| Including farmer cost | 3,810,900 | 41.58 | 0.56 | 10,104,200 | 67.36 | 1.29 |
| Without farmer cost | 3,097,400 | 33.80 | 0.46 | 9,230,600 | 61.54 | 1.17 |
| <u>Radio - Monitor - Agronomist II:</u> ^g | | | | | | |
| Including farmer cost | 3,084,800 | 33.66 | 0.46 | 7,763,200 | 51.75 | 0.99 |
| Without farmer cost | 2,393,800 | 26.12 | 0.35 | 6,920,900 | 46.14 | 0.88 |
| <u>Monitor only:</u> | | | | | | |
| Including farmer cost | 1,696,500 | 18.51 | - | 4,688,300 | 31.26 | - |
| Without farmer cost | 1,659,400 | 18.11 | - | 4,618,200 | 30.79 | - |
| <u>Traditional agricultural extension:</u> ^h | | | | | | |
| Including farmer cost | 3,283,200 | 35.85 | - | 9,643,100 | 64.29 | - |
| Without farmer cost | 3,222,300 | 35.16 | - | 9,518,100 | 63.45 | - |

^aIncludes all costs incurred for startup, research and technical assistance amortized over a 10-year life of project. Represents the costs which would be faced by other countries seeking to establish a program such as BVE (hence referred to in the text as "international").

^bBased on Guatemalan Oriente: 91,650 farm families and annual production of 147.5 hours of original radio agricultural programming (including 45 radio forums).

^cBased on Guatemalan Occidente: 150,000 farm families, and annual production of 105 hours of radio agricultural programming (including 30 radio forums).

^dAssumes that 50 percent of the farmers listen to all programs.

^eAssumes 370 and 1,000 monitors in Regions I and II, respectively.

^fAssumes 185 and 500 agronomists in Regions I and II, respectively.

^gAssumes only 90 and 250 agronomists in Regions I and II, respectively.

^hAssumes 370 and 1,000 agronomists in Regions I and II, respectively, but no radio and no monitors.

APPENDIX D.2, page 2

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TOTAL AND AVERAGE ANNUAL COST PROJECTIONS
FOR AN EXPANDED BVE PROGRAM IN GUATEMALA^a

| | Oriente ^b | | | Occidente ^c | | |
|---|----------------------|----------------------------|---------------------------------------|------------------------|----------------------------|---------------------------------------|
| | Total \$ | Per farmer family \$ | Per farmer listening hour \$ | Total \$ | Per farmer family \$ | Per farmer listening hour \$ |
| <u>Radio only:</u> ^d | | | | | | |
| Including farmer cost | 320,900 | 8.96 | 0.12 | 882,500 | 5.98 | 0.21 |
| Without farmer cost | 190,700 | 2.08 | 0.03 | 140,000 | 0.93 | 0.02 |
| <u>Radio - Monitor:</u> ^e | | | | | | |
| Including farmer cost | 2,120,000 | 23.13 | 0.31 | 5,293,200 | 35.29 | 0.67 |
| Without farmer cost | 1,452,000 | 15.85 | 0.21 | 4,480,600 | 29.87 | 0.57 |
| <u>Radio - Monitor - Agronomist I:</u> ^f | | | | | | |
| Including farmer cost | 3,165,900 | 39.45 | 0.53 | 9,975,200 | 66.50 | 1.27 |
| Without farmer cost | 2,902,400 | 31.67 | 0.43 | 9,101,600 | 60.68 | 1.16 |
| <u>Radio - Monitor - Agronomist II:</u> ^g | | | | | | |
| Including farmer cost | 2,889,800 | 31.53 | 0.42 | 7,634,200 | 50.89 | 0.97 |
| Without farmer cost | 2,198,800 | 23.99 | 0.32 | 6,791,900 | 45.28 | 0.87 |
| <u>Monitor only:</u> | | | | | | |
| Including farmer cost | 1,501,500 | 16.38 | - | 4,559,300 | 30.44 | - |
| Without farmer cost | 1,464,400 | 15.98 | - | 4,489,200 | 29.93 | - |
| <u>Traditional Agricultural Extension:</u> ^h | | | | | | |
| Including farmer cost | 3,090,200 | 33.72 | - | 9,514,100 | 63.43 | - |
| Without farmer cost | 3,027,300 | 33.03 | - | 9,389,100 | 62.59 | - |

^a Excludes all costs to date: start-up, research, technical assistance, etc. All salary levels are calculated on basis of Government of Guatemala salary and wage scales.

^b Assumes 91,650 farm families, with 147.5 hours of original radio programming (including 45 radio forums).

^c Assumes 150,00 farm families, with 105 hours of original radio programming (including 30 radio forums).

^d Assumes that 50 percent of the farmers listen to all programs.

^e Assumes 370 monitors in the Oriente and 1,000 in the Occidente (based on Project experience).

^f Assumes 185 agronomists in the Oriente and 500 in the Occidente (based on Project experience).

^g Assumes reduction to 90 agronomists in the Oriente and 250 in the Occidente.

^h Assumes 370 agronomists in the Oriente and 1,000 in the Occidente, but no radio and monitor.

APPENDIX D.3.

ESTIMATED ANNUAL COSTS FOR AN EXPANDED BVE PROGRAM IN GUATEMALA
(1978 Quetzales)

| | <u>Oriente</u> | <u>Occidente</u> |
|-------------------------|----------------|------------------|
| <u>Cost to Society:</u> | | |
| 1/- w/development costs | 2,315,000 | 5,422,200 |
| 2/- w/operating costs | 2,120,000 | 5,293,200 |
| <u>Cost to Donors:</u> | | |
| - w/development costs | 1,647,800 | 4,609,600 |
| - w/operating costs | 1,452,000 | 4,480,600 |
| <u>To Farmers:</u> | 668,000 | 812,600 |

Source: Calculated from Table 3 in Annex

- 1/ Includes all costs incurred for startup, research and technical assistance amortized over a 10-year life of project.
- 2/ Excludes all costs to date: start-up, research, technical assistance. All salary levels are calculated on basis of Government of Guatemala salary and wage scales. Represents cost to society of running the project once development phase has been completed.
- 3/ The total costs given in Table D.1 assume 90,000 farms at 3.20 mz. each in the Oriente and 150,000 farms at 1.36 mz each in the Occidente region. These costs represent average annual costs for each of the ten project years. Again we encourage the reader to consult the Klees and Wells study if they are interested in the detailed description of how total costs by region and treatment are derived from the cost function introduced in this section.

APPENDIX D.4

*BVE System Net Agricultural Benefit Projections
(Quetzales/mz.)

| <u>Project Year</u> | <u>Oriente</u> | <u>Occidente</u> |
|---------------------|----------------|------------------|
| 0 | 0 | 0 |
| 1 | 4.00 | 4.17 |
| 2 | 6.60 | 6.86 |
| 3 | 10.86 | 11.30 |
| 4 | 17.88 | 18.62 |
| 5 | 29.48 | 30.68 |
| 6 | 48.56 | 50.57 |
| 7 | 80.00 | 83.33 |
| 8 | 80.00 | 83.33 |
| 9 | 80.00 | 83.33 |
| 10 | 80.00 | 83.33 |

* Percent change in benefits from one project year to the next may deviate slightly from the assumed 65% annual increase due to number of decimal places used in the original calculations.

The following assumptions were made in calculating potential benefits:

- (1) In a normal year, it was assumed that the net gain in productivity for the Oriente region would be Q165/mz and the net gain for the Occidente region would be Q175.
- (2) In drought years, there would be a net loss of -Q20/mz in the Oriente region and -Q50/mz in the Occidente region.
- (3) For semi-drought years, net gains would be positive but substantially lower in a normal year with the net gain for the Oriente at Q20/mz and for the Occidente at Q50/mz.
- (4) A seven-year cycle of one serious drought year, one semi-drought year and 5 normal years is assumed.
- (5) Averaging these net gain assumptions together over the seven-year cycle, one can assume the average maximum benefit in any given year to be Q120/mz in the Oriente and Q125/mz in the Occidente.

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- (6) Though Klees and Wells contemplate three alternative scenarios regarding the number of farmers reached, we examine only the mid scenario which assumes that 2/3 of the farmers in the region adopt all of BVE recommendations or that all of the farmers adopt 2/3 of the practices. The maximum benefit for the Oriente is, then, 2/3 of Q120/mz or Q80/mz and for the Occidente is 2/3 of Q125/mz or Q83.33/mz.
- (7) It is assumed that it takes seven years of BVE operation to achieve the maximum practical impact, and that there are no benefits in the first year of the project.
- (8) The benefits in year 1 are assumed to be 5% of the maximum and are assumed to grow by approximately 65% over the first seven years and to remain constant thereafter.

first table on 1 sheet.

Appendix D.5

Annex D-4

BVE ANNEX

(pp. 1 & 2)

TABLE 5
SUMMARY OF TOTAL BVE PROJECT COSTS
AND BENEFITS BY PROJECT YEAR

-----OCCIDENTE-----

| YEAR | FOR SOCIETY: W/ DEVELOPMENT COSTS | | FOR SOCIETY: W/ OPERATING COSTS | | FOR INDIVIDUALS: | |
|------------|--------------------------------------|------------|------------------------------------|------------|------------------|------------|
| | COSTS | BENEFITS | COSTS | BENEFITS | COSTS | BENEFITS |
| 0 | 5,422,200 | 0 | 5,293,200 | 0 | 812,600 | 0 |
| 1 | 5,422,200 | 850,680 | 5,293,200 | 850,680 | 812,600 | 850,680 |
| 2 | 5,422,200 | 1,399,440 | 5,293,200 | 1,399,440 | 812,600 | 1,399,440 |
| 3 | 5,422,200 | 2,305,200 | 5,293,200 | 2,305,200 | 812,600 | 2,305,200 |
| 4 | 5,422,200 | 3,798,480 | 5,293,200 | 3,798,480 | 812,600 | 3,798,480 |
| 5 | 5,422,200 | 6,258,720 | 5,293,200 | 6,258,720 | 812,600 | 6,258,720 |
| 6 | 5,422,200 | 10,316,280 | 5,293,200 | 10,316,280 | 812,600 | 10,316,280 |
| 7 | 5,422,200 | 16,999,320 | 5,293,200 | 16,999,320 | 812,600 | 16,999,320 |
| 8 | 5,422,200 | 16,999,320 | 5,293,200 | 16,999,320 | 812,600 | 16,999,320 |
| 9 | 5,422,200 | 16,999,320 | 5,293,200 | 16,999,320 | 812,600 | 16,999,320 |
| 10 | 5,422,200 | 16,999,320 | 5,293,200 | 16,999,320 | 812,600 | 16,999,320 |
| 12.0% | 36,058,839 | 40,866,694 | 35,200,961 | 40,866,694 | 5,403,971 | 40,866,694 |
| C/B Ratio: | 1: | 1.13 | 1: | 1.16 | 1: | 7.56 |
| 15.0% | 32,634,967 | 34,039,123 | 31,858,546 | 34,039,123 | 4,890,851 | 34,039,123 |
| C/B Ratio: | 1: | 1.04 | 1: | 1.07 | 1: | 6.96 |
| 20.0% | 28,154,622 | 25,554,494 | 27,484,793 | 25,554,494 | 4,219,403 | 25,554,494 |
| C/B Ratio: | 1: | 0.91 | 1: | 0.93 | 1: | 6.06 |
| 25.0% | 24,782,183 | 19,591,440 | 24,192,588 | 19,591,440 | 3,713,991 | 19,591,440 |
| C/B Ratio: | 1: | 0.79 | 1: | 0.81 | 1: | 5.28 |

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-----OCCIDENTE-----

| PROJECT YEAR | FOR DONOR: W/ DEVELOPMENT COSTS | | FOR DONOR: W/ OPERATING COSTS | |
|-----------------|------------------------------------|------------|----------------------------------|------------|
| | COSTS | BENEFITS | COSTS | BENEFITS |
| 0 | 4,609,600 | 0 | 4,480,600 | 0 |
| 1 | 4,609,600 | 850,680 | 4,480,600 | 850,680 |
| 2 | 4,609,600 | 1,399,440 | 4,480,600 | 1,399,440 |
| 3 | 4,609,600 | 2,305,200 | 4,480,600 | 2,305,200 |
| 4 | 4,609,600 | 3,798,480 | 4,480,600 | 3,798,480 |
| 5 | 4,609,600 | 6,258,720 | 4,480,600 | 6,258,720 |
| 6 | 4,609,600 | 10,316,280 | 4,480,600 | 10,316,280 |
| 7 | 4,609,600 | 16,999,320 | 4,480,600 | 16,999,320 |
| 8 | 4,609,600 | 16,999,320 | 4,480,600 | 16,999,320 |
| 9 | 4,609,600 | 16,999,320 | 4,480,600 | 16,999,320 |
| 10 | 4,609,600 | 16,999,320 | 4,480,600 | 16,999,320 |
| | 30,654,868 | 40,866,694 | 29,796,989 | 40,866,694 |
| C/B Ratio: | 1: | 1.33 | 1: | 1.37 |
| | 27,744,116 | 34,039,123 | 26,967,695 | 34,039,123 |
| C/B Ratio: | 1: | 1.23 | 1: | 1.26 |
| | 23,935,219 | 25,554,494 | 23,265,390 | 25,554,494 |
| C/B Ratio: | 1: | 1.07 | 1: | 1.10 |
| | 21,068,192 | 19,591,440 | 20,478,597 | 19,591,440 |
| C/B Ratio: | 1: | 0.93 | 1: | 0.96 |

TABLE 6
SUMMARY OF TOTAL BVE PROJECT COSTS
AND BENEFITS BY PROJECT YEAR

-----ORIENTE-----

| YEAR | FOR SOCIETY: W/ DEVELOPMENT COSTS | | FOR SOCIETY: W/ OPERATING COSTS | | FOR INDIVIDUALS: | |
|------------|--------------------------------------|------------|------------------------------------|------------|------------------|------------|
| | COSTS | BENEFITS | COSTS | BENEFITS | COSTS | BENEFITS |
| 0 | 2,315,000 | 0 | 2,120,000 | 0 | 668,000 | 0 |
| 1 | 2,315,000 | 1,152,000 | 2,120,000 | 1,152,000 | 668,000 | 1,152,000 |
| 2 | 2,315,000 | 1,900,000 | 2,120,000 | 1,900,000 | 668,000 | 1,900,000 |
| 3 | 2,315,000 | 3,127,680 | 2,120,000 | 3,127,680 | 668,000 | 3,127,680 |
| 4 | 2,315,000 | 5,149,440 | 2,120,000 | 5,149,440 | 668,000 | 5,149,440 |
| 5 | 2,315,000 | 8,490,240 | 2,120,000 | 8,490,240 | 668,000 | 8,490,240 |
| 6 | 2,315,000 | 13,985,280 | 2,120,000 | 13,985,280 | 668,000 | 13,985,280 |
| 7 | 2,315,000 | 23,040,000 | 2,120,000 | 23,040,000 | 668,000 | 23,040,000 |
| 8 | 2,315,000 | 23,040,000 | 2,120,000 | 23,040,000 | 668,000 | 23,040,000 |
| 9 | 2,315,000 | 23,040,000 | 2,120,000 | 23,040,000 | 668,000 | 23,040,000 |
| 10 | 2,315,000 | 23,040,000 | 2,120,000 | 23,040,000 | 668,000 | 23,040,000 |
| 12.02 | 15,395,266 | 55,399,943 | 14,098,473 | 55,399,943 | 4,442,349 | 55,399,943 |
| C/B Ratio: | 1: | 3.60 | 1: | 3.92 | 1: | 12.47 |
| 15.02 | 13,933,449 | 46,145,047 | 12,759,789 | 46,145,047 | 4,020,537 | 46,145,047 |
| C/B Ratio: | 1: | 3.31 | 1: | 3.62 | 1: | 11.48 |
| 20.02 | 12,020,573 | 34,643,816 | 11,008,041 | 34,643,816 | 3,468,571 | 34,643,816 |
| C/B Ratio: | 1: | 2.88 | 1: | 3.15 | 1: | 9.99 |
| 25.02 | 10,300,715 | 26,560,520 | 9,689,467 | 26,560,520 | 3,053,096 | 26,560,520 |
| C/B Ratio: | 1: | 2.51 | 1: | 2.74 | 1: | 8.70 |

-----ORIENTE-----

| PROJECT YEAR | FOR BONDH: W/ DEVELOPMENT COSTS | | FOR BONDH: W/ OPERATING COSTS | |
|-----------------|------------------------------------|------------|----------------------------------|------------|
| | COSTS | BENEFITS | COSTS | BENEFITS |
| 0 | 1,647,000 | 0 | 1,452,000 | 0 |
| 1 | 1,647,000 | 1,152,000 | 1,452,000 | 1,152,000 |
| 2 | 1,647,000 | 1,900,000 | 1,452,000 | 1,900,000 |
| 3 | 1,647,000 | 3,127,680 | 1,452,000 | 3,127,680 |
| 4 | 1,647,000 | 5,149,440 | 1,452,000 | 5,149,440 |
| 5 | 1,647,000 | 8,490,240 | 1,452,000 | 8,490,240 |
| 6 | 1,647,000 | 13,985,280 | 1,452,000 | 13,985,280 |
| 7 | 1,647,000 | 23,040,000 | 1,452,000 | 23,040,000 |
| 8 | 1,647,000 | 23,040,000 | 1,452,000 | 23,040,000 |
| 9 | 1,647,000 | 23,040,000 | 1,452,000 | 23,040,000 |
| 10 | 1,647,000 | 23,040,000 | 1,452,000 | 23,040,000 |
| C/B Ratio: | 10,958,238 | 55,399,943 | 9,656,124 | 55,399,943 |
| | 1: | 5.06 | 1: | 5.74 |
| C/B Ratio: | 9,917,727 | 46,145,047 | 8,739,252 | 46,145,047 |
| | 1: | 4.65 | 1: | 5.28 |
| C/B Ratio: | 8,556,156 | 34,643,816 | 7,539,469 | 34,643,816 |
| | 1: | 4.05 | 1: | 4.59 |
| C/B Ratio: | 7,531,275 | 26,560,520 | 6,636,371 | 26,560,520 |
| | 1: | 3.53 | 1: | 4.00 |

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