AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523
BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY
Batch 72
ARDA

1. SUBJECT CLASSIFICATION
A. PRIMARY: Food production and nutrition — AE30-0000-0000
B. SECONDARY: Development

2. TITLE AND SUBTITLE
Information for decisionmaking in rural development; volume II

3. AUTHOR(S)
Roth,Alan; Morss,E.R.; Weisel,Peter; Barclay,A.H.; Smith,R.L.; Poynor,G.V.; Dommen,Arthur; Merk,J.L.

4. DOCUMENT DATE	5. NUMBER OF PAGES	6. ARC NUMBER
1978	417p.	ARC

7. REFERENCE ORGANIZATION NAME AND ADDRESS
Dev.Alts.

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)
(Vol.I,112p.:PN-AAG-162)

9. ABSTRACT

10. CONTROL NUMBER
PN-AAG-163

11. PRICE OF DOCUMENT

12. DESCRIPTORS
Data acquisition
Decision making
Information
Information systems
Reviews

13. PROJECT NUMBER
931000300

14. CONTRACT NUMBER
AID/otr-C-1383 GTS

15. TYPE OF DOCUMENT

AID 590-1 (4-74)

Information for Decisionmaking in Rural Development

volume two

A Report Prepared for the
Office of Rural Development,
Agency for International Development
Under Contract AID/otr-C-1383
Work Order No. 20

MAY 22, 1978

INFORMATION FOR DECISIONMAKING IN RURAL DEVELOPMENT

VOLUME TWO

Donald R. Mickelwait, Project Director,
Alan Roth,
Elliott R. Morss,
Peter F. Weisel,
A. H. Barclay, Jr., and
Richard L. Smith

and

George V. Poynor,
Arthur Dommen, and
J. Lamar Merk
of
Poynor International, Inc.

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by

Development Alternatives, Inc.
1823 Jefferson Place, N.W.
Washington, D.C. 20036

May 22, 1978

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PREFACE

The draft of *Information for Decisionmaking in Rural Development* was completed in April 1977. The 300-page document was submitted to numerous reviewers for comment and recommendations, while DAI staff also conducted an assessment of the work. The net verdict was that the study undertook too large a task and, in attempting to cover an exceedingly complex subject, presented a report that contained much of value but was nearly unreadable in presentation and organization. One particular problem was the mix of intended audiences, ranging from project manager to regional planner to technical information system specialist.

After six months the Rural Development Office of the Agency for International Development decided to fund a revision and improvement of the study, which was to present more simply the essentials of information for decisionmakers in one section, and the details of information systems for technicians in another. This has led to the present two-volume study.

In revising the report, DAI drew upon the comments that had been offered on the draft, as well as a good deal of original material that had been generated specifically for the final report. Individual case studies were reviewed, and projects revisited in Thailand, Indonesia, and the Philippines in Asia; Kenya and Tanzania in Africa; and Colombia in Latin America. In addition DAI sent staff (at its own expense) to a useful workshop on Information Systems for Rural Development Projects, sponsored by the OECD during March 1978, where an exchange of experiences and case studies among nearly 50 practitioners provided an excellent overview of the state of the art. Many of the ideas generated at the seminar are presented in this report.

Much new material represents continued work by DAI under contract to design and operate information systems in development projects around the world. This is true of the internal project monitoring and evaluation system in the Hanang District Rural Health Project and the study of the impact of labor-intensive feeder roads in Colombia. Other material results from the completion of subsequent major reports to AID on the design and implementation of development projects; the findings of these reports are referred to, rather than repeated in yet another document.

The subject of information is inextricably bound to the art of appropriate project design and the implementation of rural development projects. No amount of analytical objectivity will overcome the fact that DAI has adopted an approach to development

that involves participation by and benefits to a local population in a self-sustaining process of socioeconomic growth. Research has shown that participation in the information flow and in project decisionmaking is likely to be crucial for project success. Thus the choise of development philosophy is the significant parameter in the definition of critical policy decisions within rural development, and in the specification of information requirements.

The bulk of the fieldwork and writing of this report has fallen to Donald Mickelwait and Alan Roth, with major inputs from George Poynor of Poynor International, Inc. Dr. Poynor is responsible for Chapter Two in Volume One, as well as the chapters on Sector Analysis and Area Frame Sampling in Volume Two. ATAC's Bill Rusch supplied a detailed account of the technique of computerized farm surveys, which is referred to in the body of the report. For DAI, Peter Weisel completed the assessment of two information projects in Kenya and the Hanang study in Tanzania. Richard Smith described the ongoing Colombian road impact study. Elliott Morss reviewed all material and provided the chapter on information use in Volume One. In all, many of the professional staff assisted in clarifying concepts and presentation. We believe these two volumes add to a growing body of knowledge on alternatives for the use of information to support rural development projects.

Donald R. Mickelwait
Washington, D.C.
May 22, 1978

CHAPTER ONE

INTRODUCTION

This volume has grown out of the problems inherent in presenting policy options to decisionmakers while, at the same time, attempting to delve into technical details that are appropriate for those who have to design (or contract to design) information systems to support rural development projects. It can best be viewed as a "parts" catalogue, which can be used by the reader to select the subject of immediate interest, or the case study that is appropriate to the problem at hand. There is no overriding conceptual linkage between one section and the other, no attempt to present a theory of information needs and use. That is the subject of Volume One.

In Section I a nonproject analytical modeling technique called Sector Analysis is presented, but most of the examples are derived from agriculture. The background of this technique, and instances of ongoing application, are presented for the interested general reader. The discussion follows from Chapter Two of Volume One, which reviews information needs at the national, regional and sector levels.

Section II presents the use and abuse of statistical surveys, including the choice of area frame and population sampling methodology. Since population sampling has been the standard technique

of most rural data collection efforts, there are many case studies from which to choose. An attempt is made to show the complexity of sampling designs and survey methodology, on a continuum that runs from high precision achieved through high resource commitment, to minimally generalizable surveys whose approaches involve less rigorous, more subjective, data collection methodologies.

Section III presents everything else and includes the extremes of reconnaissance and rapid surveys, requiring insightful field investigators and subjective judgments, and detailed farm records, which are the most laborious and potentially accurate data collection instruments for agricultural production. The chapter on internal project systems deals with a combination of methodologies, concentrating on how they fit into the management structure of a project. Research studies on information systems, and the approaches that have been followed in the past and future, complete the section.

The use of case studies is not uniform throughout this volume. In most chapters the analysis is by major points, illustrated by specific cases. In the chapters on statistical surveys, internal project systems and research, however, the case studies are presented individually to allow the reader a better sense of the entire project, and the impact and placement of the information system. In addition to the case studies used directly in this volume, at least as many were reviewed and

included in the conceptual discussion and are listed in the bibliography.

Readers are encouraged to select and skim at will. There is no penalty, but rather the likelihood of increased efficiency, from selective reading on a topic of special interest.

SECTION I

SECTOR ANALYSIS

CHAPTER TWO

SECTOR ANALYSIS, WITH SPECIAL REFERENCE TO AGRICULTURE

THE PROCESS OF SECTOR ANALYSIS

The need to develop and implement programs that address a multiplicity of development goals has led to increased efforts to improve sector planning methods. In the agriculture sector this has meant increased research and experimentation to make sector analysis more responsive to broadened development goals. It has also led an increasing number of developing countries to begin using formal sector analysis methods.

Sector analysis is defined here as a process which uses social, cultural and economic analysis to examine both micro- and macro-level policy and program implications. There are three important aspects of sector analysis:

- The conceptual or theoretical basis upon which analysis is grounded;
- The formulation of models or frameworks (quantitative, qualitative, or both) which combine theoretical considerations with specific information to allow structure and performance of the sector to be studied empirically, and policy recommendations formulated; and
- The selection and preparation of concrete sector programs.

Some countries, such as Mexico and Thailand, have gone rather far in the development of sector analysis efforts in agriculture. Other countries have undertaken shorter or less complex sector analysis efforts. Still other countries have not yet made the attempt to use sector analysis. Sector analysis should be seen as a process, with first halting steps leading to more ambitious efforts. This permits thinking about what further steps are most appropriate to a given situation in a given country, rather than trying to force the adoption of a particular kind of sector analysis activity or level of effort from the beginning. It also permits studies and data gathering efforts to be viewed as building blocks in a continuous process rather than as ends in themselves.

Fullerton has indicated that past efforts at sector analysis have appeared to progress in stages.[1] First stage efforts are usually focused on specific types of problem-oriented studies: project-specific studies, loan identification and analysis for international lenders, etc. The results are very often highly subjective and qualitative, and are most often embodied in the reports of individual consultants or small teams, which are then integrated into sector-level documents. The objectives of the analytical efforts themselves are most often to find technical solutions to specific problems. There is usually little or no attempt made to develop an internal capability to do analytical

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[1] See H. H. Fullerton, *Future Plans for Agricultural Sector Analysis*, Bangkok: DAE/ISU Sector Analysis Team, November 1976.

work, and foreign consultants are relied upon for a great deal of the work.

At a second stage, a host government institution is created or strengthened and is given official responsiblities to carry out sector studies. In this stage much effort goes into providing appropriate counterpart technical assistance to these institutions and the other resources necessary for them to cope with the analytical problems faced. As these institutions gain strength, both professionally and bureaucratically, there is a tendency to move away from narrowly focused studies, and to begin to piece together in a more systematic manner the kinds of information and analyses necessary for policy analysis of a broader stripe, as well as to increase the latitude enjoyed by analysts in deciding on objectives and tasks.

A third stage is that level of sector analysis effort in which a continuous, functioning process is in operation, with responsibility and authority to identify issues and to conduct research and analysis being assigned to a unit that has political and professional legitimacy.

SOME RECENT SECTOR ANALYSIS EFFORTS

It will be useful to review several recent sector analysis efforts before attempting to describe them in methodological

terms. The studies discussed here have taken place in the past eight or nine years. Some of them represent good examples of first stage studies, carried out by foreign professionals with no inputs from host country analysts. Others represent second stage efforts, having involved counterpart efforts utilizing both host country and foreign staff working out of a host country institutional base. And one or two represent third stage sector analysis, initiated primarily by host government staffs, with selective use of foreign analysts.

In recent years the practice of sector analysis has gravitated more toward the use of formal sector models, primarily because of growing evidence that such models allow more precision and clarity, and force a much-needed discipline upon both analysts and policymakers. Most of the examples discussed in these pages have formal models as key elements in the sector analysis process. It is, of course, possible to have meaningful agriculture sector studies without explicit models; indeed, many studies not using models have had useful and practical results. There are, however, two reasons why this discussion will be restricted to formally constituted sector analyses: first, apart from being state-of-the-art forms, they are important instruments for analysis; second, they can be described and documented in methodological terms with some clarity and precision, a feature not shared by other sector and subsector studies.

Guatemala, Peru and Panama

Agriculture sector analyses were completed in these three countries with the assistance of teams from Iowa State University, using very similar methodological approaches. The Guatemala study took place in 1968, the Peruvian effort in 1969-1970, and the Panama analysis between 1970 and 1973.

The methodological framework used in these sector analyses is of the general equilibrium type. A relatively simple macroeconomic model of the economy was constructed and used to describe the major structural and behavioral relationships between macroeconomic variables for some baseline period. In the Guatemala study these variables were the impact of exports and changes in the international terms of trade and foreign investment on gross domestic product, domestic investment, and the balance of payments. The model was used to obtain consistent macroeconomic projections over the planning period to be used in the analysis (1969-1975 in the Guatemala case). The model thus provided linkages between the world economy and the national economy.

Once the above was accomplished, ranges were available within which agricultural projections regarding production and consumption could be made. Agricultural demand projections by commodity groups were made, subject to consistency checks by the macroeconomic model. In this way linkages between the overall economy and the agriculture sector were established.

In both the Peru and Panama studies input-output models were available, which aided in checking consistency of sector growth rates between sector and economy levels. This was done informally in the Guatemala analysis. The Guatemala study was done in something of a first stage environment. Although Guatemalan professionals were involved in the study, they were seconded from various agencies. In the case of the Panama study, the work was apparently done in a second stage manner, with reasonably broad participation from various Panamanian institutions.

Although there have not been accurate accountings of resources used in carrying out these analyses, an upper bound of $100,000 (local and foreign costs) for the entire Guatemala study has been suggested by Thorbecke.[1] Thorbecke suggests that the methodology is especially useful for countries with economic and social dualism and a heavy reliance on exports, and points out that the simplicity of the model and the fact that it can be implemented with resources and data readily available to a developing country represent advantages from the point of view of getting sector analysis efforts started.

Nigeria and Korea

Michigan State University has provided the technical assistance for rather extensive sector analysis efforts in these two countries. The Nigeria study occupied roughly a five-year period

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[1] Erik Thorbecke, "Sector Analysis and Models of Agriculture in Developing Countries," Ford Research Institute Studies, 12:73-89, 1973.

from 1969-1973. The major methodological thrust was the creation of a larger simulation model which included components representing a number of agriculture sector activities. The organization of the model distinguished two producing regions, Northern and Southern Nigeria, and a third organizational component represented the remainder of the economy. By changing values of exogenous variables, policy instruments, and technological levels, the model can be used to generate alternative development scenarios.

The fundamental advantage of the simulation approach is also the factor that constitutes its main difficulty. Since it is a completely flexible modelling device, almost any kind of component can be integrated into the model. In the Korea study, for example, optimizing production models were incorporated, as was an input-output model. The model thus grows in size, becoming in most cases enormous. This complicates the use of the model, requiring larger and more sophisticated computing resources. The flexibility also complicates the process of validating the model, or ensuring that it is doing what it was intended to do.

The earlier study in Nigeria served as the research vehicle for the development of much of the methodology and, as such, was very costly. One estimate of total cost put it at over $1 million for the five-year period.[1] Costs were lower

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[1] This figure was cited in the course of disscussions in 1973 between George Poynor and Arthur Coutu, who was then chief of AID's TA/AGR/ESP.

for the Korea analysis, but estimates have not been obtained for this project.

Policy analysis in these studies included price policy analysis, analysis of the direction and level of agricultural research, analysis of public investment alternatives, and analysis of import substitution policies. Also included were impacts of policy alternatives on farm and non-farm income, food consumption (nutrition), balance of payments, and employment.

Mexico, Ivory Coast, Brazil and Portugal

These efforts were all sponsored by the IBRD. The Brazil and Portugal models were very similar, and the efforts consisted mainly of constructing large, multiregion linear programming models of the agriculture economy, in each case. The Portugal study began in early 1971 and took three years to complete. The base year for the model was 1968. Policy analysis consisted of regional trade considerations, foreign trade, sectoral income and consumer welfare considerations. One of the principal techniques used in the analytical effort was to compare results, in two different model runs, of different policies in order to obtain trade-offs between production and consumption considerations.

The Portugal model had submodels representing 11 producing regions of the country. In addition, for purposes of testing research hypotheses having to do with model aggregation, one model was formulated having three aggregated regions, and

another having just two of the original regions.

Alternatives considered in making projections from the base year up to 1980 included such concerns as irrigation, improvements in livestock herds, mechanization and use of high-yield seeds, fertilizers and insecticides. Demand projections were made as demand schedules since prices were variables endogenous to the models. Investment activities were fed into the models as packages of goods and services; for example, a farm machinery package would include tractors, plows, other tillage equipment, and harvest equipment necessary to carry out certain types of crop production. Improved or new production activities were inserted into the models by altering model coefficients to represent the improved or new activity and including the new activity in the model along with the old.

It is important to stress that this kind of model, like those outlined earlier, deals primarily with technical and economic aspects of agriculture programs and policies, not with administrative and institutional concerns. These must be treated separately and integrated into final policy formulation by policy analysts.

The Mexico and Ivory Coast models had certain features that are not present in the Brazil and Portugal models. The Mexico study has been documented extensively by Goreux and Manne.[1]

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[1] Louis M. Goreux and Alan S. Manne, *Multi-level Planning: Case Studies in Mexico*, Amsterdam: North Holland Publishing Company, 1973.

The term "multi-level planning" has been used to describe the approach because the model gives results at several levels. In the Mexico case the agriculture model is likened to a macroeconomic model, providing linkages between the economy and the agriculture sector. Within the agriculture model itself, there are submodels representing regions and districts. This enables the analyst to explore relationships between sector policies and economy-wide development strategies, as well as linkages between investment project decisions and sector-level policies.

One of the goals of the Mexico study, which is also applicable to many of the other cases discussed, was to "formalize the major aspects of micro-level and sectoral decision-making."[1] The model allows the analyst to address questions of pricing policies, trade policies, employment programs, and some categories of investment allocation. It is not particularly well suited for analyzing agricultural research and extension, crop insurance policies, or credit policies.

Some interesting results of the model are worth mentioning. It has been possible to set priorities for data improvement using the model, as implications of the data are followed through. This is a unique by-product, and over time should be a valuable one. Since the model accounts for all input requirements by season and locality, it can be used to estimate the degree of unemployment, in total, by season, and by locality, something

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[1] Ibid, p. 292.

difficult to do by any other method, and impossible to project under varying policy assumptions by any other means. As in the case of the Portugal model, the Mexico model (named for the Mayan rain god Chac) permits a more precise definition of issues, and allows trade-offs to be analyzed precisely.

As a result of seeming contradictions in water coefficients in the Mexico model, results were obtained that caused the Secretariat of Water Resources to revise completely its water norms. Subsequent analysis has pointed to results having to do with regional comparative advantages for production of certain crops, which would have been virtually impossible to obtain by any other means.

Data improvements are of two types. The first is a continuous project for the collection of census-type information and production cost estimates by locality. This project proceeds on a state-by-state basis, using stratified random sampling techniques and both aerial photography and direct interviews to obtain information. The second activity is aimed at devising more appropriate farm-level questionnaires.

In terms of policy results, analysis has allowed ranking of crops in terms of the gains to be expected from additional imports or exports. Export subsidies and their impacts have been analyzed. The impacts upon employment of rates of adoption of mechanization in agriculture have been determined using the model. And packages of policies have been tested to determine

the results of several policies applied together.

Although total resources applied to get the Mexico model through its development stages and into full use are not available, the project has absorbed the time of a number of qualified analysts, and has spanned several years.

The Ivory Coast model is similar in many respects to the Mexico model, but has as a primary objective the ability to determine income distribution effects of alternative policies.[1]

Thailand

A large sector model has recently been completed in Thailand, as a joint effort of the Department of Agricultural Economics (DAE) of the Ministry of Agriculture, and the Iowa State University. The model is similar to the Portugal model described above, with the exception that prices are not endogenous to the model. Nineteen producing regions were represented in the model. Specific policy analysis goals were set forth for the sector analysis, namely, to be able to determine:

- The adequacy of productive capacity within the agricultural sector to meet expanding export markets and increased domestic consumption needs over the next five years;
- The effect of the completion of irrigation projects in progress over the next five years, in terms of agricultural income, employment, and productive capacity;

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[1] No detailed description was available when this report was being written.

- The effect of, ar` incentives for, increased rates of adoption of new varieties of rice and fertilizers;
- The expected levels of future farm income and employment;
- The effects of alternative rates of population growth; and
- Future agricultural credit requirements.

Data sources for the model were as follows:

Item	Source
MODEL CONSTRAINTS	
Land use	General Farm Survey (GFS)
Irrigation area	Royal Irrigation Department
Farm credit	General Farm Survey
Crop labor	GFS, Population Census, growth rates approved for planning
Area fertilized	GFS, Specific rice survey
R.D. varieties	GFS, Specific rice survey
Domestic demand	Income elasticity studies, population growth rates
Export demand	Time series projections, DAE/NESB agreement
Subsistence demand	GFS, special surveys
COEFFICIENTS	
Rice yields	GFS for 1971-72, 1974-75
Rice fertilizer response	GFS, fertilizer trials by DAE and other agencies
Upland crop yields	GFS for 1971-72, 1974-75
Labor requirements	GFS, Farm records
Capital requirements and variable costs	GFS, Farm records
Transportation costs	Transportation survey, transportation study

Honduras

In Honduras formal agriculture sector analysis has been underway since 1972, at the hands of local analysts. In 1972 a small sector analysis group was set up with financing by AID grant

funds, with the purpose of generating agriculture sector analysis results within a few years. The first national sector model was completed in a few months, using available data, and subsequent activities involved setting data priorities and generating data for a set of regional models and a revised national model. Regional models have been built for most producing regions, and the revised national model, patterned after the Chac model in Mexico, was completed in 1976.

The Honduras example is given for two reasons. First, it illustrates that even countries with very little in the way of previous sector planning activities can accomplish a great deal of sector analysis in just a few years of preparation. Second, in the Honduras case total cost has been very low: only about $250,000 was expended (local and foreign costs included) over the five years of project life. Local analysts took over the work from the very beginning, with a minimum of technical assistance from foreign analysts. In the fifth year the chief economist of this group was made chief of sector planning for the Ministry of Natural Resources, thereby securing the political legitimacy considered to be an important factor in the third stage of the life of sector analysis efforts.

Colombia

Between 1971 and 1975 a considerable amount of sector analysis was carried out using data from Colombia by the Sector Analysis Division of AID's Latin America Bureau. Although a staff was

set up in Colombia in late 1972 for the purpose of transferring the work to Colombia, the transfer has not yet been completely effected.

The goal of the sector analysis effort during 1971-1972 was to develop, using available data, a set of methods and models for use in policy analysis. An input-output model was planned to analyze linkages between the economy as a whole and the agricultural sector. In many ways this model, finally completed in mid-1972, was unique. It was a large model, containing 250 activities. Among these, roughly 125 were agricultural, including production, marketing, and certain agricultural processing activities. The aim of this information was to attain more specificity concerning impacts of proposed investments than could be obtained through typical input-output models, the activities of which represent whole sectors of the economy. In addition the data to be used in constructing the model were set up in computer files in such a way that various versions of the model could be generated. Thus in one version, aimed at traditional input-output analysis, agriculture, marketing and other industrial activities comprised the endogenous activities, with government and household activities exogenous. In a version designed to enable income effects to be traced, households were included as endogenous variables. This version fits the description of what has come to be called a "social accounting" model.

In the social accounting version of the Colombia input-output model, households were stratified according to income

levels and according to agricultural and non-agricultural endeavor. Thus the model could be used, by tracing impact on employment, for analysis of income distribution effects of alternative policies, and for analysis of impacts on farm and non-farm income.

Linkages between the sector and the micro levels were accomplished in the Colombia analysis through the use of an agriculture sector linear programming model. This model allowed analysis of resource allocation alternatives, which addressed themselves to such objectives as employment, income distribution, maximization of agriculture sector income, and contribution of agriculture to the national product, given various assumptions concerning the state of the sector and resource limitations.[1]

The first round of analysis, carried out between March 1971 and June 1972, was relatively inexpensive, considering the magnitude of the models constructed, costing only about $200,000 for all inputs, including local costs and AID staff, contract analysts and consultants, and computing resources and travel costs. In later phases of the activity costs increased, largely because the activities expanded into other countries than Colombia, and because a number of large data collection efforts were undertaken.

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[1] The linear programming model used specific types of farms and other agricultural activities as variables, so that it could be viewed as giving answers in sufficient detail or specificity to be used for micro-level decisions. As an example, there were several different technological sets included for corn production, some of which represented corn production as it was normally carried out only on small farms, others for medium and large farms. Policy analysis using the model could thus differentiate among the various sizes of farms that were growing corn (or any other of 30 or so crops that were grown on small and large holdings).

DATA CONSIDERATIONS

It is difficult to specify with exactitude the data necessary to carry out sector analysis, since a number of techniques are used by different practitioners. There is nevertheless a common body of information used in all sector analysis efforts. The list given in conjunction with the Thailand analysis is illustrative. Data concerning land use patterns, special land characteristics such as irrigated versus non-irrigated land, labor use patterns, domestic and external demand for various commodities, uses of technological inputs such as fertilizer, improved varieties, etc., and other items that represent delineations of baseline sector activity or constraints to sector activity, are important in all sector studies that attempt to be comprehensive in any sense. As indicated in the Thailand example, data of these types are generally taken from censuses and from surveys dedicated to obtaining more detailed agriculture data than censuses can normally provide. Some data proceed from the routine reporting by agencies or institutions charged with surveillance of certain types of activity (such as irrigation, fertilizer use, etc.). In those cases where very detailed data require voluminous reports on individual farms or households, census techniques fail for two reasons: (1) because the cost of obtaining detailed data on every farm or household in a region or in the nation is prohibitive; and (2) because the administrative errors associated with this kind of exhaustive interviewing are enormous.

For the kinds of data described, stratified random sampling techniques are used to control errors of representation, that is, to ensure that the resulting information tells us something about the region or nation as a whole, as inferred from studying only a part, and also to minimize errors of an administrative nature. In cases where the detailed information need not be representative of the entire population (whether regional or national), in-depth case studies can be used to obtain data. These are relatively costly on a per farm or per household basis, but by virtue of their narrow focus on a few entities are kept at reasonable cost levels.

In addition to basic "constraint" data, which refer to levels or magnitudes of various activities, models use coefficients of various types to show the relationships between various activities or resource uses. Thus yield coefficients show output for various crops as a function of land area, and fertilizer response coefficients show how yields related to the application of fertilizer. Data of this type are only obtained through observation in detail of producing entities (farms), under different conditions. In order to save time, functional relationships are normally inferred from large cross-sectional surveys, which contain observational units that represent all or most of the settings of variables considered to be important. Thus in a survey designed to determine yields, farms would be stratified according to size, kind of crop, and perhaps technological level of production, in order to obtain the most homogeneous and con-

sistent data regarding functional relationships.

Another consideration of importance relates not to which units are observed in order to obtain data on functional relationships, but how to go about observing them. It is obvious that, in order to obtain data concerning how a farmer uses his resources through the course of a season or year, it is better to visit the farmer at various points in the year than to ask him in one afternoon how he organizes his entire season's production. The way the farmer is asked for information will affect the way he responds and may bias the data obtained in serious ways. Various solutions to this problem have been attempted, from attention to improving interview structure and content, to devising farm record systems in which the farmer plays a more active role in the provision of data on a routine and regular basis.

The data problem is a difficult one. In some cases one has the impression of being drowned in data, and yet sees nothing of value emerging from the deluge. In other cases there appears to be a dearth of any kind of planning data. Both extremes contain elements of truth, but both are equally false impressions in many respects. Information of value does not often flow freely (and free) from data. It must be extracted. One of the principal values of the sector analysis process, no matter at what stage it is encountered, is that it makes use of data and, through this use, obtains estimates and judgments on a recurring basis

not only of the validity of data but of their relevance to various needs and policy and program requirements. As indicated earlier in this section, some approaches to sector analysis need relatively little data, and the data that are needed can be generated as part of the study itself, in a reasonable time frame. The power of sector analysis lies in its ability to help structure data so that information of a higher order of meaning becomes available. It thus serves both as a means for ordering existing data, and for helping determine what actual data needs are for analysis of given issues.

SUMMARY AND CONCLUSIONS

Sector analysis is a process of highlighting important relationships among activities within the sector, and between activities at different levels in the economy. It focuses on productive activity in a sector, such as agriculture, and relates that activity to social variables such as levels of food production, foreign trade variables, employment, income distribution, and technological concerns. It deals well with technological and resource allocation questions, but not as well with administrative and institutional concerns. It normally increases data requirements, but of itself provides a steering role in determining what data are actually needed, and how good the existing data are.

By viewing sector analysis as an important process related to decisionmaking, black-and-white judgments regarding the level or utility of sector analysis in a given place and at a given time are obviated. The process viewpoint begins with smaller efforts aimed at specific actions or projects, but leads rapidly to taking the longer view into consideration. Actions appear at first not to have any bearing on immediate decision needs, but are seen to have a bearing on needs in the near future (one to three years).

Sector analysis cannot be identified with the planning process although it plays a key role. In much the same way, although it will play a key role in rural development considerations, it will not represent the entire rural development planning process, even at the sector level. The role that sector analysis does play is in many instances almost entirely missing from sector and project studies: it uses a theoretical, consistent basis, combined with reliable information concerning the situation under study to draw conclusions relating to the possible impacts of policies and programs. Most sector reports and studies tend to concentrate on administrative and institutional considerations, which sector analysis tools are relatively powerless to analyze.

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SECTION II

SAMPLING AND STATISTICAL SURVEYS

SAMPLING AND STATISTICAL SURVEYS

The majority of the information systems analyzed for their applicability to decisionmaking in rural development contained a sampling frame and some variety of statistical survey, which allowed generalization of the results to a larger population. In this section two sampling techniques -- area frame sampling and population sampling -- are discussed, as are the statistical surveys that follow naturally from a commitment of resources to generate the frame.

Area frame sampling, which is constructed on distinguishable natural features of the physical terrain, and population sampling, which in rural development has nearly always centered on rural households, are not dichotomous. Both the area and population frames end with a series of questionnaires and/or observations directed at farm households. It is the manner of selecting the households and the permanence of the sampling frame that constitute the major difference. In an undertaking where there is a need for continuous data collection from a population on a number of socioeconomic and agricultural aspects of their environment, the upfront costs of establishing a relatively "permanent" area frame sampling unit are justified. In a "throwaway" one-time survey to establish a set of limited hypotheses (e.g., there are small farmers and/or rural poor in the local area who are legitimate objects of an AID development program) the household sample

is the likely preference. Household sampling can be longitudinal, but in areas with high turnover there are major problems in obtaining comparability. An area frame, on the other hand, can retain its comparability over time, even with relatively large population shifts.

None of the statistical surveys reviewed in Chapter Five are based upon the area frame sample. This may reflect the continued popularity of the one-time survey, which has been the staple of social science data collection methodology. In addition to the nine case studies reviewed in that chapter, speical attention has been paid to the problems of transfering a technique developed for Western societies (where the W-2 form offers a clear income indicator) to a rural Third World society where income can only be imputed. The conclusions of this section reverberate through the general analysis in Volume One, in which alternative data collection methodologies are often preferred for providing information that will be of use in rural development decisionmaking.

CHAPTER THREE

AREA FRAME SAMPLING

INTRODUCTION

This section presents an overall view of the technique of area frame sampling and its construction, development and application for obtaining rural development data in agriculture and other related sectors.

Area frame sampling originated in Iowa during the 1930s. In succeeding years, it has developed into a highly accurate and efficient method for obtaining agricultural and other statistics. The concept is a very simple one, based upon dividing the total land area of a country or region, irrespective of the actual uses of the land, into small blocks, or "segments," without any overlap or omission. Depending upon the size and complexity of the particular survey to be undertaken, a determined number of these segments are selected by random sample and the desired data collected from all the farms or other "reporting units" contained within each selected segment.[1] Typically, one questionnaire is filled out for each reporting unit.

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[1] There is no standard definition for "reporting units," but it is generally accepted that in area frame sampling they are discrete land units inhabited by a population to be used as informants for data collecting purposes.

Since units of land rather than listings of farms or households are being used as the reporting units, area frame sampling techniques can be used to monitor those changes that take place over a period of time in the use of the land within the segment. Thus conceptually, an area frame is always current and complete with regard to any definition of a reporting unit. The area frame does not become outdated in terms of coverage of a population unless the population extends into areas not covered by the frame. Changes in land use or number and location of reporting units have some bearing on the variance of the estimate but do not introduce bias.

Because of the land-base concept, a well designed area frame has a variety of possible applications. It can be used repeatedly for a number of years to provide the basis for a program of regular, ongoing surveys for collecting such data as crop production, land use, livestock production, number and size of farms, economic indicators, and suppliers of agricultural inputs. Since cities and populated places can be included in it, the area frame can also be used for conducting surveys of households, persons, service and/or processing facilities, or any other definable reporting units that can be uniquely associated with area frame segments. In some geographic locations, area frame sampling has provided the only means whereby needed data could be obtained.

The minimum requirement for the application of area frame sampling is the availability of accurate maps and/or aerial

photographs for dividing the country or region to be surveyed into land-use strata, or divisions, as well as into small area sampling units that have boundaries which can be easily and accurately identified on site by a field interviewer.

CONSTRUCTING THE AREA FRAME

In constructing the area sampling frame, the country or region is first divided into "strata," or land divisions, having similar land use and characteristics. Land-use patterns, topography and the purposes for which the area frame is to be used are the principal criteria for determining how this stratification is to be carried out. Based upon the past experiences of the U.S. Department of Agriculture in constructing area frames in different countries during recent years, normally four or five strata are used. Division of a country or region into these strata is accomplished by using the most current available aerial photographs, soil classification maps, and land-use and vegetation cover maps, as well as by personal ground observation whenever practical. Tables 1 and 2 illustrate the stratification utilized by the USDA in constructing recent area frames in El Salvador and Tunisia.

After stratification of all land area for the entire country or region, each stratum is then divided into "count units" or "frame units." A count unit is an area of land that is

TABLE 1

LAND-USE STRATA IN EL SALVADOR, 1975

Stratum I:	Intensive Agriculture: Areas cultivated with corn, beans, rice, sorghum and others.
Stratum II:	Special Crops: Land cultivated with crops having a well-defined zone of cultivation. As many substrata as necessary may be defined; such as coffee, sugarcane, cotton, fruit trees, coarse fibers, vegetables, etc.
Stratum III:	Pasture Land: Pastures only.
Stratum IV:	Non-Agricultural Land: Areas comprising mountains, forests, swamps and other natural vegetation, and having little or no agriculture.
Stratum V:	Urban Areas: Populated areas such as cities, towns and villages.

Source: U.S. Department of Agriculture, Statistical Reporting Service.

TABLE 2

LAND-USE STRATA IN TUNISIA, 1974

Stratum I:	Cultivated Land: All land which has been worked or improved, except those areas where vineyards and orchards are intensive enough to be placed in a separate stratum.
Stratum II:	Non-Cultivated Land: Areas comprising mountains, forests, brush and desert, and having no agriculture.
Stratum III:	Urban Areas: Intensively populated areas such as cities, towns and villages.
Stratum IV.	Arboriculture: Areas comprising extensive plantings of vineyards and orchards.

Source: U.S. Department of Agriculture, *1974 Tunisian Acreage & Livestock Enumerative Survey*, Volume I, Washington: Statistical Reporting Service, August 1974, pp. 2-3.

larger than a segment, but usually smaller than the smallest political subdivision. Count units are the most permanent part of an area frame and should be defined by boundaries that are permanent, positively recognizable natural or man-made landmarks. The exact size of a count unit is determined by different individual local conditions and circumstances, but it should be large enough to accommodate alternative specifications of segments that are appropriate for various surveys. Count units should provide economy in the selection of area samples, but a unit need not be divided into segments unless a sample segment is to be selected from it for use in a particular survey.

Count units are in turn divided into one or more sample segments. These are the basic units from which data are actually collected. The division of count units into segments usually presents a wide range of problems. The choice of size of the segments depends upon the purposes of the surveys to be carried out, and whether the open, closed or weighted-segment method is to be used. "Size of segment" is a general term and may refer to such concerns as the land area of a segment, the number of reporting units within a segment, or the amount of land under cultivation or other use within a segment. The objective is to divide the count unit into the assigned number of segments of as nearly equal size as possible. As in the case of strata and count units, segments should be delineated in such a manner as to have boundaries that can be identified positively by

interviewers in the field. Thus, the average size of a segment is often a matter of determining the smallest average size that is practical with regard to topographic detail.

It is impossible to delineate segments so that no farms will overlap segment boundaries. Associating farms with segments has historically been the cause of many operating problems in carrying out agriculture surveys. To cope with such problems, three primary methods for using area sampling have evolved. One is the closed-segment method. In employing the closed segment, data for that part of the farm operation within the sample segments are collected. If the open segment is used, data for the entire farm operation are collected for all farms having headquarters within the sample segment. In using the weighted segment, entire farm operations data are collected for every farm that is wholly or partly located within the sample segments and these data are then proportionally assigned (weighted) to the segment. For surveys in which the reporting units must be the entire farm, only the open-segment and the weighted-segment methods are applicable. In surveys where only some of the data are amenable to being collected by the closed-segment method, either the open-segment or the weighted-segment method may be used in combination with the closed segment.

In all three methods the "tract" plays an important role. A tract is defined as a portion of a segment that is under one management. It is either an entire farm, part or parts of a

farm, or a non-farm area of land. A tract is determined by the definition of a farm and by the boundaries of a segment. A farm is always composed of one or more tracts. Figure 1 provides an excellent illustration of the relationship between segments and tracts.

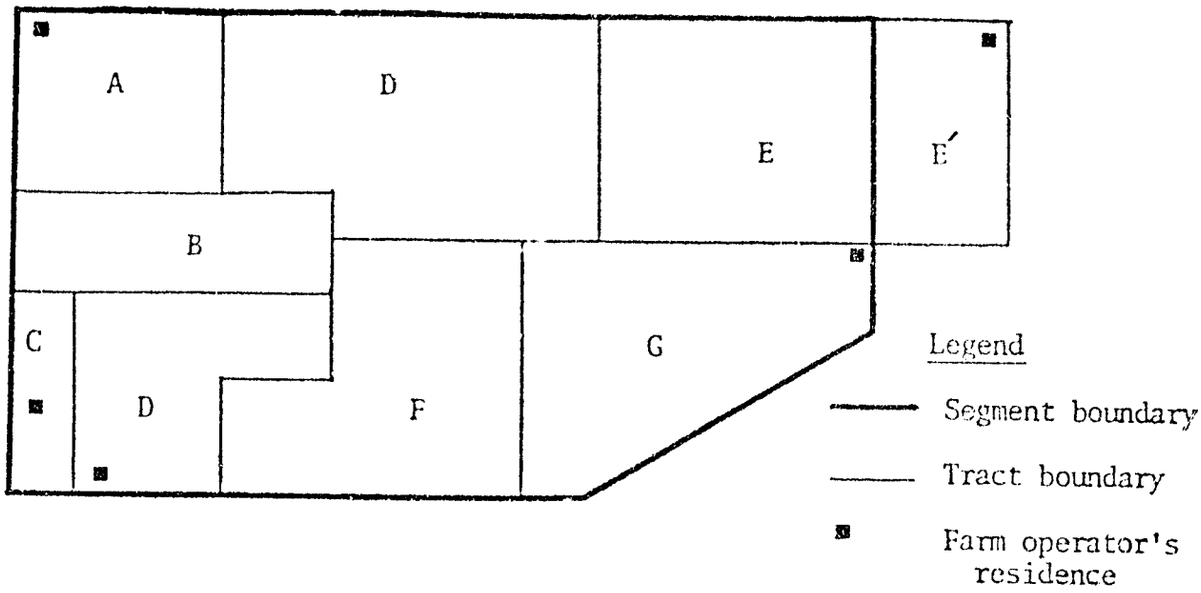
In using the area frame technique to carry out a sample survey, the total number of required segments, as well as the number of segments to be selected from each land-use stratum necessary for obtaining statistical data of sufficient precision, is determined by mathematical formulae. The allocated number of segments is then selected by random sample from count units in each applicable land-use stratum, and the survey is carried out in these segments. The sample segment allocation and sampling frame characteristics used in carrying out a general crop and livestock survey in the Dominican Republic in 1973 are illustrated in Table 3.

An employment survey in a farming region could be carried out by selecting a sample of farms (tracts) that would be representative for the region or area of interest. The questionnaire would be developed to determine the employment on the sample farms. Other sources, such as census data, would be relied upon to ascertain the total population of the area or region.

The use of this method to determine nutritional status is illustrated by a different survey in the Dominican Republic, based on the same area frame, which included a household survey

FIGURE 1

DIVISION OF A SEGMENT INTO TRACTS[1]



Tract	Farm	Description
A	1	Tract A is an entire farm. The operator lives on his farm.
B	2	Tract B is a farm but the operator does not live on his farm or inside the segment.
C	3	Tract C is a nonfarm tract. That is, no agricultural operations are performed within it. However, one of two brothers who operate a farm lives on this tract. No part of their farm is located in this segment. But according to previously defined rules that designate one person as the "operator" of a farm, the brother living in Tract C is the operator of Farm Number 3, rather than the brother who helps operate the farm and lives on the farm in another segment.
D	4	Tract D is composed of parcels of land at two locations within the segment. It is operated by one person who lives in the segment and has no land outside the segment.
E	5	Tracts E and E' compose Farm Number 5. This is an example of a segment boundary crossing a farm and dividing the farm into two tracts. The operator lives in Tract E'.
F	6	Tract F is part of Farm Number 6. The remainder of the farm is a tract located a few miles away from this segment. The operator lives outside the segment.
G	7	Tract G is part of Farm Number 7. The operator lives in the segment and on his farm.

[1] Taken from Earl E. Houseman, *Area Frame Sampling in Agriculture*, Washington, D.C., U.S. Department of Agriculture Statistical Reporting Service, November 1975, p. 14.

TABLE 3

SAMPLE ALLOCATION AND FRAME CHARACTERISTICS
USED FOR TAKING THE DOMINICAN GENERAL CROP AND LIVESTOCK SURVEY, 1973

Land-Use Strata	Number of Subsamples[a]	Total Number of Segments in Sample	Average Segment Size (Km^2)	Total Number of Segments in Universe
I. Intensely Cultivated	9	180	2	3,193
II. Intense Coffee and cacao above 100 meters	3	60	2	978
III. Extensive agriculture and pasture	12	120	4	7,873
IV. Primarily non-agricultural	2	20	4	2,784
V. Populated places	2	20	0.5	261

[a] A countrywide sample will include a number of different data collection subsamples for the measurement of a given stratum, in order to take in variances for different areas or regions. Each subsample is made up of a number of segments.

Source: Harold F. Huddleston and Clarence Dunkerley, "A Methodological Report on Agricultural Statistics in the Dominican Republic," Mimeographed Report submitted to the USAID Mission to the Dominican Republic, June 1974, p. 15.

of diet, health and nutrition. Data were gathered by farm household on the actual diet eaten, using a 24-hour recall method. Children under the age of six were measured, using anthropometric techniques, to determine their nutritional status. Overall health of household members was determined by questions about the incidence of illness and use and availability of health treatment.

Area frame sampling can be used for a wide variety of surveys, once the purpose has been determined. The area frame simply provides the structural basis on which to define the sample, and from there to select a subsample that will be representative of the population of the overall region or area.

In any sampling system there are of course numerous sources of error as well as methods for reducing error. Survey plans should include provision for studies of sampling variance, response errors, coverage errors and costs. Such studies should provide a continuing basis for adjusting the allocation of resources in an effort to achieve maximum accuracy at a minimum cost.

AREA FRAME SYSTEM RESOURCES AND MANAGEMENT REQUIREMENTS

The construction and implementation of an area frame sampling system is a major investment that should be amortized over a long period of time and through the use of many surveys. It should be noted, however, that the cost of carrying out a sample survey using the area frame technique is generally estimated to be less than ten percent of the cost of conducting a complete census or enumeration. Furthermore, the accuracy of data obtained on a country- or region-wide basis is often much greater when using area frame sampling than when obtained through a complete count. The Statistical Reporting Service estimated that the cost

of constructing the area frame and carrying out two initial sample surveys in the Dominican Republic was at least $71,000, while the estimated cost for constructing a more recent frame for El Salvador was approximately $93,000.[1] In addition to the financial investment required, it is also necessary to invest a considerable amount of technical and human resources, as well as time. Figure 2 illustrates the estimated technical and human resources required to develop and implement the area frame for El Salvador over a period of approximately 13 months.

Upon completing construction and implementation of an area frame, a small permanent staff of trained technicians, clerks and interviewers provided with adequate equipment and facilities is essential to carry out projected surveys and select and prepare samples as needed. Rather than allow gradual deterioration of the frame to take place after its initial construction, the permanent staff should also possess the capability to make revisions in the frame as necessary or helpful. The staff should be able to build in improvements based upon their accumulated experience with the use of the frame. An adequate maintenance program should lengthen the efficient life of an area frame by several years.

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[1] These figures depend on the degree to which a country has already been charted, since this technique is dependent on aerial photography and corresponding ground checks. The six countries of Central America and Panama are all establishing area frame sampling programs, based on projected annual survey cost savings in the vicinity of $1 million, once the framework is in place.

FIGURE 2

RESOURCES REQUIRED FROM USDA/AID AND COUNTERPART AGENCIES OF EL SALVADOR TO IMPLEMENT AN AREA SAMPLING FRAME
SEPTEMBER 1974 - OCTOBER 1975

Activity	Resources From MAG[1]	Resources from USDA/AID
Acquisition of cartographic material	54 topographic maps 2 planimeters 1 map file Other materials	Photoindex of El Salvador (if available in Washington, D.C.)
Administrative reorganization of Department	2 technicians from Investment Project 301	--
Marking off strata on topographic maps	1 technician, Project 301 1 technician, Dept. of Agriculture Statistics 1 colaborator, Dept. of Agriculture Statistics	1 technician cartographer for 1 month (October 1 - November 1, 1974)
Training of personnel	1 technician, Project 301 1 technician, Dept. of Agriculture Statistics 1 colaborator, Dept. of Agriculture Statistics	1 statistician for 2 weeks (last half October 1974)
Marking off and selecting count units	2 technicians, Project 301 2 colaborators, Dept. of Agriculture Statistics	1 sampling expert for 2 weeks (first week October 1974 and second week January 1975)
Marking off sampling units (segments) and selection of sample	2 technicians, Project 301 3 colaborators, Dept. of Agriculture Statistics	1 sampling expert for 1 week (first week in March 1975)
Identification of selected segments and planning of Survey No. 1	3 technicians, Project 301 2 colaborators, Dept. of Agriculture Statistics 3 field supervisors,[2] Project 301	1 statistician or cartographer for 2 weeks (last half of March 1975)
	12 enumerators, Project 301 700 photomaps 5 sets of topographic maps 4 vehicles[3]	
Training of personnel to work in Survey No. 1 (drafting and testing questionnaires). Organization of field phase and training of personnel for this.	3 technicians, Project 301 1 technicians, Dept. of Agriculture Statistics 2 colaborators 8 field supervisors 32 enumerators Office supplies	1 statistician and 1 sampling expert for 2 weeks each (first and second week in April 1975)
Field phase, Survey No. 1	3 technicians, Project 301 1 technician, Dept. of Agriculture Statistics 2 colaborators, Dept. of Agriculture Statistics 8 field supervisors 32 enumerators 10 vehicles	1 statistician and 1 sampling expert for 3 weeks (last half April and first week in May 1975)
Tabulation, estimation and analysis, Survey No. 1	3 technicians, Project 301 2 technicians, Dept. of Agriculture Statistics 5 colaborators Tabulation equipment, conventional mechanical type	1 statistician and 1 sampling expert for 2 weeks (last week May and first week June 1975)
Evaluation of results obtained in Survey No. 1 and planning and execution of Survey No. 2.	3 technicians, Project 301 1 technician, Dept. of Agriculture Statistics 2 colaborators, Dept. of Agriculture Statistics 8 field supervisors 32 enumerators 10 vehicles office supplies	1 statistician and 1 sampling expert for 2 weeks (last half July 1975)
Tabulation, estimation and analysis of Survey NO. 2 and planning of ING No. 3	3 technicians, Project 301 2 technicians, Dept. of Agriculture Statistics 5 colaborators, Dept. of Agriculture Statistics Tabulation equipment, conventional	1 statistician and 1 sampling expert for 3 weeks (last week August and first half of September 1975)
Evaluation of results obtained from Surveys No. 1 and No. 2 and reprogramming of activities of the Dept. for the 4th Quarter of 1975	3 technicians, Project 301 3 technicians, Dept. of Agriculture Statistics	--

[1] Included are the resources that will be assigned specifically to each of the activities. Also to be taken as part of the MAG contribution are facilities, office furnishings, office supplies, etc.

[2] In the case of field personnel, per diem should be included.

[3] Vehicles include fuel and lubricants.

Source: U.S. Department of Agriculture, Statistical Reporting Service.

A well-trained and technically skilled staff such as the one working in the Secretariat of Agriculture of the Dominican Republic is capable of carrying out all phases of regular on-going as well as special surveys. These operations include field interviews, field edit and recheck, office edit, tabulation and publication. Most importantly, the data collected from each survey carried out by this staff is normally tabulated and estimates are prepared within 30 to 60 days after completion of the survey. Of course, such an efficient survey operation requires accessibility to an equally efficient data processing capability when needed.

When last contacted, this Dominican agricultural survey staff consisted of one statistical technician/survey supervisor, ten crew leaders, 30 field interviewers, five edit and review clerks and one office secretary. The group is under the general direction of a graduate agricultural economist.

STATUS AND APPLICATION OF AREA FRAMES INVOLVING U.S. INPUTS

During the past several years the Statistical Reporting Service of the U.S. Department of Agriculture has been actively involved in providing technical assistance to the governments of several countries throughout the world in constructing area frame sampling systems. Most of these projects have been undertaken in collaboration with the Agency for International Develop-

ment. As of February 1, 1977, area frame systems have been implemented and are ongoing in the Dominican Republic, El Salvador and Tunisia. Other area frame projects are in various stages of construction and development in Bolivia, Costa Rica, Guatemala, Liberia, Nicaragua, Thailand and Zaire. Another such project had been initiated in Colombia, but was terminated before completion. Since the fall of the Government of the Republic of South Vietnam in 1975, no information has been available regarding the status of a regional area frame pilot project completed there in the early 1970s. Individual area sampling frames have also been constructed and are in regular use in all 50 states of the United States.

As the result of these years of experience in technical assistance activities, USDA's Statistical Reporting Service is now recognized by agricultural and statistical organizations and experts throughout the world as having a professional staff who possess a very high level of expertise and capability for providing technical advice and support to governments and international organizations in the planning, construction, development and implementation of area frame sampling systems and surveys consistent with a country's individual goals and available resources.

Following is a partial listing of various types of surveys which have been, or are currently being, carried out in several different countries through the use of area frame sampling. It

should be noted that some of these are ongoing surveys which are conducted on a regular periodic basis:

- Acreage and Livestock Enumerative Survey;
- Cacao Plantation Sector Enumerative Survey;
- Coffee and Cacao Production Surveys;
- Cost of Agricultural Production Surveys;
- Farm Credit Surveys;
- Farm Employment Survey;
- General Crop and Livestock Production Surveys;
- Household Employment Survey;
- Livestock and Fish Pond Production Survey;
- Rice Production Surveys;
- Rural and Urban Household Food Consumption Survey; and
- Special Household Survey of Diet, Health and Nutrition.

CONCLUSIONS CONCERNING AREA FRAME SAMPLING

Area frame sampling is now recognized as one of the most important of the sampling techniques currently being used to help collect rural development data. The construction and implementation of an area frame is initially an expensive, complex and highly technical process. However once a frame is constructed, area sampling offers a relatively inexpensive and accurate method for data collection, and users worldwide have generally been

favorably impressed with its convenience, ease of application and versatility. The area frame may also be easily utilized as the vehicle for carrying out continuing programs for gathering data on a regular periodic basis. Furthermore, in addition to providing agricultural statistics, the area frame technique is also capable of obtaining data from other sectors.

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CHAPTER FOUR

POPULATION SAMPLING

INTRODUCTION

For many development projects it is not possible to survey the entire population that is being or is to be affected by a project. The first consideration is the size of the population. The target population of a project may be small in size, but it may be important to survey the entire area where it is located. This may be simply in order to distinguish the target population from other segments of the population. If the population to be surveyed is too large for the survey time and resources available, one means of obtaining information about it is to take a sample, which must be sufficiently representative to permit inferences about the entire population to be derived. There are a number of different ways to produce a sample that will provide the specific information that is needed for decisionmaking.

SAMPLING METHODS

Cross-Section Surveys Using Probability Samples

A common method of selecting a sample is to identify all units in a population and give each unit an equal chance of being

selected. This is usually done by assigning random numbers to the units to be sampled. A simple survey design will use one list for the entire population without distinguishing among any specific characteristics of the population. In most of the case studies described in this chapter, random samples were drawn not from the entire population but rather from subgroups within the population. There are two main reasons for doing this: (1) certain factors in the environment do not permit simple random sampling of the entire population, and (2) the survey could provide more useful information if a more complex survey design was used. An environmental factor must also be considered, since some population units are inaccessible in hostile areas or too remote for a survey team to reach. Also when a large population is involved, the sampling units may be so scattered that travel time and expenses would create unreasonable inefficiencies.

Clustering

When there are factors in the environment that do not permit simple random sampling of the entire population, it may be necessary to select portions of the population that are amenable to sampling. Given limited time and resources to collect data, it may be that villages that are more than a two-day walk from the nearest road, or households that lie across a river that is too dangerous to cross, are not within reach of the enumerators and must be omitted from the survey design. In some areas hostility to outsiders may also prohibit sampling. In considering the need for reasonably easy access to the sample units, a survey

design will cluster the units in such a way that the enumerators can get to a sufficient number of households or reporting units to provide an adequate sample size for analysis. A random selection of subgroups within a population may facilitate enumerator access sufficiently to obviate nonrandom selection of units.

Purposive Sampling

When the sample must be arranged to fit survey resources, there are a number of methods to reduce the size of the population to a manageable level. Purposive sampling is a nonrandom selection of subgroups of the population, which are chosen according to a perceived value of the subgroup in relation to the objectives of the survey. In the Rural Health Survey in Afghanistan the sample was not drawn from the entire rural population but rather limited to 18 villages, and these villages were selected according to certain criteria including distance from the health centers. It was only at the village level that a random sample was drawn. For the Block Development Planning Survey in India, states and districts were selected in order to limit the population to be sampled. (Criteria for state and district selection were not communicated.) Within each district one block was selected. This selection was left to the states and, as it turned out, the states generally chose blocks that were [illegible] relatively well developed. In this case the purposes of the states were not consistent with the purposes of the survey designers, who would have preferred blocks that were more representative of the overall development environment in those states.

Subgroup selection inevitably affects the results of the survey. Unless there is a specific communication to the contrary, results will be interpreted as if the survey used a simple random selection of reporting units. The sample in the Block Development Planning Survey, for example, was representative of more developed blocks. The results drawn from the survey may be applicable for planning in more developed blocks in general, but should not be applied to less developed blocks without assessing whether the biases in the sample invalidate the results for those blocks. If the purposive sampling and the reasons underlying the selection are ignored, the value of the results for planning may be substantially diminished. At the same time it should be recognized that reducing bias by broadening the sample generally costs more money, so the extra reliability to be obtained from this method of reducing bias must be balanced against the increased costs.

Multistage Sampling

In order to break down a population into subgroups of reasonable size for selecting reporting units, surveys often use a multistage process. In some cases one stage may use an area frame approach, another stage population frame sampling. The Rural Health Survey went through a number of selection processes, from province to health center to village to household. The Block Development Planning Survey went from state to district to block to village to household.

Alternatively, stages could progress from state to area to tribe to some smaller population unit. Sample selection at each stage may be purposive or it may be random. The ability to select an adequate random sample depends to a large extent on sample size and on the homogeneity of the population.[1]

Census Surveys to Facilitate Sample Selection

Sample selection is improved by better knowledge of the population. A common means of obtaining the necessary information about a population is to refer to census data. In developed countries census data are usually available and sufficiently accurate for many types of surveys. In developing countries if census data do exist (not all countries have conducted census surveys), there are often serious problems of accuracy, comprehensiveness and timeliness. When census data are not available it is sometimes necessary to take a census (depending on the amount of information available and the need to minimize sampling error), but if the population is large it is usually beyond the resources of the survey to do a preliminary census.

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[1] The determination of an optimum sample size requires an estimate of the standard deviation (σ) and a determination of some level of acceptable error in the estimate. Specifically, this can be expressed in equation form as:

$$\text{Sample Size} = \left(\frac{t \times \sigma}{d}\right)^2$$

t is the ordinary t-ratio, e.g., if $t = 1.96$, there is a five percent chance that the true mean value will fall beyond some distance (d) from the mean sample estimate. One rarely knows σ, and therefore one usually must incorporate the standard deviation of the sample values into the formula. Further details on selecting sample size can be found in statistics texts such as W. J. Dixon and F. J. Massey, Jr., *Introduction to Statistical Analysis*, New York: McGraw Hill, 1969.

Pilot testing[1] can reduce the population to be sampled to a size that is amenable to a preliminary census. Pilot testing is also useful to get a notion of the adequacy of questions to be used in the main survey and to get a better expected variance in order to determine final sample size. The Rural Dynamics Study in Indonesia used such an approach to select villages in the survey region, and enumerators conducted census surveys in the selected villages before selecting households for the sample survey. Pilot testing may be used just to get a count of farming households, or it may also get other information (e.g., size of land holdings, approximate level of income, types of crops cultivated) to provide a basis for stratification or nonrandom sampling. Pilot tests should provide only enough information to develop the sample frame, since the sample survey will be used for more detailed data collection.

Truncated Sampling

In identifying the population for a survey, characteristics are chosen for their relevance to the information needed for decisionmaking. It may be decided to limit the population to all men between the ages of 15 and 55 or to all women who have had fewer than six children. The sample is truncated in this way because of a decision, for example, that only men who would probably be active members of the labor force are relevant to the survey. Truncating the sample is done to eliminate irrele-

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[1] This would be any preliminary structured fieldwork to learn more about the area to be surveyed in order to facilitate and improve the actual survey.

vant extremes of the population in question. Among the case studies, an example of truncated sampling is the Survey of Household Incomes and Its Disposition in India, described on pp. 89-91. From a census the population was divided into three income classes (annual income 7,500 rupees and below; 7,501 to 20,000; and more than 20,000). Larger than proportionate samples were taken from the two higher income classes, as they were considered more relevant for the purposes of the survey. The survey was designed to track savings and the two higher income classes were considered most likely to save. The lower income class was not eliminated so the truncation was not complete.

Screening

Screening is used when one does not have enough information to eliminate an irrelevant portion of the population with a specific characteristic because there is no census information on this characteristic to build it into a sample frame. In such a situation enumerators quickly learn about this characteristic from a respondent and terminate the interview if the respondent lies outside the truncation. In the Comprehensive Computerized Surveys[1] enumerators did not interview families that owned or used less than one hectare of land, because the solution to their

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[1] Under contract to AID, the American Technical Assistance Corporation (ATAC) has prepared four farm data surveys. As an aid to the preparation of this report on information for decisionmaking in rural development, ATAC compiled the insights derived from the surveys in a document entitled "Application of Comprehensive Computerized Surveys in the Collection and Analysis of Farm Data in Developing Countries," March 1977. The author, William H. Rusch, has been the principal ATAC designer and team chief on all surveys.

economic problems appeared to lie elsewhere than in development of their farms. This did not mean that nearly landless families did not warrant study, but that the program for doing so should be different and should probably also include the totally landless.

Stratification

The purpose of stratification is to reduce the variability of the population within the sample frame from which the selection will be made. Good stratification will maximize both the homogeneity within each stratum and the differences between strata. In most surveys reporting units are randomly selected within each stratum. For multistage sampling each stage can be stratified, and the variables used for each stage can be different.

The degree to which stratification was used in the case studies differed considerably. Only the Helmand Valley Farm Economic Survey did not use stratification, but relied upon a random sample of all households in the province studied. Most of the case studies used stratification at only one stage. The Laguna Household Survey in the Philippines stratified for selection of villages, but then took a random sample of all households in each village selected. The villages were divided into four strata: intensive rice farming, farming of other crops, fishing, and semi-urban villages with a wage-labor factory orientation. The villages were selected in proportion to the number of such

types in the total village population. One-third of the villages were selected to represent rice farming, one-third to represent farming of other crops, and one-sixth each for fishing and semi-urban villages. It was later felt, however, that the fishing households were underrepresented. Rather than add more fishing villages to the survey it was decided to take a larger sample from each of the fishing villages.

Some of the surveys were stratified at the final stage. In the Chao Phya Irrigated Agriculture Development Project in Thailand, the farms to be surveyed were divided according to three farm-size classes. The Cropping Systems Project Baseline Survey stratified the farms by type and frequency of irrigation. In the Philippines the Baseline Survey of the Laguna Rural Development Prototype Project used three variables for stratification: age, sex and marital status. As there were limited categories for each variable the number of strata remained small: (1) male, single, under 25; (2) female, single, under 25; (3) male over 25; (4) female over 25. With married people under 25 omitted (a form of truncation) and no marital distinction for those over 25, it was not clear how the variable of marital status was to be used in analysis.

The Rural Dynamics Study in Indonesia used a very complex form of stratification. The original plan was to use ten groups of variables that were a composite of 40 original variables and to perform factor analysis[1] on the ten groups to provide the

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[1] Factor analysis is a method used to group variables. Given a large number of variables, factor analysis is performed to find groups of these variables

strata for sampling. However the data needed for the variables were not complete for many of the villages. Data were missing for between 25 and 95 percent of villages in the resulting factor-scores, and this approach had to be abandoned. The stratification was then simplified to include only two main variables: accessibility and ecological conditions, the latter relying on a combination of population density measures and ratio of irrigated paddy land to total village area. Each of the two main variables was divided into subgroups, with four subgroups for accessibility ranging from high access to low access, and five subgroups of ecological conditions ranging from low density, good irrigation to high density, poor irrigation.

A four by five matrix was used to produce 20 cells representing discrete village strata. With a total of about 800 villages each cell would contain about 40 villages, if the villages were distributed evenly among the 20 cells. Because of uneven distribution sample villages were not drawn from cells with less than 40. Only 20 villages were to be sampled and the sample needed to be in proportion to the types of villages.

The survey area consisted of five districts, and it was important that each be assigned an equal proportion of the sample. For each district four cells were selected that contained the greatest number of cases for that district. One village was then selected at random from each of those cells, resulting in

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having a high correlation among one another. In some instances, these groupings will represent relatively independent underlying influences and, as such, can legitimately be identified as aggregate "factors" for further analysis.

a sample of 20 villages. Nine cells had no sample villages, five cells had one village, five cells had two villages and one cell had five villages.

The Household Survey on Distribution of Public Expenditure on Social Services in West Bengal used a stratification that was not related to the variables important to the survey analysis. The intention was to compare the data from this survey with data collected by a similar survey undertaken in 1964, which had used a sample frame and stratification designed by the National Sample Survey in 1962. The 1962 survey had different objectives than the 1964 and 1976 surveys and the stratification, which was by agricultural practices, was made to respond to these other objectives. While this was not relevant to the following two surveys, it was not seen to be deleterious in any way to the later surveys, and was used for the sake of convenience and availability rather than statistical utility.

Quota Sampling

A specific type of stratification is quota sampling. in this form of sampling enumerators select respondents with regard to specific subgroups of the population. Each enumerator is assigned to interview a specific number of respondents for each subgroup. Subgroups can be categorized by age, sex, income level, ethnic group, etc., but the distinction has to be clear and readily identifiable by the enumerator. Because respondents are not picked randomly there are biases that have to be examined before the data can be used for analysis.

The idea behind quota sampling is that the use of subgroups decreases variability and that biases within a subgroup are minor due to greater homogeneity. However this ssumes little or no variability within subgroups, which is rare. Also other variables may be involved in the data collection and analysis and may be subject to considerable bias with this technique, which could create serious problems with the analysis.

Among the case studies an example of quota sampling was the Rural Health Survey in Afghanistan. Enumerators were assigned to interview one male and one female in each household. The sampling system was not successful as there were many households that did not have males to interview due to seasonal migration. The result was that there were almost twice as many females interviewed as males. This presented problems for analysis, since the males who migrated were likely to be healthier than those who stayed behind.

Any stratification will diminish the variance of the sample but, as long as the total sample represents a random sample of the survey universe, there is no danger imposed on analysis of variables that are not related to the variables used for stratification. The Rural Dynamics Study showed that there are limits to the number of variables that can reasonably be stratified in any one survey and a limit to the number of strata (relative to sample size). A seminar report of the Agricultural Development Council, "Field Data Collection in Developing Countries: Experiences in Asia," states:

> While optimum stratification is an ideal which is very difficult to achieve, it should not be forgotten that even very crude stratification, may lead to considerable reduction of sampling errors. If a constant sampling fraction is used in each stratum, the estimate from a stratified sample will be more precise than that from a simple random sample of equal size, in whatever way one may form the strata. One should not therefore shy away from stratification even where one does not have adequate information to make the units within each stratum homogeneous.[1]

Controlled Selection

When a population is divided into strata, every unit of the population will be represented in one stratum or another. Some strata may not be as desirable for sampling as others. Controlled selection eliminates undesirable strata from the survey. The strata may be eliminated because the characteristics of those strata are not relevant to the analysis, because the populations of those strata are too small to be significant or because there is a very low or zero response variance.

The Rural Dynamics Study in Indonesia was a clear example of controlled selection to eliminate strata with small population size. Another example was the Rural Electrification Survey in Costa Rica. For this survey the population was divided into four strata: connected users, connected nonusers, inaccessible users and inacessible nonusers. Inaccessible users were those users supplied by private generating plants or small private distribution systems rather than the cooperative distribution

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[1] Agricultural Development Council, Seminar Report, "Field Data Collection in Developing Countries: Experience in Asia," compiled by Frank Lynch, S.J., Resident Consultant, Institute of Philippine Culture, New York, June 1976, p. 8.

system. However the population of this stratum was so small that it was eliminated from the survey. The Baseline Survey of the Laguna Rural Development Prototype Project used marital status as a variable for stratification but restricted its use to people under 25 by only selecting those who were single. The Public Expenditure Survey in India did not eliminate the lowest income stratum but took a smaller sample from that stratum because it was considered less relevant to the analysis.

ATTRIBUTING CAUSALITY TO CHANGES IN THE ENVIRONMENT

For many surveys a critical element of the analysis is an assessment of the effect of a treatment on the target population. One way to measure this is to collect relevant data before the treatment and after the treatment and to calculate the differences in the data between the two points in time. This requires two separate surveys and some prior thinking concerning the variables that will be measured at the two points in time. However when the decision to measure change is made at the second point in time, it is often the case that there was no survey made at the first point in time or that the data available do not fully reflect the variables needed to measure the change.

Matched Pair Sampling

An alternative approach for assessing change when baseline data are not available and recall data are unreliable is to use

matched pair sampling.[1] The matched pair sampling technique compares those who have received treatment with those who have not. The general idea is that the have-nots should closely resemble the treatment group before treatment.

There are a number of examples of matched pair use from the case studies. The Comprehensive Computerized Surveys included a discussion of the need for precision in defining the membership of matched pair groupings.

> ...in comparing program "participants" and "non-participants," [it is necessary] to consider more precise definition of these two terms for purposes of sample selection. Otherwise, comparative analysis might be enormously complicated by including in the participant group many new and/or inactive participants who received no benefits whatever during the farm year and perhaps the inclusion in the non-participant group of outstanding graduates of the program who require no further aid. We may, therefore, wish to define the participant population more narrowly as active participants who received program benefits during the agricultural year under study and the control group as farmers who never participated.[2]

The survey description provides an example of stratification within matched pairs. A sample of 540 farmers was divided into credit users and nonusers. The two matched pairs were then divided into three strata by size of farm. Finally the six resulting groups were divided into three substrata by major farm activity (fruits and vegetables, cereals and livestock). For these surveys the minimum desired sample size for any one stratum

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[1] This does not exclude the use of matched pair sampling over time (see discussion of Causal Relationships, pp. 65-67).

[2] William H. Rusch, op. cit., p. 14.

was 30. Only if there was equal distribution of the total sample among the 18 strata would the desired stratum sample size be achieved. Since an even distribution could not be expected, the total sample usually exceeded 700 farmers.

Among the case studies there were three evaluations of rural electrification programs. All of these were one-time surveys that used matched pairs to provide an assessment of change. For the Rural Electrification Survey in Costa Rica the matched pair rationale was as follows:

> Since the research team was limited to a one-time cross sectional measurement, an ex post facto experimental design was decided upon and an appropriate area for its application identified...; the La Fortuna area of Canton San Carlos was selected. The lower (southern) half of the area...is supplied with power.... This area has been electrified for three to four years and is, in effect, an experimental area. The upper portion of the San Carlos study area is not served by a central electric distribution system. Since the entire study area is essentially homogeneous this upper or northern portion is used as a control group in what is a naturally occurring experimental situation.[1]

The plan for this survey was to use two matched pairs: users and nonusers who were within reach of the central electric distribution system; and users and nonusers who were not within reach of the distribution system. As mentioned earlier, users not within reach of the distribution system were too small in number to create a meaningful stratum for the survey.

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[1] University of Florida, Center for Tropical Agriculture, Center for Latin American Studies, "Rural Electrification: An Evaluation of Effects on Economic and Social Changes in Costa Rica and Colombia," August 31, 1973, p. 47.

The Project Nelcor Survey in the Philippines used a sample of electrified and non-electrified households in cooperative areas, and electrified and non-electrified households in non-cooperative areas. The number of non-electrified households was almost double that of electrified households in cooperative areas, as it was felt that this would provide a greater understanding of the reasons for households in cooperative areas not to use electricity.

For the Cost-Benefit Survey of Rural Electrification in India,[1] villages were first stratified by the number of connections in a village. There were four strata of villages for a total of 20 villages in each of four project areas surveyed. Within a village pairs of users and nonusers were broken down into four separate categories: industrial, agricultural, commercial and domestic. The benefit of electrification was to be measured by the differences in certain variables between the users and nonusers. The survey analysts concluded, however, that they could not attribute the difference to electrification and that the benefit of electrification could not be measured using a one-time study.

Sampling Methodology and the Assessment of Causal Relationships

Matched pair sampling over time is a method used for determining causality when evaluating project performance. This

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[1] Sources include "Cost-Benefit Analysis of Selected Projects Sponsored by the Rural Electrification Corporation in West Bengal," Discussion Paper by Applied Statistics, Surveys and Computing Division, Indian Statistical Institute, Calcutta, November 1975, and an interview with Dr. S. K. Pal of the Institute.

requires time series sampling of project participants and non-participants (the control group) at two or more points in time. Among the case studies there were no examples where time series surveys were used with a clearly defined control group. Only the Comprehensive Computerized Surveys and the Costa Rica and Colombia electrification survey attempted to set up a control group in the baseline survey. Other surveys, such as the Rural Dynamics Survey and the Baseline Survey of the Laguna Rural Development Prototype Project, used participants and nonparticipants as variables in analysis but the sample design was not stratified using this distinction as a criterion.

A control group is difficult to develop. It must be similar to the project target population, so that causality can be attributed to the project rather than to differences between the control group and the target population. It is also necessary for the control group to be sufficiently isolated from the target population and project activities so that there is no apparent spread effect. If the control group is also changing as a result of the project, the survey will measure less benefit from the project than is justified. According to the design format of the Comprehensive Computerized Surveys, variations of the system of selecting the "nearest neighbor" of the participant within the same range of farm size worked well, but required very tight control by the survey director. If the groups are too close together the spread effect will be so strong that even tight control by the survey director may be insufficient, or cost-ineffective.

Participants and nonparticipants are easier to compare in certain types of projects than in others. In projects where extension workers are training farmers in modern agricultural techniques, the technology may be easily communicated from one farmer to another and the demonstration effect of one farmer's success may strongly influence other farmers in the area. The spread effect will be facilitated or limited by the nature of the social structure and communication patterns. The ease with which other farmers (nonparticipants) are benefitted depends on their access to the resources necessary to apply the new technology. Therefore in projects such as those involving small infrastructure development, if a nonparticipant is not connected to the new road or electrical distribution system or irrigation canal, the problem of spread effect would be of little significance.

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CHAPTER FIVE

STATISTICAL SURVEYS

INTRODUCTION

For the purposes of the analysis in this section, the term "statistical survey" will refer to a survey that utilizes data from a sample to make inferences about the characteristics of a larger population from which the sample is drawn.[1]

The analysis of the surveys in this section is further restricted to those in which the data was collected by enumerators whose capabilities are limited to collecting on a predetermined set of questions. In this sense "Statistical Surveys" are contrasted with "Reconnaisance and Rapid Surveys," as discussed in the following chapter, and to "Internal Project Systems," which will be discussed in the next section.

THE LITERATURE ON STATISTICAL SURVEYS

The literature on the methodology of statistical surveys is overwhelming; in fact data overload prevails. Major organizations

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[1] A current and highly publicized example of a "non-statistical" survey is the *Hite Report*. The author is careful to point out that her "sample" may not be representative of any population larger than the total of those women who actually responded to her questionnaire and that her statistics are, therefore, not generalizable beyond her "sample."

with large statistical departments that conduct surveys have issued their own texts and the research community has produced volumes on the planning for the techniques and the details of the statistical survey as a data collection instrument.[1] A review of surveys that have been conducted on farm management techniques suggests that hundreds have been undertaken over the past 20 years, albeit with extremely varied purposes, methodologies and findings. The state of the art is difficult to discern in a field so diverse and separated.[2] One reason for the proliferation of statistical surveys is the acceptance of this methodology by the Western academic world, which produces, directly or indirectly, the vast majority of the information experts working in rural development.

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1 The explanation of how to conduct agricultural surveys and the two-volume work by the U.S. Bureau of Census on household surveys are landmarks in a crowded field. The Bureau has, in cooperation with the Survey Research Center of the Institute for Social Research at the University of Michigan, also issued *Indexes to Survey Methodology Literature*, as Technical Paper 34 (April 1974) which contains 2,500 entries. The UN has published *Handbook of Household Surveys*, Studies in Methods, Series F, No. 10, United Nations, N.Y., 1964. The FAO has published two volumes of *National Methods of Collecting Agricultural Statistics*, as well as *Quality of Statistical Data*, *Sampling Methods and Censuses*, and *Handbook on Data Processing Methods*. The Agricultural Development Council has sponsored a series on Survey Research Methodology, with titles including "An Introduction to Some Tests of Significance" and "Some Statistical Properties of Samples." The Survey Research Center of the Institute for Social Research (ISR) of the University of Michigan has produced state of the art texts in this field: John B. Lansing and James N. Morgan, *Economic Survey Methods*, ISR, University of Michigan, 1971; and Martin R. Frankel, *Inferences from Survey Samples; An Empirical Investigation*, ISR, University of Michigan, 1971. These examples represent just the tip of the iceberg of publications on statistical surveys.

2 Arthur J. Dommen, "Producing Good Farm Surveys," Paper No. 75-2, Revised May 1976, Poynor International Corporation.

> Survey research is probably the best known and most widely used research method in the social sciences today. Its use in the academic world grows daily. It is now taught and used in departments of sociology, political science, psychology, business administration, public health, and geography to name a few. Increasingly, social science graduate students are encouraged to conduct surveys to satisfy thesis and dissertation requirements for original research. Undergraduate classes frequently conduct surveys, and faculty members publish reports of hundreds of surveys every year.[1]

The documentation on most aspects of statistical surveys is overwhelmingly large. There is one area that has, however, been treated rather lightly, perhaps because it is very difficult to investigate, and that area is how surveys actually have, or should have been, used to tackle real-world development problems. Accordingly, this section will deal primarily with the major questions of when and how statistical surveys should be considered as aids to rural development decisionmaking.

PRODUCING "GOOD" SURVEY RESULTS

With the plethora of statistical surveys, research texts, large organization handbooks and other studies, there would seem to be no reason for survey research not to have attained a level of high proficiency over the last 25 years. That it has not, that surveys continue to be funded, planned, executed and analyzed at relatively low levels of understanding, is cause to reflect

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[1] Earl R. Babbie, *Survey Research Methods*, Belmont, California: Wadsworth Publishing Company, Inc., 1973, Preface.

on the essential qualities of the survey. The editors of a thoughtful study on Third World surveys began their preface with the following statement: "...Because so many surveys in the Third World are so poorly done, we try to show where major and sometimes drastic improvements are needed in survey design, conduct and interpretation."[1] The preface ends by saying, "While our tone frequently is pessimistic, our aspirations always are optimistic."[2]

It should be noted that survey shortcomings are not limited to those carried out in the Third World. Of 26 surveys studied under a National Science Foundation grant, 15 were judged not to meet their research objectives: four because of poor survey design, four because probability samples were not implemented, and seven because of serious technical flaws. While there is evidence of good surveys being conducted, the number of bad surveys seems to be entirely unacceptable considering the cost and burden to respondents. Many reasons are identified for the poor survey work. It seems clear that the inadequate quality can be partially remedied through government-wide care and control.[3]

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[1] Gerald Hursh-Cesar and Prodipto Roy (eds.), *Third World Surveys: Survey Research in Developing Nations*, The Macmillan Company of India Limited, New Delhi, 1976, Preface.

[2] Ibid.

[3] A pilot study of federally sponsored surveys, performed by Dr. Barbara A. Bailar and Dr. C. Michael Lanphier under grant to the American Statistical Association from the National Science Foundation.

The list of functional activities or subjects within rural areas that have been the objects of statistical surveys is very long and includes farm management, agricultural production, land tenure and registration, marketing, labor force, household expenditures and family budget, consumption and nutrition, family planning attitudes and use, and migration. This list does not, of course, constitute a suitable explanation of why the surveys were undertaken or how they might be used in the process of decisionmaking in rural development. It is not possible to begin an analysis of each case study with a clear statement of the purpose of the study and assume that purpose and use coincide. In like manner, the stated purpose of any survey is not a particularly good indicator of what the survey results might be able to contribute to decisionmaking. An understanding of purpose and use is central to an understanding of appropriate data collection and analysis techniques in rural development. The interrelationship of purpose, use and survey techniques can best be addressed after an examination of the problems that arose in a number of statistical surveys recently conducted in a variety of rural fields.

The textbooks lay out carefully plotted step-by-step systems approaches to the development of statistical surveys, which will not be repeated here. Instead, these major issues, corresponding to real-world options for decisionmakers, will be raised.

> The parameters of the survey, including the interrelationships between the size of the

sample, the complexity of the survey instrument, and the intended uses of the resulting information;

- The reliability of the data from the survey, with a special look at the measurement of income; and
- The potential and actual uses that can be made of survey data in decisionmaking in rural development.

ESTABLISHING THE PARAMETERS OF THE SURVEY

In the United States fewer than 3,000 telephone calls can predict, with high accuracy, the outcome of national elections. The turnaround time in this type of survey is often less than 24 hours, and the sampling technique is highly sophisticated, such that a sample of 3,000 permits valid inferences to be made about the entire American voting population. This small sample assumes, however, that the survey directors only wish to predict national trends. If predictions are desired on the voting patterns of each state, or if there is a requirement to predict the breakout between black and non-black voters, males versus females, or youth versus elderly, the size of the sample would normally have to increase.

In rural development, single-subject surveys are rarely useful. Information needed for programmatic decisionmaking requires the inclusion of a number of variables that may explain differences in perceptions or behavior. Suppose that a survey

intends to allow decisionmakers to distinguish simultaneously between farmers living in varied ecological zones (high elevations, valleys and coastal areas, for example), growing three different types of crops and doing so on large, medium and small farms. The interrelationships of these variables would create a three-dimensional matrix with three categories on each axis, thus containing 27 cells. Assuming a requirement of at least 30 respondents in each cell, the minimum size of the sample would be 810. Of course it is impossible to know in advance that each of the categories chosen will have a significant influence on the farmers' behavior or will be an important explanatory variable in an analysis of policy issues. And it is virtually impossible, without highly structured sampling procedures, to get exactly 30 responses in each cell. (In a normal distribution at least one of three cells for each variable would contain more than 30 and at least one less than 30.) This means that, in this hypothetical case, a sample of considerably more than 810 would nearly always be required.

There are formulas for the selection of a sample size based upon the degree of confidence necessary and the variance in the population to be studied. Such criteria are generally impossible to predict and, in their place, real-world surveyors use categories that might be proxies for population variances. They then determine how many cells are necessary, completing the sample size by specifying the minimum number of responses in each cell.

This procedure is captured well by a summary of four computerized farm data surveys conducted by the American Technical Assistance Corporation for AID, documented in a study that complements this report. The author, who was the primary survey designer and executor for ATAC, William Rusch, writes:

> With respect to sample size, it is often satisfactory in an unsophisticated survey to use a sample of 50 to 100, which is ordinarily enough to provide basic data on a reasonably homogeneous universe. In a CCS (Comprehensive Computerized Survey), however, it is important to have a large enough sample to permit analysis of subpopulations cut in accordance with factors which are important for analytical reasons such as study of the factors contributing to high or low incomes or study of the use of credit. While perfect planning is not possible, we hope to end up with at least 30 cases in each significant subpopulation.
>
> To illustrate, let us suppose we would like to be able to divide the universe first between farmers who have credit and those who do not; then further according to size of farm (smallest, intermediary, largest); and then further and finally according to whether farm activities are primarily (1) fruits and vegetables; (2) cereals; (3) livestock. Theoretically, we might achieve this with a sample of 540, making successive cuts as follows:
>
> - 540 size of total sample;
> - 270 each credit and no-credit;
> - 90 each by size of farm (smallest, intermediate, largest); and
> - 30 each primary activity (1), (2), or (3).
>
> The problem, of course, is that a random sample will not produce such nice distribution. Nonetheless, it is easy enough to specify from the outset that the sample will include 270 credit users under a program and 270 nonusers (control group). Unfortunately, the control group will probably include some borrowers under other programs; this may suggest the desirability (if credit analysis is a primary survey objective) of

> having a larger control group than group of program participants. The division by size of farm presents less problems as it is not essential to set size ranges in advance; for example, we can simply have the computer divide the cases according to farm size into three equal groups. Most difficult of all would be to arrive at a result with fairly even distribution according to types of farming activity.[1] However, to some extent it is possible after a survey is conducted to alter somewhat the grouping of farm activities to achieve more equal distribution. In the final analysis, the selection of the size of the sample is a question of judgment in which costs, objectives, and means of achieving objectives all have to be considered together. In a case such as described above, we would probably want a sample size of about 700 to 750 to assure achievement of analytical objectives.[2]

If the determination of sample size is a question of judgment on costs, objectives and methodology, then this determination should not be left exclusively to an information specialist as it often it. Rather, this determination should be the result of negotiations between the information specialist and the decisionmakers when the survey is first planned.

Complexity of the Data Collection

The determination of sample size is not independent of the complexity of the data to be collected, i.e., the level of detail and the number of data points to be extracted. A following sec-

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[1] Note, however, that when we wish to study results of production of various crops, we have a different problem. Since most farmers grow several crops, we will usually have no difficulty in getting 30 observations on each of the major crops. On a large number of less common crops, however, we will not have a sufficient number of observations.

[2] W. H. Rusch, "Application of Comprehensive Computerized Surveys in the Collection and Analysis of Farm Data in Developing Countries," Draft Report from American Technical Assistance Corporation, March 1977, pp. 14-15.

tion reports on the complexities of attempting to capture income through the use of statistical surveys.

For any one concept, such as income, there are numerous ways that it might be measured, some more complete than others. There are also a great many different subjects that could be included in a survey, for example, the entire list of functional subjects mentioned at the beginning of this section. Some surveys stick to one subject (single-purpose surveys); others deliberately attack a great many subjects (multipurpose surveys). It should be obvious, but has not been to many survey designers, that as sample size and the complexity of the collection instrument increase together, the probability of deleteriously affecting the entire survey also increases. This is not a theoretical problem. Conceptually there are economies of scale to be enjoyed from the addition of more units to be sampled or from an increase in the number of questions to be asked of each sampled unit. However, these increases must be weighed against the cost in respondent fatigue, the increased complexity of analysis and the cost of data storage and processing, as well as interview time and general administrative costs.

THE RELIABILITY OF STATISTICAL SURVEY DATA -- WITH PARTICULAR EMPHASIS ON THE MEASUREMENT OF INCOME

Statistical surveys allow the generation of reports with numerical data that give the appearance of hard, quantitative supporting evidence for whatever case is being presented. Mean income figures are often cited with their confidence levels.[1]

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[1] For example, the MORESCO study on the impact of rural electrification in one area of the Philippines begins with the statement "Mean per capita income in the MORESCO area is sixty-nine dollars," and proceeds into a discussion of income levels and subsistence, complete with confidence intervals. The questionnaire used to determine those conclusions was drawn from a probability sample of 253 households, representing more than 20,000 people in the local area. Income questions asked were:

C10 Could you please tell me how much you earn in your main occupation (for head-of-household)?

C11 Besides your main employment, do you have any other source of income?

C12 What other sources of income to you have? Farming, sale of livestock, sale of secondary products, fishing, family business, pensions, others (specify)?

C13 How much additional income do you earn from these sources? _____ (per time unit)?

C14 For other members of the family who are working, how much do they earn? How much do they contribute to the household income per year and what type of work do they do? (Write out matrix of name, amount earned, amount contributed to household income and nature of work.)

The probability of these questions generating reliable responses is very low. Fifty-six percent of the sample had less than six years of school and 53 percent were primarily engaged in agriculture. Thus the confidence intervals used in the study were probably established on fantasy data. See Research Institute for Mindanao Culture, Xavier University, "An Evaluative Study of the Misamis Oriental Rural Electric Service Cooperative," a report submitted to USAID/Philippines, 1976.

Changes in mean income among project participants are cited as a benefit of the planned project intervention.

Although there has been a great expansion of survey research into other than economic areas, those who provide funds for development projects want to see income results -- numbers showing a benefit in relation to the cost of providing the development assistance. This has led a great many statistical surveys into the very murky area of estimating income levels for rural households.

A large proportion of the rural respondents will be functionally illiterate, with no records available to stir their memories. They may have reason to believe that the data will fall into the hands of people trying to extract more money from them. This makes collection of accurate income data a very difficult assignment. There are several ways to address this problem.

First, farm income can be collected every day by observation, by physical examination of yields, inputs, outputs, farm labor, etc. The technique most closely approaching this methodology is the farm record, using daily, weekly or biweekly collection for key variables. At the other extreme are those surveys that attempt to capture a full agricultural year in a two-hour interview, often across two or more crop cycles (in tropical irrigated rice production, for example) or across a number of annual and permanent crops and animal lines. In a sophisticated survey there are the additional problems of depreciation, crops in the

ground at the time of the interview, crops grown for use on the farm to feed animals, etc. -- a large and complex package of problems to solve before it will be possible to obtain consistent, standardized estimates of farm income.

One of the most puzzling problems is the imputation of income to the farm. In a near subsistence area, little will be sold, and income is often imputed to the food consumed by the farm family. In this instance, the economists who determine the value of family labor (if it is to be charged as a cost of production) and of family consumption have far more control over reported levels of income than do the farmers themselves.

An analysis of the income figures generated by three surveys of the impact of rural electrification in the Philippines found all three wanting.[1] (Earlier surveys asked very general questions, attempting to obtain overall estimates from the farmers of their yearly income.) When data on household expenditures were collected in more detail than income, the results were predictable: a dissaving rate of, in some cases, more than 33 percent for the average respondent in the majority of the areas sampled. When more questions were included in the income questionnaire, more income was registered.

This type of analysis inevitably leads to a questionnaire that is a farm record of inputs and outputs. There are different ways of obtaining income information with this method:

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[1] Development Alternatives, Inc., "An Evaluation of the Program Performance of the International Program Division of the National Rural Electric Cooperative Association (NRECA)," January 28, 1977, p. A-31.

- First, obtain the output and sales of farm production by each enterprise line to obtain gross income. Then obtain cash costs of production for all crop lines taken together and subtract from gross income to obtain net farm income; and

- Second, obtain all inputs and outputs for each production line, deciding in advance whether all inputs (including family labor) will be extracted, as well as all outputs (including family consumption). This will provide net farm income.

In either method, the possibility of significant error is so high that many surveys refuse to extract the bits and pieces of income data and to aggregate them to claim an overall farm income statistic.

One thoughtful survey conducted on the impact of rural electrification in Latin America developed a Level of Living scale, based upon the theoretical work of John C. Belcher.[1] It served as a proxy for income measures that the study's authors decided could not be obtained with confidence.[2] As a further check on the consistency of the responses, they instituted a test/retest procedure, which called for a different interviewer to return to a selected sample of respondents and collect a second set of data responses. The commentary on the accuracy of agricultural data is of interest in any discussion of the potential ability of one-time statistical surveys to obtain accurate farm income data.

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[1] Center for Tropical Agriculture, Center for Latin American Studies, "Rural Electrification: An Evaluation of Effects on Economic and Social Changes in Costa Rica and Colombia," a report prepared for the Agency for International Development, August 31, 1973, p. 62.

[2] In the survey on Distribution of Public Expenditure on Social Services in West Bengal, 1976, income data were also considered nonobtainable and expenditure data were used as a proxy (see preceding section).

IV. Agricultural Information (32 re-interviews in total)

> This section, composed exclusively of factual questions, showed a surprisingly large number of discrepancies. Seven persons reported a different number of "manzanas" they owned, with discrepancies as large as 51 to 2 or 5 to 8 (interview to re-interview). The cost of the "manzana" was differently reported by 12 persons with differences as big as $2,000 to $4,000 colones or $5,000 to $3,000 colones. Three persons cited a higher price and the rest said "do not know" the first time and gave a price the second time. The questions about cattle owned contained more surprises. Some examples of discrepanices: from 17 to 43, from 39 to 0 from 24 to 68. Altogether, 10 persons gave different answers to this question. There were five discrepancies for the question about farm machines owned, and five for the question about farm installations, and nine persons gave different answers to the question: What are your three main crops? ...this section showed the second largest index of reliability.[1]

In a study to determine whether short-cut methods of asking income questions led to useful answers, two economists reviewed survey data from Taiwan that first obtained income and at a later date expenditure estimates from the wife. At a different point in time, between the two interviews with the wife, the husband was asked a detailed series of questions about family income. The three measures varied significantly. The authors write:

> The observed discrepancies between the three income measures must be due in part to misunderstanding (due to shortcut methods of questioning) and in part to inadequate information (especially but not exclusively on the part of the wife), uneasiness about disclosing private matters, difficulties inherent in reporting certain kinds of income, as well as psychological needs to appear more or less affluent than one actually is. Some types of errors may

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[1] "Rural Electrification: An Evaluation of Effects on Economic and Social Changes in Costa Rica and Colombia," op. cit., p. 60.

> have a random incidence. Others are related to socio-economic characteristics that play a role in economic-demographic analysis....
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> ...In sum, our data suggest that the effort to elicit accurate income reports from the husband produced income data that differed substantially, even in rank orderings of brackets, from the data obtained by very brief questions addressed to the wife. Moreover, these differences vary with major socio-economic characteristics. Given evidence of extensive misreporting, the question of relative accuracy of the three income measures arises....[1]

Few projects have undertaken small farmer research with the tenacity of ICA's Caqueza project supported for four years by the Canadian government's International Development Research Centre. An initial diagnostic study of 600 families in early 1972 provided an estimated per capita income of $50 (Canadian) annually. Six months later improved estimates of agricultural production, taken into consideration the actual pattern of multiple croppings encountered in the area, yielded per capita income figures of about $86 per year. Subsequent analytical evaluation, which more accurately reflected production income and food expenditures, suggests annual per capita income levels approximately 20 percent higher. The authors wrote:

> ...Obviously, an evaluation program based on the original estimate of $50 as the base level would unduly inflate the degree of project achievements.
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> The principal reason why the original estimates were so erroneous was because the peasant farmer, prior to the development of benefits from project activities, was overly suspicious of the motivations of ICA personnel soliciting income information....

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[1] Maurice MacDonald and Eva Mueller, "The Measurement of Income in Fertility Surveys in Development Countries," in *Taiwan Population Studies*, University of Michigan, Population Studies Center, Working Paper No. 24, October 1973, p. 18.

> Two major conclusions have been drawn from the experiences gained in developing the Caqueza diagnostic study. First of all, the determination of base-line levels of socio-economic characteristics must be derived not from vague estimates, but from hard data, which are obtained over the first few years of a project and not during the few months of superficial pre-project surveying. The information garnered during the pre-project period serves well for selecting project areas and, indeed, gives guidance as to the type of activities to be initiated, but does not lend itself to establishing base-line levels of socio-economic characteristics. The second conclusion is that the trends of change over time must accompany base-line data levels. A knowledge of the trends of change in farm size, family size, income, health levels, migration rates and employment levels is necessary to substantiate the degree of project impact in goal achievement attributed to project activities.[1]

The lesson to be drawn from these experiences is clear: the accuracy of income figures generated from statistical surveys in rural areas cannot be assumed. Errors in the data may be major and nonrandom, as has been documented in several of the cases studied.

A major attempt to obtain income data in a detailed one-time survey is the Survey of Household Income and Its Disposition in India.[2] This was a nationwide survey conducted in 1976-77 by the National Council of Applied Economic Research for the Ministry of Finance. The orientation of the survey was on savings. As such, the national population was divided into three strata using rough income estimates as the key variable (Rs 7,500

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[1] K. G. Swanberg, "Evaluation in Rural Development," pp. 7-8, contained in ICA-CIID Rural Development Team, "The Caqueza Project," Bogota, Colombia, October 1974.

[2] From an interview with the Deputy Director-General of NCAEC (February 1977).

and below, 7,501 to 20,000 and 20,000 and up), and the sample covered slightly more than 50 percent in the two upper strata, as these were the people most likely to save. The survey covered 240 villages (40 percent urban) in 120 districts.

Income calculation did not include the sale of assets. Borrowing was also not included, as this would have resulted in double counting for the country as a whole. The recall period was July 1975 to June 1976 (post-harvest).

The enumerators were high school graduates from local areas who were trained for six weeks (training included questionnaire pretesting). The average interview took five to six hours and used several sittings to fit farmers' schedules.

Nonresponse was about ten percent, but this was not seen as a reaction to income questions. Rather the enumerators were sometimes thought to be family planning civil servants who were there to identify people for forced sterilization.

A large number of consistency checks were built into the questionnaire, and when discrepancies arose the enumerator reinterviewed. There were six supervisors spotchecking the work of 60 enumerators.

The data are being computerized by 30 people working on the editing and coding, which will be followed by analysis planning.

This survey appears to have had considerable success in obtaining income data. However much of it came from the middle

and upper classes who are literate, keep some records and apparently have little they think they need to hide. The interviews at the lowest economic level were less successful and the resulting data indicated a dissaving.

If data are to be used to compare and contrast a project's target group with other groups in a local society, the collection errors may be relatively common to both, although two of the studies showed that income responses varied with income levels. If, however, the purpose of income measurement is to capture statistics (mean values) at one point in time, remeasure income at a second point in time, and attribute the differences to the intervention of the project, then the present state of the art of statistical surveys will not generate income measurement with sufficient accuracy to validate such conclusions.

There are other, equally valid measurements of important variables in a rural population, which can be captured by the statistical survey technique with reliability and utility. These often involve behavior changes -- observation of the actions required for the process of modernization and development. As proxies for income, particularly if they are continued over time, behavior changes in farm production practices, cropping patterns, irrigation usage, improved inputs, even such simple measures as the use of cow-dips in areas where cattle diseases are prevalent, can all be solid indicators of modernizing change. Changes in physical units can be observed and traced over time with preci-

sion. It is the attempt to monetize all development benefits that leads to confusion and inaccuracy.

Many of the poorly designed statistical surveys are conscientiously conducted by field practitioners who are responding to certain requirements of donor organizations, e.g, that their project:

- Show the target group to be at the very bottom of the local area income pyramid; or
- Show that the target group has achieved income benefits from the project.

Often these attempts are made with miniscule funding ($11,000 in the MORESCO example cited) before initial or continued funding will be approved. In the case of AID, it appears to be the Congressional insistence on evaluation of all AID projects that underlies this requirement, which is strictly interpreted within certain AID offices. If such evaluations were allowed to use physical changes related to income proxies, e.g., level of living scales or wealth and possession scales and production behavior changes, forward development progress could be measured even though it might not be directly quantifiable. Until such time as research has determined how to undertake accurate income measurements, requirements for statistical survey results should be flexible. Funding to undertake research on low-cost income measurement techniques would be a step forward in the state of the art in information systems to support decisionmaking in rural development.

THE POTENTIAL AND ACTUAL USE OF STATISTICAL SURVEY DATA IN DECISIONMAKING IN RURAL DEVELOPMENT

Data Overload

Textbooks in the field, experts in the classrooms, and researchers writing reports on large information systems all offer one fundamental principle: do not collect data for which a real-world use is not apparent. Yet this is exactly the circumstance that obtains in large data collection and analysis experiments for rural development and is furthermore being promoted by the "Standard Package" philosophy. There is no conceptual difference between a project data bank that cannot be utilized at the moment for decisionmaking (but may be useful for research in the future) and a large Management Information System (MIS) that stands ready to deliver uncalled-for information to corporate policymakers. In the United States, the failure of MIS to provide useful inputs into most decisionmaking has been discussed in documents with titles such as *Why Information Systems Fail*[1] or "Management Misinformation Systems."[2] The final report of the study group examining the excess federal paperwork burden states:

> Within the last twenty years, the information management professional has assumed increasing importance. Its growth has corresponded to our increased capability and need to manage large data bases. Major technological breakthroughs in information management have been accomplished by this group.

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[1] Henry C. Lucas, Jr., *Why Information Systems Fail*, New York: Columbia University Press, 1975.

[2] R. L. Ackoff, "Management Misinformation Systems," *Management Science*, 14(4): B147-56.

> Unfortunately, in terms of the interaction with Federal policymakers and social science data users, a major problem remains. In order to perform his job properly, the information manager needs direction on what data are needed and how such data will be used. Data users are either unable or unwilling to anticipate their data needs. Indeed, there is considerable evidence to suggest that the data needed by policymakers and social policy researchers cannot be programmed in advance. Policy and decision output is not simply a matter of data input. Unfortunately, most information managers operate as if the procurement and application of information was purely an input/output mechanism. Experience suggests that the information manager is unable or unwilling to accept such behavior and because he has been trained to handle large complex data systems, he will build them; it is prestigious and intellectually challenging for him to do so.
>
> The consequences of this process are serious. The wrong data are often collected. A hardware and software system that is far more sophisticated and complex than the situation warrants and/or the potential user can comprehend has been developed.
>
> At this point, there is very little communication between the information manager and the potential data user. The potential data user rarely will enter into a frontal attack on the information manager; instead, he will develop his own information sources.[1]

The movement toward multipurpose surveys lacking in clearly specified purposes for data items was reviewed by an Indian economist in six surveys conducted by the Bureau of Applied Economics and Statistics, West Bengal, India.[2] Of all items collected, 43 percent were never aggregated or used in any report or table. The percentages were especially high for income of family members

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[1] Elliott R. Morss, et al., "Final Report of the Value/Burden Study Group" (draft), Process Studies, Federal Paperwork Commission, February 25, 1977 (mimeographed), eventually to be published by Westview Press, pp. 5-6.

[2] B. K. Guha Thakurta, "Designing of Schedules for Large-Scale Multipurpose Surveys," in *Symposium on Recent Development in Survey Methodology*, March 22-27, 1976, Indian Statistical Institute, Calcutta.

(66 percent omitted from analysis) and consumption and expenditures of the family (70 percent ommitted from analysis). The author concluded:

> The practice of collecting data on a large group of information with a view to utilizing a major portion of these whenever necessary in the future should be discarded because of the fact that such practice ultimately turns out to be costly as the data on many of the collected items of information intended for future use are not utilized at all.[1]

Missing Analysis

If the researchers have gained control over the information and collection process, it is likely that the decisionmakers have not known, or have not taken the time to understand the tradeoffs in different methodologies, sample sizes or approaches to the collection of data by statistical surveys. Since statistical surveys have been shown to be of small utility for project design, although sometimes necessary to provide the documentation that allows a project to be selected over others by the funding agencies headquarters, the real use of statistical surveys should be in project implementation -- the measurement of change in key variables of a target population in an area to be assisted by the project. One popular but weak technique that has been used is the matching of participants and nonparticipants after the project has been in existence for some time. In rural development, a computerized comprehensive farm data survey will deliver some useful information nine months after initiation, but at an estimated cost of $168 per respondent. This is far below the turn-

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[1] Ibid.,pp. 14-15.

around time for most statistical surveys. The stronger methodology, that of establishing solid baseline data for the local area and tracking participants and a control group over time by statistical survey, is appropriate for some variables, and not appropriate for others.

At this time there is no proven survey technique that will measure rural income so precisely that a measurement of differences at two points in time can provide strong confidence that real change has occurred. The two major types of surveys that attempt to measure change are: (1) cross-sectional surveys that determine mean values of key variables over time from a sampling of the population, and examine differences in means to search for some impact of the project; and (2) longitudinal (panel) surveys that track the same individuals over time to determine how key indicators of their quality of life have fared. While the state of the art in measuring change over time may still be quite primitive, time series surveys can be helpful in getting a clearer picture of rural dynamics than can be achieved by simple observation or by one-time surveys that compare haves with have-nots or require lengthy recall. Unfortunately the difficulties in using time series surveys are not often known by project designers who plan baseline surveys and expect the impact of the project to be easily measurable with a follow-up survey at project completion.

It is the lack of analysis, resulting from either the inability to manipulate the data once acquired, or from the lack of

funds to do so, which prevents more from being learned by drawing on data that have been collected. By appreciating the problems incurred by similar attempts to measure change and by assuring that adequate planning, manpower, equipment and time are made available, the potential to derive considerable benefit from these surveys surely exists.

The principal authors of the Laguna Household Survey argue that funds for statistical surveys should be divided in thirds: one-third collection, one-third processing, and one-third analysis. Many of the multipurpose large-scale surveys could have made better use of their overly large data bases with additional funds (assuming that money can be transplanted into skilled data analysis, which may be challengeable). Even AID will not often provide funds for more than cross-tabulation analysis of computerized farm data surveys. On this point William Rusch wrote:

> By the time we issue our initial report, we have achieved two things. The first is the creation of a demonstrably consistent, well-checked and well-organized data base. Columns add correctly, debits and credits are in balance, and anyone able to read a financial statement will be able to understand how the figures hang together and form his own judgments as to the significance of the variables used. What you see is what there is, and no dirt has been shoved under the rug. Flights into statistical space on anything as complex as farm accounts are not, in our view, desirable until such a demonstrably sound data base has been created.
>
> Second, we have prepared an extensive report which calls attention to matters of obvious interest, including subjects which warrant additional computer processing and analysis to determine more fully the significance and implications of the data.

> Our regret is that it is never possible to proceed beyond this point with more sophisticated analysis of data. Computer processing is expensive, money runs out, and program management has already received about as much information as it can digest at one time.[1]

Yet at other times and in other places there have been excellent AID statistical surveys, which have received analysis funds that allowed a full investigation of the available data. AID's oft-mentioned lack of memory, particularly in the field of surveys and survey techniques, seems to mitigate against systematic forward progress in this important field. In 1971 Robert R. Nathan Associates, Inc., completed an interesting and valuable analysis of rural farmers in Afghanistan utilizing multivariate analysis and Guttman scaling to support the conventional cross-tabulations that are the staple of every survey report.[2] This report has mentioned other surveys conducted under contract to AID (such as the evaluation of rural electrification completed by the University of Florida), which contain explanations of various methodological options and solid explanations for the choices selected for a particular situation. More analysis, more funds for analysis, and a memory to retain both the reports and the tapes of AID-supported survey research would be a step forward in improving data collection and analysis techniques.

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[1] W. H. Rusch, "Application of Comprehensive Computerized Surveys in the Collection and Analysis of Farm Data in Developing Countries," Draft Report from American Technical Assistance Corporation, March 1977, p. 21.

[2] Gordon C. Whiting and Rufus B. Hughes, "The Afghan Farmer, Report of a Survey," Robert R. Nathan Associates, Inc., Washington, D.C., October 1971. The data upon which the survey was based were not a responsibility of the Nathan team, and their credibility is low, but the quality of the analysis was high.

CASE STUDY:
DATA COLLECTION EXPERIENCE IN AID'S LATIN AMERICAN BUREAU

COLOMBIA

Several experiences with statistical surveys on development problems in recent years suggest that the state of the art is not as it should be or that the best knowledge is not being applied. The output from the noncomputerized Indian National Sample Survey, for example, has been three to five years in production and still has a significant amount of missing and inaccurate data. A large, well-funded and well-staffed data collection and sector analysis effort supported by the Agency for International Development in Colombia took over four years to generate output.

The Sector Analysis work in Colombia was previously mentioned in Chapter Two. What was not mentioned was that all original modeling was done from credit application records. In 1972 AID/Washington decided to fund a large, nearly 17,000 respondent sample survey of the rural population to provide better and more timely data for an improved sector analysis effort -- to include the generation of an input/output matrix and a linear programming model of the entire economy. The survey sought input/output data on individual farms using a large sample that would allow for straftification at many levels. The survey instrument was on one

sheet of paper, folded several ways, which proved to be very difficult for coders and card punchers to use. In early 1977, what is known as the 1972 survey was still slowly being put through computer processing, undergoing a very complex program to check for inconsistencies and errors. The USDA specialist in sector analysis and linear programming had completed his tour in Bogota, and moved elsewhere; the enthusiasm and support for continued AID involvement had disappeared. It seems clear, in retrospect, that the technical problems in a complex data collection exercise, which required specification of the inputs and outputs for each enterprise line for the surveyed farms, presented an immense data collection, consistency, cleaning and processing problem. The Colombian government has access to very skilled personnel, many with foreign training in statistics, computer programming and modeling. The agricultural census has been operating for years. But the combination of a complex collection instrument and a very large sample has seriously delayed the successful completion of the project.[1]

GUATEMALA

While the problems of the Colombia survey were being encountered, the Sector Analysis Office in the AID Latin America Bureau supported a survey in Guatemala that was initially pro-

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[1] Conversations with James Riordan, then PASA from USDA, to USAID/Colombia.

posed to determine the impact of credit on small farmers. In time the focus of the study turned to providing guidance for agricultural sector policy. The report of the survey, for which planning was initiated in the latter months of 1973, was issued in 1975.[1]

The sample size for the Guatemala survey was 1,600, a number too small to sustain some of the conclusions of the report. In response to criticisms concerning the thinness of some of the sampling, additional work was undertaken. This work was completed in June 1976 and published in Spanish in four volumes. In the refinement of the findings, several regions of the country were dropped from the analysis since the sample was not sufficient to carry the conclusions in those areas.

The interesting aspect of this survey was the availability of high-powered U.S. experts at each step, including sample design. All data were brought to Washington for processing by specialists from the Bureau of the Census and were analyzed, in the main, by specialists from USDA. Both the Census and USDA groups worked in conjunction with AID in a cooperative support arrangement. The title page of the 1975 report lists two senior AID economists, five professionals from USDA, and five professionals from the Bureau of the Census.[2] It is unlikely that

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[1] "Guatemala Farm Policy Analysis: The Impact of Small-Farm Credit on Income, Employment and Food Production," Sector Analysis Division, Bureau for Latin America, AID, April 1975.

[2] Memorandum for the Record, from the Chief of the Bureau of the Census Supporting Team, Subject: Small Farm Credit Survey in Guatemala, dated January 21, 1974.

most small surveys will have available the professional manpower and expertise that were assigned to the Guatemala study. If such a level of professional expertise were necessary (or even one-half that level), then the state of the art in statistical surveys should be considered either primitive or too demanding of the time of high-level analytical talent, or both. These conclusions do not bode well for the staff of development projects who would like to undertake their own evaluations, their own baseline data collection efforts, and/or their own impact assessment through statistical surveys.

BOLIVIA

Two of AID's staff with experience in the Colombia and Guatemala surveys combined for a successful and rapid data collection and analysis effort in Bolivia, called the Southern Valleys Survey. The data collection methodology profited from previous difficulties, and utilized self-weighting sample design (which minimized problems of aggregation and interpretation) and hand coding and cleaning (which speeded processing). The effort began in January 1977 in the form of preparations for the logistical and personnel requirements. By February 1, 1977, a questionnaire had not been designed. In July 1977 the initial output, from a 750-respondent sample, was available.[1] This very

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[1] James T. Riordan, "An Assessment of the Target Region for USAID/Bolivia's Agricultural Sector Loan II," AID/Washington LA/DR/RD, July 1977.

rapid turnaround was produced by highly trained U.S. personnel, motivated Bolivian counterparts in the Ministry of Agriculture, and a substantial infusion of financial resources.

The actual methodology employed for the survey was customized for the isolated area of the Southern Valley. Changes were made in sampling design, as well as in other parts of the procedures that had been initially established, in order to maximize the efficiency and the timeliness of the output.[1] Such changes, to accommodate circumstances that had not been foreseen during the initial planning phase, likely explain a good deal of the success in obtaining useful results in a very short period of time. They were possible because of the heavy commitment of highly skilled U.S. specialists, outlined in Table 4.

TABLE 4

U.S. PERSONNEL COMMITTED TO SOUTHERN VALLEYS SURVEY, BOLIVIA

Agency	Specialties	Individuals	Person-Months
BUCEN	Mathematical Statisticians	2	5.5
BUCEN	Survey Statisticians	6	15.0
BUCEN	Data Processors	5	6.5
AID/W	Secretaries	2	2.5
AID/W	Agricultural Economist with survey experience	1	4.0

[1] Preston Brown, "Appendix: Survey Design and Implementation," (mimeographed) Regional Staff, U.S. Bureau of the Census, undated.

In addition there were locally recruited data collectors, a team of economics students who served as data aggregators and cleaners, and the cooperating counterparts in the Ministry of Agriculture. Costing the U.S. Bureau of the Census and AID personnel at $5,000 per month (comparable private sector specialists would be closer to $10,000 per month) and a $35,000 contract for Bolivian personnel, the total cost for the survey to AID would be approximately $200,000, or $270 per respondent. At commercial rates (that is, costing the overhead associated with U.S. Government salaries) utilizing the same personnel, the survey would have required nearly $500 per respondent.

The output of the survey makes economists want to roll up their sleeves and dig into the data bank. There is farm income by source, four aggregated levels of family income statistics, relationships with land use, land tenure, time to market and proximity to roads, migration, credit, training and technical assistance, and cropping and animal production patterns. The data have been used to provide back-up material for the Agricultural Loan II,[1] and other AID projects in Bolivia including Rural Roads II, Village Development, Agro-Business and inputs into the Development Assistance Program (DAP). The primary use of the output has been to show that there are definable and accessible target populations that meet AID's mandate for development assistance, and that obvious constraints (knowledge,

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[1] James T. Riordan, op. cit.

access, transportation, credit, marketing) impede modernization and change.

While tantalizing to the analyst, the principal use made of this well conceived and efficient survey has been in the AID project justification, review and approval process. After development constraints have been identified, the survey data provide little insight about how to design projects that will, at least cost, have the largest impact on the now-identified and defined rural poor. The survey designers make no claims that a "baseline" has been established that will allow careful remeasurement and attribution of the differences to AID's development assistance in the future. The Southern Valley Survey is an excellent example of what experience and knowledgeable survey designers can achieve when operating with few human or financial resource constraints. As such it provides a model which, if the output is worth the price, works quickly and efficiently, a fitting contrast to the Colombia and Guatemala examples.

CASE STUDY:
COMPUTERIZED FARM SURVEYS

ATAC has undertaken four computerized farm surveys.[1] Over the course of the past few years, ATAC has utilized a systematic approach to design the survey, collect and process the data and generate income measures relating differences in income and production to policy variables such as credit and technical assistance. To date the ATAC surveys have been one-time only; the "evaluation" surveys matched participants against nonparticipants. As mentioned previously, this after-the-fact methodology for the attribution of differences between participants and nonparticipants to project intervention is a second-best approach.[2] In several instances the surveys were meant to serve as baseline data, and resurveys were planned to use a stronger methodology.

The surveys contain farm input and output data much like the AID/Sector Analysis instruments in Colombia and Guatemala. ATAC's instruments have been refined over time to allow computer programming. The time frame is nine months for a 1,000-sample survey, at an estimated average cost of $168 per interview. Since

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[1] The American Technical Assistance Corporation (ATAC) produced under subcontract, a monograph previously cited: William H. Rusch, op. cit., to complement this report. ATAC has undertaken farm surveys under contract to AID in Chile, Guatemala, Honduras and Kenya.

[2] Without data to show change over time and control groups to help determine causality, assessment of actual change and the causal factors for such change becomes much more difficult and is dependent to a much larger extent on subjective judgments. Many evaluations are performed under such constraints and still provide a useful service to decisionmakers to the degree that they are capable of making good judgments using relatively unstructured information.

the conduct of statistical surveys is a technically demanding assignment, the continued use of one team leader has provided ATAC with a standardized set of policies and procedures that get the job done. The utility of the output for decisionmakers, and a comparison of the costs and benefits of the approach are treated in other sections of this report.

CASE STUDY:
THE LAGUNA (MULTIPURPOSE) HOUSEHOLD STUDY IN THE PHILIPPINES[1]

INTRODUCTION

The Laguna Household Study was undertaken by two American academics[2] in cooperation with four well qualified Filipino academics. The six senior academics formed a "committee," which developed the methodology, sampling frame, data collection instruments, and supervised the data collection. Analysis of the survey results has been performed on an individual basis.

The project appears to have been formulated in 1973, with a cross-section survey conducted on approximately 550 households in 34 barrios during the period April to July 1974.

After the completion of the cross-section phase of the survey, an "intensive" phase was planned and pretested. During the period September 1975 to March 1976, teams made three visits to each of 99 households to collect data on time allocation, dietary

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[1] Data sources include: Robert E. Evenson and Barry M. Popkin, "Notes on the Laguna Household Study in the Philippines" (mimeographed); copies of the survey instruments; three copies of research reports resulting from the survey; and discussions with Robert Evenson and Barry Popkin in the Philippines and the U.S.

[2] Robert E. Evenson, an economist from Yale University working with the University of the Philippines, Los Baños, under an Agricultural Development Council grant; and Barry M. Popkin, then of the University of the Philippines, Diliman, currently with the University of North Carolina.

intake and associated health data. The first visit of the "intensive" phase called for a 48-hour observation with interspersed interviews, while the second and third visits were for a 24-hour period.

THE DATA COLLECTION INSTRUMENTS

Some of the complexity of the data being collected can be gained from a listing of the instruments used during each phase.

Cross-Section Instruments[1]

1. Mothers Section

This instrument administered to mothers covered the following items. About 1½ hours of the mother's time were required.

a. Demographic, schooling, etc., of all household members;

b. Home production of goods including time spent previous week in major home activities;

c. Consumer expenditures -- past week, (food) past month, services, etc., past year (durables);

d. Breast-feeding;

e. Health beliefs;

f. Inventory of household assets -- present value, when acquired, etc.;

g. Household capital.

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[1] Robert E. Evenson and Barry M. Popkin, op, cit., pp. 4-8.

2. Fathers Section

This instrument was administered to the father. About 1½ hours were required.

a. Occupation, time to work;

b. Rice production, costs, technology (time allocation) recall, (including supervising time);

c. Rice yield and technology history;

d. Sugarcane, coconut, other crops, production cost and technology;

e. Home gardening income and costs;

f. Poultry and livestock, income and costs;

g. Income from wages (all household members);

h. Income and costs, business and professional (all household members);

i. Income and costs, fishing (all household members);

j. Income and cost, other sources;

k. Farm land use and value.

3. Health-Social Services Instruments

Administered to mothers. Required ½ to 1 hour. Includes some family planning practices information. Key sections were the morbidity and social service use patterns and expenditures during the previous two months.

4. Anthropometric -- Hemoglobin and Stool

Administered to most members. Department of Health personnel collected hemoglobin and stool on a partial sample.

5. Household Dietary Intake - 24 hours

This is a combination recall and dietary history record procedure. All household food intake during a 24-hour period was collected along with the value of food and source and the number of consumption units.

6. Barrio Questionnaire

Administered to Barrio officials, to obtain barrio infrastructure and institutional supply data.

Intensive Phase Instruments

1. Time Allocation

This procedure was developed only after considerable pretesting efforts to find a lower cost procedure. Our earlier experience with time accounting by families was that families do not do a very good job. Recall procedures appeared to have a fair amount of error. We determined that it could be best to adopt a participant-observation procedure. Interviewers stayed with the families (they were already known to the families) and recorded beginning and ending time (to the minute) of activities by all household members for 48 hours in cycle 1 and 24 hours in cycles 2 and 3 of the intensive phase. Some recall was necessary, of course, but this could be phased around observed activities to minimize the recall error. Joint activities, i.e., doing more than one during a period of time, were recorded. Cycle 1 was conducted from late September 1975 to late November; cycles 2 and 3 followed.

2. Dietary Intake -- Individual

A method for measuring individual dietary intake was developed and administered during the same week and for the same time periods, as was the case for time allocation. Intake was weighed and measured for all individuals. Food preparation time was recorded for major foods. Household food inventories were collected.

3. Food Expenditures -- Past Week for Selected Items

   Administered all 3 cycles.

4. Income -- Past Month for Wage, Gardening, Business, Professional Activities

5. Social Service Utilization -- Morbidity past 2 weeks

6. Breast-feeding

7. Nutrition Beliefs (only in Cycle 1 and farm survey)

8. Expenditures on Schooling and Clothing by Child -- only in special survey of farmers

9. Value of Children (from Dr. Rodolfo Bulatao) -- in special farm survey

10. Transfers between households (in special farm survey)

11. Rice production and costs (3rd Season) and credit use in special survey of farmers. Also corrections for allocation of agricultural expenses.

The Laguna multipurpose survey was an ambitious, complex and demanding undertaking. The questions used in each instrument were detailed: for example, a farmer with a working wife and children, who hired labor whom he paid in cash or kind for each activity in the last rice crop, would give 214 separate responses under one land-use-for-rice survey. The instrumerts also called for time allocations for all other crops, and general farm requirements.

Analyzing the Survey Output

There are several important considerations in analyzing the utility and replicability of the Laguna Household Study for rural development decisionmaking.

First, for successful completion, it required large amounts of professional time and attention. Barry Popkin was memorable in the Philippines for his unbounded energy and dedication to this project. He personally established the computer files that would allow access to easily identified and coded data from the surveys, and also provided the program that aggregated the bits and pieces of household consumption into understandable nutrition intake. The authors estimated that it required two person-years of senior time to bring the survey to the state that initial data analysis could be performed. This time, on the commercial market, would cost close to $100,000.[1] It is not included in any of the cost figures on the survey.

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[1] Going rates for experienced professionals on long-term overseas contracts with AID (at the time the survey was undertaken) ranged from $50,000 to $80,000 per year.

Second, actual costs, not including the senior U.S. academics, were approximately $75,000 divided as follows:[1]

Direct Survey Costs:		
Cross-Section	$15,000	
Longitudinal	3,000	
Intensive	12,000	
		$30,000
Data Handling and Processing:		
Basic Processing and Set up	25,000	
Analysis	7,000	
		$32,000
Analysis Support (stipends, secretaries)		$13,000

It is difficult to break out the costs of the cross-section survey from those of the intensive survey for data handling and processing. Making the assumption that processing and analysis support costs are in relative proportion to the survey costs, the cost per respondent of the cross-section survey would be $67.64. If 50 percent of the uncosted supervisor's value is added, the total approaches $150 per interview, a figure consistent with other detailed surveys. The intensive surveys were much more expensive. If it is reasonable to ascribe 50 percent of the joint processing and analysis costs to this portion of the survey, the cost comes to nearly $350 per household for all three visits.

Third, the output of the survey was intended as a research guide to a better understanding of important variables in rural

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[1] Evenson and Popkin, op. cit., p. 12.

Philippine households. Two of the studies were entitled "Economic Determinants of Breast-Feeding Behavior: The Case of Rural Households in Laguna, Philippines," by Barry M. Popkin; and "Time Allocation in Philippine Rural Households," by Elizabeth M. King. The two senior academics write, "The 'products' of the survey can be measured both in terms of M.S. theses, Doctoral dissertations and professional papers (so far, seven M.S., two Ph.D. and four or five additional papers have been completed or are near completion and several more are underway) and in terms of the value of the data set to other researchers."[1]

This output is as expected in solid academic work, and the Laguna Household Survey appears to be an excellent example of advancing knowledge of important parameters in rural behavior in this province of the Philippines. The question, one which is important since this model is being adapted for use in a large development program, is whether this approach can be used to provide either project design or project implementation guidance for rural development projects.

When this question was raised in the Philippines, an interesting set of answers emerged from both the senior academics engaged in the Laguna study and the AID staff responsible for the regional development of the Bicol, where the Laguna model, with modifications, was being tested for use as a longitudinal evaluation tool. One problem concerned priorities: some 40 percent

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[1] Evenson and Popkin, op. cit., p. 13.

of the cost of the Laguna survey concerned nutrition beliefs and practices -- a very small portion of the Bicol River Basin Development Program. A second problem concerned data reliability, particularly the economic data on household income. The questionnaire was voluminous. In farming areas where half a dozen crops are grown, with complementary animal production, the farmer was asked to recall thousands of data bits for entry into the questionnaire. It has not been documented that this information can be extracted in sufficient accuracy in a once-a-year survey to provide the basis for a longitudinal evaluation. A third problem concerned data processing. The Laguna study depended critically on the cooperation of academics with specialized skills. Robert Evenson's argument for the inclusion of a great variety of data collection points (some to fit everyone's specialties) was that it was important to interest the researchers who had the training and talent to undertake analysis. The same argument appeared from the AID staff assigned to the Bicol: the project staff did not have the time or capability to analyze the data; therefore, the data base should be sufficiently broad to encourage academics, both in the Philippines and in the U.S., to undertake analysis that would be useful for decisionmaking in rural development.

This is an interesting argument. Multipurpose surveys have demonstrated their utility in providing data for specialized studies, as in Laguna. However, we do not know of an ongoing assessment of the performance of a development project based upon

a multipurpose survey data base. This problem is compounded by attempts to obtain useful analysis from a group of disparate professionals whose work is based on individual needs. The Laguna Household Survey, proven to be excellent for researchers in micro-subjects, has not established that the technique will be valuable for decisionmaking in rural development project planning or implementation.

The Laguna Study is indirectly providing benefits to a development program. The American academics who participated in the Laguna Study are currently involved in planning the Bicol Multipurpose Survey (BMS) for the Bicol River Basin Development Program[1] where they are able to apply the lessons learned in the Laguna Study. Besides working with an improved methodology in the BMS by not repeating mistakes made in the Laguna Study, they have oriented their BMS work to a decisionmaking framework.

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[1] The BMS is described in Chapter Eight.

CASE STUDY:
CHAO PHYA IRRIGATED AGRICULTURAL DEVELOPMENT PROJECT, THAILAND[1]

This ongoing World Bank-supported project contains a monitoring and evaluation system that has been operating in pilot areas since 1968. Originally 50 farmers were interviewed twice a year, with an additional 200 added after new areas were opened in 1972. The survey work has been conducted by one department of the Ministry of Agriculture and Cooperatives, while the project is being implemented by yet another department, although within the same ministry.

The survey, conducted by government employees specifically assigned to this collection effort, includes data on land tenure and ownership, land use, farm inputs, water control, agricultural production and sales, and off-farm inputs, water control, agricultural production and sales, and off-farm work. Results are hand-tabulated and used to check the need for, and availability of, inputs related to crop yields. The longitudinal study has had excellent continuity: all of the original farmers are still in the panel.

Several conclusions of the survey designers are of interest. First, the results are currently hand-tabulated; thus, a small

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[1] Data sources are five published reports on the results of successive surveys taken in the project, and discussions with a representative of the technical assistance consulting team (ILACO) responsible for the surveys in Bangkok.

sample size is an absolute necessity. Only cross-tabulations have been produced, with ranges, means and averages. Second, the farmers' estimates of crop yields can be checked against crop-cutting data from the agricultural extension service. Very uniform patterns with high correlations exist, although the farmers' estimates are regularly 10 to 15 percent under the crop-cutting measurements. This is attributed to a difference in humidity between the freshly cut rice and the paddy offered for sale.

Third, the original questionnaires contained a great deal more socioeconomic information than do present versions -- information the Thai organizations thought would be useful. However, since the utility of this type of data proved to be of little consequence to decisionmakers, the questions have been dropped and the survey now concentrates on a small number of economic variables that can be extracted with some certainty and aggregated in a preplanned way to fit the decisionmaking process.

The consultant organization, ILACO, finds the data useful for planning other projects, and it is used by the extension service to modify the recommendations on the provision of inputs for rice crops in the area.

CASE STUDY:
THE RURAL DYNAMICS STUDY, INDONESIA[1]

An Indonesian research institute, Agro Economic Survey, has undertaken a Rural Dynamics Study (RDS) as a long-term, policy-oriented investigation of rural change, the aim of which is to provide policy recommendations relating to the three major goals of rural development in Indonesia: namely, economic growth, improved employment opportunities and improved income distribution in rural areas.[2] The Institute is staffed by Indonesian academics, assisted by Agricultural Development Council (ADC) foreign specialists under a Ford Foundation grant.

The initial efforts consisted of an 800-village survey using group interview techniques, which began in June 1975 and extended through September 1976. The village-level questionnaire contained nearly 1,100 variables, of which 1,045 were coded and computerized. One important objective of the study was to obtain a picture of village conditions, which would allow stratification for the selection of sample villages for a detailed study of households. However, the attempts to use factor analysis on the computerized data failed since missing data, when aggregated, made 25 to 95 percent of the variables chosen for study unusable.

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1 Data sources are three mimeographed reports from the Rural Dynamics Survey, a copy of the village-level collection instrument, and discussion with research staff in Bogor, Indonesia.

2 Agro Economic Survey, "The Rural Dynamics Study in West Java," Outline of Research Plans, Phase II, Revised December 1976, p. 1.

Stratification was then obtained utilizing three scaled variables: high to low access, high to low density, and good to poor irrigation.

The Institute staff judged 13.5 percent of the data collected from the village surveys to be unreliable and 31.3 percent to be only moderately reliable.[1] However, the 577 "strong" variables still overwhelmed the ability of the staff to analyze the resulting data.

In the Outline of Research Plans for Phase II, the authors wrote:

> The potential of this large body of village-level data (the collection and analysis of which was a new departure for Agro-Economic Survey staff) has yet to be fully exploited. Preliminary reports have identified significant changes over time and variations between regions and village in land-use, technology, institutions and access to development services, and the team will return to this material for more sophisticated analysis of the determinants of these differences and changes as particular questions and hypotheses develop, and in response to requests from other agencies. A number of students have begun to use the village-level data for research to complete degree requirements and the team will encourage continued use of the data in this way.[2]

The research staff conducting the Rural Dynamics Study estimated that data had been overcollected by as much as 50 percent.

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[1] Agro Economic Survey, "Preliminary Evaluation of the Reliability of Data Collected in a Survey of 795 Villages in the Cimanuk River Basin," Rural Dynamics Study, Methodology Report No. 1, December 1975, p. 5.

[2] "The Rural Dynamics Study in West Java," op. cit., p. 3. About a year later (March 1978), an ADC staff member working with the RDS reported that the most notable use of the village-level data (aside from internal RDS use) was in providing data for three graduate students to complete their masters thesis work.

They saw that the only way to limit the data collection effort was to specify more closely the hypotheses to be tested, but even this was seen to have limited utility in light of the many unknown relationships to be understood. The Institute also made an attempt to obtain decisionmakers' inputs into the determination of critical questions in rural development, to help specify the data needed for useful policy analysis. This was generally not productive, as the policymakers responded that the generation of data that would improve rural development was a responsibility of research institutes, and the selection of subject areas and the related data should be an important part of the Rural Dynamics Study.

In early 1977 the RDS completed a detailed household-level survey of 200 to 250 households in each of six villages. As in the village-level survey, the questionnaire covered about 1,000 variables. This survey was followed by a semi-annual survey of 60 households in each of four villages. It was thought that interviews after each of the two annual agricultural seasons would provide the most reliable data. However, it turned out that the annual survey was the more reliable. Enumerators reported that farmers had great difficulty breaking the year into parts. They were able to much more easily conceptualize, remember and aggregate on a one-year basis (paddy harvest to paddy harvest). The semi-annual survey was then changed to an annual survey.

The RDS is also carrying out a monthly survey of 120 households (60 in each of two villages). All family members over six years of age are interviewed by local school teachers one evening each month about the previous day's activity, consumption, income and expenditures and about the previous month as a whole. The questionnaire contains about 100 variables.

The monthly survey found that the semi-annual and annual surveys had a bias toward unreported labor use. Both the monthly and the less frequent surveys have identified many potential issues, but the survey information does not easily explain why some of the noted conditions exist. Questions such as why the larger farmers get the best credit terms or why the extension agent is not known by most of the farmers cannot be answered from the survey data. In order to better understand what the collected data mean, the RDS is sending the enumerators back into the field to do informal interviews with farmers, extension agents, local leaders, and others.

Another problem faced by the RDS is the overwhelming quantity of data being collected. Special data punch cards are being developed to hold the data from the monthly survey in a way that is practical for both hand-tabulation and computerization. The RDS has had trouble obtaining adequate, stable sources of financing to cover the costs of data analysis and report writing. The current staff are not skilled in written English, and a large number of draft reports in Behasa Indonesian are piling up. The

reports that emerge are in bulk form and not oriented to the needs of specified decisionmakers.

The lessons from the Rural Dynamics Study have not been systematically incorporated into government policymaking. However, the Director of RDS is well known among the policymakers and is often invited to participate in policymaking forums. As knowledge is gained from the RDS, the policymakers are relying on him more for identification of problems, descriptions of relevant conditions, identification of causal factors, and recommendations for appropriate action. As of this date, this process remains ad hoc and informal.

CASE STUDY:

INTEGRATED DEVELOPMENT PLANNING PROJECT, INDIA[1]

This large research project was oriented to improving the methodology for block planning in India. Surveys were used to collect data for block planning, and the resulting block plans were to be combined to serve as a district plan. The original project idea was to plan all blocks in a district and then to undertake the district plan. This idea was discarded, and the project surveyed one block in each of 20 districts. Each of the participating states received funds for local manpower and travel expenses to cover a three-year period. The Central Research Cell that supervised the survey was funded by the Ford Foundation at $200,000 per year from May 1969 to October 1974.[2]

The states played a role in planning the work and reviewing the final plans, but their participation in the project was not satisfactory. The states chose blocks that were already fairly well developed, resulting in a nonrepresentative sample. The final block development plans were discussed with state officials (State Planning Unit/State Development Commissioner), but this

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[1] Data sources include a copy of the Manual for Block Level Planning, and copies of the industrial, cottage industry, shopkeeper, village and household questionnaires, supplemented by discussions with the Council for Social Development, New Delhi, India.

[2] The project was undertaken by Central Research Cell, Pilot Research Project in Growth Centers, Department of Rural Development, Ministry of Agriculture and Irrigation, Government of India, in collaboration with the Council for Social Development and the Ford Foundation.

was too high a level and the block-level staff were not close enough to state officials for effective implementation, although the plans were all accepted at the state level.

The training of 120 project staff was undertaken by the National Institute of Community Development and the Indian Institute of Public Administration. The first course covered a six-week period and included some testing of the questionnaire as a training exercise. The second course was after the survey and processing to show how to do planning from the findings.

A pilot effort was used to specify the project framework and methodology and included interviews in 80 villages (40 in each of two blocks) over a two- to three-month period. When the project was fully funded, pretesting was done in five states, using about 20 villages in each state.

The village questionnaire was administered by two interviewers to a group of four to eight village leaders (three to four hours per interview). The questionnaire had been developed in the pilot project and then revised and pretested during training. The final questionnaire had been precoded but not again pretested, and this resulted in 20 percent of the questions being unusable.

Questionnaires other than the village and household questionnaire took about one-half hour each to administer. For the household survey the coverage was 270 to 280 households per block

(35 per village). The Shopkeeper, Cottage Industry and Industry questionnaires all posed problems. Shopkeepers and Industry people were not honest and their data had to be discarded. The Cottage Industry data were generally good, but only partially used since they were difficult to plug into the planning process. The household data were very good, but most of the operation for planning centered around the village-level questionnaire (for planning the location of services and infrastructure development in a block and subblocks). The household questionnaire was too detailed for that level of planning.

The surveying process took three months for the household and other questionnaires and three months for the village-level questionnaire. The project did its own card punching -- 500,000 cards and about 150 tape reels. There had been little prequestionnaire determination of analyses to perform, although there had been some early thinking on agricultural analysis that was never used. There was a good picture of the objectives for which the planning studies were being done. An effort was made to determine information needs for development planners, but the block planners for whom the planning was to be done were not consulted. Most of the analysis was dependent on first seeing the data.

The household data were recorded on tape and a program was prepared, but there was no remaining computer time. All of the key actors who supported the project have gone on to other assignments and the project was not extended to process the data. Only

about ten percent of the household data were used in the planning exercise. For block planning most of the information was found to come from the village-level survey. The household data were drawn on to check verification and accuracy of the village-level data. One lesson learned was that certain kinds of data are not obtainable at the village level (e.g., use of public health facilities was overreported at the village level).

The project did not include a follow-up to see how much the block plans and a block planning manual developed by the project were actually used by block planning units.

CASE STUDY:
NATIONAL SAMPLE SURVEY, INDIA[1]

The NSS is a nationwide sample survey initiated by the Government of India in 1950 to collect comprehensive socioeconomic data relating to different sectors of the economy of the country. It is an annual multisubject integrated survey being conducted in the form of successive rounds, each covering some topics of current interest to the Central and State Ministries, the Planning Commission and other interested organizations. The NSS has a governing council composed of representatives of ministries, states, universities, the Indian Statistical Institute and senior NSS staff. The council meets every two months to review information requests from ministries. The demand from the ministries is very high, since the government requires them to request NSS support before they can consider doing their own statistical operations. The NSS can undertake an ad hoc survey to meet a special demand, but this is usually discouraged. The state government statistical bureaus often handle such requests and generally have an interest in doing so, since problems are often state-specific.

A disincentive to having the NSS undertake special surveys is the lengthy processing time required. Once the data have been

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[1] From interviews with staff of the National Sample Survey Organization.

collected it can be as long as three to five years before results are available. Processing has been one of the biggest problems for the NSS. The data are hand-tabulated with the aid of IBM 407 accounting machines. The average processing time is about 30 months. Furthermore the NSS can only prepare tables of averages and percentages, although private researchers with access to computers have used the NSS data for sophisticated analyses. The plan is to shift to a computerized system in a few years, but this is a politically sensitive issue, since the many NSS staff who would lose their jobs are creating resistance to change.

The NSS covers every district using a sample of villages in each. The sample size (both villages and households) varies from year to year. Consumer expenditures and two to three other subjects are covered annually; rural and urban areas are treated separately. The survey is divided into eight subsamples, two covered in each three-month season with the two allowing independent results for comparison. The standard error is calculated as one-half the difference between the two samples: the standard error for the entire survey is the average of the standard errors for each of the 350 strata (usually a district is the stratum). The survey uses recall data over 30 days preceding the date of the survey, with households interviewed in a set schedule evenly over a month.

The NSS permanently employs 800 enumerators, who do about one to two households per day with interviews lasting two to three hours depending on the questionnaire.

The 31st round (1976-77) covered approximately 9,000 villages and was oriented to performance of irrigation and utilization of power in the rural sector and economic conditions of slum dwellers in the urban areas. In addition to the general sample of villages, there was a special sample of about 1,600 villages from the command areas of major irrigation projects commissioned after 1947 and medium irrigation projects commissioned after 1964. Data were also collected on minor irrigation projects commissioned after 1947 by selecting a sample of community development blocks. For the slum dweller survey the NSS separately surveyed a sample of declared slums with inadequate sanitary and water facilities and a sample of undeclared slums.[1]

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[1] National Sample Survey, *Instructions to Field Staff, Volume I, Design, Concepts, Definitions and Procedures*, Department of Statistics, New Delhi, India, May 1976, pp. 1-7.

CASE STUDY:
HOUSEHOLD SURVEY ON DISTRIBUTION OF PUBLIC EXPENDITURE ON SOCIAL SERVICES, WEST BENGAL, 1976

The basic objective of this survey was to learn how the benefits of free public services are being shared by people in different levels of society. The survey duplicates another that was conducted from July 1964 to February 1965, except for some minor improvements and additions that have been made.

The earlier survey, in order to save time and effort in the selection of sample households, utilized the sample of households in West Bengal that was canvassed in the 18th round of the National Sample Survey (NSS) conducted between February 1963 and January 1964. Some accommodation was made for households that had changed location, but this did not affect the sample or results as there was no intent to compare results with the NSS findings (the NSS survey focused on births and deaths).

The NSS design was stratified, two stage, using villages and households as the first- and second-stage units in the rural sector, and urban blocks and households as the first- and the second-stage units in the urban sector. In each sector there were four independent and interpenetrating subsamples that could produce independent and equally valid statistical estimates. The sample size of the 1964-65 public expenditure survey was about

one-twelfth that of NSS in the rural sector and about one-tenth of NSS in the urban and formed two independent and interpenetrating half-samples, covered by two different teams of fieldworkers.[1]

The 1976 survey did not attempt to use the same households but used a similar survey design and stratification in the same geographical area. The survey covered about 3,700 households with nine interviewers averaging one and one-half hours per interview and being paid on a piece rate basis at seven rupees per household, which included the preliminary work of drawing up the sample frame.[2] The survey took about six months, the card punching one month, and analysis and report preparation four to six months.

The survey did not attempt to collect income information since the Indian Statistical Institute has found it extremely difficult to obtain reliable income data due to public sensitivity to income questions. The survey is using household expenditures as a proxy for income. This is viewed as adequate although these income estimations will not take into account changes in level of savings. The expenditure data allows stratification of the population by level of living (economic class).

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[1] Tares Maitra, Banamali Dey, Nikhilesh Bhattacharya, "An Enquiry on the Distribution of Public Education and Health Services (sic) in West Bengal," *Sankhya: The Indian Journal of Statistics*, 1974, Vol. 36, Series C, Pts. 2 and 4, pp. 499-533.

[2] Indian Statistical Institute, Household Survey on Distribution of Public Expenditure on Social Services in West Bengal, *Instructions to Field Workers* (mimeographed) 1976.

The findings will be published in the form of technical papers, with no direct link to government policymakers. The information is being prepared for the Indian Council for Social Science Research, which is jointly funding the survey with the Indian Statistical Institute. The survey staff figures that the information will reach policymakers.[1]

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[1] Interviews with the staff of the Indian Statistical Institute responsible for the survey.

CASE STUDY:

"STANDARD PACKAGE" OF ECONOMIC AND DEMOGRAPHIC QUESTIONS[1]

The Standard Package was designed under contract to the World Bank as "an add-on to more specialized economic, fertility, health, nutrition or other human resources surveys in LDCs. It is intended to enhance the usefulness of such household surveys for economic analysis and policy."[2]

The introduction contains an illustration of an application of additional modules:

> ...a survey whose principle [sic] focus is employment could, by including a few migration questions, be used to analyze the relationship of employment differentials to migration, a problem of considerable importance in LDCs. Similarly, the addition of a few well chosen fertility questions to an income or consumer expenditure survey can provide useful data on the interrelationship between economic status and fertility at a minimum of additional cost.[3]

One very clear benefit of the "Standard Package" is the role it plays as a guideline to collectors without survey experience, who are not familiar with the problems of asking certain types of questions. The modules consist of specific questions, followed

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[1] Data sources are Eva Mueller and Deborah Freedman, "'Standard Package' of Economic and Demographic Questions," Population Studies Center, University of Michigan, December 1976, supplemented by an interview with the authors.

[2] Ibid., cover page.

[3] Ibid., p. 2.

by a definition of terms and instructions on recommended ways to pose the question, as well as potential pitfalls in presentation of the question. However the major purpose was not to improve the quality of specific questions (that may already be on questionnaires), but rather to add more variables to questionnaires to increase the analytical capacity of development economists.

The case studies have documented that a constraint in using survey data is not simply having the right data, but also knowing how to use the data. The report does contain some information on how specific data points can be used, for example:

> ...pay rates of employed family members are useful for income analysis, for identifying work of low productivity, for measuring the economic benefits of education, for an analysis of the economic consequences of migration, and for estimating the economic value of children.[1]

However, how the analysis is to be done is not dealt with. While the report emphasizes the importance of specific data for analysis, it assumes that the economist knows how to perform the analysis. Unfortunately many surveys collect data before the nature and detail of the analysis to be done or the skills and equipment necessary to analyze the data are considered, and therefore end up with much more data than can be used. Collecting more data before providing for improvements in analytical capabilities may not be helpful. The authors state:

> The "Standard Package" has been reviewed by a number of economists and other social scientists to assure

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[1] Ibid., p. 27.

> that it obtains high priority information. Even minor omissions will reduce its value for some analytical purposes.[1]

When the authors of the report were asked about the value of additional modules to a survey that has a limited purpose, the response was that the data need not be used in that survey, but rather collected by the survey (to profit from the economy of scale) and put on computer tapes for use by others. The "others" were identified as researchers, often Ph.D. candidates working on dissertations.

The critical link, however, remains that between the output of researchers and the decisionmaking process of those charged with designing and implementing rural development projects. The past examination of surveys conducted by researchers suggests that these linkages are neither clear nor certain.

The Standard Package was assessed in detail by designers of the Bicol Multipurpose Survey (BMS) in order to see which of its components or indicators might be a helpful addition to the BMS. Although the BMS covers a multitude of subject areas, the chief information systems consultant for the BMS development found that the Standard Package could not provide a single indicator that was useful. He found that the Standard Package was vague in its sociocultural orientation and did not include the means to obtain the hard economic, agricultural or demographic data that were

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[1] Ibid., p. 11.

needed. Ninety percent of the household activities of interest to the Bicol staff were not included in the Standard Package. Viewed as a whole, the Standard Package was found to lack the kinds of questions that would be useful to decisionmakers in the Bicol River Basin Development Program.[1]

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[1] Dr. Barry M. Popkin, a consultant to USAID/BRBDP, was the key actor in the development of the new BMS and supplied DAI with this information. A detailed description of the BMS appears in Chapter Eight.

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SECTION III

OTHER DATA COLLECTION

AND ANALYSIS OPTIONS

CHAPTER SIX

RECONNAISSANCE AND RAPID SURVEYS

INTRODUCTION

In this section an examination of reconnaissance and rapid survey techniques is divided by their uses in project design and project implementation.[1] Information requirements for these two phases are addressed in Volume One, Section I. The particular type of rural development project that is being addressed is one where direct benefits will accrue to an identified target population. Such a project has an identified "area" focus, either one contiguous "island," such as an Area Development Project, or a number of separated islands composed of target individuals or target areas surrounded by nontarget groups or locations. One of the first assignments in considering support to a rural development project is to identify and locate and enumerate the target population. The more broadly based the concept of development, and the more functional the ministries to be included (e.g., health, nutrition, agriculture, local government), the more likely it becomes that an area development project will emerge from the process of project design.[2] These "area" projects are the subject

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[1] The terms "reconnaissance" and "rapid survey" are used here interchangeably.

[2] A small farmer credit project may fall under the rubric of "rural development projects," but comprises assistance to only one component of rural development. When several or many components are to be assisted, the natural outcome of organizing the development assistance effort has tended to be an area-wide effort.

of the following chapter.

THE USE OF RECONNAISSANCE AND RAPID SURVEYS FOR PROJECT DESIGN

While there is no agreed-upon methodology for designing rural development projects, some approaches appear to be more successful than others.[1] Two discrete functions can be distinguished in project design: the collection of data on a local area, including data on the prospects for modernizing change, and the specification of a development intervention. These two functions are often performed by different people at different times. In some rural development projects, however, they are carried out simultaneously. When one team both collects necessary local-level information and designs the project (all within a limited time frame), the methodology may be called reconnaissance or rapid survey for project design.

CASE STUDIES

The implications for both these functions of project design are considered in the following pages. Various aspects of the

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[1] "Successful" is defined here to mean ease of implementation, commitment of all levels of the host country to implement as planned, and flexibility of design to allow modifications during the operational phase. Projects with these design features will be the focus of discussion in this section of the report.

data collection and analysis during the design phase as performed in ten projects will be examined. The projects will be compared on the following aspects:

- The assignment given to the design team;
- The duration of the project;
- The composition of the design team;
- The data collection methodology;
- The analytical techniques employed -- how the design was shaped from the data collected; and
- The cost in dollars and/or personnel for project design.

Each aspect will not be examined in all cases. However extremes will be identified and experience with AID/World Bank/FAO projects will be compared with smaller development assistance attempts.

Table 5 sets out the projects to be examined.

The Assignment Given to the Design Team

As might be expected, there was a broad variance among assignments given to design teams. The major international assistance donors have several different kinds of design assignments. In Gamo Gofa (1), North Shaba (2), Lofa County (3) and Leribe (6), the assignment was defined by a circle drawn on a map, with instructions to develop a project to benefit the area, based upon increasing agricultural production. All projects were to operate in an uncharted environment, with relatively unknown local

TABLE 5

PROJECTS USING RECONNAISSANCE/RAPID SURVEY DESIGN TECHNIQUES

		Sponsor	Environment
Ethiopia	Area Development Southern Gamo Gofa (1)	AID	Very remote, very traditional agriculture[1]
Zaire	Area Development North Shaba (2)	AID	Remote, traditional agriculture[1]
Liberia	Area Development Lofa County (3)	IBRD/AID	Isolated, traditional agriculture[1]
Afghanistan	Area Development Logar District (4)	AID	Easy access, complex agriculture
Chile	Reform Sector Farm Management and Technical Assistance (5)	AID	Easy access, very complex agriculture
Lesotho	Area Development Leribe (6)	FAO	Isolated, traditional agriculture[1]
Kenya	Area Development Tetu (7)	Kenyan Government, IDS	Easy access, traditional agriculture[1]
Nigeria	Area Development Uboma (8)	Nigerian Government, Shell Oil	Isolated, traditional agriculture[1]
Colombia	Area Development Caqueza (9)	Colombian Government, IDRC	Easy access, traditional agriculture
Bolivia	Campesino Development (10)	DESEC/PVOs	Isolated, traditional agriculture

NOTE: Numbers in parentheses designate the names that will be used in the textual discussion. DAI had a role in the design of the following projects: (1), (2), (3), (4) and (5).

[1] Traditional agriculture in Africa differs significantly from traditional agriculture in Latin America, including the level of technology and the importance of land constraints.

interrelationships and production possibilities. In Chile (5) the project was defined, prior to the arrival of the design team as assistance to land reform recipients in improving their entrepreneurial capabilities -- teaching them how to extract the most from their farm. Over time, the assignment was modified to include the provision of all technical assistance and extension services. Designers in area development projects in Logar (4), Leribe (6), Tetu (7), and Caqueza (9) were given assignments to improve the quality of life of small farmers or less progressive farmers, while in Uboma (8), where the population was homogeneous and uniformly poor, the focus was upon developing the overall community.

In the DESEC (10) project in Bolivia, the designer was also the project director, organizer, fundraiser and guiding intellect. From his experience in bringing peasants together in their own interest, he formulated the outline of the project and utilized the specific concerns of various peasant groupings to identify the technical assistance -- beyond the organizational aspects -- that would be provided. In one sense there was no project design, but rather the beginning of a continuing effort to establish development change among poor rural people.

The Duration of the Project

It is not the years of external assistance that distinguish project design efforts, but the difference between continuous efforts, as in Tetu (7), Uboma (8), Caqueza (9) and DESEC (10),

and time-phased external assistance with a clear beginning and ending date. In continuous projects design is a reiterative process of trial and error lasting a number of years. Two of the projects, Caqueza (9) and Tetu (7), were experimental, deliberately attempting to find ways of reaching the smallest and most neglected farmer living in an area where there were large differences in income and agricultural production practices. There was a commitment to proceed without knowing precisely how. Large development assistance projects, by contrast, require project plans, agreements with host country governments and established methods of proceeding, which mark the end of the "design phase" (as it is being used in this report) and the beginning of implementation. The design process and its data collection and analysis components are often shaped by requirements from the funding agency, which involve the allocation of resources across projects rather than the design of a particular project. In Tetu (7), for example, the design flowed from a carefully tested survey instrument which was able to identify farmer groups by an income proxy with sufficient policy variables to allow the generation of an approach to reaching the lowest farmer categories. In Chile (5) a computerized farm survey calculated income levels which allowed comparisons between the target group being considered for assistance and other low income small farmers. The Tetu survey created a solid knowledge basis for the generation of a design with no requirement to justify the project. The Chile survey was used to justify the project within the AID

approval process, but had little impact on project design

The Composition of the Design Team

The extremes are again provided by a comparison of DESEC (10), where the designer was also the implementor, and other AID-supported projects [Gamo Gofa (1), North Shaba (2), Lofa County (3), Logar (4) and Chile (5)], where special teams were constitued whose purpose was to generate a project design that could be approved, negotiated and implemented. In all but one of these projects [Lofa County (3)], the designers were also the basic data gatherers, responsible in the field for the data collection and analysis. In the World Bank/AID project in Liberia (3), the Bank paid for an extensive and detailed survey of the locality scheduled for the project. The designers then worked from the study report. The original data collectors and analysts were not represented on the design team.

In projects (6) through (10) the design was accomplished by teams that collected the basic data and included individuals who were to be part of the implementation team.

An analysis of the actual makeup of the teams is not particularly enlightening, since many of the larger development assistance efforts carried honorific team members, who had some approval responsibility and thus were assigned to the design team. The functional areas of specialization in projects (1) through (5), all supported by AID, included:

- Rural sociology/anthropology, particularly necessary in areas where the local social/cultural structure could act as a serious impediment to development;
- Agricultural economics, practically oriented:
- Local institutional development, unless included in the first two functional specialties;
- Information systems (to allow monitoring and evaluation as the project was implemented), unless included in the preceding functional specialties;
- Technical areas, practically oriented; and
- Rural development project design specialist, a team leader who could integrate the various components into a coherent and implementable project design.[1]

Additional categories were often required to generate material to satisfy headquarters-based approval requirements. In projects (1) to (5) these included: economists to provide the income projections, cost/benefit analyses, and rates of return over time; and cash-flow analysts to provide various tables on such things as loan repayments.

The situation in projects (6) through (10) was significantly different. Leribe (6) was designed by a rural sociologist working with a counterpart from the extension service of the government, Tetu (7) by a research staff of the University of Nairobi (Institute for Development Studies) in conjunction with local officials who were to implement the project, Uboma (8) by a rural

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[1] Occasionally one specialist could handle more than one functional area.

sociologist/agronomist who would implement the project, Caqueza (9) by the extension service team of the Colombian government (ICA), and DESEC (10) by the man who would direct the program. The design teams that were destined to be involved in implementation included many of the specialists listed on page 158. Those that did not include such functional specialties within the design team often lacked important data (Leribe, with excellent sociological data, floundered on the details of agricultural economics) and/or added technical specialties to the team over time [as in Uboma(9)].

The Data Collection Methodology

In this section the data collection methodologies used in each project will be described separately.

Gamo Gofa (1)

This extremely remote area of Ethiopia was entered by the design team, utilizing a predetermined set of data collection requirements, which had been tested in a prior project. After initial meetings to gain a knowledge of national-level priorities and objectives, the team departed by vehicle, spending the next 24 days in the field. Provincial and district officers were contacted at each point along the way. Newly created peasant associations were visited to determine if they could be used as the focus for a development assistance effort, and to obtain from the leadership whatever basic information existed on the local area. From traditional local leaders (chiefs and subchiefs

of tribal units) it was possible to gain an understanding of agricultural production techniques as practiced throughout the yearly cycle and to understand how this had changed in the recent past. It was also possible to ascertain two kinds of data from the chiefs; first, why some farmers obtained higher yields and income than others, and second, the nature of production and income constraints encountered by all farmers -- access, marketing, availability of inputs, technical knowledge, etc.

Since it was quickly determined that local (provincial and district) planning and implementation capability was nearly nonexistent, a significant portion of field time was devoted to understanding the existing system and the alternatives open for improvement.

The team, which contained in one form or another all of the functional specialists listed previously, included two agricultural economists and was able to divide into several groups for the purposes of examining local agricultural systems. Early attempts to use group interviews, which had proven successful in Zaire, did not prove productive, as the low level of development and lack of prior exposure to outsiders did not allow a free exchange of ideas in a group setting.

At each administrative division the team was joined by local officials who were able to speak local dialects and languages and provide insights into the interface between the local population and the various arms of the government. Data collection

utilized a reiterative survey approach, asking questions until answers became consistent, dropping questions that did not apply or became confirmed in all the various local environments. The team lived in local villages and found informal conversations and communications to be a valuable part of the data collection process.

North Shaba (2)

The first project design field trip was undertaken by a group of nine technical experts who visited remote (North) Shaba Province in Zaire. This first team apparently lacked a unifying rural development philosophy, and was unable to complete what was then used as the interim stage of AID project design called the Project Review Paper (PRP). During a subsequent two-week period, a rural development specialist, drawing on the technical data, completed an interim project design. Some months later, he led a second design team to the project area. During this trip, he traveled with two anthropologists through the majority of 120 villages in the area. The data that were obtained significantly altered the findings of the first design team, which had confined its investigation to the major towns.

The data collection effort proceeded on several fronts. First it was clear that infrastructure was a serious constraint; detailed information was collected on the state of roads and bridges in the area during a 21-day bicycle trip. These observations were complemented by a great many meetings with local farmer groups, a technique that worked well in this environment.

The local leader would assemble a group, which would then spend many hours with the team, providing information on farming systems, variance in local yields, overall development constraints and the interface with the government's extension service. The male members of the design team were unable to communicate with local women, a task that was handled by a female anthropologist member of the design team.

Marketing was also viewed as a serious constraint and a marketing specialist interviewed local merchants and farmers in the project area. The team also met with key members of the public and private sector in both Lubumbashi and Kinshasha.

Lofa County (3)

This project was initiated by the World Bank which commissioned a study reported to cost more than $400,000, and involving a large collection team which spent four months in the field. The very detailed report was used as the basis for project design. The IBRD officials on the design team did not see the need for additional fieldwork, and only by dogmatic insistence did the AID-funded design team members proceed to the field for a five-day visit. Data collection for the short field trip centered on the institutional capability of projected cooperatives to provide the services envisioned in the project. After returning to the capital, the majority of the time was spent in meetings with national-level officials and negotiations on implementation of the overall project.

Logar District (4)

Within easy access of the capital city, Kabul, Logar District was still a virtually unknown, closed society. The design team elected to complete three surveys in addition to observation and in-depth interviews with local officials. First the team initiated a village-level survey of 18 communities, beginning of necessity with local leaders in group meetings. Second, they completed a household survey of nearly 200 residents of the area. Third, they arranged for interviews with a sample of 125 women (undertaken by a CARE-MEDICO team of Afghan women) in the project area.

The surveys consumed six weeks (including hand-tabulations of results) and the efforts of four design team members, one local anthropologist, two government officials and six data collectors and coders. The coding and cross-checking took longer than the original data collection. The final evaluation of the effort by the design team concluded that the data obtained would be very useful in guiding an implementation plan, providing much of the knowledge necessary to program intelligently the first year. However, the attempts to complete interviews and tabulate the responses, all in six weeks, went well beyond the data requirements needed for an acceptable project design.

The analysis provided interesting insights on data sources in rural Afghanistan. Group interview responses were validated by household interviews, but represented only groups who had

best access to water, the scarce resource in the Logar area. The village leader and his immediate friends provided a portrait that was at the high end of the spectrum of economic potential. At the other economic extreme was the farmer (from information obtained in the household survey) who, due to perpetual shortages of water, could plant wheat on his land only when climatic conditions permitted. The complexities of the water distribution system, water rights, negotiations between users at the head and foot of irrigation canals, could not be captured by survey technique.

The project could not have been designed by a team that had only the results of the three surveys to review. Important information involving dynamics -- information on the potential for change, points of intervention, possibilities for government assistance -- was generated through informal interviews, combined with in-depth discussions with knowledgeable local officials.

Chile (5)

In this environment it was not complexities of local cultural practices that inhibited rapid design. The farmers are economic men, the agricultural system is complex and often mechanized, and the constraints are understandable by cursory investigation among projected project participants. Two problems arose to stall the project: (a) an inability to get agreement at high government levels to plans proposed at lower levels; and (b) unknown technical solutions to commonly agreed problems, such as the cost of para-

technicians, the technical assistance service package to be provided, and the level and extent of subsidy needed for the first years to maximize delivery of benefits to farmers and minimize the outflow from the national treasury.

USAID/Chile provided $11,500 for the Ministry of Agriculture to hire the services of a well qualified design team from a Santiago University, and then provided an additional amount to pay for a pilot project to answer the technical unknowns. AID/Washington paid for a U.S. design team of the composition already listed, which made six trips at various times over the course of two years, a total of 12 person-months. Cooperation with the government officials and hired consultants has been excellent, planning has been collaborative and detailed, but changes in government agencies and personnel slowed the final approval of the project for over a full two years after initiation.

Besides the work of the design team and the six-month pilot test, data collection techniques included a computerized farm sector survey (whose only utility was to provide a justification of the project on equity grounds), studies of the agricultural sector, studies of the potential return from land reform sector holdings, and studies of the (illegal) sales of land reform property by beneficiaries.

Leribe (6)

This FAO-supported project was designed by a rural sociologist and a Musotho counterpart who was assigned from the extension

service of the Ministry of Agriculture. Over the course of a ten-month crop cycle, they obtained access to the area and to the chiefs there, and utilized village meetings to gather data and to provide the initial interest in and support for the project. They also gave the project manager the following studies, based upon surveys completed:

- Area Inventory;
- Land Holder Survey
- Tractor Owner Interviews;
- Grazing Stock Census; and
- Grazing Stockholders and their Practice.

These were in addition to the overall recommendations that were provided to the project management on design recommendations.

Data collection techniques were the stock-in-trade of the rural sociologist, who started with open-ended interviews until items of common interest allowed the generation of a closed interview form, allowing consistency and comparisons among the answers. The five surveys have numerical data, but no information about the sample frame is available to help determine whether the surveys were, in fact, statistically sound. The survey work, which has been used as a model for the data collection requirements of other area development projects in complex tribal environments, suffered, as did the project, from a lack of attention to traditional agricultural practices, and the constraints and potential for introducing change.

Tetu (7)

This project was designed on the basis of a computerized farm survey, a statistically accurate sampling of the farm population in Tetu district, Kenya. Researchers from the Institute for Development Studies of the University of Nairobi prepared, pretested and supervised the baseline survey, which was specifically designed to generate a dependent variable -- a "progressiveness" index among the area's farmers -- and sufficient independent policy variables that some action recommendations (project design) could be extracted from the data. It is one of the very few cases that have come to light where the design could proceed with some directness from a large, statistical sample survey. Based upon the results of the survey, the researchers carried the findings to local officials who, in an exchange of ideas on possible solutions to the identified problems (the lack of or the inappropriateness of communications with less progressive farmers), helped to generate the design of an experimental project supported by the IDS researchers.

Data collection for the baseline survey was completed by field extension workers especially chosen and trained for the assignment; theses interviewers became personally involved in the accurate completion of the questionnaires. Computerized analysis revealed few of the missing or impossible answers generally found when disinterested (nonparticipant) census takers are used.

Uboma (8)

This project was initiated and supported by Shell Oil Company (Nigeria) and utilized an approach that had been found to work in Italy. A Nigerian agronomist (who was clearly a working rural sociologist) selected the area of the project, obtained the approvals needed to begin a data collection program, and undertook a series of surveys of the nearly unknown and unstudied remote area:

- The Physical Environment of Uboma;
- The People of Uboma;
- The Diet, Food Economics and Health of the Uboma People;
- Land Tenure in Uboma; and
- Agriculture in Uboma.

The majority of the data collection for the studies was undertaken by the agronomist during long intensive semistructured interviews, occasionally taking a full day with one household. During a nine-month agricultural cycle, he completed the data needed for an understanding of the local area, its potential and constraints, and identified possibilities for development assistance. In particular, he plotted the natural family groupings to allow the project to begin with a homogeneous and cooperating social unit as the basis for early innovations.

Caqueza (9)

This project utilized the staff of the Colombian Research and Extension Service (ICA) in an experimental attempt to reach

and benefit farmers with three or fewer hectares. Since the project was approved prior to entry into the area, the design was not distinguished from the beginning of implementation. The overall concept was based upon a visit to the Puebla project (CIMMYT in Mexico), with a concern for the special needs of small farmers in an area with highly skewed income distribution and landholdings.

The project attempted simultaneously to involve local leaders in providing technical assistance to small farmers, to give lectures and demonstrations in convenient meeting places, to identify and enlist the cooperation of small farmer leaders, to conduct experimental plantings of improved corn and potatoes, and to initiate a baseline survey -- which was not available until the end of the second year of the project.

A conscientious data collection effort during later years of the project provided management with many insights on the failings of the original effort. The only systematic data collection in the first years that could be used as a part of project design was that of field trials of responses to fertilizer and other modern inputs. Later this lack of understanding of the local small farmer, his constraints and concerns, was to be cited by researchers in the project as the major reason for the slow adoption rate and the lack of project impact for the first three years.

DESEC (10)

Project design data was collected by the implementor insofar as the organization of peasants was concerned. The peasants, once organized, provided the data necessary to identify those areas where they desired assistance and would actively cooperate with technical specialists.

The Analytical Techniques Employed --
How the Design was Shaped from the Data Collected

In all five of the projects supported by AID, (1) through (5), the design was undertaken as the data were extracted and refined, more sites were visited, and more instances recorded. This reiterative process was used most extensively in (1) and (2), where the remoteness of the area caused the design team to travel on a track that could not be repeated. As project ideas were established, hypotheses were tested and refined at the next location to generate the project design.

This process utilized the integration capacity of the design team members, fitting data from a new environment into the knowledge and experience gained from other rural development projects. At this point in time it is an art form, to be tested as more rural development projects are implemented and evaluated.

Three of the projects utilized computer-aided survey research: Chile (5), where the results were used in project justification; Tetu (7), where the results fed directly into

project design but only when combined with local officials' recommended solutions to the problem identified by the survey; and Caqueza (9), where the computer was used only after the right questions (i.e., detailed, technical questions which could be asked by closed interviews) had been asked, several years after project initiation. The remainder of the projects relied upon human integration skills for analysis. No better methodology has been found for the complex requirements of rural development project design when applied in a relatively short time frame.[1]

The Cost in Dollars and/or Manpower for Project Design

The smaller, more deliberate projects utilized one to three design members over the course of ten months to three years of collection, testing and modification. Large projects funded by international assistance agencies cost more. The average cost of AID-supported designs, assuming four or five necessary team members for a total of 12 to 15 person-months were to be used at commercial rates, is approximately $100,000 per project. This includes two design missions: an interim project report and design, and a final project report and design, the latter completed after a second trip to the field to obtain data and make modifications requested by headquarters. A good portion of this time, perhaps as much as 30 percent, can legitimately be charged

[1] This short time frame may be the most appropriate approach if the flexible "process" approach to project design and implementation is used.

against implementation requirements, as the design team explains convinces and negotiates with local, district, provincial and national officials to obtain their inputs, modifying the project to ensure active cooperation in the implementation stage. Nowhere was this function more important than in Leribe (6), where the sociologist's contacts with local leadership provided the access through which the project could be initiated.

Separating the data collectors from the project designers increases the cost significantly. In Lofa County (3), where data collection was funded by the World Bank, the design costs were three to five times that of most AID-supported projects. This is because the data collectors did not know what information was most important for the project designers and were thus forced into generating a great number of pages of interesting, but not useful material.

Hand-tabulated, quota sampling surveys, as conducted in Logar (4) have utility for the implementation stage, but provide a wealth of data not required for project design. It was the process of data collection, rather than the results of the tabulations, which provided the insights used in project design.

Conclusions Concerning the Use of Reconnaissance and Rapid Surveys for Project Design

A number of factors have been shown to be important in deciding which data collection and analysis techniques are most

appropriate for different levels and types of projects. Table 6 provides a qualitative judgment on how the particular data collection and analysis technique chosen in the ten cases studied influenced final project design.

For large development assistance programs, the most appropriate mix of data collection and analysis for project design is a team that collects the data, analyzes it on the spot, and designs the project during reiterative field visits. At least two such visits are necessary if the project must go before an international agency to be funded; the first is to create the original design and obtain the cooperation and collaboration of host country and local officials and leaders, and the second is to make the modifications required by the approval process, and reaffirm what had been agreed during the earlier visit.

The human capacity to integrate many disparate data bits in a holistic fashion is critical to the design process. Computerized, consistent responses to one-time surveys have limited usefulness, although they may be important in the approval process and valuable during implementation.

A standardized data collection document for rural development projects would significantly improve the state of the art. At present different data are analyzed by different designers to produce noncomparable specifications and design. If the designers were working from a common data set, their insights would soon be tested against the common sense of other designers and other

TABLE 6

THE INFLUENCE OF DATA COLLECTION AND ANALYSIS TECHNIQUES ON PROJECT DESIGN

	Estimated Cost of Project When Initiated (in $U.S.)	Data Collection and Analysis Technique	Length of Time Before Data Were Available for Project Design	Influence[1] on Project Design
Gamo Gofa (1) Ethiopia	$1,000,000+	Rapid Survey	4 weeks	Critical
North Shaba (2) Zaire	1,000,000+	Rapid Survey	4 weeks	Critical
Lofa County (3) Liberia	1,000,000+	In-depth Field Study	6 months (estimate)	Important
Logar District (4) Afghanistan	1,000,000+	Rapid Survey Quota Sampling Surveys	4 weeks 8 weeks	Critical Minimal
Chile (5)	1,000,000+	Statistical Computerized Farm Survey Rapid Survey Special Studies Pilot Test	6 months 4 weeks 4 months 6 months	Minimal Important Important Important
Leribe (6) Lesotho	1,000,000+	Survey with Sampling	10 months	Critical
Tetu (7) Kenya	25,000	Statistical Computerized Sample Survey	6 months (estimate)	Important
Uboma (8) Nigeria	250,000	Survey with Sampling	10 months	Critical
Caqueza (9) Colombia	200,000	Statistical Survey (Baseline)	24 months	None
DESEC (10) Bolivia	100,000	Rapid Survey	2 months	Critical

[1] Critical = Project could not have been designed in the absence of data and insights generated.
Important = Provided significant insights into project design.
Minimal = Little use made of the actual tabulated data except for justification purposes.

projects and the art form would (perhaps) improve. One such data requirements document has been created and field-tested by DAI in Gamo Gofa (1), and will be modified and reported in a forthcoming AID-supported study on rural development project design and implementation in 1978.[1]

THE USE OF RECONNAISSANCE AND RAPID SURVEYS FOR PROJECT IMPLEMENTATION

The focus of this report is on the large methodical systems for data collection and analysis in rural development, a difficult field where there is still much to be learned. Yet small studies, observations, and analysis by field teams can provide excellent insights into the complexities of project implementation.

There are many examples of rapid survey techniques used in project evaluations. For many AID projects an evaluation team is brought in to assess progress to date (often after several years of implementation), identify problems and make recommendations for corrective action. It is rare to have even a semblance of baseline information, and the evaluation team must estimate change through qualitative judgments based on what information exists,

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[1] DAI is under contract to produce a handbook for AID on rapid survey data collection for rural development projects.

supplemented by observations on quick field vists. In such evaluations conducted by DAI, rapid survey techniques similar to those used in DAI's design activities have proved effective within the constraints of resources allocated to these evaluations and the lack of available data. In each case a project evaluation was planned, but there was no ongoing information system that prepared data for the evaluation. This may be less of a problem in the future, as some recent projects have included information gathering components that can service the scheduled evaluations.

In the Internal Project Systems Chapter, the Sederhana Irrigation Project case study examines one attempt to prepare for an evaluation in the very early stages of project implementation. When the actual evaluation was undertaken it was found that the extensive data collection had been inadequate, and a nonstatistical rapid survey was used to meet the perceived information needs.

The use of observation, simple indicators, and small studies often separates projects funded by missionaries or other private voluntary groups from large multimillion dollar international assistance efforts. In the smaller projects the director and staff have regular, perhaps daily, contact with the population to be assisted, and thus the benefit of direct observation of development impact. Larger projects apparently generate a bureaucracy of their own, where the demands of paperwork, reports,

vehicle maintenance, and payrolls keep top decisionmakers from the direct contact so important to understanding the results of the development assistance. Small projects utilize small studies, observations and reconnaissance as a matter of economic necessity. In the past, large projects have relied on statistical surveys, some monitoring and little direct observation.

The following techniques have proved useful in keeping projects on track, and providing the first line of information to be used in a monitoring and evaluation system.

Regular Reporting from Project Participants

This technique has been used to good advantage in projects that are based upon, or encourage, meetings of participants. DESEC (10) utilized community-level, regional-level and national meetings, with election of leaders to represent the base units at each higher level, to report on progress, establish priorities, identify problems, and to assume many responsibilities, for example, encouraging credit repayments from lagging community members. As a first line of defense the establishment of regular meetings, attendance of the project staff at these meetings, and a report that reaches the top decisionmakers would be a necessary ingredient in any advanced information approach. None of the World Bank or AID projects surveyed contained evidence of the use of this inexpensive technique.

Special Studies

Most of the larger projects designed in rural development in the past few years contained Project Monitoring and Evaluation Units (PMEUs) with undefined responsibilities. Some of these units have conducted special studies at the request of project management, which often focused on special problems and anomalies. The questions were often geared to discover what was and was not working and why, within a particular aspect of an overall program. In the Caqueza project (9), special studies were used to particular advantage. When the adoption rate proved to be far below what had been expected, a special study exam ned all recipients of credit for corn farming to determine why, with money available, they did not utilize proven high-returning techniques. The answers led the project into a most interesting area of small farmer perceptions of risk and risk aversion. Many other PMEU-type units have commissioned small studies, often without statistical or census-type survey methodology. Generally, knowledge can be gained by identifying who is or is not conforming with the behavior that has been recommended, and talking with representatives of the identified groupings to determine why. Since the purpose of these small studies should be to inform management and to allow a revised set of implementation directives, they should be available rapidly and presented in a way that is useful to policymakers.

The data collection and analysis techniques used for project design are those that are most applicable for small studies:

rapid survey techniques, reiterative questioning until answers become consistent, determination of constraints that are general and constraints that are specific to a particular group. Since the distributional aspects of rural development are of special importance, the inability of low-income groups to make use of project assistance is a problem of particular importance, which can be detected rather easily by the use of rapid survey techniques. Such techniques are an important part of an overall project monitoring and evaluation system which will be discussed in Chapter Eight.

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CHAPTER SEVEN

FARM RECORDS

INTRODUCTION

Farm records are a potentially powerful instrument for capturing the reality of economic behavior and decisionmaking in a rural environment. As such, they may have considerable utility to rural development practitioners, to policymakers, and to the managers of farm enterprises themselves. Because they focus on individual farm enterprises and depend on frequent collection of extremely detailed data, farm records differ significantly from other information-gathering techniques. Farm records systems differ among themselves as well; the respective strengths and weaknesses of various systems are analyzed in this chapter.

Farm records can be adapted to fit the operations of any farm enterprise, whatever its form and size. Whereas interviews and surveys based on questionnaires attempt to gather data at one or at most a few discrete points in time, farm records can assemble data on a continuous basis. Entries are normally made at very short intervals, and this feature increases the quality and quantity of the data entering the system. This result, in turn, enhances the precision of key parameters in the operation of the farm enterprise, including:

- The main characteristics of the ecological setting and the constraints on agricultural production;
- The amount and quality of its operational landholding (whether owned, rented, leased or held on some other basis);
- The farm inventory, availability of capital, and access to and use of credit;
- The labor inputs from various sources, and the costs or obligations incurred;
- The level of technical knowledge brought to bear on production of different crop lines and types of livestock;
- The quantity, quality and availability of inputs;
- The outputs from each crop line and their utilization and distribution; and
- The costs and returns for each crop line and for the farm enterprise as a whole.

There are two levels where the components of a farm records system fit together: first, at the level of the farm enterprise itself, aggregation of data is needed to determine overall technical and financial performance; and second, the farm enterprises themselves may be compared as units within a larger agricultural system (defined in terms of a geographic area, size of landholding, mode of agricultural production, or some other variable that is held constant). These two potential analytical requirements place a premium on internal consistency and articulation of the records in use on an individual farm enterprise, and on standardization of the data generated, so that meaningful comparisons can be drawn between farm enterprises operating in the same system.

In developed countries, the principal use of farm records has been within the enterprise itself, that is, on the first of the two levels described above. Farmers have put various types of records systems to valuable use in analyzing the commercial viability of their farms, in allocating resources so as to maximize profitability, in calculating tax liabilities, and so forth. Detailed and systematic comparisons between farm enterprises, on the other nand, have not been undertaken very frequently in developed countries. Two reasons for this would appear to be the variability of individual farm accounting systems, and the reluctance of some farm managers to share with others information they regard as confidential.

In developing countries, farm records have a somewhat broader range of potential uses, since they tend to be associated with efforts to introduce technological change and to improve productivity and farm income. Several of the farm records systems developed in recent years were formulated by students and researchers who were concerned with how rural households obtained basic subsistence. In such cases direct benefits from information produced by the system have usually been limited to an advanced degree, or published academic monographs (often both), for the researchers involved. A broader purpose may be served if the insights gained through the research are integrated into the formal knowledge base concerning agriculture in the developing countries. Even these incremental gains, however, tend to have little discernible impact on decisionmaking at the project, program or national levels.

In keeping with the thrust of this report, it should be emphasized that farm records systems can also be designed for specific practical applications, especially where technical assistance is being supplied. For practitioners attempting to aid the development of agriculture and further the well-being of rural populations, a properly designed and implemented farm records system can be a valuable tool in producing appropriate technical recommendations. This tool can be applied at several different levels: (1) from the point of view of the individual farmer or farm enterprise, to aid in decisionmaking with a view to improving productivity; (2) from the point of view of local institutions, to aid in decisionmaking with a view to implementation and supervision of programs; and (3) from the point of view of national planners, to aid in formulation, implementation and evaluation of national development goals and programs.

By its very nature, when established in the context of a rural development project, a farm records system demands close interaction between project management, project field staff, and farmers in the target population. There are analytical advantages, arising from the very detailed data obtained, and there are operational advantages, as well, in the productive use of extension and other field staff. A fully operational system effectively forces these personnel to pay attention to the activities of small farmers, and to the constraints they face. In this regard a farm records system elicits an important (and desirable) behavioral change on the part of technicians and

paratechnicians. The responsibility for observation and data collection at this level represents a major departure from conventional procedures, in which these agents meet information quotas by concentrating on larger-scale and more "progressive" farmers. It also contrasts sharply with census exercises in which collectors or enumerators have little or no interest in the data they collect, since they themselves will never use them in their subsequent work.

An operational farm records system usually requires careful planning and several tiers of personnel to implement it. In the following case studies of such systems, the term "enumerator" refers to the individual who actually does the recording of raw data. In some of the cases the enumerator is the farmer himself or a member of his family. In others he is a hired individual who records the raw data on the basis of regular visits to the farm, observations, and discussions with farmers. All of these systems have found it necessary to involve supervisors who can post the entries made by enumerators to more complex records or accounting forms, often modeled after a double-entry bookkeeping system. Frequently the supervisor is the critical element in the operation of the system, moving raw data into categorized forms that are useful to the analyst and to the final user of the data obtained by the information system.

CASE STUDIES

The following examples of farm records systems have been selected for examination because they fulfill the definition given above, and because they have either been implemented in practice, or are in the planning stage, in developing countries.

The 11 case studies have been numbered according to the alphabetization of the names assigned to them in Table 7. In the following pages, a number of features have been isolated in each of the systems reviewed so as to allow for comparison among the cases.

TABLE 7

SUMMARY OF FARM RECORDS SYSTEMS REVIEWED

Number	Designer's Name	Title of System	Country
(1)	BAEcon	Farm Business Analysis	Philippines
(2)	DAI	Farm Records Program of the Farm Management Project	Chile
(3)	FAO	Farm Management Data Collection, Analysis, Storage and Retrieval System	Tunisia, Ethiopia, Nepal, Barbados, Ghana Tanzania
(4)	Hatch	Farm Journal	Peru
(5)	Hayami	Private and Social Accounts of the Peasant Economy	Philippines
(6)	Jackson	Agricultural Development Bank Accounting	El Salvador
(7)	Norman	Cost Accounting Approach	Nigeria
(8)	Price	Cropping Systems Program	Philippines
(9)	Spencer	Cost Route Method	Sierra Leone
(10)	Tollens	Cost Route Method	Zaire
(11)	Winch	Cost Route Survey Method	Ghana

BAEcon (1)

INFORMATION SYSTEM:	Farm Business Analysis, Philippines
MANAGED BY:	Bureau of Agricultural Economics, Department of Agriculture
STATED PURPOSE:	...to provide more reliable information for the analytical evaluation of the performance of different farm types and the enlightenment of agricultural development projects currently implemented or planned for implementation in the future. In summary, the effort hopes to arrive at "grassroot" findings for the formulation of workable policies and programs to uplift the condition of rural families and the nation as a whole.[1]
DATA COLLECTION:	Fieldwork covered one year, all of 1976. Sample included 1/10th of farm households and 1/20th of nonfarm households in one province in each of ten regions. Enumerators were third-year high school students, living at home, who kept records for their own families. Survey instrument: questionnaire, used daily.

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[1] *Farm Business Analysis of Selected Agricultural Farms in Ten Provinces in the Philippines Through the Establishment of Farm Records*, Manual of Operations, Principles of Farm Bookkeeping, System and Numbering of Accounts, A Joint NFAC-USAID-BAEcon Research Study, 1976.

DAI (2)

INFORMATION SYSTEM:	Farm Records as a Medium for Technical Assistance, Chile
MANAGED BY:	Private sector institutions, including cooperatives.
STATED PURPOSE:	(1) To increase the entrepreneurial/managerial capability of the reform sector farmer. (2) To answer the question: "What data are needed in order that the Technical Service Unit (which will provide technical assistance) can analyze overall and individual entreprise performance and develop better farm management and crop technology for the next year?"[1]
DATA COLLECTION:	Fieldwork planned to cover seven years,[2] once started. Sample will be recent recipients of family farms under agrarian reform, to number 30,000 by end of five years. The majority are assumed to be functionally literate, and will serve as own enumerators, supervised by one paratechnician per 50 farmers making twice monthly visits, one local project agronomist per 500 farmers, and one regional project agronomist per 2,500 farmers to supervise paratechnicians. Survey instrument: Two sets of forms,[3] including one for enterprise data (daily entries), and the other for interviews and comparative analysis. Cost projected at $120 per year per farm, when technical assistance is included.

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[1] "Recommendations for a Standardized set of Farm Records for the Technical Assistance and Farm Management Project in Chile," Development Alternatives, Inc., March 7, 1977, p. 5.

[2] "Interim Report, Farm Management Project Chile," Development Alternatives, Inc., May 3, 1976.

[3] "Farm Records as a Medium for Technical Assistance: A System for Land Reform Farmers in Chile," Development Alternatives, Inc., February 15, 1978.

See also "Report on a Seminar on Information Systems to Support the Farm Management Project in Chile ICIRA Project," Development Alternatives, Inc., January 30, 1976.

FAO (3)

INFORMATION SYSTEM:	Farm Management Data Collection, Analysis, Storage and Retrieval System, Tunisia, Ethiopia, Nepal, Barbados, Ghana, Tanzania.
MANAGED BY:	Food and Agriculture Organization of the United Nations.
STATED PURPOSE:	...a micro-economic approach to policy analysis and planning by agricultural development planners and policymakers,...an effective data delivery system for collecting, analyzing and making available the necessary information for this purpose. Such information would include input/output coefficients, factor/product price ratios, capital/credit requirements, land/labor relationships and productivity/income potentials, as derived for existing and alternative production structures, and organizational arrangements. Only then can the impact of alternative policy measures regarding small farmer development be adequately assessed and effective strategies devised and implemented.[1]
DATA COLLECTION:	Sample estimated at 130 farms in Tunisia, where at least one round has been completed. In Ethiopia the format is being changed; in Nepal the work is ongoing, with small-scale testing; in Barbados the system is ongoing; in Tanzania the work is started but not fully adjusted; in Ghana the status is unknown. Survey instrument: Questionnaires.

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[1] K. H. Friedrich, "Small Farmer Development and FAO's Farm Management Data Collection Analysis and Storage/Retrieval System," paper presented to the Sixth Session of the FAO Regional Commission on Farm Management for Asia and the Far East, Manila, April 28-May 6, 1975 (AGS:FMF/75/6).

See also "Farm Management Data Collection, Analysis, Storage and Retrieval System. Section B - Data Collection Sub-System," Second Draft, October 1975 (AGS:MISC/75/1).

HATCH (4)

INFORMATION SYSTEM:	Farm Journal, Peru.
MANAGED BY:	John K. Hatch
STATED PURPOSE:	To present an "insider's" view of traditional small farm practices.[1]
DATA COLLECTION:	Sample of 30 corn-growing farmers in the valley of Motupe, of which 22 provided complete data. Fieldwork covered one crop cycle, from April to December 1972. Each farmer served as his own enumerator, with supervision from the manager. Survey instrument: Farm Journal, requiring twice weekly entries.

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[1] John K. Hatch, "The Corn Farmers of Motupe: A Study of Traditional Farming Practices in Northern Coastal Peru," Land Tenure Center Monograph No. 1, University of Wisconsin at Madison, 1976.

HAYAMI (5)

INFORMATION SYSTEM:	Private and Social Accounts of the Peasant Economy, Philippines.
MANAGED BY:	Yujiro Hayami, International Rice Research Institute, Los Baños, Philippines.
STATED PURPOSE:	To provide a comprehensive quantitative description of the peasant economy.[1]
DATA COLLECTION:	Fieldwork covered one year, from June 1975 through May 1976. Sample of 11 farmers in a rice-growing village (Barrio Tubuan, Pila, Laguna Province), who served as their own enumerators, supervised by two full-time research assistants. Survey instrument: Farm records, daily entries. Cost estimated informally at $600 per farm.

[1] Yujiro Hayami, "Anatomy of Peasant Economy," a collection of papers by the International Rice Research Institute.

JACKSON (6)

INFORMATION SYSTEM:	Agricultural Development Bank Accounting, El Salvador.
MANAGED BY:	Cooperative officials.
STATED PURPOSE:	Accounting and financial management directed towards credit repayment but with the establishment of sound financial organizations equally important.[1]
DATA COLLECTION:	Sample consited of all of 20,000 cooperative members in approximately 150 cooperatives. Fieldwork is current, with coverage varying from one to five years. One to three members per cooperative serve as enumerators; they are generally literate, but lacking formal education, and are under the supervision of one bank staffer, one agronomist and one accountant, visiting each cooperative at least once monthly. Instrument: Complete set of accounting records, cash and daily journal, membership cards, labor sheets, expense and receipt slips, used daily. Cost was impossible to estimate.

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[1] Dr. Donald R. Jackson, Development Alternatives, Inc., written communication.

NORMAN (7)

INFORMATION SYSTEM: Cost Accounting Approach, Nigeria.

MANAGED BY: David W. Norman, Rural Economy Research Unit, Ahmadu Bello University, Zaria, Nigeria.

STATED PURPOSE: (1) To develop a suitable methodology for undertaking farm managing surveys in the northern states of Nigeria. (2) To determine the quantity available to farmers of the factors of production and to determine the use made of them. (3) To investigate factor-factor, factor-product and product-product relationships.[1]

DATA COLLECTION: Fieldwork covered one crop cycle from April 1966 to March 1967.

Sample included 124 farmers from villages of Hanwa, Doka and Dan Mahaway.

Study used approximately one enumerator per 20 farmers, plus one crop weigher per 40 farmers at harvest. Supervisor visited each enumerator weekly.

Instrument: Questionnaire, completed twice weekly.

Approximate cost of each farm record was $139.

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[1] David W. Norman, *An Economic Survey of Three Villages in Zaria Province, 2, Input-Output Study, Volume I*, Samaru Miscellaneous Paper 37, 1972.

See also David W. Norman, "Methodology and Problems of Farm Management Investigations: Experiences from Northern Nigeria," Michigan State University, African Rural Employment Paper No. 8, 1973.

PRICE (8)

INFORMATION SYSTEM:	Cropping Systems Program, Philippines.
MANAGED BY:	Edwin Price, International Rice Research Institute.
STATED PURPOSE:	To give an accurate account of the use of land, labor, power, and cash in various farm enterprises. This information on resource utilization is then used in the design of new cropping patterns....[1]
DATA COLLECTION:	Covered one crop cycle, 1977. Sample of 50 farmers in the vicinity of an outreach site, who acted as own enumerators, supervised by one barrio assistant per barrio (each sample comprises six to ten barrios). Instrument: Farm records, used daily. Cost was approximately $150 per farm record.

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[1] E. C. Price, "Research on the Economics of Cropping Systems at IRRI," paper prepared for IRRI Annual Review, January 28, 1977.

See also Nicanor Roxas, Dennis Garrity and Edwin Price, "The Calibration of Instruments for Collecting Farm Level Data," (mimeographed).

SPENCER (9)

INFORMATION SYSTEM: Cost Route Method, Sierra Leone.

MANAGED BY: Dunstan S. C. Spencer

STATED PURPOSE: The aim was to compare the alternative production systems for rice in order to determine through a linear programming model the combinations of the rice industry to gross national product.[1]

DATA COLLECTION: Fieldwork covered one crop cycle from February 1971 through July 1972.

Sample included 240 rice-growing farmers, with one enumerator per 30 farmers, having nine to twelve years of school. Enumerators were supervised by frequent but irregular visits.

Instrument: Weekly questionnaires.

Cost per farm record estimated at $41.40.

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[1] Dunstan S. C. Spencer, "The Efficient Use of Resources in the Production of Rice in Sierra Leone: A Linear Programming Study," unpublished Ph.D. dissertation, University of Illinois, 1973 (34/09-A. 74-05705. 177 pages).

See also Dunstan S. C. Spencer, *Micro-Level Farm Management and Production Economics Research Among Traditional African Farmers: Lessons from Sierra Leone*, African Rural Development Paper No. 3, Michigan State University, 1972.

TOLLENS (10)

INFORMATION SYSTEM: Cost Route Method, Zaire.

MANAGED BY: Eric F. Tollens

STATED PURPOSE: The emphasis...has been on the collection of micro-level data in rural areas since a lack of farm level data is a major handicap for policy analysis of rural employment and rural development at the local, regional and national levels.[1]

DATA COLLECTION: Fieldwork was carried out from 1971 through 1974, using a sample of 20 farmers in "a typical representative rice-producing village," and one enumerator per ten farmers.

Instrument: twice weekly questionnaires.

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[1] Eric F. Tollens, *Problems of Micro-Economic Data Collection on Farms in Northern Zaire*, African Rural Employment Working Paper No. 7, Michigan State University, 1975

WINCH (11)

INFORMATION SYSTEM: Cost Route Survey Method, Ghana.

MANAGED BY: Fred Everett Winch III

STATED PURPOSE: To obtain farm level input/output data in order to determine the relative importance of land, labor and purchased inputs in the production of rice and to estimate the relative financial costs and returns of the major rice production systems in current use.[1]

DATA COLLECTION: Fieldwork covered one crop cycle, May 1973 through February 1974.

Sample included 161 rice-growing farmers; 143 were retained for analysis. One enumerator per approximately ten farmers was used, supervised weekly. Enumerators had middle school certificates.

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[1] Fred Everett Winch III, "Costs and Returns of Alternative Rice Production Systems in Northern Ghana: Implications for Output, Employment and Income Distribution," unpublished Ph.D. dissertation, Michigan State University, 1976 (37/02-A, p. 117, 76-18687, 212 pages).

Comparisons

The 11 farm records systems reviewed in the preceding section run the gamut from pure research efforts [e.g., Spencer (9)] to internal project reporting systems [e.g., DAI (2)]. Some are small-sample systems; others are designed to handle large samples. Within this diversity, however, all the systems show certain fundamental similarities, notably in their dependence on close rapport between data collectors and farmers. [In the case of Winch (11) only nine farmers out of 350 refused their cooperation in the exercise.]

These systems may usefully be compared on the basis of the following criteria:

- The settings and conditions in which the system was applied;
- The purposes for which the data were collected;
- The costs of the systems;
- The meaningfulness of the data collected;
- The validity of the data; and
- The replicability of the system.

Operational Settings

The small farmers who are the intended beneficiaries of rural development projects -- and the focus of farm records systems -- often live far from urban areas and seats of government. For this reason their activities, production strategies and perceptions of risks and returns are not always clearly visible to key decision-

makers. Even when a serious attempt is launched to collect and analyze basic data on these phenomena, effective communication between enumerators and small farmers cannot be taken for granted. Psychological, cultural and sociological factors may interfere with this process, as the experience of many social scientists indicates. One logical way of bridging the gulf is to make use of local people, in some instances the farmers themselves, in the task of data collection. Adequate supervision must be planned for, of course, but the benefits of this approach are self-evident.

Where resources exist for a fairly extensive program of farm records use, and where the sample members are functionally literate to some degree, it may be decided to have the farmers themselves keep their own records. This decision was taken in Chile in the case of DAI (2): the survey instruments were purposely designed so that land reform farmers could understand the basic recording of data without sacrifice of accuracy, and eventually maintain the principal records themselves.

Educational levels within the target populations require considerable differentiation in the approach to collecting micro-level data. In the example of Chile, the farmers were judged capable of listing each transaction accurately in a daily farm journal, using the date, quantity and cost. While this was borne out in initial field tests, the error rate quickly multiplied when the farmers were asked to allocate these transactions to different crop categories or to credit accounts. At this

stage of data processing it was necessary to introduce supervisory assistance.

With much smaller samples Hatch (4) and Hayami (5) provide examples of farm records systems where farmers acted as enumerators, but relatively highly educated supervisors were posted at dense spacings to supervise the operation and ensure accuracy of the data collected. In BAEcon (1), a rather novel method was adopted: the enumerators were chosen from among third-year rural high school students, who lived on small farms and were thus able to keep the relevant production and consumption records on the activities of their own families.

The systems of Norman (7), Spencer (9), Tollens (10), and Winch (11) all operated in conditions where low educational levels among the sample precluded dependence on the farmers themselves for keeping records. In all four cases the enumerators who were recruited were school-leavers who had been socialized in a very different milieu from the farming environment in which they were to work.

The availability of funds also tends to constrain the choice of data collection methods and the scale of operations. The financial resources to which managers of a farm records system have access affect both sample size and the staffing complement of the system. Where relatively massive amounts of money can be brought to bear on satisfying information needs, as in FAO (3), which was supported by the World Bank, large allocations can be

made both to enumeration and to supervisory efforts that will generate large amounts of data.

Limited time also tends to be an important consideration in choosing a method of data collection. In Winch (11) civil servants were enlisted and given some basic training in the use of the survey instruments; they undertook the enumeration task for rates of pay varying from the equivalent of $31.32 to $33.06 per month, depending on their grade, plus per diem and travel expenses, through a single crop cycle. The effort was not continued beyond this time, although the data obtained during the cycle proved sufficient for the researcher's Ph.D. dissertation. A data collection effort programmed over a span of several years, however, such as DAI (2), can afford to ensure that enumerators are thoroughly trained, because they are expected to fulfill the data collection function over the whole life of the effort.

Purposes for Which the Data were Collected

Farm records have sometimes been seen as the preserve of expatriate graduate students, who compile masses of detailed data, which are carefully removed from the developing country as soon as the research is complete. The data are then fed into a computer at a faraway university and, when analyzed, enable the students to fulfill the research requirement of their Ph.D. degrees. For obvious reasons, the influence of this type of research effort on development policies and projects within the countries where data were generated has been of a very limited nature.

While such academic research may eventually find a use in helping to explain the constraints -- technological, financial, climatic, economic, or other -- under which a particular system of agriculture labors, the impact on the sample of farmers or farms chosen is virtually nil. Sophisticated analytical procedures -- for example, imputing shadow prices to some of the variables -- raise the data to higher levels of abstraction, and aid in formulating theoretical models of agricultural systems. Yet unless a deliberate effort is made to derive policy implications from these models, the entire exercise will have negligible impact on the production practices and income levels of the small farmers who were studied.

Other farm records systems have been designed with the specific intent of improving small farmer management and decisionmaking. This approach specifies farmer understanding as one of the critical variables in the development process. Systems of this type focus not only on improving the individual farmer's knowledge of how best to use his resources, but also on improving the technical recommendations made by the extension service or other intervention agent. This approach necessitates careful monitoring of relationships between the content of technical assistance, the mode of delivery, and the results of extension programs: the analysis must be made across a number of farms with a view to explaining high and low results. This type of farm records system is particularly useful in the context of project implementation, for it allows the management and staff of the project to

track the results of their efforts and analyze the underlying causes.

In addition, farm records can serve as the basis for the most consistent and accurate measurement of changes in farm technology, output, and farm income. Optimally, evaluation exercises require measurements of this kind; farm records can be most useful for this purpose, since they reduce recall error and enhance the confidence level of imputed project results (e.g., the differences revealed between preproject status and postproject status). They appear to be more powerful in this regard than techniques based on periodic surveys.

Methods and Levels of Analysis

With records maintained on even a small sample of forms, the tasks of tabulating, processing, and analyzing data quickly become formidable. Tollens (10) reported that, in his survey of rice producers in Zaire, each interview required 25 rows to be filled in, and thus 25 punch cards: counting two visits per week and a one-year length of survey, this adds up to 2,600 punch cards per farm. A sample of 100 farms would thus require about 260,000 punch cards. The volume of tabulation involving a sample of 30,000 farms would thus be unmanageable.

Winch (11) reported that, in the Ghana survey, six rice production systems were identified on the basis of: (a) the power source for initial land preparation, and (b) seed variety. "The task of data tabulation was broken into successive operations

across sample farms rather than coding all data for each farm separately," and this step was "very time-consuming."

The survey instruments used in FAO (3) were designed with computer processing in mind. Accordingly, the forms were precoded, and the system involved a lengthy process of cleaning, punching, and checking for validity, all based on appropriate software.

National planners require a selection of data at farm level on which to make analysis and reach policy recommendations. If it is to be useful to the farmer, data collection must also involve a certain amount of selectivity, creating important tradeoffs. For instance, it may be decided to restrict data collection to the most important crop lines on the farm, without attempting to be comprehensive. In complex agricultural systems -- those significantly above subsistence agriculture, where the market has a strong influence on the allocation of farm resources -- farmers may have as many as ten crop lines. Such complexity forces the designer to decide what lines to cover in the records kept. At the same time, there is a need for an "overall" farm record of income. This may necessitate aggregating a number of crop lines into a residual ("other") category. With the assistance of competent but low-level supervision, a semiliterate, or a literate member of the farm family, can provide these data and thereby allow the crop-specific, as well as "overall" farm income to be computed. This will provide a sufficient basis for further

analysis (computer-assisted if possible, but hand-tabulated if necessary) of the causes of variations in output and income. These findings in turn may produce recommendations leading to improved farm management and technology in the coming crop year.

Costs

The costs of a farm records system depend critically upon how costs are allocated. A Ph.D. student may be uncosted (free), in relation to the farming system studied, but he or she is rarely the basis for a continuing project. The opportunity cost of high-level expatriate talent invariably prevents replication on a significant scale. If local enumerators are hired, however, their costs can be computed. If the supervisors are also charged with extension, credit application, and technical assistance responsibilities, the portion of the total costs of such a system to be allocated to the keeping of farm records is difficult to estimate. In DAI (2) it was estimated that for $120 per year a Chilean cooperative could deliver technical assistance to a farmer in the reform sector, basing the technical assistance upon a system that supplied accurate knowledge of the actual cost of production and returns to the farm. Some of these costs could then be allocated to the process of applying for and obtaining production credit. Other costs would be incurred in preparing a farm plan for the coming year, and in providing technical assistance in the production of specific crop lines. The farm records provide a basis for improving the farm plan and the technical assistance, as well as the individual farmer's ability to manage his own resources.

In short, comparisons of costs can be made among research-oriented farm records systems; but project-oriented farm records systems are components within larger development assistance efforts, and therefore can only be measured along with the costs and potential benefits of the entire project. In the case studies reviewed above, varying levels of precision in cost estimation were encountered, reflecting the complexity of these issues.

Meaningfulness of Data

The managers of all 11 farm records systems under review stated, in one form or another, that they were trying to generate data that would provide meaningful insights into the farm economies they were trying to measure. Yet the criterion of meaningfulness depends very much on the prior conception of such an economy in the mind of the manager.

Meaningfulness of data is manifested mainly in the choice of the variables on the part of the designer of the system. It should be obvious that, if a survey manager defines his variables in a unique fashion, the results obtained from his survey will also be unique and will not be strictly comparable to any other. Tollens (10) and Hatch (4) counted time spent walking to and from fields as part of labor time, but Norman (7) did not, reasoning that to have included time in walking would have biased upwards the data on labor input for crops grown in fields far from the village.

When it comes to the analysis of data collected by farm records systems, problems of variability in definition are compounded. Much hinges here on how costs are imputed. Frequently analysis of farm records leads to the conclusion that dissaving is going on in the household; in Hayami (5), however, supervisors were reportedly told to make accounts balance in such a way as not to show dissaving.

One dimension of the farm economy that is obviously lacking from a farm records system that operates only through a single year or crop cycle is that of time. The data collected are likely to be strongly influenced by weather, prices, and other factors beyond the farmer's control. There is no way to get around this problem except to have the system operate over several years or cycles.

Finally, it may be said that, overall, the conception of the farm economy that the user carries in his head dictates to a large extent the design of his survey instrument, and thus his choice of variables. Norman (7) specified labor utilization as the key variable to be measured, since he hypothesized that labor was the limiting input in production performance. For a proportion of farmers who are more advanced and who are freely selling their produce on open markets, on the other hand, farm income may be a more appropriate variable to concentrate on in obtaining reliable data, as was the case in DAI (2).

Validity of Data

All the survey managers included in this review agreed that a major advantage of the farm records systems is their reduction in recall error. This is an obvious but crucial point. Data obtained by entries of transactions in a farm journal, or weekly summary of costs and returns, will be more accurate than those obtained by asking the farmer in a year-end interview to estimate (from memory) his total costs and returns for the preceding year. Recall ability of farmers in developing countries, however, does not appear to be a simple straight-line function of elapsed time, but is a more complex phenomenon.

The only systematic investigation of the validity of data obtained from farm records within the scope of the present review was carried out in connection with the data collection effort in Price (8). In this investigation, Price compared estimates by farmers of their farm area, their labor time, and their crop yields (three very basic variables), with controlled measurements made by his research staff. To obtain a controlled measurement of labor time, for instance, the researchers timed each operation (in a nonobtrusive way of course) using a stopwatch. They found that the farmer's estimate was usually the greater of the two, probably because the farmer normally included time spent in preparing for fieldwork and in getting to and from fields in his estimate of labor time. The researchers estimated the following equation from their two sets of data:

Farmer's estimate = 1.67 (stopwatch estimate) + 0.33

The coefficients of this equation were significant. The researchers concluded that the constant term (0.33) represented the number of person-days spent in preparing for work and in getting to and from the field, and the coefficient 1.67 represented the upward adjustment that is necessary to account for that portion of the farmer's time when he is not actually performing the field operation (e.g., time during which he is resting, or making repairs on his tools). Similar equations were estimated by Price for the other two variables.

Spencer (9) has pointed out that recall ability among African farmers depends on the variable involved. In a small experiment connected with his rice production survey in Sierra Leone, he tested a group of farmers with daily interviews, obtaining recall data for one to seven days. Analysis of variance showed no significant differences in the reported sample means between the data for one and seven days recall, in the amount of rice harvested and in person-hours of family labor used per day. But there was a significant difference in the case of value of food and drink purchased.

In all cases, attempts to reduce recall error by stepping up the frequency of data recording raise the total cost of the survey. According to Norman, one should ideally decide the acceptable degree of measurement error and then determine the minimum frequency of interview and the necessary research resources to meet the requirement.

One of the survey managers, Winch (11), mentioned that sample farmers overdeclared their acreage by about 30 percent. Accordingly, it may be well to mention here the problem of deliberate bias introduced by respondents. Winch feels that in his case the respondents may have had an interest in overdeclaring acreage. This type of bias, of course, may be present in all kinds of surveys and is not peculiar to farm records systems, but a solid understanding of conditions in a particular farming environment will allow the analyst to identify those variables or data points where bias is most likely to occur.

Replicability

With regard to replicability, all of the farm records systems reviewed could be replicated, given the required financial resources. However, only two of the systems were designed in such a way that they could be made self-sustaining. Jackson (6) was designed so that the members of the cooperatives bore all costs, either through salaries, fees and interest charged, or through voluntary labor. DAI (2) was designed so that the costs would be borne by the farmers themselves, out of the added benefits they were expected to derive from improved farm management practices (resulting from the feedback of information obtained in the records).

The distinction between research-oriented and project-oriented systems is especially important where replicability is an issue. In the latter type of farm records system, emphasis

is placed on establishing a self-sustaining, self-financing system. Often the techniques for achieving this goal must be developed on a quasi-experimental basis; financial viability will usually be a function of increased production and incomes among the target population, which in turn depend on identifying appropriate interventions, extension techniques and technological packages; and this process of identification is itself tied to the farm records system. In practice these relationships imply that, in its initial stages, the farm records system will need to be subsidized, up to the point where the "payoff" (increased production and income) allows participating farmers to assume the burden of financing the system.

For research-oriented systems the criterion of replicability depend more on the technical design of collection instruments, strategies of sample selection, and techniques of measurement. If financial support is forthcoming from sources interested in the research findings, replication of survey efforts can be accomplished by researchers trained to utilize a common methodological and theoretical framework. Inevitably, though, as in-depth replications are attempted in differing environments, the critical variables and data points to be covered in the farm records system will shift. This in turn complicates the task of making rigorous, quantitative comparisons between results obtained in different farming systems.

CONCLUSIONS

Farm records can be a powerful tool in understanding the details of small farming systems. The level of detail, the potential for accuracy, the depth of understanding of farmer perceptions and cultural practices, are all beneficial in a well-structured farm records system. The costs can be high, particularly if the farmers themselves cannot be trained to serve as the principal data recorders.

No one universally applicable farm records system exists that can satisfy the information needs of all decisionmakers. On the contrary, it is essential to tailor a system to its specific environment -- which entails identification of relevant data points in small farmer behavior (e.g., labor inputs in one setting, use of production credit in another). It may be said that, because the extent of existing knowledge on small farmer behavior and adaptations to technological change is severely limited, major efforts are needed to develop ongoing farm records systems that will be able to operate on a self-supporting basis.

More important than serving as research tools for academically oriented studies, farm records have their greatest potential when directly tied to the provision of extension to small farmers. The extension agents, or paraprofessionals, work directly with the farmers to capture the details of their farming system and their agricultural and income returns over the

full cropping cycle. The best of the local area producers can be identified and interviewed, and the resulting insights incorporated in next year's recommendations. In the optimum model, the farm records serve to record farmers' "field trials," as the knowledge base continues to improve, and recommendations can be derived for other farmers in similar circumstances. The Chile farm management project presents the only known example where this approach has been directly integrated into private sector extension and farmer support organizations. Other such combinations of records and extension may be forthcoming in the future.

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CHAPTER EIGHT

INTERNAL PROJECT SYSTEMS

INTRODUCTION

To satisfy the information requirements of ongoing projects, internal project systems may use one or several of the data collection and analysis techniques already discussed, including reconnaissance and rapid surveys, statistical surveys and/or farm records. The project may also combine these techniques with others that directly involve the staff in collecting, analyzing, aggregating and reporting data on activities within the project. Alternatively, the project may use an outside group to serve as staff for the purposes of monitoring and evaluating ongoing efficiency and progress.

This section is devoted to an analysis, not of the individual techniques detailed in previous sections, but of how these techniques might fit together under the authority and responsibility of the management of a project. Examples will concentrate on cases that are not purely one or the other of the technical methodologies but that show how a variety of techniques can be employed by project staff in support of ongoing decisionmaking in rural development.

CURRENT INTEREST IN ONGOING MONITORING AND EVALUATION SYSTEMS

Internal project systems, by definition, are limited to the implementation phase of a project's existence. The information responsibilities in this phase are often listed under the heading of monitoring and evaluation systems. The Agency for International Development, the World Bank, and the United Nations are all experimenting with various guidelines for the establishment of Project Monitoring and Evaluation Units (PMEUs) in the field.

For some years, AID has required for project design a matrix of project inputs, observable project outputs, and the "benefits" to be derived from the project by the local population. This "logical framework" has been found to be a useful design tool. But for purposes of evaluation, the "logical framework" provides minimal help since the methodology employed is necessarily one of matching actual outputs or other indicators against the targets for those outputs or indicators as set forth in the matrix. Since many of the important increases in target population behavior do not follow linear trends (i.e., farmer behavior may have a critical mass so that most changes in farm production occur during the last quarter of the project), it is relatively difficult to match farmer behavior at the midpoint of the project with the endpoint target established in the original plan.[1]

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[1] This is only one objection to utilizing the logical framework as an evaluation tool. There are many others. The AID office that is most devoted to the use of this technique in project design does not believe that the establishment of targets, often without baseline data to set accurate starting points for changes in key variables, is an evaluation system. They argue persuasively, however, that targets and objectives make the project more amenable to evaluation.

The utility of the matrix is that it does establish indicators of success, indicators which can serve as the basis for ongoing measurements as the project proceeds, even though the end-of-project target values may not be useful in analysis.[1]

The Social Development Division, Centre for Social Development and Humanitarian Affairs, Department of Economic and Social Affairs of the United Nations, has been experimenting with a framework somewhat similar to that used by AID in that inputs are translated into benefits to the local population through a set of conversion factors that are analogous to AID's observable output measures. The World Bank has made a considerable effort in establishing monitoring and evaluation units within selected projects. A World Bank desk review of 113 rural development projects (agriculture and rural development) to compare and contrast the internal monitoring and evaluation systems led to some of the following principal findings and recommendation:

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[1] DAI experience with project logical frameworks, developed as part of a project design and then used for evaluation, has shown that the logical frameworks are often not executed well enough to be very helpful for identifying planned targets. While in theory the logical framework appears well suited to providing a concise means of communicating critical targeted objectives, as well as external factors that may affect achievement of these objectives, in practice filling in the logical framework matrix is usually a last minute, hasty exercise to meet an AID requirement. In these evaluations (conducted by DAI) a common statement by USAID and project staff was that the targets were "pulled out of the air." With some project designs the logical framework indicators simply do not include targets. With many logical frameworks the assumptions (exogenous variables) are not detailed enough to provide guidance to evaluators. Every logical framework that DAI has encountered in its evaluation exercises has had serious methodological flaws, making it very difficult to use for evaluation.

Principal Findings and Recommendations

Monitoring and evaluation has grown very rapidly in the past two years; a monitoring and evaluation component was included in 30 of 38 rural development projects financed in FY 75, such components accounting for between 15 and 20 million dollars, approaching one percent of total project costs. The monitoring of rural development projects must be considered, therefore, to be one of the principal sources of information relating to the improvement of our knowledge and understanding of rural development programs.

A second finding is that issues concerning the acceptability, organization and information requirements of monitoring and evaluation vary enormously with the country and the project on account of the technical, physical and institutional diversity of rural development projects, and their differing objectives, uncertainties and environments. A further source of diversity is that a variety of project monitoring activities are initiated ad hoc by project officers as problems develop during project execution (investigations into crop disease problems is an example). The recent initiatives mentioned above (paragraph 1.1), to designate staff with general responsibilities in respect of monitoring and evaluation, are a response to the diversity and complexity of the problems encountered.

Our main recommendations based on these findings are that Bank policies and procedures need further development in light of the growing importance of monitoring and evaluation in rural development projects; and that staff operational support needs to be organized on a regular basis. The staff providing operational support should provide assistance on determining the information requirements, organization and techniques of monitoring and evaluation; co-ordinate approaches at the regional level; and focus on the full exploitation of the output of monitoring and evaluation exercises.[1]

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[1] Dennis Anderson, "Issues in the Monitoring and Evaluation of Rural Development Projects: A Progress Report," IBRD (an unofficial working document whose views are not to be taken as Bank policy), March 1976, p. 4.

This was followed within the Bank by the generation of a "Preliminary Kit on Monitoring and Evaluation,"[1] which was intended to provide field personnel with a better understanding of the possibilities and pitfalls of introducing a PMEU into a Bank-supported project.

Under contract to the Bank, Development Alternatives provided a short paper that discusses the major issues to be addressed in the design and implementation of information systems to support agricultural and rural development projects. This paper was later revised to provide a more expanded view of state-of-the-art methodology, as of the end of 1976.[2]

One of the difficulties of producing project monitoring and evaluation guidelines is the need to explain evaluation theory to be used by the project-supported units. Authors in the field of evaluation are nearly as proflific as those in survey methodology. The United Nations Secretariat (Social Development Division) prepared an annotated bibliography on this subject containing 169 entries, while Sage publications has recently produced three thick volumes of articles in this field.[3] The first issue

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[1] Guido Deboeck, "Preliminary Kit on Monitoring and Evaluation, Monitoring and Evaluation of Agricultural and Rural Development Projects: Basic Concepts, Design and Illustrations" (unofficial working document, which is not intended to represent Bank views), June 25, 1976.

[2] Donald R. Mickelwait and Alan Roth, "A Short Paper on Information Collection and Analysis to Support Agricultural and Rural Development Projects," Occasional Staff Papers No. 2, Development Alternatives, Inc., February 1977.

[3] Social Development Division, Centre for Social Development and Humanitarian Affairs, Department of Economic and Social Affairs, United Nations Secretariat, "Monitoring and Evaluation Systems for Assessing Developmental Impact at the Local Level: An Annotated Bibliography" ESA/SDHA/Misc. 17, October 11,

of *Evaluation Quarterly*, also from Sage Publications, contains an article which traces the present state-of-the-art in this complex field through major U.S. experimentation and studies.[1] As with survey methodology, the methodology of evaluation will be considered in this section of the report only in relationship to the ability of various approaches to provide better information for policymakers in development.

ONGOING MONITORING AND EVALUATION AS AN AID TO PROJECT DECISIONMAKING

Internal project systems can provide the essential tasks of an information system during implementation. These tasks include testing of alternatives, control of critical project variables, measuring change in the environment, determining the reasons for change in the environment, and prescribing recommendations for modifications in project design to improve performance.

It is important to know how the internal project system will accomplish these tasks. On the one hand a contract for a computerized comprehensive farm survey with supervision, data collection and analysis provided by a U.S. organization (perhaps in

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1976; Elmer L. Struening and Marcia Guttentag (eds.) *Handbook of Evaluation Research*, Vols. 1 and 2, Sage Publications, 1975; Gene V. Glass (ed.) *Evaluation Studies: Review Annual*, Vol. 1, Sage Publications, 1976.

[1] Peter H. Rossi and Sonia R. Wright, "Evaluation Research: An Assessment of Theory, Practice, and Politics," in *Evaluation Quarterly*, Vol. I, No. 1, February 1977, p. 3.

conjunction with a local research institute) will produce a finished report containing the conclusions of the data, and computer output in tabular form laying out the details of the data. Project management, however, may have had little involvement in the study and may, as a result, take little interest in the final report or have little faith in the completed data. Insofar as project staff are concerned it is an "outside" evaluation. On the other hand an evaluation undertaken by project staff, involving management directly and drawing upon data that are being reported by the field staff, is far more likely to have an impact on decisionmaking at all points in the project where information is collected, analyzed, aggregated and disseminated. Because the conclusions are internal to the project, staff can learn while they are engaged in data collection tasks. If the system is adequately designed, with close attention to all levels of decisionmaking, the project can utilize the information system as the impetus to improved performance and improved acceptance by both the field staff and the local population. It is the potential incentive to improve project performance and staff understanding that makes internal information systems important in any consideration of information to support decisionmaking in rural development.

An important element in using internal project systems to improve performance is the willingness of project management to learn by their mistakes. An information system should show not only what is going right but also what is going wrong. When a

person passes information to his or her superiors (e.g., field worker to project manager, project manager to program manager), there is a possibility of recrimination if the information shows problems. These people do not want to be blamed for poor results, so they will often not pass on information that reflects poor performance, even if they are not personally responsible for it. The management system must identify the limits of personal accountability, so that those reporting will not feel constrained about passing on information that identifies problems. Project management may wish to keep negative information in a confidential status to avoid criticism from outside or above. If project management can and does use this information to take appropriate corrective action, then the system is useful despite its confidential nature. However, if corrective action can only be taken by higher-level decisionmakers, it is essential that the information reach that level.

An example might clarify the role of internal project systems. In the recently designed North Shaba Maize Production Project in Zaire, a special subsystem within the project concerns monitoring and evaluation.[1] A Data Collection and Analysis unit (DCA) will operate within the framework of the project management unit. The DCA will work with the other subsystems and their field staffs to ensure that data for monitoring and evaluating all project activities are forthcoming on a regular

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[1] North Shaba Maize Production Project, Zaire, Project Paper (AID-DLC/P-2204), Part III. A Sub-System for Project Monitoring and Evaluation, pp. 138-158.

basis. A diagram portraying the essential links in the information system is shown in Figure 3. One information link is from the extended families -- the target population in this project -- to the agricultural assistance "paratechnician" working with the farmer's council. The paratechnician agricultural assistants will provide the regular interface with the local population, and will provide the bulk of the systematic reporting on project activities. The agricultural assistants will feed back to the households conclusions based upon information they have collected, for example, what cultivation techniques are working best in the local area, which farmers are having success with the new varieties introduced by the project.

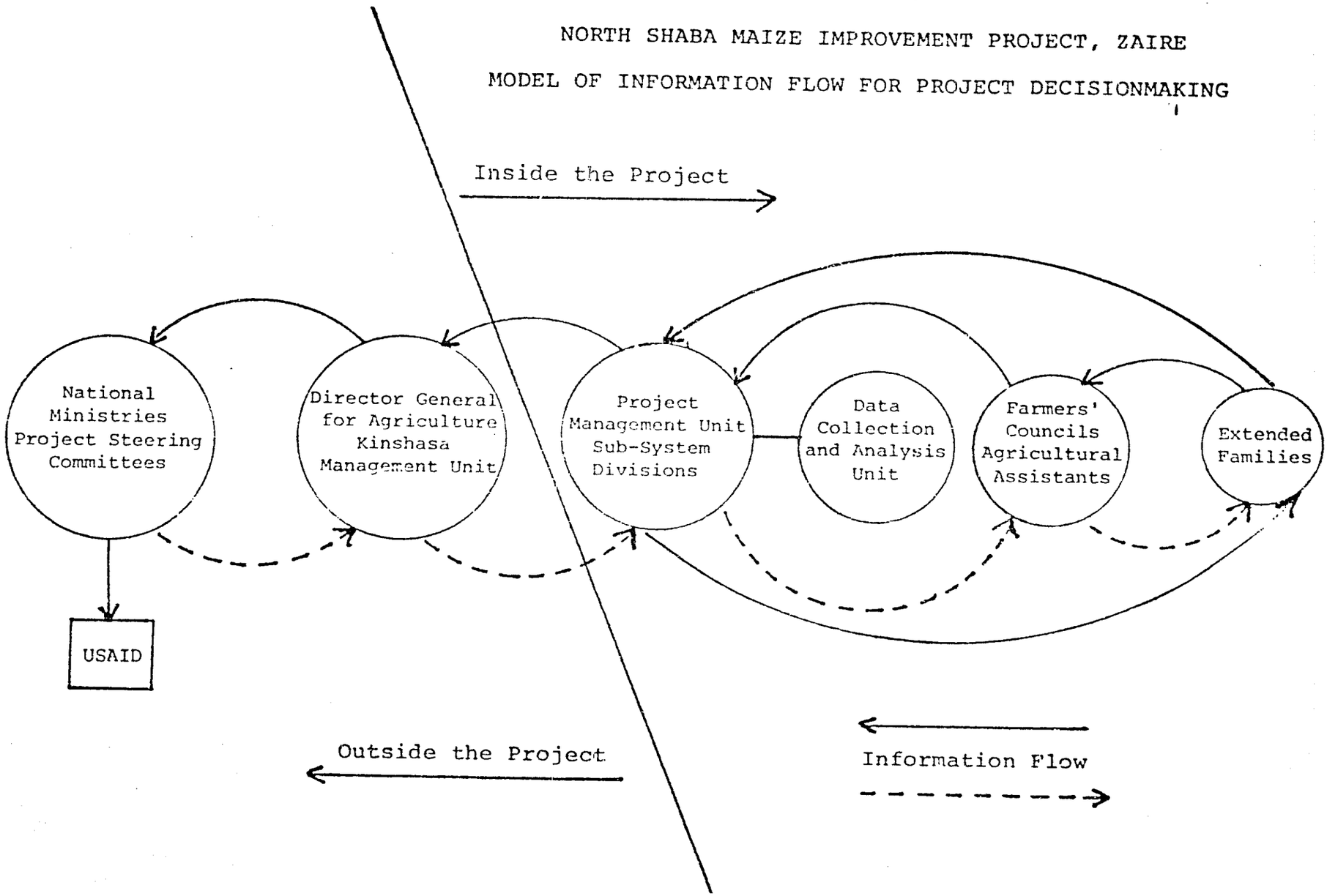
The next information cycle is from the agricultural assistants to the management unit, a link carefully monitored by the Data Collection and Analysis Unit. Some of the information obtained by the agricultural assistants will be directed upward to the management unit, either aggregated or on coded sheets to prevent data overload at the management level. The management unit, including the DCA unit, will review the data, analyze them, and pass processed information (conclusions drawn from the data) back down the cycle to the agricultural assistant. All this information flow takes place within the project area.

A second information cycle would be needed if the DCA elected to undertake statistical surveys utilizing the extended families as the reporting unit. Then data would flow directly

FIGURE 3

NORTH SHABA MAIZE IMPROVEMENT PROJECT, ZAIRE

MODEL OF INFORMATION FLOW FOR PROJECT DECISIONMAKING



from the extended families to the DCA and the management unit. This same cycle would obtain for any small studies conducted by the DCA, as well as for reports of meetings held among the local population with project staff in attendance. Both these techniques have proven useful in other large development projects.

Following the same model, but moving down, project management may wish to communicate directly to the local population, bypassing the agricultural assistants. This would be necessary, for example, if there were a popular complaint about the services of an assistant. In this case a special team from the management unit would travel to the area and speak directly to project participants.

THE DISTINGUISHING FEATURES OF AN INTERNAL PROJECT INFORMATION SYSTEM

A good project monitoring and evaluation system must be a functional component of the project. Major difficulties arise if the unit that obtains and analyzes the data becomes estranged from project management.

There are, of course, different models that can be used. One model gives a contract to an outside (perhaps academic or research) institution to provide the project with ongoing monitoring and evaluation data. This calls for close coordination

with project staff and a field data collection staff that is cooperating with, but not directly responsible to, project management. The trade-off in this situation is that the data obtained will be highly objective but may not be useful for decisionmaking.

A second model is a project staff unit (PMEU) which is directly under the management and employs its own field collection staff. In instances such as these -- often in World Bank-supported projects -- the PMEU limits itself almost entirely to statistical surveys, preparing instruments, coding, processing and analyzing data.

A third model involves the PMEU setting priorities, ensuring that data collection will occur and providing the manpower for the analysis, while leaving basic data collection responsibility to the operating field staff of the project. In this instance the PMEU is a coordinating agency, ensuring that the various components of the project collect and examine their own monitoring data, but demanding that the overall reporting from the field contains the elements necessary for top management decisionmaking.

Obviously some combination of all three models is possible, and may provide better information than any one that might be selected.

Internal project systems can also be characterized by their relationship to the start-up of the project. A monitoring and

evaluation system that is established as the project gets underway, with a clear responsibility to support the management, presents one set of difficulties. A system that is imposed on a project after start-up, when personnel are in place and operations (including a very different reporting system) have already begun, presents yet another set of problems.

In the following pages case studies of internal project systems will be presented, which will discuss the difficulties of building information systems into already operating projects.

CONCLUSIONS CONCERNING THE DESIGN OF INTERNAL PROJECT INFORMATION SYSTEMS

Internal project systems may be large or small, they may be systematic with statistical surveys or ad hoc with observations across a reasonably representative sample. The crux of the system is to provide information for decisionmakers. If the information is not used, or is seen as being obtained, processed and disseminated by "outsiders," the quality of the analysis will not have an impact on the process of development. A first requirement in any internal information system is to determine what the project management needs and then design a method of collecting and reporting that data for the benefit of the "insiders" and in support of the objectives of the project. Separate research organizations have had serious difficulties in meeting these

TABLE 8 (Continued)

Data	Collector	Data Source	Collection Method	Intended Use
B. Health Indicators (Continued)				

requirements, and their longevity and sustainability within development projects (at least in the cases examined) has been unduly curtailed.

In addition, if information is for decisionmaking, it should begin with the target population. The system should feed back to households, farmers, and rural dwellers information that will help them respond to the assistance of the project. In the same way, the field staff, cooperative leaders and local area supervisors must be made a part of any internal system, not merely to collect the data, but to analyze, consider conclusions, and feed back to lower-level workers information that will be helpful in their work.

As data are passed up the project hierarchy, aggregation should take place in order that each successively higher echelon receives only the amount of detail that it can accommodate. As the information is passed down the ladder it should be disaggregated so that it will be appropriate for individuals to act upon. This cycle of information processing and feedback, recycled at each level of the project, is critical for the provision of accurate data and for the use of processed information within a project. Few fieldworkers or cooperative managers will continue to spend time and energy to report data that does not, in some short time, make their jobs easier or better, or both.

There are a variety of techniques that can be used to capture the details of the data needed for project implementation. Some

are sophisticated, requiring computers and statistical analysis. Others are commonsense observation, discussions with leaders and other key members of the target population and the lower levels of the field staff. In the rush toward academically sound methodology, the project should not neglect the very fast but nonetheless complex observation and analysis capabilities of the evaluators themselves, operating at every level of the project. These collectors and users of information, when coordinated and supported by a project monitoring and evaluation unit, can provide the basic data necessary to determine impact, diagnose change, and provide prescriptions for modifications essential for project success.

CASE STUDY:
INFORMATION SYSTEMS FOR PROJECT MANAGEMENT AND EVALUATION IN NORTHERN TANZANIA[1]

INTRODUCTION

Much has been written in recent years concerning how most effectively to structure systems of data collection, analysis and dissemination designed to assist in development project management and evaluation. The systems that have been designed vary widely, but the greatest emphasis has been on building some variation of a "centralized" data collection and analysis capability. Such a system typically involves a central government ministry or project management unit identifying data needed for collection, devising structured data collection instruments, training a cadre of enumerators, supervising the data collection, and carrying out analysis at the center. This approach often uses a computer capability for data processing and analysis.

Information systems have seldom been developed to use local-level staff and project participants as the primary actors in data collection and analysis; nor have they focused on identifying the principal project decisionmakers from the village level upwards, and structuring a system to meet their needs. One system that uses the latter approach is being implemented in the

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[1] Designed by Development Alternatives, Inc., 1977-78.

Hanang District Village Health Project in northern Tanzania.[1] This project, financed by Coordination in Development, Inc. (CODEL), through a USAID grant, has been underway for the past year; the experience gained to date from the structuring and evolution of the information system that is built into it presents unique insights into the implementation of such an approach.

This paper describes the project itself and the information system as initially designed; it analyzes changes that were made in the system over time and draws conclusions that have applicability elsewhere.

THE HANANG VILLAGE HEALTH PROJECT

The Hanang Project is designed to develop a process for improving the health of villagers in Hanang District, which is composed of approximately 100 villages with a total population of 225,000. The principal thrust of the project is the improvement of village health through preventive medicine, focusing largely on the health of children. It includes the following discrete activities:

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[1] Dr. Peter Weisel, a staff member of Development Alternatives, Inc. (DAI), has assisted the Hanang Project staff in the development of this approach. DAI has an ongoing contract to provide assistance to the design and implementation of the Hanang information system. Data sources for this paper include the original information system design developed by the project staff with the assistance of Dr. Weisel, documentation on subsequent changes made to that design, and discussions with the Hanang staff in March 1978.

- Health education related to nutrition, sanitation and hygiene practices. This includes, for example, encouraging improved diets through increased consumption of locally produced -- and protein rich -- beans, greater utilization of latrines and personal cleanliness.

- Health education related to prevalent communicable diseases, their prevention, causes and cures. This involves gaining an understanding of the most common diseases and the practices that are used to cure them. One important aspect of this work is that of learning considerably more about traditional attitudes concerning cause and effect relationships between diseases and their presumed cures. Such practices as making incisions or extracting pieces of flesh to cure certain diseases are current in the project area. Understanding present practices and attitudes is important in determining both the emphasis and the approach in this dimension of health education.

- Maternal and child health care services provided through village clinics. Mobile clinics visit project villages monthly on a predetermined schedule to offer vaccinations to children and provide ante and postnatal care to mothers. The clinics are organized from local dispensaries, and both the dispensaries and the villages must commit certain resources as a condition to the commencement of clinic services. Villagers must make a structure available for holding the clinics, and provide such necessary equipment as an examining table or bed, and benches or chairs. Dispensaries must have vaccines and drugs available as well as Maternal Child Health Kits and refrigerators.

The implementation arrangements for the project build on the decentralized political and administrative structure found in Tanzania. In that system villages are organized around a formalized structure: it is intended that Village Councils will be responsible for planning and implementing a wide array of village activities, including those aimed at increasing produc-

tion and providing social services. The Councils are comprised of representatives elected by the villagers; each member is responsible for organizing a specific activity, such as agricultural production or education. The Councils are headed by a Village Chairman and Secretary. Villages are subdivided into smaller units (kitongoji), each comprising approximately 100 households. Those activities initiated by Village Councils are, in most cases, administered through these smaller units.

In the context of this general village structure, the health activities undertaken by this project are organized as follows:

- From each project village two residents (Village Health Trainees) are chosen who are responsible for carrying out the project activities, i.e., organizing the health education work, assisting clinic staff in running the clinics.

- These trainees, after having been selected, receive ongoing training in a wide variety of health-related matters. The training is a combination of classroom work and field practice, commencing with one month of formal training and continuing with one month of fieldwork in their own villages. This process is repeated through three cycles, after which periodic, shorter workshops are conducted throughout the life of the project. The instruction ranges from substantive health issues -- training in nutrition, sanitation and hygiene practices, methods of disease identification and treatment -- to methods of adult education for use in health education work, to training in data collection and analysis techniques. The adult education training revolves around the psychosocial approach of Paulo Freire, while the instruction in data collection and analysis techniques ranges from the identification of data needed for collection to various data collection methodologies and approaches to analysis.

- Each 100-house village unit, or kitongoji, is further divided for purposes of project implementation into smaller 15- to 30-house units, referred to as village health units. From each such unit villagers choose one representative, a Village Health Leader (VHL), who is to work with the Health Trainees in implementing the project. Trainees are responsible for instructing VHLs in health education techniques; the latter subsequently implement the education on the health unit level. It is the VHLs, working with a relatively small number of households, who are the principal contacts between project activities and individual villagers.

Above the village level are additional officials and staff responsible for project implementation. Project personnel, working at the district level, consist of a complement of health/administrative/data collection staff. Below the district but above the village are Division Health Leaders (DHLs), who act as the liaison between the district staff and the village Health Trainees. The district is divided into four divisions, with each DHL responsible for all villages in his/her division. Finally, at both the district and division levels are party officials and Ministry of Health staff, who have overall responsibility for the project.

While the project is thus designed around a village/division/district structure that is formally in place, in many instances the capability of the structure to plan and deliver development resources is weak and has not been adequately tested. Equally important, much is yet to be learned about effective preventive health activities at the village level. A primary question being addressed by this project is how to utilize external resources,

in combination with locally generated resources, to influence behavioral change in villagers to improve the level of health. What approach to the delivery of project inputs -- principally efforts at health education -- can effectively accomplish these changes? How much can health education efforts be decentralized? Can Health Trainees with a minimal formal education carry out the work? Can these individuals effectively transfer the educational techniques to VHLs, most of whom have no previous formal training? Can VHLs then influence the attitudes and behavior of villagers in their respective health units?

It was in search of answers to these types of questions that an ongoing system to monitor and evaluate project implementation and impact on village health was incorporated into the project. The system was intended to be a low-cost approach with the potential both of being sustained in the project area subsequent to the termination of external project funds and of being replicated in other districts in Tanzania.

THE INITIAL DESIGN OF THE HANANG HEALTH PROJECT INFORMATION SYSTEM

The first step in developing the monitoring and evaluation system for the Hanang Project was for the DAI consultant to work with project staff and other involved government officials at the division and district levels to determine:

- The objectives of the information system;
- The data requirements necessary for collection;
- The research methodology to be used, including data sources, collectors and appropriate analytical techniques; and
- The most appropriate approach to information dissemination.

Objectives of the Information System

The three specific objectives of the project monitoring and evaluation effort, settled on by the project staff, were:

- To gain an overview of village health conditions and problems. The principal need for this information is to assist planning activities on the village level, e.g., to help Village Trainees in their efforts to define and carry out health activities appropriate to a given village.
- To monitor project implementation in terms of the financial, commodity and extension inputs into the health education and clinic activities, the direct project results or outputs, and the initial effects of project activities on the behavioral patterns of villagers. The information is used largely for project management purposes, i.e., to track activities in order to determine whether what was scheduled has in fact been accomplished, and to identify problems, assess their causes and prescribe solutions. Monitoring information is used to signal needed actions on the part of the project staff with regard both to implementation and to possible modifications in project design.
- To evaluate the impact of the project on the health of villagers. This component of the information system looks at both behavioral changes related to, for example, nutrition and hygiene practices, and changes in the incidence of selected diseases. Its primary use is for determining the appropriateness of project approaches, possible needed changes in project design, and the potential for replicating the approach elsewhere.

The demands on the information system were great: tracking project progress, looking at project impact, identifying problems and their causes, and prescribing solutions. The approach used to develop the system was to specify data requirements prior to project start-up, as well as a collection and analysis methodology and a system of data dissemination, recognizing that much was unknown regarding each of these, and that the system would have to be sufficiently flexible to change as experience showed what would and would not work.

Data Requirements, Research Methodology and Information Dissemination

The point of departure for specifying data requirements was to determine the information needs of decisionmakers for specific project-related issues from the village through the national level. Additional data related to broader health issues, while perhaps interesting, would be superfluous for project decisionmaking. Ideally, data specification would first involve understanding the decisionmaking process -- what decisions are made by whom, based on what information. From this first step data requirements for specific project purposes would be developed. The goal was to anticipate the types of health decisions that would have to be addressed as the project got underway, through discussions with project staff and local leaders. Since this process meant projecting future possible decisions and data needs for them, it was not possible to specify all monitoring and evaluation requirements adequately. Data requirements would have to

be modified over time as experience was gained. It was possible to establish the following preliminary list:

- In the village, information on health problems and conditions is needed for both planning and project implementation purposes by the Village Trainees and the VHLs, as well as by other local party and government officials: the Village Chairman, Secretaries and Village Development Committees. In addition, villagers themselves need information on improved nutrition and hygiene practices and how such practices relate to the incidence of various diseases prevalent in the village.

- Division Party Secretaries and DHLs should know the progress of health education and clinic activities and problems being encountered, in order to make management decisions designed to facilitate implementation. Health center personnel on the division level must have data on disease incidence, broken out by area, and a good notion of the nature of and reasons for various nutrition and hygiene practices being followed.

- Finally, on the district, regional and national levels, numerous decisionmakers need various types of monitoring and evaluation information. District Ministry of Health personnel and project staff need to know whether project implementation is proceeding smoothly and whether the project is having the desired health impact. Regional and national officials, both party and government, need to be kept informed of project impact and to understand the strengths and weaknesses of alternative project implementation strategies, in order to make decisions concerning possible project replication.

On the basis of these generally defined information needs, the project staff developed an initial set of data points for collection. The data points, collectors, sources, and methods of collection and analysis need to be viewed in the context of the objectives of the information system already described.

Because data requirements and collection methodologies for the first and third objectives on page 241 overlap, they are treated together; the second objective is discussed separately.

Gaining an Overview of Village Health Conditions and Evaluating Project Impact

As originally designed, data to be collected for these purposes fell under two general headings -- descriptive village data and baseline data. Both of these types of data were intended to provide the Health Trainees with some understanding of village health conditions and problems. In addition, the baseline data were needed to measure project impact over time (for evaluation purposes). These data, as initially specified, are shown in Table 8.

TABLE 8

INITIAL DATA REQUIREMENTS OF HANANG INFORMATION SYSTEM

Data	Collector	Data Source	Collection Method	Intended Use
I. DESCRIPTIVE VILLAGE DATA				
1. Name of village, division, ward	Trainee	Village informant	Discussion	For Trainees in understanding magnitude of population with which they would work, distance from service centers and primary economic activities of village. All relate in varying ways to health issues: availability of health care, available diet, available consumer goods.
2. Number of families in village	Trainee	Village informant/ village observation	Discussion, house count	
3. Number of ten-house units in village	Trainee	Village informant	Discussion	
4. Stretch (width and length) of village	Trainee	Village informant	Discussion, walking village diameter	
5. Miles from administrative center, market center, and dispensary/hospital	Trainee	Village informant	Discussion	
6. Services being provided in village (including health services)	Trainee	Village informant	Discussion	
7. Main agricultural activities (crops and livestock)	Trainee	Village informant	Discussion	
II. BASELINE DATA				
A. General				As "classification variables," against which health behavior indicators and disease incidence variables will be cross-tabulated.
1. Tribe	Trainee	Household sample	Discussion	
2. Number of years of formal education	Trainee	Household sample	Discussion	
3. Type of roof on house (Indicator of economic well-being)	Trainee	Household sample	Observation	
B. Health Indicators				Variables in B.1., 2., and 3. are behavioral indicators that serve as proxies for levels of nutrition, hygiene and sanitation. They provide knowledge of village health conditions and are used in examining the relationship between health behavior and disease incidence.
1. Nutrition				
a. Number of times children fed per day	Trainee	Household sample	Observation	
b. Whether children are breast fed	Trainee	Household sample -- children ages 0-5	Discussion	
c. Number of times in past week when the following was served: eggs, fruit, green vegetables, meat, milk (response: often, seldom, not eaten)	Trainee	Household sample	Observation, discussion	
2. Sanitation				
a. Whether the house has a latrine	Trainee	Household sample	Observation	
b. Whether the house has a rubbish pit	Trainee	Household sample	Observation	

TABLE 8 (Continued)

Data	Collector	Data Source	Collection Method	Intended Use
B. Health Indicators (Continued)				
3. Hygiene				
a. How food in the household is stored (covered, off floor)	Trainee	Household sample	Observation	
b. Indicator of cleanliness of clothing (clean, partly clean, dirty)	Trainee	Household sample	Observation	
c. Whether household members wear shoes (adult males, adult females, children)	Trainee	Household sample	Observation	
4. Adequacy of supply of potable water				To determine the need for improved village water systems.
a. Source of water for humans/animals	Trainee	Household sample	Discussion	
b. Distance to water source	Trainee	Household sample	Discussion	
c. Sufficiency and cleanliness of water	Trainee	Household sample	Observation, discussion	
5. Vaccinations received by type	Trainee	Household sample	Discussion, clinic records	To determine the need for intensification of innoculation program
6. Social/cultural problems and beliefs that are detrimental to health	Data points must be defined with Trainees who represent different villages and tribes. The data collector will be, as above, the Village Trainee and the source of the household sample.			To provide an understanding of attitudes/practices that affect health, which the project may need to address.
C. Mortality/disease incidence				To analyze the impact of changes in health behavior on disease incidence and to track changes in disease incidence over time.
1. Mortality				
a. Births	Trainee	Household sample	Discussion	
b. Deaths	Trainee	Household sample	Discussion	
2. Disease incidence				
a. Measles	Village Health Leaders	Household sample - children ages 0-5	Collected monthly through discussion. Trainees record in journals monthly from Village Health Leaders.	
b. Whooping cough				
c. Gastroenteritis				
d. Round worms				
e. Eye Diseases (sore eyes)				
f. Kwashiorkor	Clinic staff		Collected monthly through observation/examination. Trainees record in journals monthly from clinic records.	

TABLE 8 (Continued)

Data	Collector	Data Source	Collection Method	Intended Use
2. Disease incidence (Continued)				
g. Marasmas				
h. Anemia				
i. TB		Household sample		
j. Leprosy				
k. Bilharzia				
l. Hookworm				
m. Malaria (spleen count)				
D. Village capability to identify and solve local health problems				As indicators of the capability of villagers to identify and solve local health problems through measuring (a) the extent of activities organized by the village and (b) the degree of participation of villagers in the activities.
1. Number of ten-house units with which Village Health Leaders are actively working	Division Health Leader	Village informants	Discussion	
2. Number and type of health education activities organized by village over past six months and number participating	Division Health Leader	Village informants	Discussion	
3. Number of health clinics in past six months in which village representative actively worked	Division Health Leader	Clinic staff	Discussion	
4. Number or residents using services of health clinics held over past six months	Division Health Leader	Clinic records	Examine clinic records	
5. Health related activities initiated by village over past six months	Division Health	Village informants	Discussion	

Though at first glance this listing appears long and by implication overly complex, the project staff felt that it represented a set of data that was easily obtainable through either direct questioning or observation, and that the data collection was within the capability of the principal collectors -- the Health Trainees, DHLs and VHLs. Further, it was felt that it represented a minimum requirement for policy decisions. Based upon this data set a household questionnaire was designed, as well as collection instruments for obtaining descriptive village data and selected information from village clinics.

Organization for Data Collection. There is a wide array of staff involved in the implementation of the Hanang Project. The District Medical Officer -- the head of the Ministry of Health at the district level -- is the official head of the project but does not direct day-to-day operations. This is the function of the project director, who is assisted by two public health specialists, two community development nutrition specialists, a project financial administrator, a teacher, two registered nurse midwives, four Division Health Leaders, two Health Trainees per village, and one VHL per 15- to 30-house unit within each village. Support staff consists of two drivers, a clerk, a secretary, a mechanic and a watchman. In addition to this core staff, six additional personnel were hired specifically for the monitoring and evaluation work. A statistician was retained half-time, as well as a full-time Data Coordinator (responsible for data compilation, to be carried out at the district project headquarters),

a Health Information Supervisor to handle the field coordination throughout the district, and three data clerks. One of the public health specialists is in charge of overall management of the information system. All staff receive salaries with the exception of the village-level personnel -- the Health Trainees and VHLs -- who work on a voluntary basis.

The central actors in the collection and analysis of data for gaining a village health overview and for project evaluation are the Health Trainees, VHLs and DHLs, the public health specialist in charge of managing the system, and the six central project information system staff. The Health Trainees, DHLs and VHLs are the principal data collectors, while the rest of those involved in the information system carry the bulk of the analysis and dissemination responsibilities. In addition, system design involved a substantial consulting input, consisting of three visits (of one to three weeks each) during the first year of project implementation by Development Alternatives, Inc.

Table 9 is instructive in understanding the relationship of the information system to total project activity. The six staff working full time on the information system (three management/implementation and three support staff) were hired specifically for monitoring and evaluation work. As a percentage of total staff in each of these two categories, they represent a significant input, though the total numbers of personnel involved are small. Further, the ten staff who are working part time on

TABLE 9

PROJECT STAFF INVOLVED IN INFORMATION SYSTEM WORK

	District/Division Level Management/Implementation Staff (n = 17)		Support Staff (n = 9)		Village Level: Village Trainees (n = 64)		Village Level: VHLs (n = 650)	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Staff working full time on information system	3	17	3	33				
Staff working part time on information system	10	59	-	-	64	100	650	100

information system activities are involved largely in data collection and analysis for purposes of gaining an overview of village health or for project evaluation. They are, for the most part, responsible only for tracking the project activities for which they are directly accountable.

Probably more significant is the role of the village-level staff. The high degree of part-time involvement of these personnel reflects the fact that the information work is an integral part of all project activities and cannot be easily separated. Much of the work of the 64 trainees and the 650 VHLs is to learn from the villagers what the prevalent health problems and issues are and to determine how best to conduct the health education and clinic work. The information system is intended to systematize and facilitate their work, so data collection, analysis and use become part of the normal day-to-day activities. Whether the system functions depends to a large degree on these workers

and whether they can obtain reliable data and utilize the resulting information effectively.

Further, a primary goal in the design of this project was to define a workable collection and analysis system that would be sufficiently inexpensive to be replicable in other districts in Tanzania. Project costs specific to the information system, excluding consulting costs, are approximately 12 percent of the total; if consulting services are included, they amount to 17 percent. These costs include such items as salaries, travel expenses, per diem for travel, and some equipment. They do not include wages for the Village Trainees or VHLs, since these staff work as volunteers. If a monetary value were placed on their services, the percentage of project costs specific to the information system would rise.

The personnel breakdown and the cost percentages raise interesting questions concerning the inclusion of an information system of this type in a project. The decision about whether such a system should or should not be included (whether it is too costly) ultimately revolves around whether the system can be shown to make a difference in project performance -- whether it assists in management decisions and provides insights into needed project modification or redesign. If significant benefits do accrue, then the level of personnel involvement and associated costs can be justified.

Sampling, Data Analysis and Dissemination. As indicated in Table 8, the bulk of the data are to be collected from a village household sample utilizing a single baseline questionnaire. The sample was stratified into households with and without children under five. This was done to test the hypothesis that health behavior would vary between such households. The respondents were to be heads of households, and the sample was to be chosen by utilizing a table of random numbers. The collection methodology for this dimension of the information system, using a formal collection instrument, was thus structured and involved no informal approaches to data gathering (in contrast to the project monitoring discussed later).

The data gathered to provide an overview of village health conditions would be initially tabulated by hand by the Health Trainees and DHLs and passed on for review by the central project staff. This information was to be used by trainees and project staff in making decisions concerning what project activities should be stressed and/or initiated, and for use in discussing health issues with villagers. For presentation in villages, the trainees and central staff would collaborate to decide the most useful way to show the information, e.g., health problems displayed graphically through diagrams or charts. Summarizing the data would be the joint responsibility of both trainees and the central staff.

Data processing and analysis for project evaluation would be carried out by the central monitoring and evaluation personnel

and would be relatively simple. The data would be punched on cards, permitting cross-tabulation of selected data with the use of a sorter. The analysis would seek to determine changes in health behavior attributable to the project, and to examine the relationships between health behavior and disease incidence. Two categories of comparisons would be made using the baseline data: tribe, years of formal education, and economic well-being against the health indicators (indicators of behavior related to nutrition, hygiene and sanitation, which will be measured over time for change); and health indicators against disease incidence. Tests of statistical significance would be used to infer whether observed changes can reasonably be attributed to the project (are significant) or are due to non-project related influences.

The analyzed evaluation data would have multiple uses. The information would be disseminated from project staff back to villages for use in demonstrating relationships between health behavior indicators and disease incidence. Project and district staff would utilize the findings to modify project strategy, and regional and national officials would require the information for decisions relating to the replication of health activities in other areas.

Monitoring Project Implementation

Information for project monitoring -- or, more broadly, for management decisions -- is collected and compiled by the central project staff, the Health Trainees and the DHLs. The data initially identified by the central staff as most critical for

their purposes included financial data and data on the progress of specific project activities. The project's financial administrator keeps a running log of amounts spent, broken out by the type of expenditure, and tracks these amounts against total monies available.

The information identified for collection on the progress of project activities is illustrated in Form I. In developing this format, project staff initially considered listing project inputs against outputs. The alternative of specifying project "activities" (see Column 1 on Form I) resulted from the realization that this is how most implementing officers perceive their projects. They normally do not think in terms of inputs and outputs (and frequently find that the distinction between the two is not clear), but rather of a series of discrete activities that must be completed in the course of project implementation. The staff themselves would be responsible for specifying the activities important to track; because each person on the staff has a different set of responsibilities, the listing of activities for each would be different. The data collected would thus not be comparable and would not be coded. For each activity the staff would note the officer responsible (Column 2), the expected results and planned timing (Columns 3 and 4), and the actual results along with the time when each activity was accomplished (Columns 5 and 6). Finally, reasons for any differences between expected and actual results would be recorded in Column 7. This approach was designed to capture input and output data and to

Hanang Health Project

Form I

MONITORING DATA

CENTRAL PROJECT STAFF

Month _____

(1)	(2)	(3)	(4)		(5)	(6)		(7)
Activities	Officer Responsible	Expected Results (Magnitude and Value where applicable)	Planned Time		Actual Results (Magnitude and Value where applicable)	Actual Time		Reasons for Difference Between Expected and Actual
			Start	Finish		Start	Finish	

Hanang Health Project

Form II

MONITORING DATA

DIVISION HEALTH LEADERS

Village: _____

Month: _____

(1) List Steps Undertaken in the Village Aimed at Making Progress in the Following Areas:	(2) Initiated by	(3) Expected Results	(4) Actual Results	(5) Reasons for Difference Between Expected and Actual Results
1. Health Education				
2. Health Clinics				
3. Health Related Activities				

provide other management information that would enable project staff to know, on a monthly basis, which activities are moving ahead as planned, which are stalled, what appear to be the primary problems facing activity implementation, and who is responsible for solving the problems and seeing that implementation proceeds. It would provide the basic information needed for making management decisions.

A similar record of activity progress would be kept by Division Health Leaders for each project village in their respective divisions (see Form II). The original format for recording the information that they need differs from that which was established for the central project staff, in that the central staff is concerned with all activities undertaken by the project -- from building construction at district headquarters, to staff training, to village clinics. Division Health Leaders, on the other hand, are only called upon to help implement village-level activities. In Column 1 the various village activities to be undertaken are broken out by health education, health clinics and health-related projects. As in the case of the central staff, the DHLs were to determine which activities within these broad categories were most important to track and note them here. Columns 2 through 5 -- for specifying results and explaining why they differ from initial expectations -- are similar to but less comprehensive than the comparable information to be recorded by the central project staff on Form I.

The Health Trainees were also to keep a record of project activities taking place in the village and record them in monthly progress reports, which are required under the terms of the project. The format of these reports, shown on the following page, calls for the trainee's observations of developments related to the general categories of activities supported by the project, e.g., health education, clinic activities. They are intended to indicate actual progress made, as well as trainees' perceptions of approaches to and problems confronting the village health activities. It is designed to provide both DHLs and central project staff with some indication of the support needed by trainees in each village.

A final category of monitoring information to be collected by the project staff relates to initial project effects. Throughout the project, and before impact data are collected and project evaluation undertaken, it is possible to begin to examine its effects and to assess the strengths and weaknesses of the innovations being tried. It was intended that this information would be gathered by the DHLs and the Health Information Supervisor, through group meetings and individual discussions with villagers; the appropriate approach would vary by village and would be settled upon by the Health Information Supervisor in collaboration with the DHLs. In these discussions the staff would be seeking any initial indications that the project was having an impact on village health. For this purpose they were

MONTHLY PROGRESS REPORT OF VILLAGE TRAINEE

Name: _____

Village: _____

Ward: _____

Division: _____

Date: _____

Since last month's report what developments have there been with regard to:

Health Education: _____

_____

_____

Health Related Activities: _____

_____

_____

Collaborative Efforts with Various Leaders: _____

_____

_____

Clinic Activities: _____

_____

_____

Problems: _____

_____

_____

_____
Signature

to use the data points for measuring project impact as a checklist. The collection of this information would continue throughout the implementation of the project.

An important issue in developing a project monitoring system is the objectivity of those collecting the data.[1] This consideration becomes particularly important when the data collection is done by project staff who have a stake in project success. Several steps were taken to ensure reasonably objective reporting in this project. First, the central monitoring and evaluation staff -- the six employed specifically for this work -- are to spot-check project monitoring data, both the data collected by the central project staff and the progress information collected by the DHLs and Health Trainees. These staff were hired as communicators whose personal gain was not directly dependent upon project success, but rather upon discovering successful project approaches, which should provide an incentive for objective reporting.

Second, the Division Health Leaders and Health Trainees are involved in project problem solving through frequent meetings with central staff. This should place the emphasis upon identifying approaches that work best, as opposed to "proving" that the approach being tried in one particular division or village is successful. It should also mitigate any pressure from the

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[1] This issue is one dimension of the larger problem of project staff perceiving monitoring and evaluation activities as threatening to their self-interest, e.g., threatening the perpetuation of project activity, with the result that the system is not utilized.

division and village staff to show that everything is progressing smoothly, and encourage objectivity.

The initial design spelled out the following data sources for monitoring information, as well as collection techniques and analysis:

- Monitoring data needed by the central project staff (Form I) would be collected by them on an ongoing basis from the officers responsible for implementing each project activity. For example, the course curriculum for the Health Trainees must be prepared and ready for review prior to the start of training. The Project Director will utilize the monitoring form as a reminder that this activity must be completed, and will check with the person responsible for curriculum preparation. If problems have arisen, resulting in delays, the Director must make decisions aimed at overcoming the difficulties. If the causes of the problems are not clear, the monitoring and evaluation staff might have to make a special inquiry about the nature of the difficulties and pass the information on to the Director before a decision can be made.

  While the primary purpose of these monitoring data is to allow the staff to track financial flows and activity progress on a continuous basis, the data can also provide the basis for summarizing overall project progress and problems for use by district government and party officials. These data would be collected from the Project Director and summarized every three months by the monitoring and evaluation staff for that purpose.

- Sources for monitoring data collected by Division Health Leaders (Form II) would include Trainees, VHLs, Village Chairman and Village Secretaries. The data would be collected on a continuing basis as project implementation proceeds, and a separate form would be kept for each village. The emphasis was to be upon tracking progress of health education activities and village clinics, as well as such health-related activities as planting vegetable gardens aimed at increasing nutrition levels. These

data would be compiled quarterly by the central monitoring and evaluation staff as they work with the DHLs.

Observations on the Initial Information System Design

The approach taken to the design of the information system and the resulting structure of the system was aimed at overcoming a series of problems frequently encountered in making such systems work. The following issues were specifically addressed:

- In order to avoid developing a system that was too complex and costly, the data to be collected were confined to those needed by project decisionmakers. Such decisionmakers include a wide array of individuals, from villagers in the project villages, to village leaders, to division and district staff, to officials on the national level.

- All information needed for monitoring and evaluating project activities cannot be specified prior to project commencement. The system was intended to be flexible enough to change as more was learned about what information was or was not needed.

- The specification of data requirements -- both the initial specification and modifications made over time -- can be done satisfactorily only if the principal decisionmakers who are to use the information are involved. Otherwise much of the data collected will be irrelevant to the needs of the intended users. In the Hanang case both project staff and others who would be involved with project decisions were brought into the initial specification of data requirements and were to be drawn upon over time to identify needed modifications.

- A workable system requires a collection and analysis methodology tailored to the capabilities of those implementing the system. Data points must be "collectible" within the constraints of project resources, and the analysis must avoid being overly complex. The Hanang system thus focused on collecting a limited

set of easily obtainable data and analysis that was no more complex than representing the data visually for dissemination back to the villagers or making comparisons of selected variables using simple cross-tabulations.

- It is critical that: (a) the information be disseminated on a timely basis in order to reach decisionmakers in time to be used; and (b) the information reach the decisionmakers in a usable form. Thus, for example, health information was to be passed back to villagers through diagrams and graphs described earlier, a form intended to facilitate discussions with villagers concerning prevalent health problems.

- In order to help ensure the collection of reliable data, the project employed information system staff whose mandate was project monitoring and evaluation, and whose personal gain was not directly dependent upon project success. In addition, frequent meetings were to be held with the principal data collectors to emphasize the goal of identifying approaches that work best, as opposed to proving that the approaches being pursued are successful.

- An effort was made to structure the system as a part of ongoing project activities, rather than as an additional task imposed on an already fully employed staff. It was recognized that management and evaluation information is, as a matter of course, collected on a continuous basis -- mostly through informal communication and often in an unstructured way. The problem became one of identifying the data that needed to be collected and analyzed in a more systematic manner. This approach was intended to demonstrate to project management the potential value of the information system.

The project was designed around the concept that much was not known about effective approaches to village health activities, and that it would be modified as more was learned. This flexibility, often absent in project design, offers the potential for the use of monitoring and evaluation information to make

needed changes. In cases of inflexible project designs where, for instance, approaches to project activities and the expenditure of project resources are predetermined, the use of information for project redesign is not possible.

MODIFICATIONS IN THE INFORMATION SYSTEM DURING THE FIRST YEAR OF IMPLEMENTATION

A number of changes have been made in the Hanang information system during the first year of its implementation. Some reflect minor changes in such things as the specification of data points or collection methods. Others represent more fundamental changes in emphasis and approach. In each instance the changes have been made to fit the system better to the project environment, in essence, to make the system work.

Changes in Data Requirements, Research Methodology and Data Dissemination

As was done in the previous section, it is useful to discuss the modifications that have been made in the context of the stated objectives of the information system.

Gaining an Overview of Health Conditions and Evaluating Project Impact

The specification of data to be collected for purposes of providing a village health overview, as well as for project eval-

uation, was modified considerably by the project monitoring and evaluation staff as a result of testing the first set of questionnaires. The changes exemplify the principle that it is difficult for project staff and others involved in the project activities to specify in advance what information would be needed The changes became necessary for a variety of reasons: (1) some data points proved, in practical terms, to be uncollectible; (2) several proxies for levels of health proved to be inadequate indicators; and (3) new data, which had not previously been perceived as necessary, were identified and added to the questionnaires. The modifications and additions to the data points, and the reasons for the changes, are shown in Table 10.

In every instance these modifications represent changes that were suggested by the testing of the initial set of data. Few are surprising. They do involve a proliferation of surveys -- the addition of a census, health survey, nutrition survey, and environmental survey. Some of these represent a different way of collecting the same type of data originally included in the baseline household survey, a change in collection methodology dictated by a better specification of what was needed and the ease/possibility of collection. Others involve the collection of additional data.

As an example, the health survey was added for two reasons. First, under the original design, the information collected to gain an overview of village health conditions was gathered largely through a structured questionnaire. This resulted in

TABLE 10

MODIFICATIONS TO INITIAL DATA REQUIREMENTS OF HANANG INFORMATION SYSTEM

Modifications/Additions to Initially Specified Data	Reasons for Changes
I. DATA TO GAIN AN OVERVIEW OF VILLAGE HEALTH CONDITIONS (expanded from Descriptive Village Data, see Table 8).	
A. Descriptive Village Data	
The data listed in Table 8 under this category remain unchanged.	
B. Household Census	
A simple household census was added, which includes: • Household identification number; • Kitongoji; • Persons in the household; • Persons in the household caring for children 0-5 years; • Children in the household 0-5 years broken out by sex.	The population from which the household sample was selected was changed from all household heads stratified by those with and without children to individuals caring for children from 0-5 years.[1] The census was used for the following: • Sample selection; • Partial data needed for determining mortality rates; • Specifying health units from households in a Kitongoji. The census was also utilized as a data collection training instrument for Health Trainees. The household questionnaire proved to be a difficult instrument to administer initially.
C. Health Survey	
This survey is intended to provide Trainees and VHLs with an overview of village health problems and is at the same time an integral part of the health education work. It is the primary tool with which to train Health Trainees and VHLs in the Freire method of adult education. The survey is initially carried out by the Trainees (and subsequently by the VHLs under the supervision of the Trainees). It is an unstructured approach to identify health issues as perceived by villagers. Trainees record, as a result of informal conversations in the villages, health-related issues as expressed by villagers. They then illustrate these issues in a variety of ways, e.g., through pictures, posters, village plays. In presenting these concepts, villagers are asked what they perceive is happening, whether it happens in their village, why it is important, whether any problems arise from it, and what could be done about it. The approach is intended to identify important health matters and assist villagers in finding their own solutions to them.	This approach was chosen as the best vehicle to implement health education. It represents a good example of data gathering as a substantive part of project work and not an "extra" exercise beyond the normal implementation of the project.
II. EVALUATION DATA	
A. General Baseline Information	
1. Tribe and number of years of education were retained.	
2. Type of roof on house was discarded, replaced by size of farm and number of livestock.	Type of roof on house proved to be an insufficient indicator of well-being. (Less than two percent of households sampled had anything but a thatch roof.)

[1] This change was made as a result of a better specification of project objectives, i.e., that the project focus would be on improving the health of children.

TABLE 10 (Continued

Modifications/Additions to Initially Specified Data	Reasons for Changes
II. EVALUATION DATA (Continued)	
B. Health Indicators	
1. Nutrition	
a. Number of times children fed per day was retained.	
b. In addition to whether the child was breast fed, how long he/she was breast fed and at what age supplementary food was started.	Data about whether children were breast fed were insufficient to give an indication of nutrition level/behavior.
c. Food served in past week was reduced to include only legumes, eggs and milk.	Initial data collection revealed that malnutrition is primarily the result of insufficient protein. Thus, diet variables were reduced to protein-rich foods.
2. Sanitation - deleted from the household questionnaire.	Whether a household has a latrine is not a satisfactor indicator of latrine use. Because of the sensitivity of the question of use, the Trainee could not obtain the information. As a result an environmental survey was devised. It is administered by a village health official (Health Auxiliary); see II.F.
3. Hygiene - Data on how food is stored were deleted.	Because this issue is sensitive it cannot be asked. Observation became impossible because of little or no light (few windows) in the houses.
4. Adequacy of supply of potable water - Deleted from household sample.	There is normally a common water source for a village. Its existence and cleanliness will be observed by the Trainees as part of the Descriptive Village Data.
5. Vaccinations - retained.	
6. Social/Cultural Problems and Beliefs.	
A knowledge/Attitude survey has been developed and is being used along with the household questionnaire. It seeks knowledge and attitudes concerning disease causes and treatment.	Knowledge/Attitude variables were not defined when the evaluation system was developed.
C. Mortality/Disease Incidence	
1. Mortality - deleted from the household sample. Will be collected monthly on the village population by the VHLs.	Village Health Leaders can easily track births and deaths in their respective health units. Job was much more difficult for Trainee.
2. Disease incidence - deleted from the household survey. Part will be collected by VHLs from the health units and part through the nutrition survey (II.E.).	
D. Baseline Data - Division Health Leader Survey of Village Capability to Identify and Solve Local Health Problems.	
Variables are specified in more detail and included in Trainee and DHL monitoring activity.	Greater specificity was required to track health education work adequately.

TABLE 10 (Continued)

Modifications/Additions to Initially Specified Data	Reasons For Changes
II. EVALUATION DATA (Continued)	
E. Baseline Data - Nutrition Survey.	
A nutrition survey was devised, to be carried out yearly by clinic doctors to measure the nutrition level of all children 1-10 years in the project villages. It includes clinical data used for assessing nutrition.	The nutrition variables in the household survey proved insufficient as proxies for levels of nutrition. They were left in the household survey (as noted in II.B.1.) as indicators of behavior related to nutrition practices. The Nutrition Survey was added because of the importance of tracking nutrition levels. It is feasible for clinic doctors to administer it.
F. Baseline Data - Environmental Survey	
This survey was noted in II.B.2. It includes data on human waste and rubbish disposal.	See comments II.B.2.

collecting on those data points that had been identified as important before the project commenced and did not allow for their modification. Further, this formal approach could not capture important differences between villages, which had to be understood before deciding upon specific activities to be undertaken in each. The health survey was designed to rectify these problems. It utilizes the methods developed by Paulo Freire, which focus on informal dialogue as a means of determining what health issues and problems are important in a particular village [see the discussion in Section I.C of Table 10]. Second, this survey was intended as the principal tool for use by Health Trainees and VHLs in the village health education work.

The experience with data collection during the first year was also instructive. As noted in Table 9, the questionnaire initially proved a difficult instrument for the trainees to administer. The result was a redefinition of the training for data collection. The training began with classroom discussion of the census data, its definition and collection techniques. This was followed by the central monitoring and evaluation staff "walking through" the collection of the data with trainees in four of the project villages. The process proved workable; its replication is possible with the DHL, rather than the central staff, assisting the trainees in the field training.

The intended data analysis was also modified in terms of the type of processing used. The analysis that was originally spelled out was thought to be both simple and appropriate given

the project resources. Everything would be done at the local -- largely district -- level, including simple cross-tabulations carried out with the use of a sorter. The system was changed to eliminate the sorter, and all analysis was performed by hand. This change was made to facilitate the work: the availability of a sorter was problematical, and the analysis could feasibly be done by hand.

These types of changes suggest the following:

- The project has gone through a series of data requirement, collection and analysis modifications that make these dimensions of the system "workable." The changes represent a process of tailoring the methodology to the capabilities of those implementing the system.
- The data requirement changes reflect the needs of project decisionmakers. They were involved in defining the changes, and thus it can be surmised that the data, as now defined, are on the whole relevant to the needs of the intended users.

The one aspect of the system that has proved unworkable to date involves data dissemination. A major criticism of "centralized" information systems is their inability to deliver "usable" information on a timely basis. This problem has appeared in the Hanang system. Census data, descriptive health data, and baseline questionnaire data for some villages are already in. However, the analyzed data have not, in most cases, reached the decisionmakers. The problem does not reflect a constraint to carrying out the necessary data tabulation and analysis. Rather, it revolves around:

- Insufficient attention by the project staff to how critical fast turnaround of data is; and

- The unreliable nature of the initial data that were collected in the process of testing the collection instruments. The result was a tendency for the staff to discount all as relatively unusable; they thus did not ferret out those that were usable, do some preliminary analysis, and get information back to the appropriate decisionmakers.

Monitoring Project Implementation

The project monitoring system has been changed drastically from its original form. The formats devised by the central project staff (at the district level) and the DHLs for tracking project inputs and outputs, identifying problems and suggesting solutions were never used. The Health Trainee monthly reporting form, while filled in, provided only general information, which was not comparable across villages and proved to be of little value.

This experience prompts several observations. The concepts upon which the original forms were devised were likely not valid. Most of the central project staff did not feel the need for nor wish to use a detailed tracking of activities that they themselves were to define and for which they would be held accountable. There appeared to be particular reticence toward careful monitoring of actual accomplishments against planned progress. A more acceptable alternative was to simply record progress rather than measuring it against a target. The changes that have been made reflect a less structured approach for central project staff and a considerably more structured and detailed approach for the DHLs, Health Trainees and VHLs.

The central staff each has his/her own tracking system, and each system varies in detail and form. The project director, for instance, utilizes a calendar on which to record all monitoring data that she wants to track systematically. The financial officer keeps detailed records of all financial flows. Other staff, however, record little information in a systematic way.

The monitoring by the field staff, on the other hand, has become more detailed. DHLs monitor trainee performance, as well as village health activities, in considerable detail. Instead of the general categories of information asked on their initial monitoring form (Form II), they now record by village the number and types of health-related meetings held, the stage of the health education work, and details of other health-related activities undertaken by the village. Trainee and VHL reporting is still more detailed, in that progress in each step of the health education work is recorded -- from the initial use of the health survey information returned to the village, to the resolutions settled upon for addressing health problems, to action taken toward their solution. The resulting data are comparable and allow for a far better assessment of progress and problems at the village level.

Though the system in its present form has been in effect only a short time, data collection is proceeding well. The single biggest concern involves the reliability of collection, particu-

larly on the part of the village- and division-level personnel. While the requirement that they monitor project activities is not of their own choosing, the data to be collected were partly defined by them. This fact, in conjunction with the ongoing dialogue between the field and central staff, which emphasizes the objective of finding workable approaches to project activities as opposed to proving that their efforts are going well, appears to be having the desired effect of encouraging reliable data reporting.

Finally, as in the case of evaluation data, the one large and important deficiency in the system to date is the lack of effective information dissemination. The conclusions concerning dissemination of evaluation data are valid in this instance as well: while there is the capability within the staff to analyze and disseminate information on a timely basis, too little attention has been paid to its importance.

CONCLUSIONS

A number of conclusions can be drawn from the Hanang case after one year of implementation.

The Necessity of Tailoring the System to the Needs and Potentials of a Given Project and Locality

The data requirements, collection methodology, and analytical techniques need to be tailored to the needs and available resources in each situation. In the Hanang case data requirements were defined through a process of: (a) specifying decision categories relevant to the project, identifying the critical decisionmakers, and defining data requirements to meet their needs; (b) involving the decisionmakers in the definition of the data needed; and (c) structuring the system to be flexible, so that it can respond to needed modifications over time (recognizing that information requirements cannot be specified adequately prior to project commencement). Each of these steps is considered essential. The result of this approach was the initial identification of a limited set of project-specific data, which was considerably modified during the first year of project implementation as more was learned.

The data collection methodology combines formal questionnaire surveys, structured to the capabilities of the data collectors, with informal, unstructured dialogue between villagers and project staff. Finally, data analysis is concentrated at the local level and is carried out by hand. Analysis ranges from simple cross-tabulations to depicting health problems and issues through illustrations, e.g., pictures and diagrams, to be used in discussions with villagers. Thus, both the collection

methodology and the data analysis are designed to avoid being overly complex and to reflect the capabilities of those implementing the system.

The assumption upon which this approach is based is that, if a system is tailored in this manner, the probability of it working will be greatly enhanced.

The Importance of Timely Information Dissemination

Monitoring and evaluation systems are typically criticized because the information generated is not disseminated in a timely manner and so is not utilized. This charge is most often made of centralized data collection and analysis systems, where data are channelled from the field to a central government ministry or bureau, which handles analysis and dissemination centrally. Often the analysis takes months, if not years, and frequently many key decisionmakers, particularly at the local level, never see the information.

In order to avoid these problems a decentralized system was developed for the Hanang project. The effort was to define an approach that would meet the needs of decisionmakers from the village level upward. While the system has been tailored to the resources available to implement it, it has fallen short in getting the information back to the necessary decisionmakers. This situation has resulted not from an inability of the system to fulfill this function, but rather stems from insufficient attention given to its importance by the project staff and a ten-

dency on the part of the staff to discount the bulk of the initially collected data because of the unreliability of a portion of it. Nevertheless, the capability to deliver the information does exist in the Hanang case. Without this dimension of the system working well, there is no justification for initiating a monitoring and evaluation effort.

Problems in Structuring an Effective Monitoring System

Initiating a system to monitor project progress has proved particularly difficult. The first approach was to develop, with the staff who were to carry out the monitoring activity, forms for listing project activities, tracking project results, and recording problems encountered in implementation. For the central project staff this proved to be overly structured; they evolved alternative approaches, each adapted to the needs of the individual staff person. Of particular importance was the need to avoid establishing targets against which to monitor project progress. A far more acceptable approach was simply to record accomplishments as they occurred.

The monitoring by the field staff, on the other hand, became more structured. The first forms allowed the staff to define which activities they would monitor. The result was the generation of data that were not comparable across villages or divisions. The field staff has now been given consistent data to collect concerning village health education activities, clinic work, etc.

In addition, there is the problem of developing necessary incentives for staff to collect reliable data. In the Hanang project this difficulty has been addressed by: (a) hiring a monitoring and evaluation staff, charged with overseeing the implementation of the system, whose personal gain is not directly dependent upon project success; and (b) stressing with those involved in village-level data collection -- the village Health Trainees and VHLs -- the need to seek effective approaches to project implementation, as opposed to proving that one particular thrust is successful.

The approach to project monitoring has, like the rest of the system, evolved throughout the year. It appears now to have the support of the project management and to reflect their needs.

Balancing Information System Costs Against Probable Returns

The decision to include an information system in a project of this sort revolves around whether the system can be expected to make a difference to project performance. That is, the return from such a system is the improved basis it can provide for management decisions and project modification or redesign. This return is difficult to measure.

The cost of a system in a project such as Hanang is likewise difficult to measure. The data collection and analysis work is an integral part of all project activities and cannot easily be separated out. The primary data collectors in Hanang, for instance, are the village-level Health Trainees and VHLs,

the same staff who are the principal implementors of the village health education and clinic work. The information system is of use to them insofar as it systematizes the communication system that is already at work and makes their tasks easier. To the extent that the system is adapted to the needs of the decisionmakers and the capabilities of the project staff, and to the extent that it is delivering usable data to those who need it on a timely basis, it can be justified. The challenge is to reduce costs and increase benefits by adapting it to meet decisionmaking needs.

The Value of Outside Assistance in Designing Information Systems

It is an enormous challenge to develop workable monitoring and evaluation systems that track inputs and outputs, measure project effects, identify problems and their solutions, and deliver the needed information to the appropriate decisionmakers in sufficient time to be of use. Few systems can be found that do all of these tasks well.

In the Hanang case the assistance of outside specialists proved highly valuable in attempting to accomplish these tasks. While the staff in Hanang are skilled and are doing an excellent job of project implementation, including modification of the information system as needed, without the input of specialized technical assistance it is unlikely that the system would have been developed from the bottom up, with a central focus of meeting the needs of project decisionmakers. It is more likely that some

form of a centralized system would have emerged, with the usual problems that are attendant upon such an approach.

CASE STUDY:
THE ORDEZA MONITORING AND EVALUATION SYSTEM, HUARAZ, PERU

INTRODUCTION

ORDEZA was a well staffed regional organization established to assist the rehabilitation of the earthquake zone in the Huaraz area of Peru. ORDEZA helped communities to form cooperatives, identify income-generating activities, borrow funds and construct the development project. Pig farms, a marble mine and a restaurant were examples of job-projects supported by ORDEZA. The organization had been operating for some years, and had received an AID loan when Development Alternatives, Inc., was asked to design a comprehensive monitoring and evaluation system for use primarily by project management and, secondarily, by the AID Mission in Lima.[1]

During 1973-1974, DAI made six trips into the project area to work with the ORDEZA staff. This consisted of determining information requirements, designing and field-testing instruments, and leaving behind revisions to be taken to the field during the absence of the technical assistance team. The purpose was to generate an internalized information system that would be seen by ORDEZA staff as their own creation and which would be of direct utility to project management.

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[1] Designed by Development Alternatives, Inc., 1974.

The existing reporting system was burdened by a requirement from AID for a socioeconomic study on each subproject before the subproject could be funded. These studies were long, expensive, non-comparable and could not be used as baseline data for any evaluation of community-wide benefits from the cooperative project. Funding decisions were essentially made, however, when the studies were initiated. After a very rapid initial survey of the area, a research team was generally committed for several months, which was tantamount to approving the project for funding.

OUTLINE OF THE ORDEZA INFORMATION SYSTEM

Over the course of 12 months DAI, with the help of ORDEZA staff members, designed, tested, redesigned the following instruments:

- Community Selection Guide;
- Socioeconomic Study of the Community;
- Monthly report of activities of ORDEZA personnel;
- Reports on meetings, assemblies or local participation on projects in the community;
- Monthly report on contributions to the community's development project;
- Summary of development activities completed in the community;
- Variations between the feasibility study and actual construction, maintenance and net income of the subproject;

- Customized accounting and inventory control records for two community subprojects;
- A community socioeconomic evaluation form, post subproject; and
- An individual member socioeconomic evaluation form, to be used annually.

OUTCOME OF THE DESIGN EFFORT

The information system was tested with enthusiastic responses from the ORDEZA teams in the field, and modified by discussion with the project director to ensure that it met his decision-making needs. The system, however, was never completed or implemented. Some of the reasons involve a change in director and other top officials in ORDEZA, and an internal switch of authority and responsibility. The information system designers have hypothesized that there were other reasons, possibly including:

- The reporting system was demanding on the field staff, with no appropriate feedback or value. It reported on their activities without helping them do their job better.
- Likewise, the reporting system did not help the local managers of the cooperative. Reports were designed more for the control of the project, than as learning or training devices to help them achieve better control over the project.
- The system, with ten different reports occurring at differing times and places, called for a headquarters evaluation staff that did not exist. This would have required a reorganization of the central office of the project, and a change in the established relationships and

lines of authority. The cost of this revision may have been higher than the perceived benefit.

The outside technical specialists (DAI) were funded by the loan agency, AID. There may have been an underlying suspicion that the system was designed to report failures or procedural shortcomings which would then be used to cut off, limit, or otherwise impose outside control on the funds flowing from the AID loan.

CASE STUDY:
AN INFORMATION SYSTEM FOR THE BICOL RIVER BASIN DEVELOPMENT PROGRAM (BRBDP) IN THE PHILIPPINES[1]

INTRODUCTION

In 1973, a very ambitious information program was launched to support a large subregional development program in the Bicol region, Luzon, the Philippines. The program was supported by AID, as well as the Philippine government. A special Social Survey Research Unit (SSRU) was established to design and then implement a comprehensive information system utilizing key personnel from the Institute of Philippine Culture, Ateneo de Manila University, in cooperation with Ateneo de Naga College, in Naga City. The director was Frank Lynch, S.J., one of the most experienced social science researchers in the Philippines.[2]

While the original philosophy was for the SSRU to establish a baseline from which development changes in local population

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[1] Data sources include discussions with SSRU Director Father Lynch and the USAID staff directly involved in the project, and an examination of the research proposals, methodology, instruments and output of the SSRU. A draft case study was submitted to Father Lynch as well as USAID/Manila for comments and revision.

[2] Father Lynch, a principal researcher and author for many highly regarded studies on the rural population in the Philippines, is a senior professor at the University who holds an international reputation in the field of social science survey research methodology and practice. He was selected to write the Agricultural Development Council's publication, "Field Data Collection in Developing Countries: Experiences in Asia," June 1976.

could be traced longitudinally (a panel survey), there were also provisions for short, quick investigations into situations or conditions of importance to the BRBDP. In the initial contract with the BRBDP, the SSRU retained the ability to spend a limited but significant percentage of total funds on research, which did not specifically involve activities of the BRBDP (since the project was still in an early organizational phase), but which would complement overall project objectives. Eventually the SSRU's tasks were expanded to include feasibility studies, each of which was approved by the appropriate BRBDP management offices. In later years the study proposals, methodology to be used, sample frame, questions to be addressed, and confidence levels on responses were subject to written agreement between the BRBDP and the SSRU.

The Institute for Philippine Culture assisted Father Lynch in the training of 30 locally hired Bicolanos who were selected to do the interviewing and coding. After a month of intensive instruction, the SSRU moved to the field for the first "quick-look" study of 600 households undertaken in October 1973. The study was designed to examine rice farmer practices and priorities in the province of Camarines Sur. The report production based upon this one survey is shown in Table 11.

The surveys were designed to be coded and computerized using an IBM 370 and SPSS software available in Manila. A carbon copy of each coding sheet was maintained at the SSRU, and preliminary

analysis, as well as responses to specific questions, could be obtained manually. While the turnaround time was minimal in comparison with other computerized survey results, the product was invariably "late" in the eyes of project management, which necessitated long hours for the SSRU staff.

TABLE 11

REPORT PRODUCTION BY THE SSRU
BASED ON THE OCTOBER 1973 600-SAMPLE "QUICK-LOOK" SURVEY

Report	Date	n	Content Source (by Block No.) From Survey Instrument Blocks[1]
Interim Report, No. 1	October 31, 1973	414	1-2 and 7
Interim Report, No. 2	November 6, 1973	514	1-2 and 6-7
Research Report Series, No. 1	December 31, 1973	600	1-3 and 6-8
Research Report Series, No. 2	January 31, 1974	553	5
Research Report Series, No. 3	February 15, 1974	553	4

[1] SSRU, "SSRU Research Activity Summaries Nos. 01-14 for research completed in FY 1974," October 1974.

After the initial survey, the SSRU conducted a series of additional small statistical surveys, which were computerized and analyzed as already described. The conclusions and data from these surveys were often combined into one report. Titles and time for report production from the last survey conducted, for the first six reports, are shown in Table 12.

TABLE 12

SSRU INITIAL REPORTS AND TIME TO COMPLETION
FROM LAST SURVEY USED IN THE REPORT

Report No.	Time from Last Field Survey to Report Production	Title
SSRU RS, No. 1	3 Months	What Rice Farmers of Camarines Sur Say They Want from the Philippine Government
SSRU RS, No. 2	4 Months	Rice-Farm Harvests and Practices in Camarines Sur: Do Compact Farms, Masagana 99, and the Samahang Nayon Make a Difference?
SSRU RS, No. 3	4 Months	The M99 Delivery System: How Well Does it Work in Camarines Sur?
SSRU RS, No. 4	4 Months	The Proposed Balongay Fishpond Estate: How do the Taga-Balongay Feel About it?
SSRU RS, No. 5	3 Months	Pakikiiba and Pakikidamay: Two Modes of Group Cooperation in Camarines Sur
SSRU RS, No. 6	2 Months	Farmers of the River Basin's Land Consolidation Project Area: Nowhere To Go But Up -- and in No Great Hurry to Get There

In April 1974, SSRU began what was projected to be an annual panel survey, with 3,240 randomly chosen households in the 33 municipalities that constitute the Bicol River Basin in the province of Camarines Sur. Reports on the output of the survey started flowing in January 1975, and the last was issued in January 1976. The subjects covered in the SSRU Report Series 8 through 13 were:

- Employment;
- Travel patterns;
- Conditions of the unemployed;
- Medical services and nutrition;
- Happiness and perceptions of the local population; and
- Income distribution and household spending.

In addition, the SSRU completed two reports in 1976: one a municipal survey, and the other a study of the travel/transportation network of the Bicol region.

THE CHANGING ROLE AND FUNCTIONS OF THE SSRU

For approximately $80,000 per year during 1974 and 1975 (the SSRU was not under a new contract to the BRBDP in 1976), utilizing a staff of 35 personnel located in the Bicol (with additional data collectors, processors and coders employed as needed), the SSRU turned out more than a linear foot of research reports, not including the instruments, methodology statements and interim reports issued along the way. While tracking the impact of the reports on the progress of the project is nearly impossible, all parties agree that there was some impact, most often acknowledged to be redirecting of BRBDP plans when the local population was found (from SSRU Reports) to have constraints or perceptions of constraints which would make implementation difficult. During

this period there was little to report on the impact of BRBDP activities, since there were few in this large river basin development program. So the SSRU reported on ongoing development programs, including agricultural extension and land reform within the project area. In spite of detailed arrangements that attempted to ensure that management needs and SSRU output would correspond, there was a steady erosion of closeness and confidence between the BRBDP and the SSRU. In a revision of arrangements during 1977, the SSRU as an organization was relegated primarily to data collection, while the responsibility for generating the issues to be addressed, the methodology to be used, and the analysis to be performed was assigned elsewhere.

The reasons for the disaffection and the root causes of the problem depend upon the perspective of the respondent, but they surely include organizational misplacement, pressure from the international donors, methodological disagreements, and contrasting approaches to development planning.[1] In spite of what was intended as pathbreaking experimentation in a major ongoing monitoring and evaluation system that would be utilized for improved project performance, the information program in 1978 is still undergoing experimentation; the original panel survey has been dropped, and new methodology and concepts are being tested. Five years after the SSRU was formed, there is still no answer to the

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[1] The following section is DAI's interpretation, since it was not possible to obtain closure on the issues with the parties involved.

question of whether, in the BRBDP, an information system will be established that will have a significant impact on ongoing project performance or provide a valid measurement of project impact.

Organizational Misplacement of the Information Unit

The SSRU was hired at a program level by the Bicol River Basin Council, which included five cabinet members. The linkages were above the project, with ties to the line agencies whose authority and leverage were delegated to the BRBDP, which is essentially a regional coordinating body. With forethought the SSRU was established as an autonomous research organization, reporting to but not controlled by the BRBDP. The SSRU maintained a carefully controlled procedure in conducting research and releasing reports, in an attempt to coordinate its activities with the project. This included:

- Prior approval for all research studies, questions, sample and confidence levels;
- Submission of the data and the report, without conclusions, to the project for review and comment;
- Submission of the full study with conclusions to management, after receiving the project's comments on the body of the report;
- Incorporating differing views into the text or the footnotes of final reports; and
- Dissemination of the reports to the program level, as well as to other interested parties including AID and the World Bank.

In spite of these attempts to ensure that the SSRU supported the project, management apparently saw a threat in objective reporting

submitted to higher authorities, whom the project also had to satisfy and/or placate. The threat was stronger than the benefits of independent reporting, and from the very beginning the organizational misplacement eliminated a cooperative working arrangement and set the stage for other differences to follow.

Pressure from the Donor

International donors are rarely neutral in their desire to give priority to one or another aspect of a project. In this case, USAID staff in 1973 promoted Father Lynch and the SSRU over alternatives that might have been more readily acceptable to the BRBDP (e.g., viewed as less threatening). While this helped ensure objective reporting, it also added to the lack of collaboration between the information unit and the project, since the donor might have been viewed as wanting an outside review of project activities.

In 1977 USAID staff agreed with the removal of the SSRU from other than data-gathering activities, and the end of the panel survey started in 1974. New AID staff with a strong interest in "hard" income, nutrition, health and production data found the reports of the SSRU lacking rigor, and opted for the use of an alternative methodology.

Methodological Disagreements

AID's new directions mandate required that real benefits reach the rural poor, and requested that solid evidence be

extracted to show that progress was being made (even though this had rarely been done with previous projects). The USAID representatives to the BRBDP took this mandate seriously, and called for "hard" data on income, employment, labor utilization, nutrition, and health status, as well as a measurement of the impact of project activities. "Hard" data are extremely difficult to collect from the recall of respondents, and do not dovetail nicely with questions concerning quality of life, desires and aspirations, and local population needs. In particular, the BRBDP and USAID believed that the SSRU stumbled on the problem that has snagged nearly every other survey research project -- the panel survey instrument was not up to the job of capturing income from rural near-subsistence households.[1] The resulting report of large-scale dissaving on the part of the majority of low-income Bicolanos, although consistent with most other Philippine survey data, was judged to be either the result of inaccuracies in data collection, or a failure of variable definition. Such a finding, along with the paucity of solid information which could be used to document project progress as required by AID's new mandate, was further fuel to the fires of dissatisfaction with the SSRU's information program.

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[1] The SSRU asked for and received assistance from the BRBDP agricultural economists for devising the collection instrument on farm production and income. The methodology used to obtain household income figures was based upon guidance from the project. It is this weakness in the conceptualization and collection of economic data that convinced USAID staff of the necessity of making changes in the information unit.

Contrasting Approaches to Development Planning

The SSRU reflects the academic training of Father Lynch, who holds a Ph.D. in social anthropology from the University of Chicago, as well as his powerful dedication to the betterment of the lot of poor Filipinos.[1] There is a philosophic and practical commitment in his work to a determination of the needs and aspirations of the average, meager-income local citizenry. This methodology utilizes a good deal of ranking and prioritization of responses to show the most important concerns of the average rural Bicolano. His reports speak on their behalf voicing considerations seldom heard. The philosophy was enunciated in the very first SSRU Research Report Series, No. 1, as follows:

> Program specialists ... are skilled at tasks such as these [regional planning]. Their problem comes rather from an unconscious tendency, ever in need of restraint, to mistake important means for essential ends. For in the single-minded pursuit of national or regional growth they will continually be tempted to by-pass dialogue with the people involved to "get on with the business at hand." Yet to take this tack would be to miss the chance to achieve, at least in some small fashion, what is basic for any genuine regional progress -- the development in the most human sense of the people living there. By not taking into account the opinion of the average person, by not giving him his say and listening to what he says, finding means to discuss with him in reasonable manner the advantages and disadvantages of the programs he suggests, the planner dooms himself to what must, on serious reflection, be judged a sterile exercise. For regional progress is either the development of thinking human beings who have learned to participate in decisions that affect their destiny -- or it is really nothing.[2]

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[1] Father Lynch is a Philippine citizen.

[2] SSRU Report Series, No. 1, "What Rice Farmers of Camarines Sur Say They Want from the Philippine Government," December 1972, p. 2.

While this approach recognizes the legitimate role of development planning, and the amalgamation of the knowledge and interests of both the citizenry and planners, there is heavy emphasis given to the extraction and presentation of perceptions, and the use of the data to guide development planning.[1]

The BRBDP, on the other hand, is a large subregional development program in which the vast majority of all funds are consumed in irrigation systems, feeder roads and other physical infrastructure. It does not regularly occur to an engineer/planner that the local population should be asked where they would like the irrigation dam. The introduction of local population involvement in the project is often assumed to come with the final distribution of increased resource availability (the local organization that helps manage the increased water supply), rather than in the upfront planning process. The potential for conflict regarding the most appropriate priority in planning development investments is obvious; the approaches to development planning begin from two distinctively different perspectives.

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[1] See, for example, Frank Lynch, S.J., Jeanne F. I. Illo, and Jose V. Barrameda, Jr., "Let My People Lead: Rationale and Outline of a People-Centered Assistance Program for the Bicol River Basin," a social-soundness analysis submitted to the U.S. Agency for International Development; Social Survey Research Unit, Institute of Philippine Culture, Ateneo de Manila University, Loyola Heights, Quezon City, August 1976.

THE REVISED AND RENEWED INFORMATION PROGRAM WITH THE BRBDP

Staff of the BRBDP and USAID were interested in the outcome of the Laguna multipurpose household survey conducted by American and Filipino academics during 1976.[1] The survey combined detailed economic input/output analysis with actual observation of nutrition intake and labor utilization, and presented a wealth of data that were thought to be valuable for monitoring and evaluating the progress of the BRBDP. Individual experts, including staff of the SSRU, were assembled to construct a new survey instrument and define a new survey methodology. This was completed in the latter months of 1977, and the initial field survey efforts were undertaken thereafter.

THE NEW BICOL MULTIPURPOSE SURVEY

The BRBDP and USAID have elected to start a completely new survey operation, this time under much stricter control from the BRBDP. The data from the previous IPC-SSRU surveys had been kept by IPC, and BRBDP policymakers felt they had insufficient control over the use of the data, which they also thought were inadequate for decisionmaking purposes. The data from the new BMS will be owned jointly by the BRBDP and USAID, and both of these organizations have played a role in determining the scope and nature of the survey instruments. A special consultant was

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[1] See Chapter Five, pp. 109-117.

hired to determine information needs of major policymakers, to develop an outline of information that could be drawn from the survey, and to provide for policymaker review of the outline before the survey instruments were developed. In developing the survey instruments he drew on his own experience with the Laguna Household Survey, as well as the experience of others with that survey, which provided valuable insights for the BMS. IPC-SSRU, and other institutions that were candidates to undertake analysis of the survey data under contract to BRBDP, were also brought into this survey design activity.

A USAID/BRBDP document describing the new BMS outlines the development of the instruments:

> A series of actions over the 1976-1977 period led to the development of the BMS instruments. Under the coordination of a BRBDP consultant, persons from the BRBDP and USAID/RD offices developed a set of objectives which were to be answered by the BMS.... With the assistance of leading researchers from the University of the Philippines Diliman and Los Baños and the Institute of Philippine Culture - Social Survey Research Unit (IPC-SSRU), a draft BMS was developed. The draft was tested and redesigned and submitted to a group of Filipino and foreign social researchers at a conference sponsored by the BRBDP in Naga City. The result was a significant revision in the instrument -- a revision developed by these experts under the supervision of BRBDP, USAID and IPC-SSRU personnel. This revised instrument was tested and translated to form the BMS.
>
> Numerous government and private agencies were represented in this process. These included representatives of the Dept. of Health; Regional NEDA; the various offices of the BRBDP; USAID-RD and USAID-ODM; the Nutrition Center of the Philippines; the School of Economics and College of Nursing, U.P. Diliman; the Institute of Agricultural Development Administration, U.P. Los Baños; and IPC-SSRU.[1]

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[1] *The Bicol Multipurpose Survey (BMS)*, November 1977, pp. 1-2.

This same document describes the components of the survey as follows:

a. Socio Economic Survey

Two or more visits to each household will be conducted to collect on a recall basis this information. Demographic, time use in home and market activities, health and nutrition beliefs and practices, family planning beliefs and practices, detailed agricultural inputs and outputs, other income, employment, and labor force information, household assets and liabilities and perceived and objective quality of life indicators will be measured with this statement. Data is collected both on each individual and the household.

b. Individual nutritional and health status profiles - Height, weight, hemoglobin and arm circumference data will be collected by trained medical technologists to provide an accurate welfare measure of all members of our household samples.

c. Barangay survey - an inventory of the physical infrastructure and social services provided in each barangay will be developed. In addition, prices at the usual shopping centers for barangay residents will be measured. These barangay data will provide an understanding of both the impact of outside forces and the BRBDP on the barangay infrastructure.

d. Agricultural and health worker surveys of all personnel in the Rural Health Units/City Health Offices, the Bureau of Agricultural Extension and Bureau of Plant Industries will be conducted by questionnaire. Both a schedule of worker activities and a test of worker knowledge are included in these survey instruments.

e. Individual dietary intake and time allocation data based on weighing and measuring and observation techniques, respectively, will be collected during 1978 for a subsample.[1]

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[1] Ibid., p. 2.

The field survey and data processing being undertaken by IPC-SSRU are progressing on schedule, and the expected completion date is November 1978. The analysis will be done under separate contract, and IPC-SSRU will be competing for analysis contracts with a number of other institutions such as the Institute of Agriculture Development and Administration at the University of the Philippines, Los Baños, the School of Economics, and College of Nursing of the University of the Philippines, and Social Research Associates. In most cases these analysts were involved in the development of the BMS and the BMS conference and have been consulted on all substantive changes.[1]

The analyses to be undertaken fall into seven categories: Agricultural production; Level and distribution of income; Time allocation and employment; Demographic change; Health and nutritional status; Perceived and actual standard of living; and Contribution of women.

While the contracted analysts will have immediate access to the data, Filipino researchers not contracted by BRBDP and/or USAID for analysis must wait nine months after the SPSS tapes are given to the BRBDP by IPC-SSRU before they can use them. Non-Filipino researchers, and research institutions who are not formally affiliated with the BRBDP, will be allowed access to the data after a waiting period of 18 months. It is the intention of the BRBDP to maximize the use of the data and to encour-

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[1] Ibid., p. 3.

age as much analysis as possible. The waiting periods have been established to give first access to local institutions, especially those that are officially involved in the analysis effort. For the contracted analysis reports, the BRBDP cannot change or omit any of the findings but maintains the right to have its own interpretation included with the findings if it differs from the interpretation of the contracted analysts.

CASE STUDY:

INFORMATION TO SUPPORT THE NATIONAL RICE PRODUCTION PROGRAM (MASAGANA 99) IN THE PHILIPPINES[1]

The national rice production program in the Philippines, known as Masagana 99 (M99), attained great increases in production in a very short time.

> Only two-and-a-half years after launching its Masagana 99 rice production program in May 1973, the Philippines attained self-sufficiency in the crop. From a 22.7 million cavan (44 kg) deficiency of palay (paddy, rough rice) in crop year 1973 to a 7.44 million cavan Philippine-produced surplus expected by the end of crop year 1976 in June is the remarkable rice production record achieved under Masagana 99.[2]

Part of the program's success might be attributable to its good information system. AID specialist Kenneth E. Smith began working on improvements in the reporting system of the Philippine rice production program in 1972. In 1973 he was assigned to institute a revised and streamlined information system within the recently announced M99 rice self-sufficiency program. As a statement of expected output, Smith declared that he would help create:

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[1] Data sources include discussions with USAID representatives in the Philippines, with the Bureau of Agricultural Economics chief within the Ministry of Agriculture, two program specialists within the M99 project, and with a member of the overall review committee that directs the M99 information system program, along with a review of monthly progress reports, monthly output, and special studies under the M99 program. A DAI staff member revisited the project in April 1978.

[2] Arturo R. Tanco, Jr., Secretary of Agriculture, Republic of the Philippines, International Rice Commission Newsletter, June 1976.

> A Management Information System (MIS) in the National Food and Agriculture Council (NFAC) capable of measuring progress and performance, and identifying implementation problems in small farmer rice and corn programs.[1]

The traditional reporting system was a burden on agricultural extensionists. The system called for details of their activities but drew out little of value about the impact of their programs on target farmers. The revised MIS (which is perhaps more appropriately called an Information System for Management) depends upon a 100 percent sampling of the extensionists' client farmers, an estimation of area planted and yield per hectare, and a number of other pieces of information about special problems in the local area. The reports are submitted upward and aggregated through one to three supervisors depending upon the area, and further aggregated at the national level. M99 area planting, estimated yields, and reports on special problems reach the national-level user less than three weeks after the close of the reporting period.

Kenneth Smith has documented in detail the procedure he undertook to establish the M99 information system, with five progress reports.[2] In addition, there are monthly and six-month summaries of the system's output. To double check the accuracy of the technicians' reports, field teams conduct carefully con-

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[1] Kenneth F. Smith, "Management Information System Progress Report #1," USAID/Manila, January 1975, p. 2.

[2] He also took time to write two handbooks, one on statistical procedures, one on time series analysis, and gave the vast majority of training courses to technicians and staff in the program.

trolled samples of hectarage planted and yields within the M99 program. A comparison of the results of these field surveys and the M99 reports is given in Table 13.

TABLE 13

A COMPARISON OF M99 AND FIELD SURVEY REPORTING

Province	Cavans per Hectare from M99 Response	Cavans per Hectare from Field Survey	M99 Over-estimate (Percent)	Date of Sample Survey
Laguna	126	100	20.6	June 1975
Iloilo	108	63	42.7	September 1975
Nueva Ecija	79	55	30.4	October 1975
Quezon	74	63	14.9	August 1976
Leyte	72	61	15.3	September 1976
Bulacan	73	62	15.1	November 1976

The discrepancies between yields sampled and those reported in 1976 were significantly less than those in 1975, a healthy trend for any information system. However, accuracy is not yet achieved. The difficulties with this ambitious system include:

- First, sample testing has shown that farmers underreport, while field technicians and their supervisors overreport. The final data generally show overestimates of yield. Production reports are made public, but yield estimates are distributed only to high-level policymakers in order to avoid adverse media reactions.

- Second, initial reports were apparently not used heavily, due to lack of confidence in the data. Use of reports has increased, which may be due to a consistency in the bias, thereby allowing more reliable conclusions to be made about changes in productivity and production.

- Third, reports on production problems are inadequate to give proper guidance to support service staff for activating corrective activities. The information is too general and field workers are reluctant to report problems, as they perceive a potential liability for blame.

- Fourth, the caseloads of the agricultural technicians are too large to visit sites and measure or estimate hectarage and yields for all their assigned clients. A sampling technique of ten percent would likely produce better data than the 100 percent now used.

- Fifth, aggregation by the supervisors may well create more problems than using data taken directly from the field technicians. A computer program to aggregate the reports of individual technicians was unable to cope with numerous errors and omissions. It may be possible in the future to computerize the data directly from the technician and feed back useful working information. At present the information flow is one way.

- Sixth, the M99 information system program was, organizationally, placed outside the line bureau that normally has responsibility for the prediction of crop hectarage and yields. This organization, the Bureau of Agricultural Economics, conducts as many as six annual surveys and crop cuttings on rice yields, from as many as 25,000 locations. The computerized forms include data on whether the respondent is in the M99 program and received credit and/or supervision. If these data were matched against the M99 MIS, both could be improved. That they have not suggests a lack of interest in and appreciation of the MIS on the part of the more traditional agricultural census takers.

In conclusion, the Masagana 99 information system is far superior to the one that was used prior to the introduction of Kenneth Smith's MIS principles. Furthermore, it is gradually becoming a more acceptable and useful tool for decisionmakers. Users were not able to accept readily MIS reports of high yields,

which contrast with more conservative yield reports of the Bureau of Agricultural Economics. The listing of technical problems (pests, flood damage, lack of fertilizer) in the M99 reports rarely gives enough information to suggest solutions, but can serve an early-warning function. The M99 data have been used to encourage Filipino rice farmers to make an extra effort and use certain new techniques, but has not appeared to have an effect on national decisionmaking, due to the availability of conflicting and probably better data. Several observers have suggested that, if the agricultural technician concentrated on estimating, from a ten percent sample, the area planted, by each specific variety of high-yielding rice seed (there are nearly a half dozen, each with a differing yield), and left the yield estimates to the crop-cutters, the overall efficiency and accuracy of both reporting systems would be greatly improved.

CASE STUDY:
TESTING APPROACHES TO MONITORING AND EVALUATING THE DISTRICT DEVELOPMENT PROGRAM IN KENYA[1]

INTRODUCTION

In 1975 the Government of Kenya initiated a program to decentralize rural development planning and management throughout the country. A debate had been carried on within the Government for several years about the most effective strategy to follow in delivering development resources to the rural areas. Some within the government felt that it was important to strengthen the capability to plan and manage development programs centrally; sufficient accountability of expenditures could only be maintained through control by the central operating ministries. The contrary position emphasized the extreme diversity in local areas and the need to tailor development efforts to these differences.

> The concepts upon which decentralized planning developed in Kenya are familiar: because the process of rural development must take place in numerous different environments -- economic, social, physical and institutional -- the process is one which requires a detailed knowledge of each area.

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[1] A DAI staff member, Dr. Peter Weisel, was involved in this work while employed in the Kenya Ministry of Finance and Planning in Nairobi. The discussion below draws on his work as well as on documentation related to the implementation of the monitoring and evaluation activity. Dr. Weisel revisited Kenya and investigated the status and momentum of the program in February 1978.

> Because of this diversity it is necessary to create at the local level structures capable of both identifying problems and needs and specifying processes for their solution -- a level which, by implication but seldom made explicit in official documents, would be below the normally large and varied districts if real local level planning and management were to be carried out.[1]

Related to these ideas were several additional concepts: the value of integrating activities in a given area, the need for a high degree of local participation if development activities are to have an impact, and the notion that, to affect this process, genuine responsibility and power must be passed from Nairobi downwards.

To implement these concepts the district development effort was initiated. The focus was on the district, of which there are 42 in Kenya, as a workable administrative and geographical unit for decentralized development, recruitment and placement of District Development Officers (DDOs) responsible for planning and coordinating specified district-level activities, the utilization of district-level District Development Committees (DDCs) as planning and management units, and the establishment of the district-level Rural Development Fund (RDF) to be used for locally initiated projects. The DDOs would be responsible to the Office of the President, which was in charge of administering the rural areas, and the DDCs would be headed by District Commissioners,

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[1] Peter F. Weisel, "Some Issues Related to District Development," Discussion Paper No. 1, Ministry of Finance and Planning, Nairobi, Kenya, March 1977, p. 1.

who were the representatives of the Office of the President at the district level.

This structure would be superimposed upon an existing organization where operating line ministries centrally allocate monies for their own activities, normally with little intercoordination. The Rural Development Fund would be new, and was conceived as a vehicle through which increasing amounts would be made available for projects planned and coordinated from the District. In the first years, however, this fund would account for less than five percent of all development funds allocated to rural areas.

It was in this milieu that the Ministry of Finance and Planning, acting as the primary proponent of a decentralized development strategy, undertook to test a management information system to be used to monitor and evaluate district development activities. The Ministry of Finance observed that the operating ministries had a variety of reporting systems, most geared toward tracking activities of individual staff, but with little capability of detecting project impact or suggesting solutions to management problems. What was needed, it was argued, was a system that would generate usable management information for district staff and below, and also provide data on the effects of government programs across ministries. To this end a system was developed and tested in Murang'a District in north central Kenya.

DESIGN OF THE SYSTEM

The system was developed by the DDO in Murang'a (with the assistance of Dr. Weisel from the Ministry of Finance) in conjunction with the district staff of those operating ministries primarily concerned with development -- Agriculture, Works, Health, Cooperative Development, and Water Development. The approach used in designing the system was to examine the decisionmaking process at various levels within the government, identifying decisionmakers and data needed for management and evaluation decisions. This process revealed that a large number of management decisions for projects funded through the Rural Development Fund, as well as for some regular ministry projects, were made at the district level and below, in essence, far below the central ministries. In general, Nairobi officials were primarily involved in decisions related to final project approval and project redesign. Functions like identification of project target groups, scheduling project activities, programming inputs, and determining the expenditure of funds once they were allocated to the districts were all decentralized. This supported the argument for an information system aimed at providing monitoring and evaluation information for a wide array of officials -- many of whom were on the village/division/district levels.

The following data were selected for collection:

- Project financial flow. Under the system that had been in effect, officials responsible for

implementing RDF projects seldom knew amounts spent or balances remaining for particular projects. District accounting offices, responsible for tracking financial flows, did not break out expenditures by project and could not provide ongoing financial information to those most in need of it. Under the monitoring system developed, implementing officers would themselves track monies as they were obligated for specific expenditures and so keep a running account of funding.

- Data on non-financial inputs into projects (staff, training, commodities), their timing and magnitude.

- Outputs of the projects, or progress in terms of initial results. Actual results were to be measured against what was planned, and through this process potential implementation problems would be signaled. Solutions would be sought through a variety of methods. In some instances solutions to simple implementation bottlenecks would be obvious; while in other cases, such as a lack of behavioral response on the part of farmers to a new technology, solutions might require a special inquiry by project staff or outsiders brought in for the purpose.

- Evaluation of project effects. This, as noted below, would vary by type of project and would be accomplished through observation or informal approaches to data collection in the first stages of the information system.

The data collection and analysis methodology was designed around local capabilities. The monitoring data would be collected by various operating ministry staff involved in project implementation; accuracy would be spot-checked by the DDO each month on a sampling of projects. The data would be kept on monitoring forms by both the implementing officers and the DDO, the latter collaborating with the project staff on implementation problems and assisting in defining solutions to them.

Evaluation was viewed as a more difficult task. Implementing officers, with the assistance of the DDO, would again be the principal data collectors. For agricultural production projects a sample of farmers would be chosen from whom to gather data. Impact would be estimated initially, not by the collection of hard yield or acreage data, but by tracking changes in the technology used by the farmers. For rural roads or water development, use data would be collected, as well as information on the commitment of local resources to maintain the facilities.

Because this system was to break new ground in terms of testing approaches for local-level project monitoring and evaluation, the officials involved in its design decided that it would first be tried on only RDF-financed projects. As the system was perfected and as decentralized planning and project management expanded, the system would be broadened to include line ministry projects, as well as replication in other districts. In Murang'a this meant that the system would focus largely on the types of projects receiving the bulk of RDF monies -- soil conservation, labor-intensive road construction, and village water development.

OBSERVATIONS ON THE IMPLEMENTATION OF THE SYSTEM

The most effective aspect of the system was the use of financial flow data and information on non-financial inputs. Local-level officers involved in all three types of projects

had greatest need of this information. They were under considerable pressure to stay within budget limits and had been previously unable to know when they were overspending. These data were collected on an ongoing basis and used by: (a) the project implementing officers, to plan the scale and timing of the activities; and (b) district and central ministry staff, to account for inputs into particular projects.

On the other hand, the effectiveness of the rest of the system was disappointing. Initially data on project progress were collected, but the accuracy of the data and the thoroughness with which the collection was carried out were questionable. Officers had little inclination to spend time on evaluating project impact; while they were being held accountable for the expenditure of project monies, there was little accountability in terms of project development impact. The incentive system was such that officers would gain little from evidence that projects were having substantiated impact, and could be hurt by evidence to the contrary.

In reviewing the implementation of the system during the first year, several causes of these deficiencies have been identified. They offer insights into needed modifications, as well as important considerations for designing information systems for government ministry programs in general.

First, those primarily responsible for project monitoring and evaluation were the line ministry officers in charge of

implementing the project activities. These officers are accountable in their work to their individual ministries, not to the DDO nor the DDC. On the other hand, the initial testing of the information system was only on Rural Development Fund projects, which were planned locally through the DDCs and not channelled through the line ministries. The result was that the RDF projects were a secondary consideration and received little attention from the line ministry staff.

The implication to be drawn is that if the system is to work it should focus on monitoring and evaluating those projects for which the ministries have primary responsibility, rather than only RDF projects. In addition, the monitoring and evaluation work must be supported by the central ministries. So long as the focus is on the RDF, the needed level of support will not likely be forthcoming.

Second, while central ministry support of the information system is necessary, such support will not solve the problem of disincentives for local staff to collect and analyze accurate and usable monitoring and evaluation data. This problem is endemic to this type of information system and suggests that one approach, perhaps the only workable approach, is to have data collection and analysis carried out by staff other than those in charge of project implementation. The objectivity of reporting can be enhanced to the extent that it is assigned to persons whose mandate is only to collect and analyze data and whose self-interest is served by doing a capable reporting job.

This problem could be solved, at least in part, by redefining the role of the DDCs, which are at present responsible for the planning and management of RDF projects. They are not charged with evaluation, either of these projects or of the broader line ministry activities. They could, however, effectively play an evaluation role. If the DDO were given the mandate, with the support of the central line ministries, to set guidelines and organize monitoring and evaluation activities through the DDC, the system would be given an element of independence from project implementation that it does not now have. The DDCs would be responsible both to evaluate district-level activities on the basis of project impact and to report the ongoing evaluation results to the central operating ministries.

Finally, the issue of data use is critical. The data that have been collected, tabulated and analyzed, have been those most needed by the decisionmakers at the district level and below, i.e., financial flow information and data on project inputs. There has been no incentive to implement the rest of the system. In the scenario described, in which DDCs play a key role as project monitors, they would be the principal users of information. Information would flow to the DDC, be analyzed by its staff, and flow back to villagers, to project implementation officers for use in management decisions, and to Provincial/Nairobi officials for use in considerations of project continuation/redesign/termination.

In conclusion, the system tested in Murang'a is far from perfect. The results of the effort, however, have been useful in indicating necessary changes that would make the system work better. The changes suggested require two fundamental adjustments: that the system, with the support of the central ministries, focus on monitoring and evaluating all district-level projects, and that the role of the DDCs be redefined to include this function. There are discussions being held at present within the Government of Kenya regarding both of these changes. Central ministries voice a desire for effective monitoring and evaluation. Some claim that this can be done by ministry staff themselves; others argue that evaluations can only be carried out effectively by a body with some degree of independence. It is not yet clear what form the system will take. There is considerable precedent, both in Kenya and elsewhere, for government ministries to resist outside evaluation. On the other hand, there is pressure for a greater degree of decentralization and according more authority to DDCs. In the latter case, if the evaluation function is assumed by the DDCs, effective local-level monitoring and evaluation could be enhanced.

CASE STUDY:
A MONITORING AND EVALUATION SYSTEM FOR THE INTEGRATED AGRICULTURAL DEVELOPMENT PROGRAM IN KENYA[1]

INTRODUCTION

In 1976/77 the Government of Kenya, assisted by The World Bank and the Arab Bank for African Development (BADEA), initiated a $36 million Integrated Agricultural Development Program (IADP) for the development of smallholder agriculture. This program was intended to promote, over five years, the establishment of "whole farm" systems through the provision of inputs and the strengthening of extension services and institutions to support a wide range of crop and livestock activities in six provinces of Kenya.

THE IADP MONITORING AND EVALUATION SYSTEM

An elaborate monitoring and evaluation system was designed for the project with the objectives of monitoring project inputs and outputs and evaluating impact. The focus is on identifying

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[1] Data sources for this paper include a detailed description of the system in J. Gachui, K. Swanberg and W. Hannover, "Monitoring and Evaluation System for Small Scale Farm Development," Ministry of Agriculture, Integrated Agricultural Development Programme Working Paper No. 1, December 1977, as well as discussions with Ministry of Agriculture staff.

constraints to the changes recommended by the project and to modify the project design as solutions to problems are found.

The system is divided into two basic components -- a "Farm Survey" and a "Pro Forma Survey" -- with additional, more detailed, studies to be carried out on labor usage and nutrition levels of children. The "Farm Survey" was designed to collect, from a random sample of farm households, data for evaluating project impact, including valuation of farm assets, material and labor inputs by type and quantity for each production activity, cost of inputs, production, input supply availability, availability of markets for output, and effectiveness of extension activities. Some of these data are collected monthly, others annually and semi-annually. For the collection a cadre of field supervisors and enumerators were recruited and trained by the central Ministry of Agriculture (MOA), which is responsible for implementing the project.

The "Pro Forma Survey" consists of a set of 12 reporting forms to be filled in by various institutions and staff involved in the project and passed to Nairobi on a regular basis (some monthly, some quarterly). The list of reporting forms is impressive:

- Monthly report on activities of the Agricultural Finance Corporation (AFC) branches participating in the program. A portion of the credit to small farmers is being channelled through AFC. This survey form seeks data on quantity and value of inputs by type of crop financed.

- Monthly report by AFC headquarters on the repayment position of IADP loanees.

- Monthly report of the Kenya National Federation of Co-operatives on input supply. These data are on "input orders" from co-operative unions and are classified by type, quantity and value of inputs, and date of order. Information on quantity supplied and date of supply is also included.

- Quarterly report from the Co-operative Bank of Kenya. This shows details of loans issued and repayment positions.

- Monthly report by co-operative societies/unions on their marketing activities. This shows quantities and prices of the various crops delivered to the societies/unions. The crops are classified by the sources of credit.

- Monthly report by societies/unions on input supply and delivery. This records the quantity and value of inputs ordered, received and distributed to the programmed participants.

- Monthly report on credit activities by societies/unions. This shows the amount of loans received from the Co-operative Bank of Kenya and distributed to the farmers by the co-operative societies, as well as the repayment position of the farmers.

- Monthly report by societies/unions on the utilization of inputs by crop.

- Quarterly report by IADP district coordinators, a district summary. The district coordinator indicates the estimated total area and average yield of specified crops in the district.

- Monthly report by district coordinators on extension services to program farmers.

- Monthly report by district coordinators and principals of farmers' training centers on training of program farmers and members of the extension service by type of course, subjects covered and duration.

- District summary on program participants and average value of loans disbursed by source of finance.

The data analysis and information flow are also spelled out in detail for each of these surveys. The "Farm Survey" questionnaires are initially edited by the field supervisors before being dispatched to Nairobi. At the Ministry of Agriculture the data are punched on cards and analyses are carried out by computer. The analyses envisioned are extensive, and are estimated by the project staff to include:

- Farm Management Analyses
  - Enterprise analysis -- gross margin, fixed costs and variable costs;
  - Farm income by ecological zones (whole farm analysis);
  - Farm investments by various categories;
  - Farm sizes by zones;
  - Land use by zones;
  - Crop and livestock yields by zones;
  - Changes in production mix cropping patterns.
- Economic Analyses
  - Production functions -- efficiency of resource use;
  - Budget analysis -- upper and lower quartile groups;
  - Adoption rates for the new technology packages by production activities;
  - Credit repayment rates;
  - Marketing efficiencies -- prices, costs, market trends;
  - Labor profiles.

- Socioeconomic Analysis
  - Farmers' attitudes toward:
    - training,
    - demonstrations,
    - extension services,
    - credit,
    - marketing,
    - input supply,
    - labor shortages;
  - Efficiency and effectiveness of:
    - credit institutions,
    - marketing institutions,
    - input supply institutions,
    - other service institutions.

Analyses in greater depth, utilizing multiple regression and correlation, are to be undertaken after the capacity to carry out the work is well developed.

The processing and analysis of the "Pro Forma Survey" are currently being done manually by the Nairobi staff, though this activity will eventually be computerized to facilitate storage and retrieval of the data. The analysis consists largely of summarizing and recording the data in tabular form.

The organizational arrangement for carrying out this work was perceived as critical by the MOA and a Management and Evaluation Unit (MEU) was established within the project unit respon-

sible for project implementation. There were two concerns involved in setting up the MEU in this manner.

The first concern was that reliable data be collected without depending on groups outside the ministry or project unit to do the work. It was thought that this could be accomplished by giving the MEU the mandate for data collection and analysis, utilizing staff hired specifically for that purpose. The MEU was placed within the project unit, but was given a degree of independence from project management to ensure the reliability of data collection.

The second concern, that information use be maximized, was also dealt with by placing the MEU within the Project Unit. Information would be directed to project decisionmakers for their use in management decisions, without passing through layers of individuals and offices before reaching those who most needed it.

OBSERVATIONS ON THE SYSTEM

After a year of implementation much has been accomplished by the MEU. Data collectors have been effectively trained and the data collection work is going well. At the same time there are several problems with the system that raise questions about whether the data will be effectively utilized and whether the system can be sustained.

First, a centralized approach is being followed in developing and implementing the system. Data points needed for collection were identified largely at the Nairobi level; after collection the data are to be sent to Nairobi for analysis; and perhaps most important, those identified by the ministry as the primary information users, and to whom information would be disseminated, are to a large degree individuals at the center, e.g., project managers, the technical, research and planning divisions of the MOA, the Co-operative Ministry and other donors. Thus the data flow appears to be upward, with little emphasis on analyzing and utilizing the data at the local -- including the village -- level. To the extent that this is the case, the needs of a whole array of important decisionmakers are not being addressed, including division and district officials, chiefs, staff of local organizations involved in project implementation, and villagers themselves.

Second, the level of sophistication of data analysis is high, perhaps exceeding the capability of the ministry to analyze and disseminate the information on a timely basis. Already raw data are becoming backed up. The longer the time lags become between data collection, analysis and dissemination, the less chance there will be of information being used in project decisionmaking.

In conclusion, by placing the system within the project unit the attempt was made to develop an approach that would ensure that reliable data would be collected and that they would

be analyzed and disseminated fast enough to have maximum utility for potential information users.

Placing a monitoring and evaluation unit within an operating ministry is not, in fact, a common approach in Kenya; more often the Central Bureau of Statistics within the Ministry of Finance would undertake such a task. In this instance the system is not meeting the potential that could be realized from the innovative organizational arrangement. The process has not been decentralized, and there has been little effort to undertake data analysis and dissemination on the local level. In the absence of changes in this direction, the system will not reach its objective of providing usable management and evaluation information to key decisionmakers.

CASE STUDY:
SEDERHANA IRRIGATION PROJECT, INDONESIA[1]

In this project there has been a major effort to develop a sound data base for a scheduled midproject evaluation. When the project operations commenced two years ago, two consultants worked for a six-week period to plan the evaluation. After about one year of project implementation, a new consultant was hired to review the evaluation plan. He developed a new plan, which called for an extensive data collection effort and designed the collection instruments. The questionnaires were to be applied to all of the 565 village communal irrigation projects.

The project is being implemented jointly by the Ministry of Public Works and the Ministry of Agriculture. The former was provided with a 20-page questionnaire and the latter with a 40-page questionnaire, both to be administered by their respective ministerial field staffs. About two-thirds of the data collected on the questionnaire of the Ministry of Agriculture were also to be collected by the Ministry of Public Works in order to provide a double check.

These lengthy questionnaires were not pretested, and when the consultant returned to review the collected data he found many gaps and sent out additional questions to fill them. The

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[1] From an interview with evaluator John Duewel in Jakarta, March 15, 1978.

Ministry of Agriculture then undertook an extensive review of the collected data, mainly through interviews and group discussions with the enumerators, and many of the weaknesses in the data were identified. One problem was that many questions were too difficult for the respondents to answer (e.g., recall over five years, field worker self-evaluation: Did you talk with the farmer?). The Ministry of Public Works also did a review of the data but not to the extent of the Ministry of Agriculture.

There were many differences in the findings on the two questionnaires. Some of these may have been due to a difference in viewpoint of the two ministries and therefore a difference in how the questions were asked or interpreted. The second phase of the project may include up to $90 million in assistance, including Food for Work. The two ministries are vying with each other for a larger role in the project and the evaluation findings will play a part in determining this. The Ministry of Public Works had been doing the primary and secondary irrigation systems, leaving tertiary systems to the Ministry of Agriculture, but this is being changed, even before the evaluation, so that the Ministry of Public Works will add the tertiary systems to the primary and secondary, while the Ministry of Agriculture is increasing its role in water management and local organization. The Ministry of Public Works has had the dominant role and wants this to continue, while the Ministry of Agriculture sees a need for greater emphasis on the needs of the small farmer. The survey findings for each ministry have tended to support the direction

the ministry wants to take.

An evaluation team from the U.S. was scheduled to arrive in Indonesia for a three-month period starting in February 1978. AID had difficulty finding qualified people, and after six weeks only one evaluator was on the job. The other two are to participate during the last month. None of these evaluators have had a previous role in the project or its evaluation planning. The lone evaluator has determined that the earlier survey work, although consuming a large amount of manpower, was only of marginal utility to the evaluation. He reports that, at this point in time (two years of implementation), it is too early to assess the impact of projects adequately, as more time is needed for local communities to adjust and make their new systems work effectively. The analysis should deal mainly with the expected preliminary changes and requires a subjective yet systematic assessment. He foresees a problem with the Ministry of Public Works dealing strictly with technical problems and the Ministry of Agriculture having subsequently to deal with the social factors that should be considered in the initial planning. The evaluation is therefore being oriented in part to identify the social issues that have to become part of a joint planning effort.

To convince decisionmakers of the importance of the social aspects of the projects, an additional survey has been added. This was to be undertaken as a rapid noncomputerized survey, with senior project technical and organizational staff (of the

Ministry of Agriculture) administering the questionnaires. This method subjects the policymakers to the full range of issues to maximize their learning experience. The 54 locations included in the study (only half are projects) were selected for their potential in lessons to be learned and their variations of conditions and practices. There are 18 two-person teams, and each nominates six possible locations from which headquarters selects three. The teams have a two- to three-day coaching session followed by about three weeks in the field. They are to write up summary reports (25 to 40 pages following specified guidelines) under tight time schedules.

The rapid survey has two main questionnaires, which are lengthy, to provide coverage of all important subjects. Since the survey is not using empirical analysis, sample size and data calculations are eliminated and much time is saved. The survey instruments are as follows:

- Village irrigation profile. Gathered from village head, senior village irrigator, two heads of administrative subunits within the village (one at head of village system, i.e., favorable location, and one at tail end of system, i.e., unfavorable location).
- Farmer questionnaire. Asked of six farmers: three near head of system, three near tail of system and these three divided by one with multiple locations, one who is tenant and one other (possibly innovative, more progressive farmers used for extension work).

The Sederhana Irrigation Project illustrates some of the problems and benefits in evaluation planning. The formal surveys

conducted by the two ministries did not obtain accurate impact data and the difference in the findings of the two formal surveys raises doubts about the reliability of the data. However the nature of the differences in the findings may allow a subjective analysis of institutional differences and constraints to aid the evaluation.

In this case there was sufficient time to undertake a rapid survey to obtain information for qualitative assessments to supplement the empirical analysis of the formal surveys. The planned, formal surveys were expensive undertakings that do not now appear to have been cost-effective. The institutional issues have become paramount and the data have been subject to institutional manipulation. While the rapid survey also has an institutional bias, it was planned by the evaluator in response to the institutional issues and was meant to act on the problem rather than be affected by the problem. However the evaluation has had to concentrate on issues for which resolutions depend more on political dynamics than on pragmatic information system-based decision-making. The survey data can be used later within the implementing agencies to improve project operations internally.

CASE STUDY:

BASIC HEALTH SERVICES PROJECT, AFGHANISTAN[1]

This project provides technical assistance to the Ministrey of Public Health of the Government of Afghanistan for the development of a basic health services program. In an early stage of project implementation, the U.S. contractor undertook a field survey of health needs, practices and resources in five separate areas of one province. In regard to representatives of the survey areas, the report states:

> No claim is made that the areas selected for description are typical of Afghanistan in general. To the contrary, each of the five is for historical, geographic, ethnic and economic reasons, distinct from other sections of the country as well as from each other. It is hoped however, that by describing these health systems, greater appreciation will be generated for the shared threads of health beliefs and practices which, shaped by local conditions, produce a common fabric.[2]

At these five sites, which included four Basic Health Centers (BHCs) and one subcenter, a team of two men and four women interviewed 190 males and 422 females. While a structured survey questionnaire was used to conduct these interviews, additional information was obtained by unstructured interviewing with health providers, traditional and modern, and with village residents.

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[1] Except where noted, this information was obtained from interviews with project staff in Kabul, Afghanistan, in November 1976 and March 1977.

[2] Management Sciences for Health, "A Field Survey of Health Needs, Practices and Resources in Rural Afghanistan," Cambridge, Mass., July 1975, p. 3.

The Ministry of Public Health restricted the formal interviewing to the health centers, so the selection of respondents is biased toward those using health center services. The unstructured interviews were used to supplement, complement and verify the information obtained from the formal survey.[1] While the survey had some major deficiencies, such as the restriction on selection of respondents, there was little known about rural health needs and practices, and the survey was very useful in providing this much needed information.

A major step in upgrading the basic health center operations, as well as the necessary support services from the ministry, was the establishment of a management information system structured to provide information about the activities of each health center and some basic information about the health centers' users. As implementation progressed it was necessary to assess the degree to which the basic health centers were reaching out into the rural areas. A new survey was undertaken to interview households at various distances from the BHCs. While the earlier survey had been helpful in identifying many potential problems in surveying health needs and practices, the second survey still encountered considerable problems.

The survey was conducted by project staff and covered three provinces, two health centers per province, and three villages per health center (18 villages in all). Villages were chosen by

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[1] Ibid., pp. 6-8.

their distance from the health center (1 km., 10 km. and 15 km., with one village at 5 km.). One village was very hostile to interviewers so it was dropped and another selected in its place.

The original plan was to interview one male and one female in each household, but many males migrated out of the village during the period when the survey was conducted. A random sample of households was defined by starting from the mosque and interviewing at every third house down the lane. The final sample totalled 488 females and 250 males. The questionnaire numbering system did not work well, and it was not possible to match males and females from the same household.

The questionnaire had been inadequately pretested because of time constraints. It had been developed by a short-term consultant provided by the contractor, reviewed by a number of people, and then precoded but not pretested in the field before the start-up of regular interviewing. Many of the weaknesses in the questionnaire did not show up until the data were tabulated.

The results of the survey may contain enough errors to suggest that the empirical findings should be used with care, especially if the data are to be used as a baseline. However, the accuracy and precision of the data were less important than the general profile that was obtained for purposes of project management and planning.

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CHAPTER NINE

RESEARCH TO IMPROVE INFORMATION SYSTEMS FOR DECISIONMAKING IN RURAL DEVELOPMENT

INTRODUCTION

The thrust of research over the past eight years has been directed at seeking low-cost alternatives to household surveys as the primary data collection methodology for rural development planners and implementors. There has not been much money devoted to attempting several different methodological approaches, as part of a research project, in one target area with a solid, detailed and accurate data base. However, in the Philippines AID has recently approved the Economic and Social Impact Assessment/ Women in Development project, which is designed to test alternatives within development projects operating in defined geographic areas. This several million dollar effort, with an output expected in the 1980s, would be a first for the major donors. In spite of millions of dollars committed to project monitoring and evaluation (more than $5,000,000 by the World Bank in Nigeria alone), there has been little systematic research on how to do this complex job better, faster, and more cheaply. The following pages detail those undertakings that have come to light during the course of this study.

CHANGING THE UNIT OF ANALYSIS FROM HOUSEHOLDS TO COMMUNITIES

It is very likely that much of the detail obtained from household surveys is not necessary, and that important changes that result from or call for development assistance can be determined from community/village level data gathering. This hypothesis was formally conceptualized and tested in Thailand with the generation of an impact assessment methodology by the American Institutes for Research.[1] Included in their work was a periodic questionnaire taken from the key informant, identified as the village headman, as well as observation and rapid survey data collection on the appearance of houses, the wat, and other community structures. Village size and closeness to an all-weather road were found to be major predictors of income level of inhabitants in the Northeast.

Utilizing some of the concepts of this work, but with a very different set of indicators, DAI attempted impact assessment for nonmonetized community development projects in Bolivia and with the ORDEZA regional earthquake rehabilitation project in Peru.[2] An ongoing research project in Colombia, which will test the efficacy of community data collection techniques against household interviews on key indicators of agricultural production and productivity, is presented in the case studies that follow.

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[1] In the case studies which follow.

[2] See the case study in Chapter Eight.

The conceptual basis for this work is one of the area as an "island" to be developed, where changes in "exports and imports" and investment must be determined. By disaggregating as far as time and resources will allow, the investigators seek to learn intraregion exchange, and the linkages between rural and urban, pastoralists and settled farmers, and between communities and market centers and raw-material providers. The process of delving into the inner workings of communities would be started on a village-level data basis, with key informants selected for their knowledge of critical variables and geographic portions of the overall community. Rather than starting with the household to generate a baseline data bank the study would proceed to the household from the macro overview, learning the interrelationships along the way. If and when it became important to have household data, for example in nutrition and child care practices, the needed information would be available for generating specific and efficient questionnaires and appropriate enumerators.

SIMPLIFYING THE DATA REQUIREMENTS

Another approach has been to simplify the data requirements by increasing the theoretical base that underlies modernization and development. This work has been undertaken by Professor Frank W. Young of Cornell University's Department of Rural Sociology. It uses a district or micro-regional focus as the unit of

analysis, and attempts to explain levels of poverty and predict appropriate development interventions based upon a structural relationship theory of change and modernization. Several different ongoing research projects contain core elements that support this overall approach, and one such attempt is included in the case studies.

IMPROVEMENT OF LOCAL-LEVEL INDICATORS

Income has proved to be the most desired as well the most difficult variable to measure in rural development projects. Several attempts have been made to define income uses, identify indicators of income change for a very small sample of the overall population, and then to collect on the more easily obtainable indicators for the entire target group. Some work has been done on this by Father Frank Lynch in the Philippines, by H. E. Voelkner in a study reported in the following pages, and in other "level-of-living" indicators. Unfortunately, the work is very locale-specific and does not generalize well. In addition the technique has not been tested with sufficient resources, time and person-power to say whether it can serve as a valuable technique for capturing change in important variables in rural development. The UNRISD has launched a long-term study entitled "Measurement of Real Progress at the Local Level," which is scheduled to provide answers in the future.[1] Begun in 1973, and

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[1] Wolf Scott with Helen Argalias and D. V. McGranahan, *The Measurement of Real Progress at the Local Level -- Examples from the Literature and a Pilot Study*, Report No. 73.3, United Nations Research Institute for Social Development, Geneva, 1973.

with field research underway in eight countries, there has as yet been little to report that could be used by development project managers.

If measuring the use of income is one attack on the problem of development indicators, measuring changes in production and agriculture practices to generate more income is another approach. Several studies have attempted to observe and measure agricultural decisionmaking, inputs and output, and then compare the results with questions addressed to the farmers themselves. There are obvious and clear differences in the responses and the observable data which call into question the use of statistical surveys based upon farmer recall as the basic data collection technique in rural development. One such study is included in the following pages.

CONCLUSION

As the understanding of development and development constraints increases, as the benefits of development are targeted to the rural poor, a heavy demand has been placed upon data collection and analysis systems to provide needed information in a timely and cost-effective way. Unfortunately, in much the same way that development projects have been approached, the tendency with their data collection systems has been to hasten in a predetermined direction rather than engaged in some adaptive

field-testing, sssuming that the methodology and techniques selected are those appropriate to the job at hand. This has led to a paucity of conclusive evidence on the "hows" and "whys" of information systems that support rural development projects. The efforts now underway in Colombia, the Philippines, and UNRISD and within projects such as the Bicol River Basin in the Philippines and the Rural Dynamics Project in Indonesia may offer better answers in the future than have been used in the past.

CASE STUDY:
IMPACT ASSESSMENT IN THAILAND[1]

Under contract to the U.S. Government, the American Institutes for Research (AIR) undertook nearly four years of work on impact assessment systems designed for rural Thailand. During the last years of the project, AIR was funded by AID, providing support to the Accelerated Rural Development program in the Northeast.

After a process of trial and error, AIR settled on a fast low-cost data collection system, which utilized indicators of social, political and economic modernization -- based upon the concept of modernizing investments. The unit of analysis was the village, supplemented by observation and questioning of selected indiyiduals, particularly those in leadership positions. Although there were a number of different approaches being developed at the same time, the major thrust was to obtain data from the village headman during a monthly meeting at the district office when the headmen were paid their government stipend. During short, 30-minute interviews, data on basic village indicators were extracted, coded and computerized. The resulting analysis tended to establish which villages were and were not wealthy, growing, modernizing and integrated.

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[1] Data sources included discussion with AIR representatives in Bangkok and Washington, D.C., an examination of the methodological basis and output of the research, and two evaluations of the utility of the approach for assessing the impact of development.

The impact assessment was not related to the input of resources from any one Thai government program, but could be collected to include all the various projects that had been sponsored in any one village. In this sense it was not a "project" system, but a way of monitoring the process of development in an area independent of any one project. Its major use was to help schedule the application of short- and long-term assistance in infrastructure, community development, water systems, irrigation, etc. The indicators, when field-tested by one AIR team, were found not to take account of all the necessary complexities of village life in northeast Thailand, but observation methods for determining important differences among villages were found to be valid measures of levels of wealth, position on traditional or moderning scales, and cohesiveness or disintegration of the local society.[1] The project terminated with the end of AID funding in 1974. The AIR project was a research undertaking and, the key personnel were U.S. specialists. The research was tacked onto an ongoing program, instead of being fully integrated within it. Friction developed with some departments within the responsible host country agency, because the woman in charge of evaluation was trained in, and would only accept as legitimate, household survey techniques. Computerization was done by American researchers, and an understanding of how the system worked, which

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[1] Donald R. Mickelwait, "The Utility of A.I.R. Impact Assessment Research in Thailand to the Development Process," a report submitted to AID, January 1974. Richard J. Barber Associates, Inc., "Evaluation of Impact Assessment Techniques in Thailand," a report submitted to AID, (draft) September 1974.

was complicated by the use of behavior statistics such as stanines, was limited to a very few individuals within the Thai Government. AIR personnel in Bangkok believed that the Thai who had been trained could easily run the system but would have difficulty making the adjustments that would be required as some indicators lost their value and new methods of capturing proxies for modernizing change had to be developed.

Subsequent analyses of the utility of the methodology for development were mixed. Development Alternatives found the system to be valuable as a learning exercise, with real potential for improvement and use, although not particularly efficacious as it actually evolved in Thailand. A second evaluation concentrated more on the internal deficiencies of the Thailand system, with less concern for its application elsewhere.[1]

The $1,000,000 project provided the first systematic field experiments in different methods of low-cost data collection, and the use of indicators of modernizing investment as proxies for developmental change. It also provided clear evidence that inserting a new, foreign advisor-dominated evaluation system into an ongoing project where individuals have already established territorial imperatives is a difficult, if not impossible task. This lesson was to be redocumented several times in the next few years.

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[1] Richard J. Barber Associates, Inc., op. cit.

CASE STUDY:
LAND USE AND SOCIOECONOMIC CHANGE UNDER THE IMPACT OF IRRIGATION: A CASE STUDY FROM THAILAND

INTRODUCTION

One of the most extensive data collection and analysis efforts aimed at the impact of irrigation on subsistence farmers has been undertaken by the School of Oriental and African Studies of the University of London in cooperation with the Royal Thai Irrigation Department. Initiated in 1969, the project has accumulated eight years of experience in the collection and analysis of socioeconomic data in the Lam Pao Irrigation Project in Kalasin, northeast Thailand. In the years 1970-76, 1,248 complete data sets on individual households have been generated, with approximately 300 households tracked annually in a panel survey. During this period of time year-round irrigation has been extended from the previous level of one percent to 30 percent of the 10,000 farm/household area. The research project:

> "Should be established to find ways and means of systematic data collection for monitoring the response of the farmers to opportunities rendered by irrigation through the removal of the critical environmental constraints which limited local agriculture to seasonal monoculture of subsistence rice."[1]

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[1] Ronald C. Y. Ng, "Monitoring Land-Use and Socio-Economic Changes Under the Impact of Irrigation: A Case Study from Thailand," (mimeographed) March 1978, p. 2.

Besides the knowledge gained through the research, the project has produced the following output for project management:

- A socioeconomic profile of the enumerated households, which helped project management to identify progressive farmers who could be the innovative agents in the development process;
- A crop-production summary providing the basic information on land use, labor utility and production economics on individual holdings to management and enough accuracy for selecting the crops to be promoted in various parts of the project area; and
- An individual farm-plan for the farmers who are included in the annual sample, which greatly facilitates the agricultural extension effort.

The latter output is by way of a simplex linear program completed on each surveyed farmer, providing a matrix of the alternative crops and cropping patterns crossed with:

- Irrigated land available, wet season;
- Nonirrigated land, wet season;
- Subsistence food requirements;
- Cash inputs available;
- Total labor force available in person-days;
- Labor available in the early season;
- Labor available in the midseason;
- Labor available in the late season; and
- Dry season irrigated area.

A special program written by the project director solves for the objective function of maximizing cash return per unit of area,

and prints out the difference between the existing and optimal agricultural production decisions and inputs. Such a program, generated as a byproduct of the research, is obviously a great boon to extension workers who are called upon to assist individual farmers in the optimization of their agricultural resources.

CONCLUSIONS AT THIS STAGE IN THE RESEARCH PROJECT

Assistance to Project Management

> One of the most important achievements of the monitoring scheme installed in the Lam Pao project area is its educational value for project management. The range of socio-economic information made available to management and policy maker has been instrumental in modifying some of the basic assumptions. The information provided has convinced management that the provision of irrigation facilities does not lead automatically to the adoption of modern agricultural practices. The functional approach of irrigation removing the critical environmental constraints is merely a necessary, but not a sufficient, condition for genuine rural development."[1]

Resources Required

The project director at the University of London works six months a year on this project, with three university assistants working full time. In addition there are three full-time Thai supervisors with the project, and a cadre of professional enumerators from the Royal Thai Irrigation Department, who devote three months each year to the resurvey of households in the proj-

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[1] Ibid., p. 23.

ect area. During this period of time all the research staff from the university are in the field, assisting in basic field collection. The project director estimated that it took the full resources of the six full-time researchers and himself to ensure that the data collected were sufficiently accurate to justify the detailed farm planning (the simplex program) that had been completed. In short, problems of data accuracy require a heavy commitment of supervisory resources during the field visits each year and a good deal of cross-checking and respondent revisitation. This has been true even though the project started with current photographic coverage and some helpful but outdated land use and land tenure data.

Turnaround Time

A major difficulty is a lack of resources, which prevents rapid data turnaround time and analysis prior to planting during the wet season. The field data are coded, aggregated and analyzed over a nine-month period, becoming available to project management approximately one year after the fact. This slow turnaround time also makes it difficult to complete two surveys a year, which would allow accurate predictions of farmer planting intentions and would employ data processors year-round. More resources, or more projects with different delivery dates for data output, would allow a faster response for assisting project management in preparation for the upcoming planting cycles.

CASE STUDY:
CROPPING SYSTEMS PROGRAM, PHILIPPINES[1]

As part of a larger data collection effort undertaken by the International Rice Research Institute (IRRI), an attempt was made to compare the accuracy of various information gathering techniques. The comparison focused on the relationships between farmers' own estimates of three key variables and controlled measurements made by researchers. The three variables were estimates of labor time in discrete field operations, farm area and crop yields. The research design hypothesized that if consistent biases were found in these systematic comparisons, then mathematical relationships could be specified to generate accurate estimates of controlled measurements on the basis of farmers' reports.

Consistent results were obtained in the comparison of estimates of labor time required for field operations. The study was made in conjunction with IRRI-sponsored trials to evaluate eight alternative field crop patterns based on upland rice during the 1974-75 crop season. Thirty-nine farmers were involved in the research, each of whom managed three of the eight cropping patterns on a portion (0.1 ha. for each pattern) of his farm. The farmers were supplied with forms on which they recorded

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[1] N. Roxas, D. Garrity and E. Price: "The Calibration of Instruments for Collecting Farm Level Data," mimeo, International Rice Research Institute, Philippines, 1976.

their own estimates of time spent each day on each of the test crops. In addition to the farmers' reports, each field operation on every crop was timed separately, but unobtrusively, by field researchers using a stopwatch.[1] The operations were timed repeatedly over small areas of the field, and then calculated on a per hectare basis. Only the time during which the farmer was actually working was measured with this method: farmers' preparations for field labor, travel time to and from the field, rest time, and interruptions were all excluded.

When comparisons were run on the two sets of data, using linear regression analysis, it was found that farmers' estimates were consistently higher than the stopwatch estimates. This relationship appeared to be relatively consistent across the eight cropping patterns. The proportion of total labor time for any given operation was also found to be similar in the two methods. The researchers utilized a linear regression of the form $Y = ax + b$, which yielded the following equation:

$$\text{Farmer's estimate} = 1.67\ (\text{stopwatch estimate}) + 0.33$$

The constant term in this equation (0.33) may be interpreted to show that for each operation, approximately 0.33 man-days are spent in travelling to and from the field and in preparing for work. (These activities appear to be of the same duration, no

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[1] To avoid biasing the data-gathering process, the researcher did not inform the farmer that he was timing the field operations, kept some distance away from the field, and avoided talking with the farmer while work was in progress.

matter what field operation is involved.) The coefficient 1.67 represents an upward adjustment to reflect that portion of time in the field when the farmer is not actually engaged in physical work (e.g., rest time, repairing tools, interruptions, etc.). Significantly, the researchers argued that the bias in farmer's estimates did not invalidate the data generated by that particular method. Indeed, they concluded that farmers' reports tended to reflect "actual" time more accurately than stopwatch estimates which measured only the time devoted to physical work itself.

A similar comparison was run on methods of estimating crop yields: farmers' reports were compared with crop cut estimates based on harvests from small sample plots within each field. It was found that crop cut estimates were almost always higher than farmers' reports of yields on the same fields. The magnitude of this difference varied significantly across crops: but in all cases except one, correlations between the two estimates were highly significant, with coefficients ranging from 0.80 to 0.95.

The researchers concluded that agronomists undertaking an economic analysis of field trials results would need to adjust their estimates downwards; conversely, economists using farmers' reports would need to adjust yields upwards, in order to approximate estimates that would be obtained by controlled measurement of crop cut yields.

A third comparison was undertaken between two methods of estimating field area: 47 farmers were asked the area of every

parcel they farmed, and then each parcel was measured with a steel tape.[1] It was found that farmers tended to overestimate the size of their parcels, by an average factor of 8.1 percent. Farmers renting land overestimated field size to a significantly greater degree than landowners, leaseholders or share tenants. The researchers hypothesized that the renters' high overestimates may have been due to the fact that landlords overstated parcel sizes in order to obtain maximum rent.

In summary, the results of all three exercises indicated that mathematical techniques can be developed to transform data derived by one technique into the data that would be generated by the other. One application of this finding, the researchers pointed out, would be to make agronomic data on crop cut yields more "realistic" for purposes of economic analysis.

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[1] Because the parcels were generally flat and rectangular, measurement techniques were kept as simple as possible.

CASE STUDY:
AN INFORMATION RESEARCH PROJECT
ON THE IMPACT OF LABOR-INTENSIVE FEEDER ROADS IN COLOMBIA[1]

INTRODUCTION

The labor-intensive road program (Pico y Pala) in Colombia was begun in 1972. The initial period (1972-74) involved joint Caminos Vecinales (the National Highway Department), Federation of Coffee Growers (Federacion Nacional de Cafeteros) and AID funding, and was aimed at generating employment in the rural areas through multiple contracting to rural workers.[2]

The current program is a joint effort between Caminos Vecinales and AID. Beyond the employment generating goal set during the first implementation stage, there is now a goal of "better utilizing resources," i.e., development. The current AID loan was intended to assist the Colombian Government in building 890 kilometers of labor-intensive roads; this figure has now been cut to 400+ kilometers, due to inflation.

The roads were to have maximum developmental impact and Caminos Vecinales was to contract with consultants for a research

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[1] Richard L. Smith, Donald R. Jackson and Donald R. Mickelwait, all of DAI, visited Colombia and collaborated on the impact study in March/April 1978.

[2] The employment situation in the rural areas is not well established and recent demand for labor in the coffee, sugarcane and cotton areas raises doubts about the need for labor-intensive construction methods to relieve unemployment or underemployment.

study that would:

- Develop an evaluation methodology based primarily on socioeconomic indicators;
- Specify collection techniques that would be economical, efficient and appropriate to the evaluation methodology; and
- Improve the evaluation system through the iterative process.

The contract to develop and test a low-cost evaluation system for labor-intensive feeder roads was awarded to Development Alternatives, Inc. (DAI), and OFISEL, a Colombia research and consulting firm, on the basis of a joint proposal. The contract was signed in February 1978.

INITIAL FIELD VISITS

Field teams made up of DAI/OFISEL staff visited five roads selected beforehand, as well as a sixth that was included in the sample because of ease of access for field data collectors. One more road needs to be selected and included in the near future to replace another (about to start) that was rejected by AID, because it was too near the coffee areas. Field visits were from one to two days per road, and included visits to the road sites, and discussions with local officials, bankers, market intermediaries, truckers and anyone available who might have knowledge of the road impact or potential impact. All site visits were made in the presence of the locally responsible Caminos Vecinales engineer.

One of the discoveries of the field teams was the lack of care with which the formal selection criteria had been applied to the road sites. In one road on the north coast, the team (which included the designer of the selection system) was unable to discover even a remote congruence between the formal criteria and the characteristics of the area. In other areas local residents had been asked to collect certain information and mail it to the offices of Caminos Vecinales for evaluation. It is apparent that the government engineers and other staff responsible for selecting and evaluating the roads have little field data collection sophistication; political considerations have played an important role in road selection.

Plans called for two not-yet-begun roads, two roads in construction, and two completed roads to be studied in the course of the evaluation system design, but of 42 roads to be built there is but one about to be started and only one (of six) that is currently finished (but is soon to be lengthened). All other roads are in construction or will not be begun for several months. By the end of the evaluation study, three roads will have been completed for one year and the rest for from zero to three months.

ISSUES REGARDING METHODOLOGY OF THE INITIAL EVALUATION SYSTEM

While the design process has only recently been initiated and calls for field-testing, a number of issues are of importance

to the design of the methodology; all of them have been or will be addressed during the course of the project.

Sample Selection

Two issues needed to be considered: one was related to the attribution of changes to the road, and the other to the gathering of data on short-term (construction-related) and long-term benefits (overall road impact).

The possibility of setting up "control" areas where roads were not to be built during the course of the project was considered and rejected as too expensive, requiring too many person-days, and probably not appropriate. Field observation revealed that any social or economic change that might take place as a result of factors other than the road would be so modified by the communication and transportation benefits of the road as to be virtually impossible to isolate from road impact. It was decided that road-related impact could best be determined by comparison of the socioeconomic status of an area before the road construction and after the road had been functioning for a period of time.

The original plan to have three different kinds of area (road about to begin, road in construction, road finished) would reveal the short-term benefits of the road construction itself. The design team was concerned about the transitory nature of the short-term (construction) benefits and the need to emphasize the long-term benefits of an existing road. These benefits will build up over time and be most effectively measured well after all con-

struction has ceased; thus, emphasis has been shifted to increased concentration on completed or near-completed roads in order to clarify development impact as opposed to transitory income/employment benefits.

Before-and-After Versus Retrospective Data Collection

Not all road areas are in the same stage of development, and good baseline data will be available for no more than two. This raises the question of whether it might not be more appropriate for this project to collect data retrospectively, particularly given the need to turn over to Caminos Vecinales a greatly simplified method. It is hoped that before-and-after and retrospective methods can be used and compared in order to indicate whether retrospective data collection can be considered valid and accurate for purposes of comparative road evaluations.

Individual Samples Versus Group Interviews

With the large number of person-days for data collection, this project offers an opportunity to compare the validity of group interviews and large samples. It is unlikely that Caminos Vecinales will be able to perform large sample surveys, and because of its importance for other, similar work, some experimentation has been built into the project. Several rural neighborhoods (*veredas*) will be divided up into 20 family units and local informants will be sought who can discuss their area. Together with overall *vereda* leaders they will be interviewed. A 50 per-

cent sample of household heads in the *vereda* will be drawn and asked the same questions. The results will be compared in order to prove the effectiveness of the group interview approach.

Unit of Analysis

The unit of analysis, in the aggregate, will be the "area of influence" of the road. What this area is can only be determined empirically through questioning and observation of the socio-economic activity at varying distances from the road. However for many purposes, especially for interviewing local people and observing road impact, the *vereda* must be the unit. A road's areas of influence probably will be comprised of all or part of from three to five *veredas*. Local organizations and local interaction take place at this level. It is possible that in most cases *veredas* will be fairly uniformly affected by the roads, since the *vereda* itself is usually defined physically by common trails toward the local market.

Road Comparison Indices

A continuing effort will be made to determine what kind of indices might be developed for comparison of different roads. Aggregate production and income increases may be compared, but not all the areas have the same potential; the Pico y Pala program deliberately aims at marginal areas. Other benefits, such as education, health, recreation, which are mentioned by informants as being of great importance to them, are difficult to compare. Whether one index can be generated, or whether roads should be

compared on a number of indices, is still an open question.

The Client: Caminos Vecinales

The end product of all this effort is not a completed evaluation of roads, but the establishment of an evaluation system that is "proven." While DAI and OFISEL are called upon to evaluate the six roads they will study, there is much latitude for experimentation with different data collection techniques, sources of information, definitions of units of analysis and so on. Nonetheless, if the evaluation system is to be used at all, it must be extremely simple and straightforward. While a complex (and not implemented) system would give Caminos Vecinales a bargaining position for future World Bank or IDB funds, a major challenge for the consultants is to try to provide a valid system that the Caminos Vecinales administrators will be able and willing to use.

SOCIOECONOMIC IMPACT VARIABLES

The initial field visits served the purpose of indicating to the DAI/OFISEL professional staff that variables would be most worth monitoring in order to develop an evaluation system. This section describes an initial effort by the DAI team to come to grips with the variables, as well as possible indicators and data points. The variables themselves were arrived at after several days of exhaustive meetings in which field observations were dis-

cussed, as well as the various professional perspectives of the joint staffs (which included a rural sociologist, three engineers, an agricultural economist, an economist and an anthropologist).

Outline of the Economic Variables

The output of this project is a methodology by which Caminos Vecinales can evaluate the socioeconomic impact of the roads. There are two parts:

- Overall program impact, obtained from the aggregation of the impacts of specific roads; and
- Explanation of the reasons for variance in the impact of specific roads, allowing for improvements in resource allocation and execution of new roads under the program.

The work plan to develop the methodology covers 18 months and includes:

- Selection of six roads for study: three will have been completed for 12 months by end of study; three will have been completed for zero to three months.
- Establishment of variables, indicators, data points and alternative data collection possibilities to take to the field for testing and revision.
- Use of before-after status to determine change, assuming it corresponds to "without-with" the roads.

The overview of the long-term impact of the different variables covers:

- Economic variables, including:
  - Change in agricultural production and productivity;
  - Change in employment (agricultural and nonagricultural);

- Change in availability of transport and transport cost;
- Changes in markets, ease of marketing, price benefits; and
- Change in land values, holding and use.

- Standardization variables (averages and range):
  - Land-holding concentrations;
  - Level of income/wealth;
  - Population (rural households);
  - Agricultural potential;
- Economic variables, indicators:
  - Area income increase (over 12 months):
    - Change in agricultural production "exported" from the road area, gross weight, wholesale price;[1] Change in transport costs of goods that are now "exported"; Change in marketing benefits of "before" exports.
    - Change in nonagricultural production exported (e.g., handicrafts, processing); Change in transport costs of "before" nonagricultural exports; Change in marketing benefits of "before" nonagricultural exports.
  - Standardized by:
    - Number of households (number of resource controlling households);
    - Total land under cultivation (has.);
    - Total agricultural production exported; and
    - Level of income/wealth.
  - Cost Benefit

$$\frac{\text{Present value of area income increase, gross}}{\text{Total cost of road}}$$

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[1] One of the simplifications required in establishing the evaluation system was to confine the investigation of agricultural changes to production that actually leaves the road area for sale or barter elsewhere. This makes the following economic analysis resemble an international trade model.

- Employment gains:

  - Monetary value of increased employment (12 months);

  - Monetary value of short-term employment (construction);

  - Number of individuals affected; and

  - Number of person-days X wage rate per person-day.

- Road area income variable (annual aggregate, gross measure):

  - Value of increased agricultural production and productivity sold outside the road area (exported):[1]

    Option 1: After-road total agricultural production value exported minus before-road total agricultural production value exported.

    Option 2: Change in agricultural production by enterprise X wholesale price.

  - Value of increased processing and manufacturing output sold outside the road area (exported) (see preceding for methodology).

  - Reduced cost of transportation for before-road agricultural production and processing/manufacturing (exported).

  - Before-road value of agricultural production and processing/manufacturing X reduction in percent of transportation costs to average wholesale price of before-road production.

    Example:

    Before-road agricultural production value = $75,000

    Before-road percent transportation costs to average wholesale price (weighted average) = 20 percent

    After-road percent transportation costs to average wholesale price of before road agricultural output (weighted average) = 15 percent

    Value of transport savings = $75,000 X .05 = $3,750

- Value of price increases for before-road agricultural production and processing/manufacturing due to storage, more buyers, economies of scale, etc.

  - Percent change in wholesale price level (weighted average) X value of before-road agricultural production; and

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See Figures 4 and 5 for example of the options.

- E.g., five percent increase X $75,000 = $3,750.

Notes of caution on the agricultural production variable:

- It is gross, a part of GNP.

- It gives no indication of income benefit to the small farmers, although if they did not benefit they would not continue the increased production.

- It is an aggregate and does not distinguish between large and small farmers. It will be criticized by all those seeking equity/distribution data. Solution to this is to:

  - Have the *enquestadores* obtain population/household and land-holding data for each *vereda*, get the dispersion along a range;

  - On the agricultural production data points, show which quartile of land-holders (lowest 25 percent, second 25 percent, etc.) is making the income change, e.g.,

	0-25	26-50	51-75	76-100
Corn to onions		X		
Pasture to potatoes				X
Corn to potatoes	X			

FIGURE 4

DATA POINTS FOR ECONOMIC VARIABLES

OPTION 1: COMPARISON OF BEFORE (B) AND AFTER (A) ROAD CONSTRUCTION

	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
Crop	Has.	Has.	Yield/ Has.	Yield/ Has.	Inputs/ Has.	Inputs/ Has.	Credit/ Has.	Credit/ Has.	Paid Man-days Labor/Ha.	Paid Man-days Labor/Ha.	Price Output/ Unit	Price Output/ Unit	Transport Costs/ Unit	Transport Costs/ Unit	Technical Assistance	Technical Assistance
Corn	70	80	1,000	2,000	$20	$50	0	$100	12	15	$20/cwt	$20/cwt	$3/cwt	$1.50/cwt	0	0

Problems: 1. Separating normal rotation changes from new crops.
2. Separating weather/climate from yield changes one to new input.
3. Obtaining data in which errors are the same (same direction for before and after).

Analysis: After crop X has. X yield X price minus before crop X has. X yield X price = Change.

FIGURE 5

DATA POINTS FOR ECONOMIC VARIABLES (Continued)

OPTION 2: RETROSPECTIVE DETERMINATION OF CHANGE OVER TIME

a. Switch from old to new crops

Crop	1 Average Value per Has.	2 New Crop	3 Average Value per Has.	Net Value (3-1)	Has. Switched	Increased Value Agricultural Production
Corn	10,000	Onions	30,000	20,000	150	3,000,000
Pasture	3,000	Potatoes	15,000	12,000	25	300,000
Fallow	0	Potatoes	15,000	15,000	30	450,000

b. Increased yield

Crop	Average Yield Increase per Has. (units)	Value per Unit	Value per Unit	Has. with Average Increased Yield	Increased Value Agricultural Production
Corn	1,000 kilos	$5.8 kilo	$5,000	100	500,000

Total

Problems: Group must point to changes caused by road.

Benefits: Only need small portion of information used in Option 1 - do not need each crop planted by hectare for entire _____ area.

- Road Construction Variables/Indicators

  - What is the total paid for unskilled labor for road (contracts)?
  - How many persons were contracted?
  - How many were actually employed?
  - How many local households were represented in employment data?
  - What percentage of total households were represented?
  - What would laborers have done if no road work?

	Wage
• Migrate to find work	____
• Unpaid work on farm	____
• No work	____
• Paid work locally	____

  - How was extra money from road used?

	Investment	Consumption
• Agricultural inputs	_____	_____
• House improvement	_____	_____
• Buy consumer goods	_____	_____
• Buy food	_____	_____
• Buy animals	_____	_____
• Buy land	_____	_____

  - Who asked for road? How?
  - Did construction strengthen local organizations? Give examples.
  - Is community more united, less united? Give explanation.

A Note on Data Collection Testing

One of the major benefits of this study would be to test the accuracy of group data on agricultural production, land holdings, etc., against aggregated individual data.

Assume a *vereda* with 80 households and the use of the group/geographic technique. Using the most knowledgeable farmer from each selected geographic area, and a leader from the entire area, obtain all economic data in a group session, including the range and average size of land units. It is possible to use a 50 percent sample of the geographic zones, asking the same question of each individual. With three examples it will be possible to prove the validity of the group interviews.

Outline of the Social Variables

- Migration
  - Net migration before the road (permanent, percentage of total population);
  - Net migration with the road (permanent);
  - What percentage of the population migrates seasonally? ____Before ____After.
- Are there more or fewer land sales? Is there a change in land tenure?
- Formal education (before and after)
  - Number of grades in local area/number of rooms?
  - Number of students/number of professors?
  - Number of children in school/number of children of school age?

- Number of secondary students/number of children of secondary school age?

- Number of students attending schools outside the area?

- Changes or improvement in housing or other farm infrastructure, who?_____ and how many?_____

- Health and nutrition

  - Major changes in the level of health or nutrition during or after the construction of the road (answer yes or no):

	Accessible	Adequate
Health Center	_____	_____
Hospital	_____	_____
Dentist	_____	_____
Extensionist Health/Nutrition	_____	_____
Mother/Child Clinic	_____	_____

  - Incidence of diarrhea, pneumonia, other illnesses, especially of children.

  - Has the diet changed for more or less variety?

    - Are more canned goods or prepared food consumed?

    - Has there been a decrease in the consumption of fruits or eggs as a result of export?

    - Are more foods purchased?

- Is there more contact with civil or ecclesiastical authorities?

  - In the locality?

  - In the cabecera?

- Security: Has peoples' perception of their security changed due either to presence of police or increased presence of strangers?

- Is there greater availability (for local people) of recreation, either locally or outside of area due to road?

- Besides marketplace is there a facility for the purchase of consumer goods, such as: travelling salesmen, occasional market (locally), periodic market (locally), small store with basic goods, general store (*granero*)?

- Have there been any major changes in consumption patterns?

  - Foods;

  - Tools (including machinery);

  - Clothes.

- Technical assistance:

  - Agricultural (before and after)

Enterprise	Agency	Adequate		Timely	
		Yes	No	Yes	No
Other: Health/ Nutrition					
Sewing					
Skills					

- Changes in crop patterns, use of land:

  - Have there been significant changes in relation to crops or livestock?

  - Have there been significant changes in land use? Especially regarding replacement of one crop for another, one system for another, e.g., shift to more perishable or bulkier "export" goods.

- Employment (see also economic section): Is there competition for labor from local crops or from outside areas? How does this influence road construction labor availability?

- Transportation:

  - Change in cost: Unit volume
    Unit weight

- Time to market
- Frequency of transportation (availability)

- Community organization by *vereda*
  - What organizations existed before the road? Now?
  - What role did the organization(s) play in requesting the road, defining the trajectory, organizing the work?
  - Other plans of the organization for current or future implementation?
  - How has the road influenced the development of other activities?

- Exchange system:
  - How has the exchange system changed with the road?
  - With the road, are there or will there be:
    - New marketing centers available?
    - Greater efficiency in reaching markets?
    - Greater or wider range of contact with intermediaries?
    - Rupture of traditional pattern of marketing?
    - Better contact with sources of:

      Food?

      Tools?

      Agricultural inputs (insecticides, fertilizer)?

      Credit service?

      Extension services (agricultural)?

      Training courses?

      Better price information?

      Development of storage facilities?

- Credit (before and after): yes, no (by crop if necessary)

	Available	Adequate	Timely
Before road			
After road			

- Has predial tax risen?

Data Sources/Unit of Analysis

- *Vereda* as unit of analysis (corresponds with DRI).
- Group interviews as data source, options:
  - Pick extremes of income and obtain change in extremes; get minimum/maximum parameters;
  - Pick average households;
  - Pick bright leaders for each geographic area within *vereda*, to represent not more than 20 households, use for sub-*vereda* data;
  - Large group meetings to obtain perceptions of satisfaction, impact, etc.
- Individual household interviews on questionnaire to check and verify group responses.
- Road interviews of produce exported at collection points, "bulking" or "bulk breaking" (markets) points.
- Observation.
- Secondary sources (DANE, ICA, Caja Agraria).

SOME HYPOTHESES AND ASSUMPTIONS CONCERNING LABOR-INTENSIVE ROADS

The selection criteria contain a number of explicit assumptions, representing a common philosophical base for those involved with the Pico y Pala project. These assumptions are consistent with, and perhaps derive from, the interests of the World Bank and AID. Some of these hypotheses deserve closer examination.

Roads Will/Can Benefit the "Poorest of the Poor"

This assumption is an article of faith and, given past emphasis by development agencies on target groups other than the poorest, it represents overdue policy-level decisions. Nonetheless the creation of a road represents increased opportunity but does not itself indicate an increase in resources. If it is accepted that the "poorest" are that way because of a relative lack of resources and not simply a relative (and related) lack of opportunity, the question arises of how much resource poverty can be ameliorated by the presentation of increased opportunity (for markets, technical assistance, credit).

The selection criteria address this problem by including consideration of potential agricultural land and potential productivity. Such considerations, viewed in the light of labor availability, land tenure, credit and other factor costs, as well as alternative risk aversion and other adaptive structures, may look quite different from a simple judgment about apparent unexploited land or "traditional" technology.

Road impact might be conceptually distinguished according to the following categories:

- Physical resources made available;
- Opportunities (as for cropping changes, use of other markets, etc.) available with the road, which would not be either available or feasible without roads; and
- Information made available, such as ICA technology advice, community news, newspapers and market information.

Roads Will Bring About Changes in Agricultural Productivity

Through increased access to markets, more efficient transport and communications, and greater physical access to development agencies, such as ICA, it is hoped that productivity will increase. This is a logically sound, but not proven assumption. There appears to be evidence in Colombia to both prove and disprove it, indicating that other factors related to such things as market structure, social organization, seasonality of produce, factor costs, and perceived risk, are related in a system which is not yet clarified. The question is an open one: granted the logic of the assumption, under what conditions will it be valid? It may be that a set of indicators can be derived to establish the likelihood that agricultural productivity can be increased. Some combination of current technology, availability of information, opportunity and so on may establish the necessary conditions for positive change. A set of questions along the following lines may set up the framework for analyzing the likelihood of change:

- Is land available and/or is technology of low quality? are other resource inputs available/likely to be available?
- Is there the market or other opportunity (vehicles)?
- Is requisite information (technical, market) available or likely to be?

Employment Will be Generated by Road Project

It would be hard to argue that labor-intensive road construction does not generate employment. The question takes on a different dimension as the temporal focus is extended, however. In order for employment generation effects to be maximal, investment of wages in land or technology would be desirable. Home improvements might be valuable, but direct nutritional effects due to food buying will be transient. It may be possible to measure the multiplier effect of added income in the area, as well as the number of farmers who are now able to break from providing labor off their own farms. A further question arises, related to the poorest of the poor discussion, which regards the utility of placing employment-generating projects in areas of great landlessness or unemployment, where the payments will serve only a passing social welfare purpose, rather than be utilized to generate investment funds for small farmers.

CASE STUDY:
SHORT-CUT METHODS TO ASSESS POVERTY AND PROGRESS FOR RURAL AREA DEVELOPMENT PLANNING[1]

INTRODUCTION

In 1976 AID provided funds for Harold E. Voelkner to work with the United Nations Research Institute for Social Development (UNRISD) in Geneva on an ambitious program of data collection and analysis for rural development planning and evaluation. The original plan called for village and household data to be collected in Thailand, Sri Lanka and the Philippines, to combine with the addition of previous data sets known to be available to generate a micro-regional longitudinal data base. Among the many objectives of the project was the desire to test methods of obtaining critical data from key informants in villages, so as to reduce the dependence upon household surveys.

Following the methodology of the school of rural sociology at Cornell University championed by Professor Frank Young, the study depended primarily upon binary data, scalogram analysis and an underlying theory concerning the structural and time-phased progress of development. Delays in receiving data sets from Thailand and Sri Lanka reduced the data base in a comparison of village surveys and household surveys to seven villages in the Philippines

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[1] Harold Voelkner kindly furnished draft materials from the ongoing analysis.

as of this date. The analysis, and some additional data processing, is proceeding at Cornell University.

THE INSTRUMENTS

The two basic instruments -- Village Basic Data Inventory (VBDI) and the Household Basic Data Inventory (HBDI) -- were first developed in FAO, and refined in UNRISD to contain items in:

> All of the ten primary basic need categories, and in other components of livelihood. Relevent LOL items were selected for each of the categories as they occur most commonly in the cultural area of South and Southeast Asia. The instruments contain some 700 to 900 different items related directly or indirectly to livelihood and basic needs. The list of items was adapted to each of the three particpating countries though only a few items had to be changed to adjust for differences in individual countries.[1]

Some 20 to 100 household questionnaires were completed for each village selected; in all some 287 households in the Philippines were surveyed using the HBDI instrument in nine villages.

VALIDATION OF THE VILLAGE DATA BY HOUSEHOLD SAMPLING

Among the large and complex agenda included in this research project was an attempt to determine the efficacy of utilizing

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[1] Harold E. Voelkner, "Shortcut Methods to Asses . Poverty and Progress for Rural Area Development Planning," draft materials from the UNRISD research project, computer printout line 793.

village-level interviews with a key informant to report on households -- in percentages or other grouped approximations. Thus the interviewer would ask for an estimate of the houses in the village with grass or bamboo walls. The responses were grouped into few (1 to 10 percent), many but not more than half (11 to 50 percent), most but not all (51 to 90 percent) and nearly all (91 to 100 percent). The report's author hastens to add that the indicators found to be especially useful, such as housing materials, were so identified after the surveys had been completed. They were not singled out for special attention during the village-level interviews, but were treated as just one of the nearly 900 data categories. In addition no observation tours of the village were made, housing materials noted and this information checked against the estimates from the key informant.

The study identifies a level of living indicator comprised of varying household materials, from grass and bamboo to cement/stone/brick construction. In the Philippines it was determined that this indicator adequately reflected wealth and income differences and provided a useful approximation to poverty levels to be used in development planning. The distribution of development benefits could also be measured by this indicator. The study attempted to test whether the basic data on housing construction could be obtained at the village level with sufficient accuracy to obviate household surveys.

Table 14 presents an interpretation of the information in the draft materials furnished by the research director. Given the

TABLE 14

COMPARISON OF VILLAGE AND HOUSEHOLD DATA ON LEVEL OF LIVING INDICATORS
BASED ON HOUSE CONSTRUCTION MATERIALS
(In percent of households with the level of living characteristics indicated)

Level of Living Index	Village Number							
	11	15	20	10	12	22	23	18/24
House with Grass/Bamboo Walls (1)								
Village Range	91-100%	51-90%	51-90%	1-10%	-	1-10%	51-90%	11-50%
Household Percentile	100	90	41	37	64	30	23	45
House with Wood Walls (2)								
Village Range	-	1-10%	1-10%	11-50%	-	51-90%	11-50%	11-50%
Household Percentile		10	29	56	33	41	28	38
House with Hollow Brick Walls (3)								
Village Range	-	-	1-10%	1-10%	-	11-50%	1-10%	1-10%
Household Percentile		0	24	6	2	27	39	17
House with Cement, Stone or Brick Walls (4)								
Village Range	-	-	1-10%	1-10%	-	1-10%	-	11-50%
Household Percentile		0	0	0	0	3	4	6

Source: Compiled from Table 4.2 of the draft report.

broad ranges of the village-level data, the actual household percentages taken from sampling fell into the village-reported ranges in less than 50 percent of instances in the eight villages. The lack of congruity is illustrated by a village-level estimate that 11 to 50 percent of the households fall into three of the four categories. This level of accuracy would hardly be sufficient for placing a village on the poverty scale, and certainly inappropriate for any attempt to measure change over time within a single village.

The research also examined the validity of village and household results against a much larger set of data, generally concerning food consumption, family possesseions, housing, external or internal characteristics, medicines and vaccination, all not readily or easily available as public knowledge. The research conclusions include:

> a. ...the percentage of perfectly matched proportion estimates hardly approaches 50% and is significantly lower for some categories suggesting that key informants (at the village level) cannot consistently make quantity estimates for all the items compared.
>
> b. The percent matched presence-absence estimations is significantly higher. It supports previous impressions that village key informants can provide valid and reliable information on a large number of characteristics of their community on a presence and absence basis if this does not involve actual quantities or even rough estimations of quantities.[1]

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[1] Ibid., line 1172.

CONCLUSION

There is a great deal more in the research than the comparison of village and household level data sets, and the final data coding, analysis and report have not been completed. There are easy answers to a lack of definition and precision in reporting village housing materials, and personal inspection is one answer. What is necessary is the understanding that, in the cultural underpinnings of rural Philippines, housing materials do in fact represent income and living levels, and are not themselves part of the socialization and accumulation process that diverts income from other sources to investments in permanent housing. Once this information has been obtained for any culture, a set of indicators on the use of increased income can be generated that will reflect differential receipt of development assistance benefits.

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