PN-AAR-431
NOV 12 1979

BIFAD
Board for International Food and Agricultural Development

Baseline Studies Field Manual

A Conceptual Model and Field Team Procedures for Analysis of Current Capacities and Development Needs of LDC Agricultural Research, Education and Extension Systems.

May 1978
Agency for International Development
Washington, D.C. 20523

BASELINE STUDIES METHODOLOGY

I. Introduction to the Baseline Methodology

Among agricultural development specialists, there is rather widespread agreement that an effective institutional structure for providing research, educational, and extension services to the agricultural sector is necessary, if not sufficient, for the evolution of a highly productive agricultural sector. These services may be provided in varying institutional form, and optimal forms tend to be country-specific. But coordination and integration of the means of providing such services are essential, if the potential complementarities are to be achieved.

There is little agreement on the capacities of agricultural institutions in less developed countries (LDC) to provide these services. This is complicated by a further lack of agreement on the relative merits of various approaches to increasing these capacities in LDC institutions. Further, there are questions of the relative returns, in terms of development objectives, for the LDC investing limited resources in programs designed to expand agricultural research, education and extension capacities, as compared to short-term, action oriented development projects and programs.

Lack of agreement on issues so crucial as these is exacerbated by a lack of hard evidence—sufficient facts are simply not available. There does not exist a current, systematic, comprehensive appraisal of the relationship between the productive capacity of the LDC institutions of agricultural research, education and extension and the national development needs for their services.

The Congressional charge to the Board for International Food and Agricultural Development (BIFAD) that programs "be designed to achieve the most effective interrelationship among the teaching of agricultural sciences, research and extension," the current inquiries into the future form and content of US bilateral agricultural assistance programs, and the unresolved questions relative to the role of strengthening this set of institutions make it imperative to establish a solid factual basis for subsequent action programs.

Thus, under the auspices of the Title XII program, the BIFAD and AID concurred on the priority need for a baseline study to determine the relationship between the <u>capacity</u> of national agricultural research, education and extension (REE) institutions or systems and the specific developmental <u>needs</u> of given countries.

These baseline studies should meet two general and eight specific objectives for each country where completed:

1) To provide host countries, AID, BIFAD and other interested parties detailed and current data relative to the capacity of LDC research, educational and extension institutions or national REE systems to provide services of a kind, quality and quantity requisite to development and sustained growth in the agricultural sector;

2) To provide a sound factual basis for (a) the identification of priority opportunities for Title XII programs, (b) development of a long-term strategy for and approach to bilateral assistance in this area of agricultural development, and (c) determining the long-term resource demands on US universities and other institutions which may participate in Title XII programs.

The specific objectives of the baseline studies will be:

1. To obtain quantitative and qualitative estimates of the capacity of LDC educational institutions to train agriculturalists at all levels--laborers, managers, technicians, paraprofessionals, professionals, educators, scientists and administrators.

2. To assess the capacity of LDC agricultural research institutions to adapt existing technology or develop new technology and to develop economic and social information requisite to improved public and private decision-making and attendant improvements in agricultural productivity, income levels and income distribution patterns.

3. To evaluate the capacity of the LDCs formal and informal institutional structures to disseminate technical, economic, social and other relevant information, in timely fashion and useful forms, to the various strata of public and private decision-makers in the agricultural sector--broadly defined.

4. To assess the effectiveness of institutionalized mechanisms for coordinating and integrating the activities of the agricultural research, education and extension system.

5. To determine the general magnitude of services which will be required of this set of institutions if agricultural and general development goals are in fact to be met in the short and medium term.

6. To provide estimates of the magnitude of such gaps as might exist between the current and projected capacity of the relevant institutions and the nation's agricultural development needs for such services.

7. To indicate the levels of investment which will be required to remove such institutional constraints as may be identified.

8. To suggest appropriate means by which the Title XII program, and the programs of other donors, might contribute to the development of adequate agricultural research, education and extension capacity in the LDCs.

II. Capabilities and Functions of Effective REE Systems.

The goal of the baseline study is to facilitate the development of REE institutional systems that can respond to the relevant range of agricultural and rural development problems. Since the composition of these systems varies from country to country, the baseline study effort is to provide data and information to individual governments, which should enable a government to strengthen or modify appropriately its particular system. There is no presumption of an ideal system which will meet the needs of all countries; however, an effective system must have the capability to manage three major types of problems and successfully perform four major types of functions.

The REE institutional system must have the capability to address three different types of problems. First, it must be able to address long-term and enduring problems--such as employment generation, agricultural and rural resource production and maintenance of a favorable economic climate. Second, the system must be able to address short-term and unexpected problems--such as natural disasters, disruptions in trading relationships, political changes, outbreaks of major diseases, droughts and floods. Finally, the REE system must provide services essential to the operation of the rural economic and social processes. That is, it must provide, on a continuing basis, reliable, accurate, and relevant information on technical, social and economic conditions to decision-makers throughout the economy--consumers, farmers, managers, administrators, ministers, etc.

A system with these capabilities should perform at least four functions. First, it must identify problems obstructing development and opportunities for accelerating development throughout the economic system--from producers and consumers to the highest policy levels. Second, the system must generate knowledge for overcoming problems obstructing development and for exploiting opportunities for development. Such knowledge is needed throughout the system and is a prerequisite for the development process.

Third, the REE system must disseminate knowledge and information in timely and usable form. The dynamic nature of development involves a multitude of decisions: producers, consumers and administrative officials at all levels continuously make decisions that may or may not advance development. To advance development of a broadly based participatory type, the REE system must continually receive, evaluate, put in a usable form and distribute large quantities of information. Finally, education is the most basic function of the REE system. It is trained

minds that make the social and economic system function effectively. Producers, consumers and officials at all levels must be appropriately trained before they can optimally contribute to the development process.

In short, the proposition underlying baseline studies is that a set of institutions, responsive to the multiple development needs of a particular country, is a prerequisite to that development. Further, to be responsive this set of institutions must have specific and unique capabilities and perform a number of essential functions.

III. Baseline Study Methodology

A Baseline Studies Methodology has been developed to provide a guide to focus the activities of the US and LDC groups in making an assessment of the current capacities of REE institutions to perform these functions. It is a generalized conceptual framework within the bounds of which empirical studies in individual countries will be conducted.

The Methodology is structured to permit systematic investigation of the complex and interdependent relationships of a nation's REE system and to accommodate the diversity in existing institutional arrangements found in the developing countries. The five sections of the Methodology are organized and ordered to present a logical sequence for the evaluation, proceeding from the historical development of the REE system to its current capacities and the problems of the agricultural sector, and finally to a diagnosis and recommendations.

This Baseline Methodology, perhaps, can be best understood in the context of its creation. It began in the search for a "point of beginning" for in-country programming for BIFAD in early discussions of the Board and Staff. But not until late in 1977 was the objective sufficiently defined to move to the development stage. And by that time, of course, to no one's fault but in the normal course of events, it was realized that the entire program was really needed "yesterday."

Despite a difficult time-frame (and perhaps an impossible task), a team of five individuals met with members of the BIFAD staff and in little more than thirty days produced the basic document which has been shaped as the Baseline Methodology. This suggests that the team, of necessity, made some rather broad assumptions about the goals and purposes of these studies; these assumptions should be made as explicit as possible.

The team focused the Methodology on the capacities of the whole research, education and extension system as it might impact on the

entire agricultural sector. While subgroups such as rural poor or commercial agriculturalists are included throughout, the assessment itself must address the entire system, particularly in the evaluation stage. Recommendations can be made for shifting resources to any subgroup, commodity, region, etc.

A cautionary note on the term system should be inserted here. The term is used throughout as a convenience and should not bias anyone to the assumption of the existence of a system as such. One of the objectives of the methodology will be to determine whether the REE institutions, in fact, function as a system.

The nature of the assessment was also a primary concern of the design group. A distinction was made throughout between analysis and assessment, the latter implying a review of existing and available information and not the generation of new, primary data. In a full analysis, each element of the methodology might be used as a beginning point for an indepth research project, but this is not the expectation for this baseline assessment. Thus, particularly given the assumed time constraints for each country (approximately three months) this project has been envisioned as an assessment.

The charts and graphs included in the Methodology nevertheless will require a substantial amount of data to complete. The Methodology is predicated on an assumed ideal model country. There will undoubtedly be countries in which certain of the data will not be available. It will be a responsibility of each field team to adjust and apply the Methodology.

Critical assumptions were also made about the field and field operation: 1) a multidisciplinary team would be made up of three to five individuals with broad experience in the country, including language facility where possible. The team would spend a maximum of three months for each country, but should also devote ample time to the review of data and materials available through the World Bank, FAO, UNDP, regional banks and elsewhere. Variations in time and team size might be expected for smaller countries. The Methodology was also designed on the assumption of active involvement of the host government for (a) early and strong support, solicited by the AID mission, of the baseline studies concept, (b) access to crucial levels of government decision-making throughout the field assessment, and (c) participation of at least one host country professional throughout the study to identify and locate data, broaden access to government offices, and to provide an indigenous perspective in judgmental evaluations of the Methodology. Thus, the quality of the baseline assessment in any given country will depend greatly on (1) the quality of the personnel selected for the field team, (2) the strength of support from the AID mission in the country, and (3) the strength of the host government commitment.

The Methodology should be pretested in several LDC's with a wide spectrum of agricultural systems before it is taken into general use.

This methodology is not a textbook or guide to REE methodologies or sector assessments in general. It is intended to be an operational guide for the assessment of capacities of specified institutions and systems in LDCs.

IV. Adaptation of Baseline Study to Specific Countries

While the Methodology is designed to be as universally relevant as possible, no prototype methodology can be equally suitable for all countries. The amount of adaptation will depend on the amount of data available, the types of agricultural systems, the geography of the country, and other constraints specific to each country. Each field team, then, should expect to adapt and adjust the methodology as required and appropriate.

As noted in the previous discussion, the Methodology calls for a greater detail of information than may be available for any given country. Each field team will have to become familiar with the Methodology and make adjustments for any paucity of information. In some cases "best estimates" may have to be made by the team, in which case the information on which the estimates may be made should be recorded as precisely as possible.

Additional adjustments will be needed to prepare the Methodology for each country. Most of these can be made during the preparation and briefing of the team, but all should be made with full discussion by the field team. Specific definitions and labels must be assigned for major and secondary crops, livestock, fisheries and other commodity categories. Other variables that will have to be reviewed include the client groups and regions. In all cases, the field team will be required to establish a working definition and subdivisions as appropriate. The institutional guide will also require adaptation for each country.

V. Outline of the Baseline Studies Methodology

This brief summary description of the Baseline Methodology is followed by a detailed outline of each section.

Section 1.0 is designed to provide background essential to objective assessment of the REE system. It is a summary of the country setting for agricultural and rural development, research, education and extension. The Methodology is designed to identify the relevant subdivisions of the total REE system for which manpower, financial and other data will be collected. Hence, this section provides the framework for assessment of the entire REE system, including the components to be included in each subdivision. Also, this section of the Methodology is designed to provide a framework for analyzing the critical organizational determinants of an effective REE system.

Section 2.0 is designed to quantify the human capital and other resources available to the several subdivisions identified in the REE system. The quantifiable indicators will include current manpower levels, annual operating costs, investments in physical facilities, past growth in REE system resources and anticipated growth patterns in resource allocation. In addition, this section will include an evaluation of critical institutional determinants for an effective REE system. The characteristics considered include:

1. Institutional Linkages.
2. Incentives for high performance for individuals in the system.
3. The critical mass needed to maintain effective programs.
4. Doctrine, philosophy and commitment to public service.
5. Capacity for self-sustaining growth in personnel.
6. Knowledge base and use for agricultural development goals.
7. Leadership and administration.
8. Organizational effectiveness.

This section is designed to identify the current resource levels and structural capacities of institutions in the REE system.

Section 3.0 of the Methodology has been designed to provide a perspective on key variables in the agricultural sector--client groups, commodities, resources and regions. The objective is to provide the field team with a clear understanding of the major agricultural problems to which the REE system must respond, without producing a full scale agricultural sector assessment. In particular, this section is designed to: 1) identify the country's development goals in terms relevant for evaluation of the REE system in moving toward those goals; and 2) categorize the agricultural sector to allow for the assessment of the allocative efforts of the REE system in addressing the needs of the sector.

Section 4.0 is the diagnostic section of the Methodology on which the problems within the agricultural sector, identified in the previous section, are compared and contrasted with the institutional capacities, outputs and practices as described and measured in the second section.

The diagnosis will include a summary of the personnel and financial allocations for the REE system at the national level. Projections will be made for training needs. A review of agricultural sector problems, alternatives strategies for increasing agricultural production, and significant successful REE institutions and practices will be used to prepare a list of the major constraints confronting the REE system.

Section 5.0, as the last section of the Methodology, will focus on recommendations for increasing the capacities of the REE system. The recommendations will be made in four areas--institutional development, personnel training, non-human capital needs, and technical assistance needs.

Outline of the Baseline Studies Methodology

		Page
1.0	Summary of the Country Setting and Framework for the Research, Education and Extension System	12
1.1	Goals and Purposes of Agricultural Development Programs (with specific reference to research, education and extension) as Stated by the Host Country	13
1.2	Historical Setting: Research, Education and Extension Structures as They Have Evolved in the Country	16
1.3	Organizational Diagrams (one for each sector of research, education and extension and one generalized for whole system)	18
1.4	Description of Relevant Research, Education and Extension Subsystems	23
2.0	Profile of the Current Resource Allocations Within the Research, Education and Extension System and an Assessment of its Critical Organizational Characteristics	24
2.1	Resource Allocations	27
	2.11 Manpower and Financial Investments by Subject Matter, Client Group, Function and Region	
	2.12 Summary for Current or Most Recent Fiscal Year	
2.2	Critical Organizational Characteristics	35
	2.21 Institutional Linkages	
	2.22 Incentives	
	2.23 Critical Mass	
	2.24 Doctrine/Philosophy of and Commitment to Public Service For Agricultural Development	
	2.25 Capacity for Self-Sustaining Growth	
	2.26 Knowledge Base and Use	
	2.27 Leadership/Administration	
	2.28 Organization	
3.0	Overview of the Agricultural Sector	93
3.1	Rural Population Distribution	94
3.2	Resource Distribution	96
	3.21 Land and Topography	
	3.22 Water	
	3.23 Climate	
3.3	Production Inputs: Management, Technology, Credit	1[illegible]

Pag

3.4 Infrastructure, Distribution, Marketing, Processing 10

3.5 Public Policy and Planning: Development Goals 10

3.51 Client Groups
3.52 Commodities
3.53 Regions

3.6 Production Valuation Distribution By Client Group 11

3.61 Commodity Distribution
3.62 Commodity Valuation

3.7 Regional Distributions By Client Group and Commodity Valuation 11

3.71 Regional Production by Client Group
3.72 Regional Valuation by Client Group
3.73 Regional Production by Commodities
3.74 Regional/Commodity Production Valuation

4.0 Diagnosis 118

4.1 National Summary of Manpower and Financial Investments for the REE System 119

4.2 Training Needs for the REE System in Meeting Population, Commodity and Regional Needs 123

4.21 Client Groups
4.22 Commodities
4.23 Regions

4.3 Constraints to Production 127

* 4.31 Constraints by Client Groups
4.32 Rank Order of Constraints for Each Client Group
4.33 Rank Order of Client Groups for Each Constraint
* 4.34 Constraints by Commodity
4.35 Rank Order of Constraints for Each Commodity
4.36 Rank Order of Commodities for Each Constraint
* 4.37 Constraints by Region
4.38 Rank Order of Constraints for Each Region
4.39 Rank Order of Regions for Each Constraint

4.4 Identification of Alternative Strategies 137

4.41 Infrastructure
4.42 Public Policy
4.43 Client Groups (farming systems)
4.44 Commodities
4.45 Resource Base

Diagnosis: How do existing institution deal with constraints to increasing agricultural production

Pa

4.5 Summary of Unique and Successful Elements of the REE System 143

4.6 Identification and Rank Ordering of Major Production Constraints 146

5.0 Recommendations for Strengthening the REE System 148

5.1 Institutional Development Recommendations 150

5.11 Strengthening Existing Institutions
5.12 Developing New Institutions

5.2 Training Recommendations 153

Domestic Training
International Training

5.3 Non-Human Capital Recommendations 156

Physical Facilities
Equipment
Library

5.4 Technical Assistance Recommendations 159

VI. Execution of a Baseline Study

There are several requirements that must be fulfilled before a baseline study can be effectively executed.

First, the decision to undertake a baseline study must be based on a thorough understanding on the part of host government and US AID officials of the role and importance of the REE system in the development process. This suggests that it may be appropriate for the AID Mission to request the assistance of a short-term consultant to work with host country officials and the Mission to evaluate the need for a baseline study.

Second, effective procedures for organizing and directing pre-study activities must be developed. Considering the complexity of the study, and the need to adapt it to unique institutional and other circumstances in each country, the study must involve a range of host country national(s) to develop a data base for cooperative use in the study. Development of this data base would probably require one or two middle level technicians working for one to two months gathering existing information. Ideally, these technicians would work under the direction of a host government official who would be participating in the baseline study.

Finally, the baseline study field team must be trained in the use of the Methodology. Workshops and briefings on the use of the Methodology will be conducted prior to the departure of the field team. During the initial phase, all available reports and documents relevant to the LDC research, education and extension system(s) will also be reviewed.

VII. Effective Use of Baseline Study Results

The Baseline Study exercise is designed to identify a range of problems constraining the effective performance of the REE system in the developing country. This means that the number and magnitude of problems identified will perhaps exceed the response capabilities of any one donor. Thus, an important result of the exercise may be one of assisting the host government in undertaking internal reforms to strengthen the REE system. Some of these will probably require outside assistance. The US AID Mission will work with the host government to define an appropriate role for US development assistance. This could involve assisting the host government to set priorities for internal reform as well as identifying the US role in the government's effort. Finally, it is anticipated that this entire exercise may lead to a clearer division of responsibility among the host government, US development assistance efforts and the development assistance efforts of other donors for strengthening the host government's REE system.

1.0 Summary of the Country Setting and Framework for the Research, Education and Extension System

The purpose of this section is to provide a general background for the detailed assessment and evaluation to follow. Information from this section should be used to identify relevant REE subsystems for which manpower and financial data will be collected and to provide a framework for establishing the critical organizational determinates of an effective REE system.

The REE system should not be evaluated or assessed in isolation from its environment. Initially, this environment is to be described in terms of the developmental goals and purposes established by the host government, with particular reference to where agricultural development falls in relation to other priorities. A second broader environmental perspective can be reviewed by describing the historical growth and development of the REE system within the country. Particular attention should be given to those features, especially successful features, which may have evolved in response to these historical and cultural conditions.

Also in the summary setting, the organization of the REE system will be prepared in graph form. Formal organization charts and descriptions for the research, education and extension subsystems, as well as a chart for the overall system, should provide a basis for proceeding more systematically with the assessment.

As noted previously, the term "system" will be used throughout the assessment; however, this is a term of convenience and does not presume the existence of a system. The historical review, organization charts and descriptions of the institutions fulfilling research, education or extension functions will provide a basis for proceeding more systematically, whether or not the components, or the whole, comprise a system in operational or organizational terms.

1.1 Goals and Purposes of Agricultural Development

The stated development policies, goals and strategies should be summarized and reviewed. Beginning with formal statements, perhaps as developed in a five or ten year development plan, the team should attempt to further define the policies etc. through interviews with government officials and/or reviews of programs in operation.

A major difficulty in such policy review is the variation between stated and operational policies. While many governments have clearly stated policy objectives relative to rural development and agricultural production, the reality of implementation and operation may point to considerable variance between statement and actual practice. Without seeking to indict anyone for failure to implement policies, such gaps as these will ultimately be extremely important for this assessment. Being as discreet as possible, this gap should be defined and precisely documented wherever possible.

The position of agricultural development in relation to other development priorities should be noted as clearly as possible.

Later in the Methodology (Section 3.5) the policy priorities for the agricultural sector will be summarized with particular reference to client group, commodities, and regional variables. (These variables are used throughout the assessment, and definitions are provided on page 22.)

Tables 1.11 and 1.12 are provided to summarize the goals and purposes of agricultural development policies. On these tables, as in all subsequent tables, the team should include citations for information sources as appropriate. If there is not sufficient space, the back of the table may be used or additional pages attached.

Table 1.11 Goals and Purposes: Summarize here the development policies, goals, and strategies of the host government.

Note information sources _____

_____

_____

Table 1.12 Goals and Purposes: Describe the priority rating given to agricultural development among various development priorities.

Note information sources _____

_____

_____

1.2 Historical Setting

The current nature of the REE system may have been profoundly influenced by the historical conditions in which the system was established and through which it has developed. This may be particularly true, for example, in former colonies, but cannot be ignored for any system. Moreover, any prescriptions for development of the REE should consider these historical patterns of development. An account should also be made of cultural factors which may have influenced this development. In briefly tracing the main historical and cultural features of the REE system this section should address such questions as the maturity of the system (or components of the system), the organizational models, and other features of the system which are likely to continue to have an impact. Successful elements of the system relative to this historical and cultural experience should be noted.

Beyond the REE system itself, some consideration should be given to the historical and cultural patterns of the country as they might impact on the REE system. The scope of such factors is nearly infinite but consideration should be given to cultural variations within the country, particularly as this might be reinforced by geographic, ethnic or agricultural variations from one region to another. Consideration should also be given to the role of women in agriculture and the needs for the REE system in question. Unique cultural, agricultural or other features, perhaps as an example the presence of nomadic peoples, should be noted for consideration in evaluating the capabilities of the REE system.

Table 1.21 Historical Setting: Summarize here outstanding features of the REE institutions, with an explanation of how they have developed over time. Note particularly those which will be impediments to agricultural development and a more efficient REE system or models which, because of their successful adaptations, should be studies for replication.

Note information sources _____

_____

1.3 Organization Diagram

The primary institutions in the REE system should be presented on an organization chart. These diagrams should be presented for research, education and extension sectors, with another diagram to show the entire system. The diagram should show, by using connecting lines, the major channels of communication among these institutions. Where possible, major authority levels should be presented visually, i.e. the ministry of education would usually be placed higher on the chart than universities. This may be the first point at which the facility with the term "system" will be tested! It is important to prepare each diagram even if it is technically a "non-system," as this may be one of the salient features of the assessment. However, this diagram should reflect the formally specified lines of communication and hierarchy (later diagrams will probe informal lines of communication).

The diagrams should include all relevant institutions, and the Institutional Guide (page 28) should be of value in identifying the appropriate institutions. Also, the linkage diagram (Figure I, Section 2.21) can be used as a model for the organizational diagrams. However, at this time the concern is for formal organization only; its effectiveness will be determined later.

Brief explanatory and descriptive notes should be prepared for individual components, whether institutions or communication lines, which might not be widely understood because of unique or unusual characteristics or functions. (Table 1.4)

Table 1.31 Organizational Diagram: Research Institutions

Note information sources _____

_____

_____

Table 1.32 Organizational Diagram: Education Institutions

Note information sources _____

_____

_____

Table 1.33 Organizational Diagram: Extension Institutions

Note information sources _____

_____

_____

Table 1.34 Organizational Diagram: Overview of REE Institutions

Note information sources _____

_____

_____

Table 1.4 Description of Relevant Research, Education and Extension Subsystems

Note information sources _____

_____

_____

2.0 Profile of the Current Resource Allocations Within the Research, Education and Extension System and an Assessment of its Critical Organizational Characteristics

With the main features of the historical and organizational framework in mind, the next step in assessing the REE system is the gathering of statistics with respect to current resource allocations. The statistical summary, which would be divided, where possible and feasible, into client group, subject matter, functional and regional components, will focus on the allocations of personnel and expenditure levels. In addition, qualitative assessment of physical facilities is included.

While the distribution of personnel and money through the REE system should be very revealing, there are other factors critical to the success of the system. The second step in assessing the system is to review eight critical characteristics of institutions in the system. Although efforts have been made to develop quantative indicators within these categories, considerable judgment will be necessary.

EXPLANATION OF VARIABLES

Through both the assessment and subsequent diagnosis, data will be sought and organized in four major variables: client groups, subject matter, functions and regions, the latter only in countries where the field team determines it appropriate. Each of these variables will be subdivided as explained below. However, it might be well to note here that availability or unavailability of data in some countries may force field teams to develop educated estimates or delete some subsections altogether.

The client group variable may be the most difficult to cope with as it includes elements of all of the following: a) targets or client users of the products of the REE system, b) categorization of the rural population, and c) production subgroups. While perspectives (b) and (c) are important, it is the client users of the REE system with which this assessment is to be principally concerned. That is, this assessment must determine what services are delivered through the REE system, to which clients.

This variable as constructed makes a primary distinction between food and non-food agricultural producers. The food producers are then further subdivided by market orientation into export, domestic-commercial, and local or occasional market categories.

These are primary orientations in each case and the team will have to make a judgment as to whether a particular group produces primarily

for domestic consumption or for export. It is possible to make a further subdivision of each client category by production output (large or small), size of holding (large or small), type of holding (private, state ownership or other tenure patterns), or other adaptation to the local context. However such adaptations are made--and they should be made wherever practicable; the adaptation should be followed consistently throughout the assessment.*

Should a situation arise where this client group breakdown proves unworkable an alternative category system is described below. However, this classification system, based on and designed some years ago by the Comite Interamerican de Desarrollo Agricola (CIDA), should be used only in situations where the client group variable cannot be operationalized.

The second variable, subject matter, has been divided into six categories: resources, commodities distribution, management and production technology, agriculturally related social research, and policy and planning. The first three categories have been further subdivided as follows: resource base into land water and climate; commodities-crops, livestock, fisheries and others, all of which should be specified; and, distribution into processing, distribution and marketing. The management and production technology category includes farm management techniques and the use of appropriate technologies. Social research focuses on sociological, psychological, anthropological and other research related to the constraints to furthering development and increasing agricultural production. The policy and planning category includes all other areas of research but should be specifically related to either analysis specifically for policy makers or analysis of the impact of policy decisions.

The perspective within this variable shifts, on occasion as, for example, in resource base area the concern is sometimes with the allocations within the REE system to research and other activities related to

---

* I. landless family units--those family units in which at least half of employment is in agricultural labor and in which no employment is on land under the control of the employee.

II. sub-family farm units--those holding land but of inadequate size to give full employment at present levels of technology and resources to two people.

III. family farm unit--those which give full employment to two to four people, all of the same family.

IV. multifamily farms/small units--those which give full employment to four to twelve people, some of whom are not members of the immediate farm family.

V. multifamily farms/large unit--those which give full employment to more than twelve persons.

to which these factors inhibit production, or the relative skill of the farmer in manipulating these resources to ehance production. This type of shift also occurs in the commodities category.

The management, technology and credit category, in a rough sense, focuses on the inputs to the farming system and the ways these might be altered or utilized to improve production. The concern is also with the skill of the farmer in this utilization. Considerations of appropriate technology will be particularly important here. On the other hand, the infrastructure, distributing, marketing and processing category represents, in a general sense, the agricultural output system beyond the point of production. This group of factors are external to the farming system, yet except for the purely subsistence farm, these functions are crucial to any farming operation.

The social and cultural category focuses on a broad range of sociological, psychological and anthropological factors which influence behavior patterns and motivations of farmers. Such factors as the unwillingness of some Asian farmers to plow under green crops as fertilizer because the crops are living organisms must be understood before the REE system can successfully approach them. Other considerations might include the social impact and/or costs of introducing new crops and technologies. The importance of this area increases as the social or cultural distance between the educated (and perhaps urbanized and westernized) personnel from the REE system and the farmer increases. The public policy and planning category is related to but quite distinct from the social and cultural category. This category will focus primarily on political and governmental questions relating to policies and planning for the agricultural sector in general and to the research, education and extension institutions and their mission in particular.

The functions variable covers the research, education and extension functions. The research and education categories have been divided into natural and physical sciences and social sciences. The extension category has not been further divided.

The fourth variable is the region. It will be used only in those countries where regional variations may be of consequence in assessing the REE system. The regional concept may be applied to geographic areas with differing agricultural problems, it may be applied to political divisions, or it may be applied to ethnic groups. This determination will be made by each field team and followed consistently throughout the assessment for that country.

2.1 Resource Allocations

The Manpower and Financial Investments Table is perhaps one of the most important for the assessment. It will provide the most detailed outline of the REE system. It will be important to obtain a clear impression of the allocations by (a) client group, (b) subject matter, (c) functions and (d) region. The breakdown of these items is outlined in Table 2.11. A specific entry is not provided for consumers; it is assumed that much of the REE activities would be of direct and indirect benefit to them. Precise statistics on allocation may not exist; "guestimates" may be necessary.

This matrix should be completed for each of the relevant twenty-one subcategories of the Institutional Guide, which has been attached here (page 28). The judgment of the team will be necessary in determining how many of these institutional categories are relevant for the particular country; it is important that a chart be developed for each relevant category. Additionally, a single form will be completed to summarize the information. (Table 4.1)

Client groups will differ for each institution and in some cases will be direct and immediate beneficiaries (example: farmer as a client of extension worker), while in other cases they will be more indirect beneficiaries (example: farmers as clients served by graduates of educational institution). The field team must thoroughly understand and agree on the configuration of client groups and subdivisions by large or small land holding and state or private ownership. Major and minor crops and livestock will be labeled as specific crops, by individual teams, establishing a consistent distinction in major and minor crops based on production volume and/or importance within the economy. If more lines are needed for major crops or other categories, the team should make appropriate additions or adjustments.

Public policy and planning and socio-cultural analysis should include but not be limited to such areas as human resources, capital and credit resources, poverty, price policy and trade questions.

Regional breakdowns are also to be determined by each team for cases where it is felt that regional disparities are important for the overall agricultural development of the country.

2.11 Manpower and Financial Investments by Client Group, Subject Matter, Function and Region

Four types of information will be needed to complete Table 2.11. Physical facilities should simply be rated on an overall qualitative basis (1=poor, 3=adequate, 5=excellent). The assessment should include buildings, equipment, grounds and other appropriate physical attributes. As this is done for each institutional category, patterns should emerge. However, care must be taken to assure that broad discrepancies are not covered over, i.e., if one of two national research stations is an excellent facility and the other is poor, the "average" perhaps should not be "adequate."

The personnel distribution should cover all persons working in professional capacities.

The expenditure data should be gathered in current US$ figures, if possible. However, caution should be exercised because many times funding is complex and poorly organized and reported. Financial allocations may also be too sensitive to be provided, in which case it might be possible to get percentage figures instead of actual figures.

Each variable (client group, subject matter, functions and regions) should cover the whole of the resources of the REE system. Thus, personnel allocations should include all individuals of the REE system distributed and redistributed over each variable. Physical facilities assessed in each category of the client group variable would be reassessed relative to appropriate commodity categories.

Attachment I: Institutional Guide

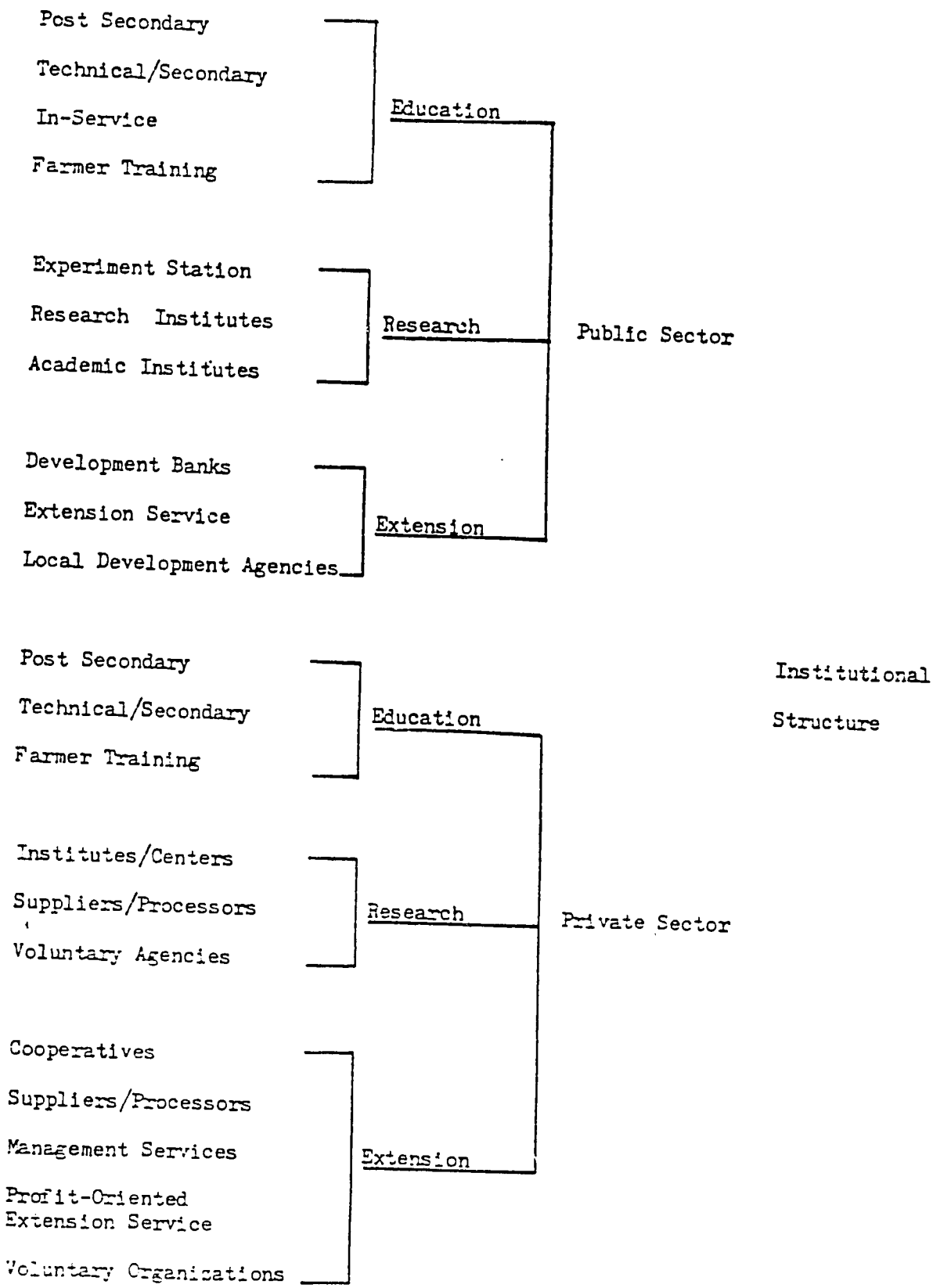


Table 2.11 Manpower and Financial Investments by Subject Matter, Client Groups, Function and Region
For _____
(specify institution)

	Physical Facilities (1-5)	Personnel (Man-years)	Annual Expenditure Current Expend. (current $ figures)	Annual Expenditure Capital Expend. (current $ figures)	Total Annual Expenditure % / year last 5 years	Total Annual Expenditure % / year next 5 years
SUBJECT MATTER VARIABLES						
Resources:						
Land						
Water						
Climate						
Commodities:						
Crop # 1						
Crop # 2						
Crop # 3						
Secondary Crops						
Livestock # 1						
Livestock # 2						
Secondary Livestock						
Fisheries						
Other # 1						
Other # 2						
Management, Technology & Credit						

Table 2.11 (page 2)

	Physical Facilities (1-5)	Personnel (Man-years)	Annual Expenditure Current Expend. (current $ figures)	Annual Expenditure Capital Expend. (current $ figures)	Total Annual Expenditure % / year last 5 years	Total Annual Expenditure % / year next 5 years
Distribution						
Processing						
Storage						
Marketing						
Social & Cultural Limitations						
Public Policy & Planning						
CLIENT GROUP VARIABLES						
Raw Materials (a)						
Producers (b)						
Food Producers (a)						
Export (b)						
Food Producers (a)						
Domestic Commercial (b)						
Local Mkt./Subsis. (a)						
Landless Labor (b)						

Table 2.11 (page 3)

	Physical Facilities (1-5)	Personnel (man-years)	Annual Expenditure Current Expend. (current $ figures)	Annual Expenditure Capital Expend. (current $ figures)	Total Annual Expenditure $ / year last 5 years	Total Annual Expenditure % / year next 5 years
FUNCTIONS VARIABLES						
Research						
Nat. & Physical Science						
Social Science						
Education						
Nat. & Physical Science						
Social Science						
Extension						
REGIONAL VARIABLES						
1.						
2.						
3.						
4.						
5.						

Note information sources _____

2.12 Resource Summary for Current Fiscal Year

The second inventory is for current fiscal resources being devoted to REE and the human resources, in man year equivalents, made possible by these allocations. Table 2.12 includes four categories to be completed as follows: physical facilities for the REE system as a whole, rated judgmentally on a 1-5 scale; personnel in total man years and numbers (if there is a significant variation); current and capital expenditures in dollar equivalents (actual expenditures and not budget figures). Physical facilities may be evaluated judgmentally here or a summary of physical facilities evaluations from Table 2.11 may be used. For a discussion of skill level assessments see the section on "critical mass" (2.23); skill level information may be summarized from that section.

As with Table 2.11, the rating for physical facilities should extend from poor (1) through excellent (5).

The professional resources available to the REE system should be related, as closely as possible, to the American systems of degrees as listed on this table. The team may establish a scale of equivalence; such a scale should be clearly marked on this Table. The last category on Table 2.12 labeled "L.B.S." is "less than a B.S. degree."

Table 2.12 Resource Summary for Current Fiscal Year for National REE Subsystem

Physical Facilities (1-5)	Personnel (Man years and/or numbers)	Current Expenditures (in US dollars)	Capital current capital expenditures
_____	_____	_____	_____

Absolute #_____

Man years_____

Skill level

Ph.D._____

M.S._____

B.S._____

L.B.S._____

2.2 Critical Organizational Characteristics

2.21 Institutional Linkages

Most studies of organizations deal with intraorganizational problems. The interorganization (IOR) literature which exists has been primarily concerned with two questions: 1) how can interorganizational cooperation be specified, and 2) how much variance in cooperation can be explained. Because of the emphasis on intraorganizational theory and concern, most IOR studies emphasize cooperation over conflict and seek to reduce conflict between organizations. The idea that cooperation is necessarily good is a value assumption almost never stated explicitly. Of the small number of IOR studies which occur in the literature, most have focused mainly on bilateral relations between organizations; few studies have examined multilateral relationships among a set of organizations. Many of the organizations used in these studies were business firms. How useful their findings would be among non-profit organizations is not clear because little empirical work has been done on this topic.

This section of the Baseline Methodology will rely heavily on data provided by host country laymen, third country professionals, international agency personnel, etc., collected through conversations, interviews, and by direct observations of the study team. Given the informal methods of gathering these data, the team may wish to pool their observations in a seminar at the termination of the study visit to the host country.

This assessment should focus on a much broader interpretation of intra- and interorganizational analysis than is usually implied in academic circles.

Intra-organizational analysis focuses on linkages, formal/informal and one/two way, between the various agencies or organizations within, for example, the research system and not within any specific research agency. Thus an organizational chart and/or sociogram will be diagrammed which indicates the various agencies within the research, education and extension systems. (See example in Figure II, page 39)

The linkage variable between and among institutions of the REE system, as well as to client groups and international institutions is to identify and qualitatively assess actual contacts and the flow of information, in contrast to the organization charts which may represent formal but less intense contacts. The lowest intensity may be the exchange of research circulars or bulletins. Others may be more direct and intense. This intensity is often measured by such questions as: 1) Have you met with the directors of _____ at any time during the past year to discuss the activities of your respective agencies? 2) Within the last five years has this unit of your organization worked jointly in planning and implementing any specific programs or activities with _____? In these examples,

director interaction is taken as a lower degree of intensity of resource investment than is the sharing of joint projects between organizations.

We assume that there is a certain degree of linkage between the various organizations and areas such as the exchange of research bulletins. What is of special interest is the more intense linkages such as joint projects and formal and informal meetings. Also conflict situations are of interest especially the nature of the conflict--shared clients or shared services, etc. These linkages and their nature should be noted as in the model diagrammed in Figure I.

Thus, the first step in the assessment will consist of diagramming the organizational structure and function of each area separately, research, education and extension. Using the pages marked Tables 2.211, 2.212 and 2.213 develop diagrams for the actual organization of each sector. (Figure I, page 38, is a sample) A fourth diagram, Table 2.214, should be prepared for the system as a whole, in less detail but combining the three already drawn for the components of the system.

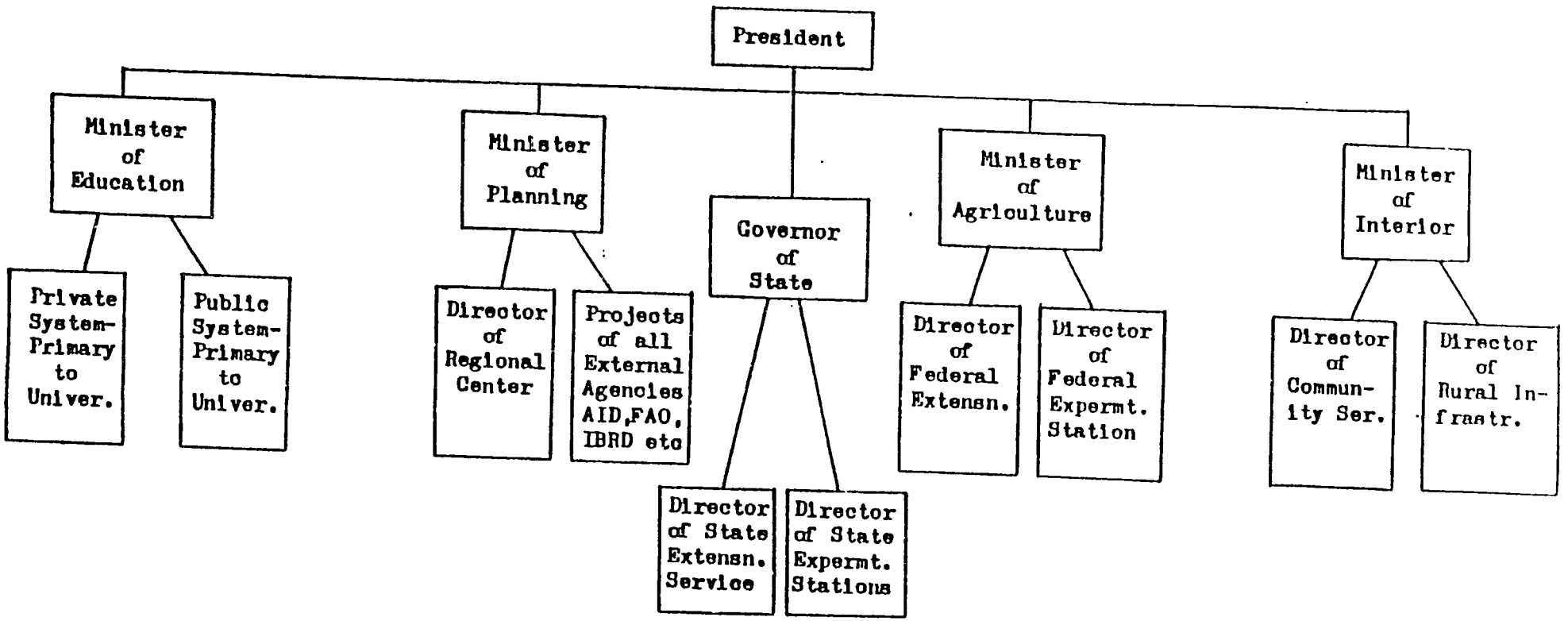
Supporting this systemic diagram should be a fifth diagram (Table 2.215) showing the nature and extent of informal linkages within the REE system. In all of these linkage diagrams, it will be especially important to label and describe the linkages shown. Another part of the assessment will deal with linkages of the research, education and extension system as a whole. Client groups will be broken down into specific target populations and one and two way linkages will be noted. (Tables 2.216, 2.217 and 2.218) For example, the extension system may communicate available data on appropriate technologies to the subsistence farmers and landless laborers , but there is little reverse communication. Perhaps these target groups do not have a mechanism, or agencies in the extension system do not solicit further researchable topics from the groups. In other words, there is a one way linkage--extension system to client group.

Obviously because of the aggregate nature of this part of the analysis--all research agencies considered in one system--this evaluation will be very judgmental in nature. If, however, a specific agency within the research system is conducting an innovative program with respect to its client group, its methodologies and procedures should be noted in a short essay. (Table 2.219A provides space.)

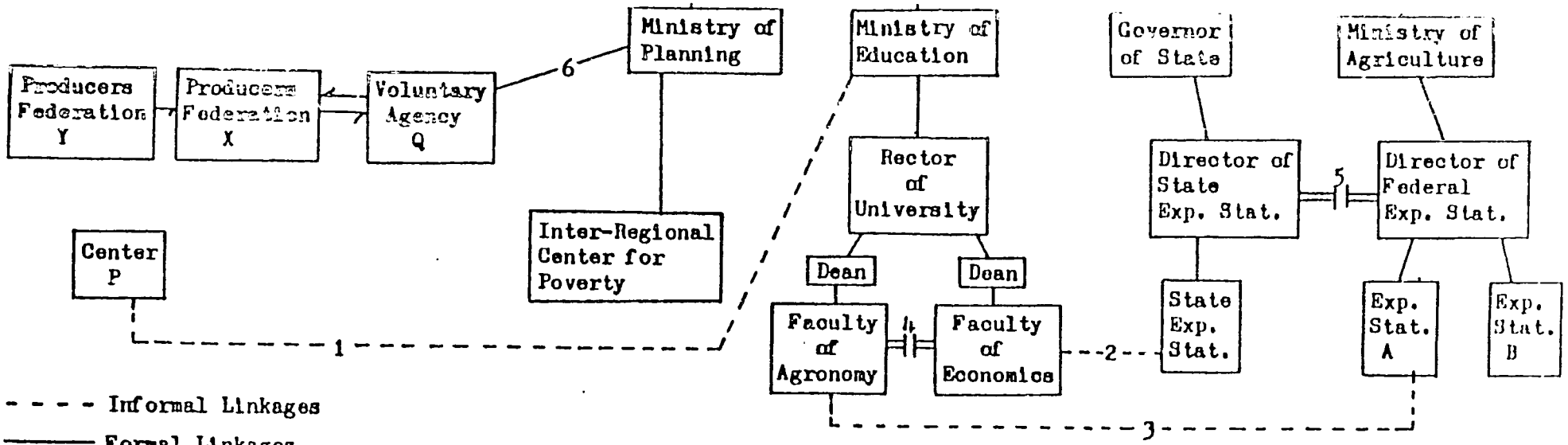
Finally, two types of inter-organizational linkages will be observed; 1) within country linkages--for example the linkages between the teaching system and the research system; and 2) outside country linkages--the research system with, for example, the International Potato Institute or the World Bank, etc.

This part of the analysis is a matrix (Table 2.219) and involves an overall qualitative assessment of what is an "adequate" linkage. An adequate linkage may mean no linkage at all. It is purely a judgment by the field team of the current situation and the utility of these linkages in accomplishing the goals of the research, education and extension systems. Communication linkages may be placed in a simple diagram (See Figure II), but the communication path should be traced through the linkage diagrams (Table 2.211-2.213) as far as possible.

Figure I. Hypothetical Model of the Formal Organizational Chart for the R E E System



BSM/4



- - - - Informal Linkages

——— Formal Linkages

(1) Center P has a contract with ministry to study rural education

(2) Faculty of Economics provides many staff for state experiment stations

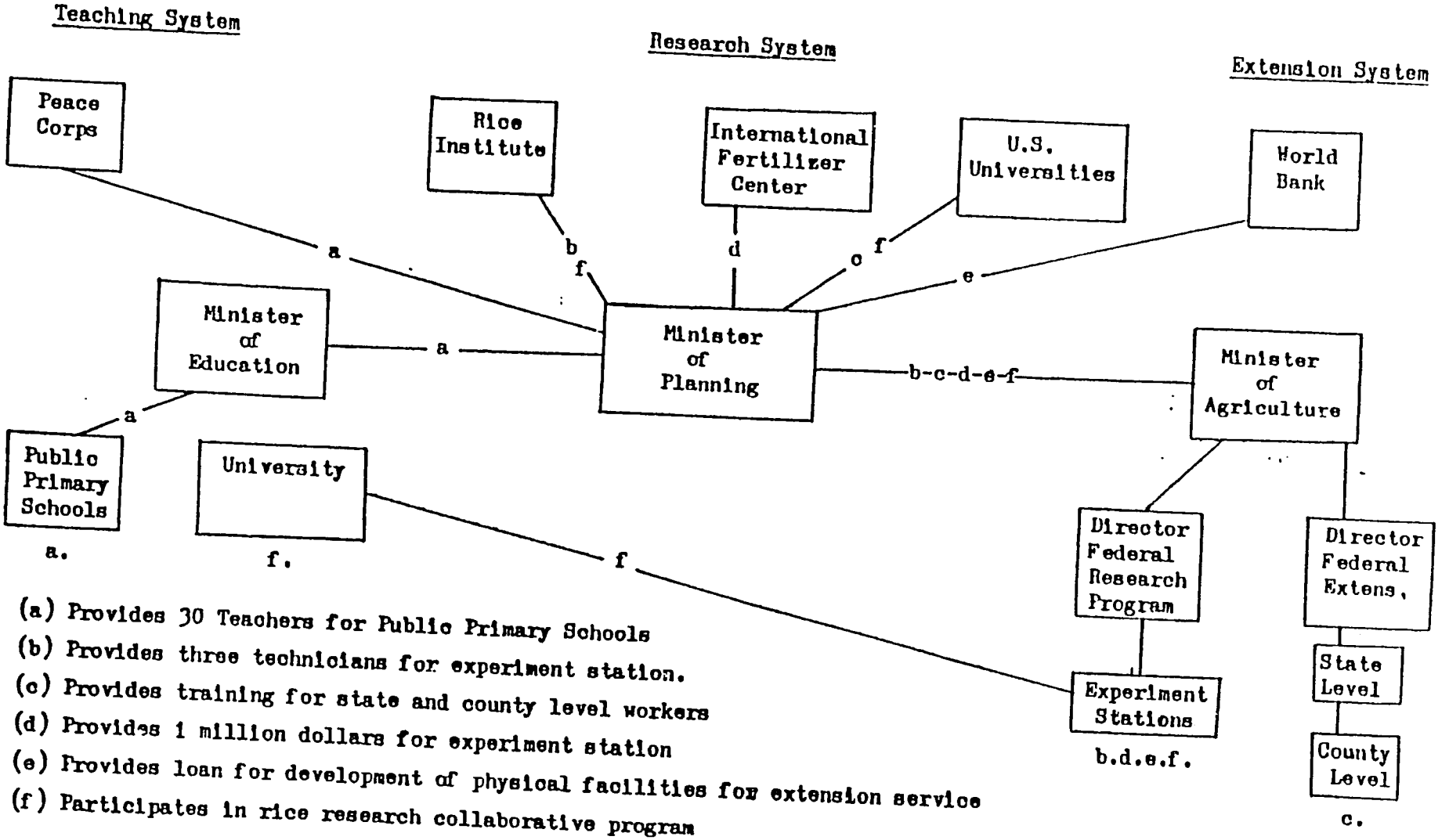
(3) Faculty of Agronomy has informal working relations with experiment station A

(4) conflict situation over budget

(5) conflict situation over clientele

(6) Ministry of Planning must approve all voluntary agency programs

Figure III: Linkages to External Institutions



(a) Provides 30 Teachers for Public Primary Schools
(b) Provides three technicians for experiment station.
(c) Provides training for state and county level workers
(d) Provides 1 million dollars for experiment station
(e) Provides loan for development of physical facilities for extension service
(f) Participates in rice research collaborative program

Table 2.211 Informal (Operational) Linkages of the Education Subsystem

Note information sources _____

_____

_____

Table 2.212 Informal (Operational) Linkages of the Research Subsystem

Note information sources _____

_____

_____

Table 2.213 Informal (Operational) Linkages of the Extension Subsystem

Note information sources _____

_____

_____

Table 2.214 Informal (Operational) Domestic Linkages of the Research, Education and Extension System

Note information sources _____

_____

_____

Table 2.215 Informal (Operational) International Linkages of the Research, Education and Extension System

Note information sources _____

_____

_____

Table 2.216 Teaching Subsystem Linkages to Client Groups

	Types of Linkages			
	Faculty to Client Group		Client Group to Faculty	
Client Group	Adequate	Inadequate	Adequate	Inadequate
Students				
Policy Makers				
Farmers				
Others (label)				

Explain nature and magnitude of inadequacies _____

_____

_____

_____

Note information sources _____

_____

Table 2.217 Research Subsystem Linkages to Client Groups

	Type of Linkage			
	Researcher to Client Group		Client Group to Researcher	
Client Group	Adequate	Inadequate	Adequate	Inadequate
Policy Makers				
Producers:				
Raw Materials				
Export Market				
Domestic Mkt.				
Local mkt./ Subsistence				
Landless Labor				
Others (label)				

Explain nature of magnitude of inadquacies _____

_____

_____

_____

Note information sources _____

_____

_____

Table 2.218 Extension Subsystem Linkages to Client Groups

Client Group	Type of Linkage: Extension to Client Group — Adequate	Extension to Client Group — Inadequate	Client Group to Extension — Adequate	Client Group to Extension — Inadequate
Producers:				
Raw Materials				
Export Market				
Domestic Mkt.				
Local Mkt./ Subsistence				
Landless Labor				
Policy Makers				
Consumers				
Processors and Distributors				
Others (label)				

Explain nature and magnitude of inadequacies _____

_____

_____

Note information sources _____

_____

_____

Table 2.219 Subsystem Linkages

Function	Field	Linkage Evaluation	Extension	Education	Research
Research	Dom.	adequate			
		inadequate			
	Inter-nat'l.	adequate			
		inadequate			
Education	Dom.	adequate			
		inadequate			
	Inter-nat'l.	adequate			
		inadequate			
Extension	Dom.	adequate			
		inadequate			
	Inter-nat'l.	adequate			
		inadequate			

Note information sources _____

_____

_____

Table 2.219A Unique and Successful Adaptations of Linkages and Communications Within the REE System

Note information sources _____

_____

_____

2.22 Incentives

The following comments on incentives apply with equal force to the research, education and extension services. Incentives here refer to the policies and tactics used within the REE system to encourage maximum efficiency and quality of outputs by individuals within the system. Incentives have to do with the wage structure, as well as budget support which enables competent professionals to carry out their programs, and other programs which enable the staff to effectively do their work and develop as individuals.

1. Salary Structure

Two aspects of the salary structure are important. The first is the adequacy of salaries compared to other occupations which require comparable levels of skills. The second is a structure of salaries in providing opportunities for advancement, and the expectation that continued productive effort will lead to higher pay.

The adequacy of salaries is a relative question. It has to be determined for the most part within a given economy. An exception, of course, is for high-level professionals for whom the international market is relevant. At this level, salaries have to be set in terms of international opportunities, for to do otherwise runs the risk of losing the very people who can be so important in developing the REE systems.

At lower levels, the criterion is to have salaries at a level that the REE systems can compete with other occupations that attract the same level of people, where level refers to skills, formal education and training, and on-the-job training. If there is a private system parallel to the public system, the private system often sets an appropriate standard for comparison.

The possibility of vertical advancement in salaries is equally as important as being competitive in the larger economy. Professionals should know that continued productive work on their part will lead to higher remuneration in the future. If such opportunities are not present, they will have little incentive to remain in the system, or to invest in their own personal development.

2. Program Support

Professionals need more than salary incentives to remain in an occupation and develop their programs. They need the support resources required to carry out their programs. Often these are the most critically short resources in LDCs. The physical plant may be adequate,

and salaries may be sufficient to attract competent professionals. But if supplies and materials are not available to do effective teaching or to conduct the desired experiments, professionals can become frustrated and ineffective. Morover, the timeliness and consistency of such support money is as important as the total amount provided.

3. Promotion Structure

A satisfactory promotion structure is important in bringing out the maximum effort from professionals, and in inducing them to invest in the development of their own skills. A number of promotion structures are possible. Unfortunately, the most common is one based on nepotism, where those who get ahead are either relatives of those in the establishment, or friends from other activities. A promotion structure based on nepotism provides little incentive for the most able to bring forth their best effort, or to further develop their skills.

From an efficiency standpoint, the most desirable promotion structure is one that rewards people according to merit or productivity. Such a system provides incentives to expanded work effort, and to the development of individual skills.

Promotion according to seniority is an alternative system, and one that is somewhat controversial. Under this system workers are remunerated according to their experience or time in grade. If such promotion requires no demonstration of productivity growth, then it offers little by way of incentives. If the promotion structure reflects the increase in skills associated with promotions, a system based primarily on seniority can still be effective. The important point is not to let promotion be based entirely on experience and time in grade.

4. Support for Professional Improvement

Support for professional improvement is an important means of raising skill levels over time, thereby raising the overall productivity of the sector. At least two aspects of this are important. The first is the possibility of sabbatical leaves, where the individual can leave his duties at half or full-pay for six months to a year for some form of self improvement. The second is the opportunity to participate in conferences and seminars. Various degrees of support can be provided here, ranging from the simple granting of time off to participates in such activities to the payment of travel, per diem, and participation costs.

5. Other Conditions of Employment

Other conditions of employment provide incentives for work and self-improvement. One of these is the authority structure. A well-defined and effective authority structure can be an important means of coordinating the work of the various individuals, seeing to it that the various things needed for an integrated program are available in a timely fashion, and resolving conflict situations within the organization. Authority can be oppressive as well, however, and either breed resentment or reduce the creativity of the individuals.

Another important condition of employment is the possibility of participating in outside activities. Such participation can be an important means of developing skills and gaining new perspectives. But it is very similar to authority in that it can be overdone. Too much participation in outside activities can be counterproductive, since it can detract from the ongoing work effort. The key here is to find the correct balance.

Table 2.221, following, may be reproduced and completed for specific institutions for for each subsystem, research, education and extension, separately as necessary. Such necessity, as determined by the field team, might arise from a lack of aggregated data or from wide variations among institutions, which would result in misleading generalizations if presented on the national level.

Table 2.221 Incentives: General for Research, Education and Extension

	Adequate	Inadequate	Explain
1. Salary structure			
--Adequacy within economy or salary competitiveness			
--Vertical opportunities for salary advancement			
2. Program support			

	Yes	No	
3. Promotion structure			
--Merit			
--Seniority			
Other			
4. Support for professional improvement			
--Sabbatical			
--conferences and seminars			

	Positive	Negative	
5. Other conditions of employment			
--authority structure			
--possibilities for external activities	Adequate	Inadequate	

Note information sources _____

Table 2.222 Unique and Successful Adaptations of Incentives Within the REE System

Note information sources _____

_____

_____

2.23 Guidelines for Determining Critical Masses Needed to Sustain Sub-Sector Productivity

It is generally believed that some critical mass of human talent is necessary if effective scientific and related forms of work are to be carried out. Research, education and extension institutions in developing countries are often characterized by small size and very limited staffs, particularly of more highly trained individuals. Often the better trained individuals are assigned to administrative rather than scientific work. This item is included in an attempt to determine whether such is the case in the country under study.

Guidelines:

1. The importance of having a critical mass increases from lower levels of education to higher levels of education, and from highly applied research to more basic research.

2. Undergraduate and graduate teaching is a critical point. The mass needed is dependent of the size and diversity of the country and the complexity of the problems its agriculture faces. Hence, large elements of judgment will be required in making an evaluation. Simple counting will not be sufficient.

3. At the national level the critical mass of highly trained professionals will probably be attained when the country is able to reproduce its own scientists. This in turn will be determined by the number of new scientists needed each year. In teaching institutions, there is probably in general no regional restriction in the sense that students must be trained in the region. At the technical or undergraduate level, regional institutions will probably add relevance if there are significant differences in the agriculture among regions.

At the institutional level, the critical mass is probably determined by having enough staff to teach the courses offered and advise the students, the latter being most relevant for graduate programs.

Beyond this, critical mass can probably be evaluated only in terms of some fairly simple-minded qualitative questions. For example, if the number of highly trained professionals is limited, what proportion of them and their time is tied up in administration? The net effective staff for teaching and research would be what was left.

Similarly, if a country has 15 Ph.D.'s, for example, are they scattered among many institutions? Or are they grouped into a smaller

number of effective teams? Perhaps the best that can be said is that a single professional can be lonely, two can produce useful interaction and cross-checking of each other, and three would do more.

An important caveat on the institutional distribution of professionals is their proximity in a geographic sense and the ease of communication and transportation. If they can get together with ease, or communicate fairly easily, the importance of groupings is reduced. For research, the critical mass of professionals depends on the diversity of the agriculture and the problems it faces. Depending on its developmental goals, a country would tend to need a cadre of scientists working on the problems faced or the number of fronts upon which a break-through is possible. For example, if insect problems are minor, then few entomologists are needed. If disease problems with a given crop are minor, then few pathologists are needed. In any case, it is generally assumed that a group of Ph.D.'s are more likely than a similar group with BS degrees to provide a critical mass.

At the institutional level, similar elements of judgment are needed. For example, a corn breeding center would need fewer professionals than a center devoted to the agricultural development of a region, the latter requiring professionals in a variety of disciplines.

A final dimension to this problem is the geographic and climatic heterogeneity of the country. If there are distinct geo-climatic regions, critical masses would probably be required for each such region.

4. Another dimension of the critical mass question is the optimum size of an institution. This would be determined by the flow of physical capital required for the research, and the availability of administrative talent. The point, of course, is that more efficient use can be made of both these inputs if optimum sized units are developed.

There are two operational approaches which might be taken in seeking data for each component of the critical mass assessed.

First, if data are available on the national level for the number of graduates (Ph.D., M.S., and B.S.) by major agricultural discipline, begin with Table 2.231, which gives a two-way breakdown and should identify (1) disciplines in which critical mass is unquestionably lacking because of inadequate numbers; (2) disciplines in which further review is necessary to determine if a critical mass may exist. In this case, disciplines in category (2) would be broken down further as shown on Table 2.232. This table would be completed for each disciplinary area in which critical mass was initially (Table 2.231) a possibility.

If national data are not available, Tables 2.231 and 2.232 should be bypassed and an institution by institution assessment using

Table 2.233 should be completed for all the institutions identified in the three linkage charts (Tables 2.231, 2.232, 2.233). In selecting these institutions, some flexibility can be exercised if it can be shown at the outset that no elements of critical mass reside in the particular institution. After data have been collected for all relevant institutions, return to Table 2.231 and summarize the national data.

Additional problems which might be encountered include variations in degree labels, in which case the team should follow the key of equivalents or approximations to the American system prepared for Table 2.12. Second, there may be qualitative equivalency problems with degree labels, in which case the team should attempt an estimate of an adjustment relative to American quality levels and attach an appropriate explanation.

The disciplines with the extension category have been reduced to physical sciences, social sciences and farm management, although there may be some overlap in the latter category.

Additionally, a regional breakdown should be developed as on Table 2.234 if relevant for the country.

Table 2.231 Critical Mass: National Aggregate of Skill Levels and Function By Discipline

	Skill Level / Function											
	Ph.D.			M.S.			B.S.			L.B.S.		
	#	%A	%P	#	%A	%P	#	%A	%P	#	%A	%P
1. Natural Resources												
2. Commodities												
3. Distribution & Marketing												
4. Management & Production Tech.												
5. Social Research												
6. Policy & Planning												

The first column (#) should give the exact number or as close a numerical estimate as possible. The second column (%A) should give a percentage of the group involved primarily in administration. The third column (%P) should give a percentage of the group involved in programs related to the discipline area.

Note information sources _____

_____

_____

_____

Table 2.232 Critical Mass: Institutional Division of Personnel By Skill Level and Function

Specify Discipline _____

Institutions	Skill Level / Function											
	Ph.D.			M.S.			B.S.			L.B.S.		
	#	%A	%P	#	%A	%P	#	%A	%P	#	%A	%P
1.												
2.												
3.												
4.												
5.												
6.												
7.												
8.												
9.												
10.												

(identify specific institutions)

This Table may be repeated for all disciplines in which the national aggregate indicates a sufficient number so a critical mass is possible.

Note information sources _____

_____

_____

_____

Table 2.233 Critical Mass: Disciplinary Division of Personnel By Skill Level and Function

Institution _____

Discipline	Skill Level / Function											
	Ph.D.			M.S.			B.S.			L.B.S.		
	#	%A	%P	#	%A	%P	#	%A	%P	#	%A	%P
1. Natural Resources												
2. Commodities												
3. Distribution & Marketing												
4. Management & Production Tech.												
5. Social Research												
6. Policy & Planning												

If national aggregate data are not available, this Table should be completed for each major institution in the system. The first column (#) should give the exact number or as close a numerical estimate as possible. The second column (%A) should give a percentage of the group involved primarily in administration. The third column (%P) should give a percentage of the group involved in programs related to the discipline area.

Note information sources _____

Table 2.234 Critical Mass: Geographic Distribution of Personnel By Skill Level and Function

Regions	Skill Level											
	Ph.D.			M.S.			B.S.			L.B.S.		
	#	%A	%P	#	%A	%P	#	%A	%P	#	%A	%P
1.												
2.												
3.												
4.												

This Table is to be used only in countries where a regional breakdown has relevance.

Note information sources _____

_____

_____

Table 2.235 Unique and Successful Adaptations in Critical Mass for the REE System

Note information sources _____

_____

_____

2.24 Doctrine/Philosophy of and Commitment to Public Service For Agricultural Development

The public service commitment in the research, education and extension system is, perhaps, the unique characteristic of the land grant experience in the United States. The Land Grant Universities have been responsible agents in improving agricultural productivity and promoting agricultural development through coordinated research, education and extension activities and a strong commitment to public service. This experience has resulted in a general recognition of the importance of this commitment for the development process. Without a strong public service philosophy the REE system cannot effectively play a role in agricultural development.

This is not to suggest that every university and research center should hold such a philosophy; it does suggest that institutions within the REE system must possess and act upon such a philosophy. Such a philosophy, clearly stated and communicated to and understood by constituents of the REE system, strengthens the will and raises the satisfaction and effectiveness of members throughout the system. It is critical for the system.

But, the lack of such a philosophy may reach well beyond the institutions comprising the REE system. It may be a function of the culture in which the role and status of the scholar prohibit effective concern with the applied problems of agricultural development. (The more so because of the social distance between the scholar and the farmer.) It may also be a function of governmental policies which direct resources away from rural and agricultural development. Or it may be a function of the negligible demand for services within some sectors of the agricultural clientele.

The evaluation here, however, is concerned with whether or not such a public service philosophy is active in the country. While the primary concern is with the REE system, four levels within the country should be reviewed: government policy, REE institutions, REE individual professionals, and client groups. Within these areas, it will be abundantly clear that much of the evaluation will be judgmental, quantitative measures of such qualitative problems are nearly impossible to find.

Government Policy

A review of the stated goals of the agricultural policies of the country should be made (Section 1.1). It will be necessary to make a judgment concerning the sufficiency of these goals in relation to the stated overall goals of the country as well as to the broad needs of the country (stated or otherwise) as the team perceives them. A primary question is whether these goals strongly encourage and reinforce the

public service philosophy of institutions within the REE system?

There are several indicators of fiscal and economic policies which may be used to develop some measure of governmental commitment. However, even for these measures, a judgmental burden remains with the team. Moreover, it is important to note that, while fiscal and economic support may be necessary to the implementation or maintenance of a public service philosophy, such support is not the exact equivalent and does not assure the presence of such a philosophy. Table 2.241 provides a series of guide questions which should enable the team to draw a general conclusion on the policy support to agricultural development and, by extension, to the REE system.

REE Institutions

It is unreasonable to expect the REE system to forge far ahead in public service without government support, and it is equally unreasonable to expect the faculty or staff of an institution to move forward decisively without effective leadership. Therefore, every effort should be made to evaluate the philosophical leadership provided by the most prominent institutions in the REE system and the leading officers of these and other institutions.

Although difficult to assess, an effort must be made to determine the extent to which the philosophy is operational for the institution. (As opposed to handy platitudes brought out on rare occasions when a baseline studies team arrive on campus.) One indicator might be the reward system, perhaps as related to incentives discussed in Section 2.4. Nevertheless, it is the acceptance by these institutions of a public service role in agricultural development and the vigor with which they fulfill that role which remains the salient question.

Table 2.242 provides a series of guide questions to assist the team in evaluating the institutional commitment to a philosophy of public service in agricultural development.

Individual Professionals

While individuals cannot do a great deal without institutional and governmental support, neither can the government or the universities effectively implement a philosophy of public service in agricultural development without the support of faculties, researchers and extension specialists.

The key for the individual will be his willingness to apply his skills and efforts in seeking basic solutions to problems of agricultural development in the country. This is not to say that every researcher should be working on problems related to subsistence as opposed to

export related problems, but it is to suggest that research relevant to the subsistence sector must be seen by the one individual as a legitimate topic for his work.

Client Group

Noting the client groups here is perhaps one way of identifying the segments of the public being served. It is important to determine whether this commitment is to all or only parts of the agricultural population. An effort should be made to determine whether and which client groups make use of the information and techniques generated by the REE system. Table 2.244 is provided to guide the assessment.

The tables for this section (2.241-2.244) are mostly comprised of questions related to this narrative. Many will require a judgment for "yes" or "no," which may be positive or negative, adequate or inadequate, etc.,depending on the context of the question. There are, however, several quantitative questions related to government fiscal policies. Perhaps these questions should be discussed and answered by the team as a group after much of the observation period has been completed.

Table 2.241 Doctrine: Government Policy

	circle most appropriate response	
1. Where does agricultural development fit in overall development priorties of the country?	High	Low
2. Are tax and tariff structures supportive of agricultural development? (Perhaps as opposed to industrial support or urban support.)	Yes	No
3. Are institutions of the REE system specifically and explicitly charged with a role in agriculture ?	Yes	No
4. Does government policy and financing give adequate support to the REE system among all ministries and agencies relating to agricultural development?	Yes	No
5. Do domestic pricing policies for agricultural products provide a stimulus to agricultural production?	Yes	No
6. Government expenditures	provide percentage	
A. Percent of national education expenditures devoted to agricultural education	_____%	
B. Percent of national research expenditures devoted to agricultural research	_____%	
C. Percent of public development funds directed toward agriculture	_____%	
7. What percent of assistance from external donors or lending institutions is devoted to agriculture?	_____%	

8. Government agricultural credit policies:
   A. Percent of public credit available to agriculture _____%
   B. Percent of credit given to agricultural client groups:
      1. Raw materials producers _____%
      2. Export market producers _____%
      3. Domestic commercial producers _____%
      4. Local Mkt./Subsistence _____%

Note information sources _____

Table 2.242 Doctrine: REE System

	circle most appropriate response	
1. Do the leading universities and research centers clearly state their public service philosophy?	Yes	No
2. Does the team find evidence which suggests that these institutions act on this philosophy? Explain _____	Yes	No
3. Do the leadership elements (presidents, rectors, deans or directors) stress public service as a key element in the function of their institution		
1. to the staff?	Yes	No
2. to the government?	Yes	No
3. to the public?	Yes	No
4. Are the mechanisms for rewarding and/or acknowledging outstanding public service effort by personnel in the REE institutions effective?	Yes	No
5. Does a review of the data from Table 2.11 suggest a balanced commitment to agricultural development? Explain _____	Yes	No
6. Does a review of linkage materials in Section 2.21 suggest a balanced commitment to agricultural development? Explain _____	Yes	No

Note information sources _____

Table 2.243 Doctrine: Individual Professionals and Paraprofessionals

	circle most appropriate response
1. Are researchers working on topics related directly to the agricultural needs of each client group?	
1. Raw materials producers	Yes No
2. Export market producers	Yes No
3. Domestic commerical producers	Yes No
4. Local Mkt./Subsistence	Yes No
2. Through field visits, has the team determined that "public service" is a legitimate function for professionals within the REE system?	Yes No
3. Are there societal, cultural, role or status factors which inhibit the professional in carrying out the public service mission for any of the major client groups?	
1. Raw materials producers	Yes No
2. Export market producers	Yes No
3. Domestic commercial producers	Yes No
4. Local Mkt./Subsistence	Yes No

Please provide an explanation for any YES response _____

_____

_____

_____

4. Do the data gathered in the Incentives Section (2.22) demonstrate that the philosophy of public service is rewarded within the system? Explain: _____ Yes No

_____

Note information sources _____

_____

Table 2.244 Doctrine: Client Groups

circle most appropriate response

1. Is there evidence within the agricultural sector that that client groups use the products (improved seed, techniques etc.) from the REE System?

1. Raw materials producers	Yes	No
2. Export market producers	Yes	No
3. Domestic commercial producers	Yes	No
4. Local Mkt./Subsistence	Yes	No

2. Are there societal, cultural, role or status factors which inhibit any client group (or segments of that group) from seeking information from an extension agent, a research station staff member or a university staff member?

	Raw Materials		Export		Dom. Comm.		Local Mkt./Subsist.	
Extension	Yes	No	Yes	No	Yes	No	Yes	No
Research	Yes	No	Yes	No	Yes	No	Yes	No
University	Yes	No	Yes	No	Yes	No	Yes	No

3. What percent of extension contacts are made with each client group?

provide an estimated %

1. Raw materials producers _____%
2. Export market producers _____%
3. Domestic commercial producers _____%
4. Local Mkt./Subsistence _____%

Note information sources _____

Table 2.245 Unique and Successful Adaptations in the Public Service Doctrine for the REE System

Note information sources _____

_____

_____

2.25 Capacity for Self-Sustaining Growth

Some LDC systems are highly dependent upon external support of various types. This section is intended to determine the degree to which this is true of the REE system under study. A high degree of external assistance may not be undesirable under some conditions, but if this is due to a lack of domestic support, then the matter may be more serious. The results here may be partly a function of the length of time the system has been in place.

This factor is closely related to the development of a "Critical Mass" (see Section 2.23) but relates more directly to the training capacities of the REE institutions. Ultimately the concern here is with the ability of the system to continually train sufficient numbers of professionals not only to replace those lost from the system but also to accomodate a reasonable expansion and growth.

The precise needs for any system will be closely related to the country--size, complexity of agriculture, developmental goals etc. In general, beginning at the more elementary levels of training, perhaps secondary levels, the system should produce village extensionists and other lower levels of personnel to meet its needs. However, at the more advanced levels, a smaller country may never produce sufficient numbers of Ph.D.s to maintain a full range of agricultural research programs. But it may be that sufficient support can be drawn from international centers or through collaboration with other institutions to eliminate the need for fully independent programs.

The team, then, must exercise some care in determining the level of self-sustaining capacity a particular country should approach. The tendency to automatically maximize the capability should be avoided.

The tables here review domestic graduates, students graduating from institutions outside the country and hiring patterns for the REE System. (Tables 2.251-2.253) In Table 2.254, a projection should be made based on Table 2.253 and other related information which the team might gather.

Table 2.251 Self-Sustaining Growth : Graduates Available to the REE System From Internal Sources

1. Number of graduates by discipline area and skill level for most recent year available

	Natural Resources	Commodities	Distribution & Marketing	Management & Production Tech.	Social/Cultural Research	Public Policy & Planning
Ph.D.						
M.S.						
B.S.						
L.B.S.						

2. Annual average percent increase in graduates by discipline area over the past five years

	Natural Resources	Commodities	Distribution & Marketing	Management & Production Tech.	Social/Cultural Research	Public Policy & Planning
Ph.D.						
M.S.						
B.S.						
L.B.S.						

Note information sources _____

_____

Table 2.252 Self-Sustaining Growth: Graduates Available to the REE System From External Sources

1. Number of graduates by discipline area and skill level for most recent year available

	Natural Resources	Commodities	Distribution & Marketing	Management & Production Tech.	Social/Cultural Research	Public Policy & Planning
Ph.D.						
M.S.						
B.S.						
L.B.S.						

2. Average annual percent increase in graduates by discipline area over the past five years

	Natural Resources	Commodities	Distribution & Marketing	Management & Production Tech.	Social/Cultural Research	Public Policy & Planning
Ph.D.						
M.S.						
B.S.						
L.B.S.						

Note information sources _____

_____

Table 2.253 Self-Sustaining Growth: Hiring Patterns Within the REE System

1. Number of positions filled by skill level and discipline area within the most recent year.

Subject Matter	Ph.D			MS			BS			L.BS		
	R	Ed	Ex	R	Ed	Ex	R	Ed	Ex	R	Ed	Ex
Natural Resources												
Commodities												
Management, Credit Technology												
Distribution, Marketing Etc.												
Social/Cultural Problems												
Public Policy & Planning												

Note information sources _____

Table 2.253 (page 2)

2. Average and fluctuation (increase or decline) in hiring within the REE system over the past five years

Subject Matter	Ph.D			MS			BS			L.BS		
	R	Ed	Ex	R	Ed	Ex	R	Ed	Ex	R	Ed	Ex
Natural Resources												
Commodities												
Management, Credit Technology												
Distribution, Marketing, Etc.												
Social/Cultural Problems												
Public Policy & Planning												

Note information sources _____

Table 2.254 Self-Sustaining Growth: Projections for Hiring Over the Next Five Years

Drawing together the data for self-sustaining growth, estimate the rate and numbers of persons that the REE system might be expected to require, assuming continuation of recent practices.

Subject Matter	Ph.D			MS			BS			L.BS		
	R	Ed	Ex	R	Ed	Ex	R	Ed	Ex	R	Ed	Ex
Natural Resources												
Commodities												
Management, Credit Technology												
Distribution, Marketing, Etc.												
Social/Cultural Problems												
Public Policy &Planning												

Note information sources _____

Table 2.255 Unique and Successful Adaptations in the Development of Self-Sustaining Growth Within the REE System

Note information sources _____

_____

_____

2.26 Knowledge Base and Use

Knowledge is the basic commodity of the REE system. Yet it, like the human factor can be overlooked in the preoccupation with budgets and organization charts. (Or ignored because it is difficult to define and nearly impossible to assess.) In general, this section should focus on how well knowledge is gathered, stored and recalled, manipulated and refined. The last category will look into the research sector to assess the quality of work being done. Does the research sector have the "basic building blocks" of knowledge, made location specific, to meet the agricultural development needs through research? The transmission of knowledge was examined in Section 2.21, Linkages.

I. Gathering

A. Review linkages of research institutions with international centers and attempt to determine the extent to which these linkages have a substantive component. Are they really tied into the international knowledge network?

B. Are data from these centers readily available at the appropriate institutions?

C. Is there any evidence that researchers exchange data on a personal basis or communicate directly outside their own country?

D. Are data shared or exchanged through the research subsystem?

E. Are there disciplines in which gathering is particularly weak?

II. Storage and Retrieval

A. Are there operational libraries within the REE system?

1. available journals
2. sufficient secondary materials
3. sufficient reference materials
4. ease of use

B. Are computer facilities available?

C. Is there evidence of adequate bibliographic preparation in research work being done? (Do the practioners attempt to retrieve information?)

D. Are there disciplines for which storage and retrieval are particular problems?

III. Manipulation and Refinement

This is a general assessment of the quality of research being carried out in the country. While the determination will be extremely subjective and related to other problems, such as manpower shortages or skill level inadequacies, some determination should be made. Note should be made of disciplines of particular strength or weakness, especially as the latter may be found to be the "bottle neck" in the knowledge base. Within this heading, some assessment might be made of the quality of pure research being carried out, but emphasis should be placed on applied research for agricultural development.

Table 2.261 Knowledge Base: Gathering

1. Do research institutions exchange information, personnel and/or develop collaborative projects? (Re-examine Section 2.21)

With:	Information		Personnel		Projects	
	Yes	No	Yes	No	Yes	No
Other institutions in the country						
Other institutions outside the country						

2. Is there evidence of informal or personal contact among researchers?

	Yes	No
Within the country	_____	_____
Outside the country	_____	_____

Note information sources _____

Table 2.262 Knowledge Base: Storage and Retrieval

	circle most appropriate response	
1. Library facilities		
1. physical facilities		
a. research	adequate	inadequate
b. university	adequate	inadequate
2. collection		
a. journals	adequate	inadequate
b. secondary materials	adequate	inadequate
c. reference materials	adequate	inadequate
d. primary data materials	adequate	inadequate
3. assessability and ease of use	adequate	inadequate
2. Are computer facilities available to the REE system?	yes	no
3. Do research write-ups show evidence of bibliographic preparation reflecting sound storage and retrieval of background supporting and other relevant data?	yes	no

Note information sources _____

_____

_____

Table 2.263 Knowledge Base: Manipulation and Refinement

Circle the most appropriate response

1. Is the research currently underway of sufficient quality so as to add to the overall knowledge base in major disciplinary or subject matter areas?

1. Natural Resources	adequate	inadequate
2. Commodities	adequate	inadequate
3. Management, Credit, Technology	adequate	inadequate
4. Distribution, Marketing, Processing	adequate	inadequate
5. Social and Cultural Research	adequate	inadequate
6. Public Policy and Planning	adequate	inadequate

2. Is there evidence that the research sector has established sufficient location specific "building blocks" or basic knowledge in all subject matter areas?

1. Soils	adequate	inadequate
2. Water	adequate	inadequate
3. Climate	adequate	inadequate
4. Crops	adequate	inadequate
5. Livestock	adequate	inadequate
6. Marketing	adequate	inadequate
7. Processing	adequate	inadequate
8. Distribution	adequate	inadequate
9. Infrastructure	adequate	inadequate
10. Public Policy and Planning	adequate	inadequate
11. Social and Cultural Research	adequate	inadequate

Note information sources _____

_____

Table 2.264 Unique and Successful Adaptations in Knowledge Base and Use Within the REI System

Note information sources _____

_____

_____

2.27 Leadership/Administration

The importance of effective leadership in developing institutions and/or in institutions attempting to respond to development needs of a country is difficult to overstress. At times when change (as opposed to the status quo) may be the norm, effective leadership is the more necessary.

In this section, the leadership group within the research, education and extension subsystem should be reviewed. The emphasis should be on the group or subsystem level, ignoring to the extent possible specific individuals. The concern of the field team should be with the general availability and quality of leadership personnel and the extent to which the system has developed procedures for identifying, training and promoting personnel for leadership roles.

The quantitative evaluation should consider the number of trained personnel available to meet current institutional needs as well as projected needs. The section on Critical Mass (2.23) should be reviewed in developing this assessment. The "path" to leadership should also be examined--is it an orderly process or a "pick-off" system where every individual who shows a little talent is prematurely drawn into higher levels of administration? Does the system appear to be overly personalized, or can competent people generally work through the system?

Consideration should be given to possible training needs in conjunction with these leadership needs.

The qualitative assessment should review the technical and political competence of the leadership groups. Technical competence should focus on such factors as organizational abilities, rapport with working staff levels in the institution and delegation of authority. Political competence should be assessed in terms of contacts, skill and effectiveness in marshalling the requisite political support from the community at large and appropriate political institutions to attain the goals of the institution.

In the section on doctrine (2.24), the public service commitment of the leadership elements of the REE system was evaluated. It should be again reviewed in this context. But, an additional element of leadership commitment should be toward innovation. Recognizing that these baseline studies will be carried out in countries which by definition will be seeking major changes, it will be crucial to identify a leadership cadre that has the will to make changes, which, in the short run may be unpopular, but which are required to move the REE system and agricultural development forward.

The demands on leaders in such a system will be nearly overwhelming; therefore, it is imperative that the field team identify those areas in which competence in leadership may be weak or lacking. While the evaluation here will be at the most general of levels, care should be taken to make the assessment as meaningful as possible.

Table 2.271 Leadership

	circle most appropriate response	
1. Does there appear to be a sufficient number of trained personnel to fill critical leadership positions with individuals formally trained for those positions?		
A. For the Research subsystem	yes	no
B. For the Education subsystem	yes	no
C. For the Extension subsystem	yes	no
2. Does the selection process for leadership appear to be systematic and give reasonable weight to competence (as opposed to personal contacts or other factors)?		
A. For the Research subsystem	yes	no
B. For the Education subsystem	yes	no
C. For the Extension subsystem	yes	no
3. Does there appear to be strength in the middle levels of administration (or are these largely "one man operations")?		
A. For the Research subsystem	yes	no
B. For the Education subsystem	yes	no
C. For the Extension subsystem	yes	no

Explain negative responses: _____

_____

_____

_____

Note information sources _____

_____

_____

Table 2.272 Leadership

	circle most appropriate response	
1. Do the leading institutions of each subsystem have institutional qualities which suggest strong internal leadership?		
A. For the Research subsystem	yes	no
B. For the Education subsystem	yes	no
C. For the Extension subsystem	yes	no
2. Does the leadership echelon of each institutional subsystem appear to strive for innovation in moving these institutions toward more effective roles in agricultural development?		
A. For the Research subsystem	yes	no
B. For the Education subsystem	yes	no
C. For the Extension subsystem	yes	no

Explain negative responses: _____

_____

_____

_____

_____

_____

_____

_____

Note information sources _____

_____

_____

Table 2.273 Leadership Training

	% with degree	% with domestic training	% with international degree
1. At the ministerial level, what percentage of office holders have been trained in the discipline of their ministry?	____	____	____
2. At the first level below the minister, what percentage of office holders have been trained in a discipline directly related to the substance of the work?	____	____	____
3. At the second level below the minister, what percentage of office holders have been trained in a discipline directly related to the substance of the work?	____	____	____
4. Among chief executive officers of institutions (rectors, directors, presidents etc.) within the REE system, what percentage have university degrees above the baccalaureate?	____	____	____
In fields relevant to their work?	____	____	____
5. At the level immediately below the chief executive officers of institutions within the REE system, what percentage have university degrees above the baccalaureate?	____	____	____
In fields relevant to their work?	____	____	____

Note information sources _____

_____

_____

Table 2.274 Unique and Successful Adaptations in Leadership Within the REE System

Note information sources _____

_____

_____

2.28 Organization

This section is directed to an examination of the internal organization of the leading institutions of the REE system. (See the Institutional Guide, page 28) The assessment is directed to the question of whether the institutions are organized so as to be responsive to a development role within the agricultural sector? Or the reverse -- does the organizational structure inhibit effective responses from some institutions within the REE system? For example, some university systems give so much autonomy to individual Faculties or Colleges that coordinated efforts by the university become impossible. Or, student services may be so lax that a university cannot possibly meet increasing demands for graduates.

To the extent that each class of the institution is organized on a standard national basis, the assessment may be addressed to that level. However, exceptions, particularly successful exceptions, should be noted in the assessment.

Table 2.281 Organization

	circle most appropriate response
1. Are the major institutions of each subsystem organized to maximize the resources of their institution to fulfill its role in agricultural development?	
A. For the Research subsystem	yes no
B. For the Education subsystem	yes no
C. For the Extension subsystem	yes no

Explain negative responses: _____

_____

_____

_____

_____

_____

Note information sources _____

_____

_____

_____

Table 2.282 Unique and Successful Adaptations in Organization Within the REE System

Note information sources _____

_____

_____

3.0 Overview of the Agricultural Sector

Thus far this baseline survey has attempted to assess the current status of the research, education and extension system within the country. Ultimately, the survey should provide some guidelines as to where and how the REE system might be improved and made more effective in its support of agricultural development. Before such guidelines can be prepared, however, it will be necessary to have some data on the agricultural sector within the country.

Section 3.0 of the Methodology has been designed to provide a perspective on the key variables--primarily client groups, subject matter areas, functional divisions and regions--as they exist in the agricultural sector. The constant dilemma is to provide sufficient data without creating virtually a larger agricultural sector study.

Keeping in mind that this Methodology should provide an assessment of the capacities of REE system only, several specific objectives for these data have been established:

1) Identify the country's development goals in terms relevant for evaluation of the REE system in moving toward those goals; and

2) Categorize the agricultural sector in variables that allow for the assessment of the allocative efforts of the REE system in addressing those variables.

These perspectives on the agricultural sector of the country should be used to judge the appropriateness of resource allocations within the REE system.

It is not likely that sufficient data on the agricultural sector can be accumulated here to provide an exclusive decision-making and judgmental framework for the team. It will be necessary to rely additionally on the prior knowledge of the team members, expertise of local professionals, and previous research and assessments. However, the points raised in this section should provide a guide to the team for the kinds of judgments required.

3.1 Rural Population Distribution

Projections for population growth and trends can be used to introduce a dynamic perspective to the assessment. While a host of problems can arise relative to the detailed rates of growth, it will be important to have an indication of what the rural population might look like in years to come.

The data required for Table 3.11 should provide several insights relative to population trends. National growth rates can usually be located for urban and rural areas; however, the primary concern here is with the rural areas. Probably less readily available will be regional data and migration information. These may also not be relevant for a particular country. Nevertheless, the team should note extenuating circumstances which will have an impact on growth patterns.

In completing Table 3.11, some difficulty may arise when distributing population or farm units over commodities as many farm units may be included several times. Therefore, it will not be necessary to complete the population estimates for each commodity category.

Table 3.11 Rural Population Distribution and Growth

National population growth rates: rural _____, urban _____, rural/urban migration rate _____.

		Approx. Number Farming Units	Approx. Current Population	Percent of Rural Pop.	Current Growth Trend*	Estimated Ten Year Growth Trend*
Population by Client Group						
Raw Materials	(a)					
Producers	(b)					
Food Producers	(a)					
Export	(b)					
Food Producers	(a)					
Domestic Commerical	(b)					
Local Mkt/Subsistence	(a)					
Landless Labor	(b)					
Population by Region						
Region 1						
Region 2						
Region 3						
Region 4						
Region 5						

*Evaluate growth trends only in terms of (a) decline, (b) static/limited growth, or (c) large growth rate. A notation of the appropriate letter in each column will be sufficien..

Note information sources _____

3.2 Resource Distribution

The resource distribution section is designed to develop a more intimate perspective on the resource base available to specific client groups and utilized for the production of specific commodities. It will be a very superficial perspective but none the less important because it should give a clearer indication of the nature of the REE needs for various components of the agricultural sector.

The three resource factors covered are land and topography, water and climate.

The information needed for land and topography should be available through local census or other sources. Land quality (percent of class #1 land) may have to be estimated and is aimed only generally to the question of who has the best (class #1) land and who has the worst.

Land tenure patterns also may have to be estimated and may vary within category, in which case the several patterns should be noted.

Land Tenure

Land tenure patterns must be estimated for each of the client groups using the following scale, focusing on the individual or individuals working the land:

(1) Land held in free title

A) in which the individual or family working the land holds all rights of disposal including loan collateral and rights of inheritance.

B) in which the individual or family hold rights to work the land but where legal or community restrictions limit disposal opportunities.

(2) Land for which title is held by an individual(s) other than those working it and where

A) the tenant has a reasonably secure and stable lease or rental guarantee.

B) the tenant has a short-term or annual claim to the land.

(3) Land held communally by village or government in which

A) differentiated wage scales are maintained for skilled workers on the communal land, or

B) undifferentiated wage scales are paid to all workers of communal land,

AND/OR

C) private plots, not necessarily titled but from which incomes derive to the individual working the plots, or

D) no private plots are available.

The assessment of land tenure patterns by client groups might include, for example, among small farmers 20 percent in category 1A, 10 percent in category 1B, 40 percent in category 2A, and 30 percent in category 3A,C. This evaluation should be recorded on Table 3.21.

General topography should simply be rated as positive or negative to the farming effort, considering, for example, rich flat flood plains as positive and near vertical mountain sides as negative.

The evaluation for water resources will require a judgment by the team as to whether its availability is adequate or inadequate. Consideration should be made in the context of optimum availability year round as being the adequate situation. Variations from that point for dry seasons etc. will have to be evaluated by the team for their impact on the agricultural potential.

Climate is reviewed only in the most general of senses. The concern here is for regional variations, for example, which may compound the agricultural difficulties for particular crops or client groups. The general stability of the climatic conditions should be noted, considering such factors as the rainfall patterns, temperature variations, tropical storm occurances or other climatic factors which may intervene in agricultural cycles. In situations where climatic stability is low and in certain situations where the climate is stable but generally adverse for agriculture, particularly stressful factors should be noted. Finally, in reviewing climatic conditions, variations which might be under utilized in agricultural terms should be recorded. For example, high elevation, cool climatic regions in some countries may hold potential for the introduction of new crops or farming systems to better take advantage of the agricultural potential of the area.

Table 3.21 Resource Distribution: Land and Topography

	Estimated Number of Hectares	Percent of Land in Cultv.	Percent of Class # 1 Land	Land Tenure Pattern	General Topography (+ or -)
Client Groups					
Raw Materials (a)					
Producers (b)					
Food Producers (a)					
Export (b)					
Food Producers (a)					
Domestic Comm. (b)					
Local Mkt. Sub. (a)					
Landless Labor (b)					
Commodities					
Crop 1					
Crop 2					
Crop 3					
Secondary Crops					
Livestock 1					
Livestock 2					
Secondary L'stock					
Fisheries					
Other					
Region					
1.					
2.					
3.					
4.					
5.					

Note Information Sources: _____

Table 3.22 Resource Distribution: Water

	Seasonal Rainfall		Irrigation	
	Adequate	Inadequate	Adequate	Inadequate
Client Groups				
Raw Materials (a)	____	____	____	____
Producers (b)	____	____	____	____
Food Producers (a)	____	____	____	____
Export (b)	____	____	____	____
Food Producers (a)	____	____	____	____
Domestic Comm. (b)	____	____	____	____
Local Mkt.Subs. (a)	____	____	____	____
Landless Labor (b)	____	____	____	____
Commodities				
Crop 1 ____	____	____	____	____
Crop 2 ____	____	____	____	____
Secondary Crops	____	____	____	____
Livestock 1	____	____	____	____
Livestock 2	____	____	____	____
Secondary Livestock	____	____	____	____
Fisheries	____	____	____	____
Other	____	____	____	____
Regions				
1. ____	____	____	____	____
2. ____	____	____	____	____
3. ____	____	____	____	____
4. ____	____	____	____	____
5. ____	____	____	____	____

Note Information Sources: _____

Table 3.23 Resource Distribution: Climate

Note here any variations in climate which are particularly stressful for any of the factors under consideration. Note also climatic features which may be under utilized to any appreciable extent.

	Climatic Stability (high/low)	Stressful Climatic Factors	Under Utilized Climatic Factors
Client Groups			
Raw Materials (a)			
Producers (b)			
Food Producers (a)			
Export (b)			
Food Producers (a)			
Domestic Comm. (b)			
Local Mkt/Subst (a)			
Landless Labor (b)			
Commodities			
Crop 1			
Crop 2			
Secondary Crops			
Livestock 1			
Livestock 2			
Secondary L'stock			
Fisheries			
Other			
Regions			
1.			
2.			
3.			
4.			
5.			

Note Information Sources _____

3.3 Production Inputs: Management/Technology/Credit

This section will review the inputs in terms of management skills, utilization of technology and other techniques of the client groups to establish the patterns by which each client group manipulates the resources available to it to maximize agricultural production. It must again be stressed that this will be a superficial assessment; it will not be possible to carry out extensive farm surveys to evaluate farm management techniques.

The purpose of this review is to gain some further understanding of the conditions typically extant in farming systems of the country. This is a necessary step prior to making judicious recommendations for alteration of the REE system.

Three factors related to management of farming systems are reviewed: credit, resource use, and production patterns, which will be evaluated in terms of availability and efficient use. The availability of an adequate credit supply for a particular client group should be recorded as sufficient (+) or insufficient (-). However, an abundant supply of "loan sharks" does not constitute an adequate source of credit for any client group. (Neither does a national development or agricultural bank established in a capital city and mired in paperwork constitute an adequate source of credit.) Availability is only one aspect of the problem, particularly for credit. Of equal importance is use--can the small farmer actually apply for and receive loans in a timely fashion? Or, are the forms too complicated, the condescension or superiority of bank personnel too intolerable, the rumors already spread that only the influential will receive approval? The reasons for <u>not</u> using established and available credit institutions may be nearly endless, but here the concern must be limited to the simple question of use.

Resource use for natural, chemical, labor and mechanical resources should be considered similarly for availability of supply(+ or -) and efficiency of use (+ or -). The point in resource use, as in the other factors, is not only to establish where gaps exist in supply, but also to determine where management of available resources, whatever they may be, can be improved.

The effective use of these resources will be yet more difficult to evaluate. For example, there will be wide variations in labor needs among different client groups and farming systems. In very small systems, labor inputs may be provided entirely by the proprietors. The concepts of appropriate technology should be strongly considered in evaluating effective use of mechanical and chemical resources particularly. The general perspective should be the efficiency with which the farmer manipulates the resource inputs available to him at the present time.

Production patterns must be reviewed with particular care, and if possible in conjunction within research scientists familiar with local agricultural practices. It is not enough to know where improved varieties of seed are being used, as, from the perspective of the farmer—especially the small farmer —the liabilities of omproved strains may far exceed the potential benefits. The question then must be, given the environmental and social constraints implicit in the situation, has the farmer developed production patterns that maximize his situation? Account should be taken of inter-cropping, crop rotations, multiple cropping, etc., in evaluating the overall efficiency (use + and - on the Table) for crops and livestock.

Table 3.31 provides two columns for each resource factor and for credit, the first relating to availability (Av.) and the second to efficiency and effectiveness of utilization (Ut.). A judgment of (+) or (-) will be sufficient. Production patterns should be evaluated as described above.

Table 3.31 Production Inputs: Management, Technology and Credit

	Resource Inputs								Production Patterns				Credit	
	Labor		Natural		Chemical		Mechanical		Crops	Livestock	Fisheries	Other		
	Av.	Ut.	Av.	Ut.	Av.	Ut.	Av.	Ut.					Av.	Ut.
Client Groups														
Raw Materials (a)														
Producers (b)														
Food Producers (a)														
Export (b)														
Food Producers (a)														
Domestic Comm. (b)														
Local Mkt. Sub. (a)														
Landless Labor (b)														
Commodities														
Crop 1														
Crop 2														
Crop 3														
Secondary Crops														
Livestock 1														
Livestock 2														
SecondaryL'stock														
Fisheries														
Other														
Regions														
1._____														
2._____														
3._____														
4._____														
5._____														

Note information sources_____

3.4 Infrastructure/Distribution/Marketing/Processing

This section will review the strength of the extended system upon which each client group must rely in realizing a profit for his effort. The team should review existing infrastructure, distributing, marketing and processing systems. Consideration should be given to the adequacy of the transportation network, marketing facilities, storage facilities, refrigeration capacity and other factors in the farmer to consumer chain.

These factors will be considered on an adequacy—inadequacy basis for client groups, commodities and regions.

No attempt can be made at a general level to define adequate systems for these categories. While roads, for example, are of primary importance in infrastructure, utilization costs in tolls and transportation fees must also be considered in determining the effective access level for specific regions or client groups. Neither can a centralized marketing system be offered, prima facie, as the only or "best" system. Perhaps the only secure criterion that can be applied to these factors is the extent to which they inhibit or discourage production within specific commodities, client groups or regions.

Table 3.41 Infrastructure/Distributing/Marketing/Processing

	Infrastructure		Distributing		Marketing		Processing	
	Ad.	Inad.	Ad.	Inad.	Ad.	Inad.	Ad.	Inad.
Client Groups								
Raw Materials (a)								
Producers (b)								
Food Producers (a)								
Export (b)								
Food Producers (a)								
Domestic Comm. (b)								
Local Mkt/Subst (a)								
Landless Labor (b)								
Commodities								
Crop 1 _____								
Crop 2 _____								
Secondary Crops								
Livestock 1								
Livestock 2								
Secondary L'stock								
Fisheries								
Other								
Regions								
1. _____								
2. _____								
3. _____								
4. _____								
5. _____								

Note Information Sources: _____

3.5 Public Policy and Planning: Developmental Goals

In this section a determination of the developmental goals established by the government for each of the client groups should be made. Moving to this level of developmental goal may require some analysis and discussion with government planners, but it is imperative to establish as clearly as possible the charge given to the REE system from above. In most countries it may be useful to complete the same exercise for major crops and perhaps regions. Forms for such an assessment have been included. If these variables are relevant for the particular country, it is difficult to overstress the importance of clearly identifying the goals established at this level.

In establishing government policy at this level, care must be taken not to depend too heavily on published policy statements. Action policies will provide a better guide or a test for the general statement. For example, what have they done to attain the stated goal of a 10% production increase? Or, in the area of land reform the "black letter law" of many countries may be quite specific and dictate broad and equitable distribution of land, but the "law in action" may be one of non-enforcement.

On Tables 3.11 and 3.12 both "black letter" and "action" laws and goals should be noted and contrasted as explicitly as possible.

Table 3.51 Public Policy and Planning: Developmental Goals of Host Country Government by Client Group

Client Group	Specified Goals	Performance Goals
Raw Materials Producers (a)		
Raw Materials Producers (b)		
Export Food Producers (a)		
Export Food Producers (b)		
Domestic Comm. Producers (a)		
Domestic Comm. Producers (b)		
Local Market Subsist. Prod.		
Landless Laborers		

Table 3.52 Public Policy and Planning: Developmental Goals of Host Country Government by Commodities

Commodities	Specified Goals	Performance Goals
Crop # 1		
Crop # 2		
Crop # 3		
Secondary Crops		
Livestock # 1		
Livestock # 2		
Secondary Livestock		
Fisheries		
Other		

Note information sources _____

Table 3.53 Public Policy and Planning: Developmental Goals of Host Country Government by Regions

Regions	Specified Goals	Performance Goals
1.		
2.		
3.		
4.		
5.		

3.6 Production Valuation Distribution By Client Group

This section is included to further refine the understanding of the position within the spectrum of agricultural production of each client group. This is done by examining the percentage of each commodity produced by each client group and converting that to a dollar valuation figure for total agricultural production. This should provide a reasonably accurate view of the commodities produced by each client group and the value received for that production.

For Table 3.61, it may be necessary to estimate some or all of the percentage figures for some or all of the commodities or client groups. In any case, the general proportional production relations among client groups are the concern; consequently, errors of a few percentage points should not greatly reduce the utility of the estimate. Directions are given on Table 3.61 for computing the percentage of total agricultural production for each client group.

To compute the valuations for each client group in Table 3.62, it will be necessary to first locate a dollar figure for national production of each commodity. Generally, these should be available from a Ministry of Agriculture, perhaps a Census Bureau or from FAO. Using this established dollar figure, the valuation for each client group can be determined by distributing the total valuation for each commodity following the same percentage as production distributions used in Table 3.61.

Table 3.61 Major Commodity Distributions By Client Group

Commodities	(a) Raw Materials	(b) Producers	(a) Food Producers	(b) Export	(a) Food Producers	(b) Domestic Commercial	(a) Local Mkt./Subsist.	(b) Landless Labor	
Crop 1 _____									100%
Crop 2 _____									100%
Crop 3 _____									100%
Secondary Crops _____									100%
Livestk.1 _____									100%
Livestk.2 _____									100%
Secondary Livestk. _____									100%
Fisheries _____									100%
Other _____									100%
Percent of the Total Agri. Prod. by Client Group									

1) Include the percent of the total value of production of each commodity produced by each client group.

2) The sum of each client group column must be divided by nine (or the number of commodities listed) to provide a percent of total value of agricultural production.

Table 3.62 Major Commodity Distributions By Valuation and Client Group

Commodities	(a) Raw Materials	(b) Producers	(a) Food Producers	(b) Export	(a) Food Producers	(b) Domestic Comm.	(a) Local Mkt./Subsis.	(b) Landless Labor	$ Valuation of Commodity (Annual)
Crop 1									
Crop 2									
Crop 3									
Secondary Crops									
Livestk. 1									
Livestk.2									
Secondary Livestk.									
Fisheries									
Other									
Value of Agri. Prod. By Client Group									Total Dollar Valuation

1) The total production value of each commodity should be placed in the column on the right.

2) Using the percentage figures from Table 3.31 compute the $ valuation for each commodity and client group. Adding down should give an approximate valuation for total commodity production for each client group.

3.7 Regional Distributions

This last set of tables for Section 3 provide more detailed information on the regions and should be completed only for those countries for which the team has already made the determination that the regional variable should be included.

The first two Tables (3.71 and 3.72) examine the regional production distribution by client group, using a percent of the regional production of each group and then translating that figure to a dollar valuation figure which should sum to the total value of production for each region and each client group. Tables 3.73 and 3.74 follow the same process, but examine each commodity produced in each region.

It may be necessary to estimate some or all of the percentage figures for Tables 3.71 and 3.73, although these may be available at least for major commodities for each region. Since the concern is for the general distribution, it will not be necessary to establish the exact percentage points. The production values for Tables 3.72 and 3.74 must be determined using the proportional distribution set in percentages in Tables 3.71 and 3.73.

Table 3.71 Regional Production By Client Group

		Region 1	Region 2	Region 3	Region 4	Region 5	Percent Production by Client Group
Raw Materials	(a)						
Producers	(b)						
Food Producers	(a)						
Export	(b)						
Food Producers	(a)						
Domestic Commercial	(b)						
Local Mkt./Subsist.	(a)						
Landless Labor	(b)						

1) Include the percent of the total value of production for each region produced by each client group.

2) The sum of each client group column must be divided by five or the exact number of regions included in the assessment.

Note information sources _____

_____

_____

Table 3.72 Regional Commodity Valuation by Client Group

		Region 1	Region 2	Region 3	Region 4	Region 5	Value of Agricultural Production by Client Group
Raw Materials	(a)						
Producers	(b)						
Food Producers	(a)						
Export	(b)						
Food Producers	(a)						
Domestic Commerical	(b)						
Local Mkt./Subsist.	(a)						
Landless Labor	(b)						
Value of Agricultural Production by Region							Total Value of Agricultural Production

1) The total value of production for each region should be placed in the last box at the bottom of each column.

2) Using the percentage figures from Table 3.72 compute the $ valuation for each client group in each region. Adding across should give a sum approximately equal to the total value of commodity production for each client group. It should compare with the totals established on Table 3.62.

Note information sources _____

_____

Table 3.73 Regional Distribution of Commodities

	Region 1	Region 2	Region 3	Region 4	Region 5	
Crop 1 _____						100%
Crop 2 _____						100%
Crop 3 _____						100%
Secondary Crops						100%
Livestock 1						100%
Livestock 2						100%
Secondary Livestock						100%
Fisheries						100%
Other						100%
	100%	100%	100%	100%	100%	

The percentage total production value of each commodity produced in each region should be placed in the appropriate box.

Note information sources _____

_____

_____

Table 3.74 Regional/Commodity Production Valuation

	Region 1	Region 2	Region 3	Region 4	Region 5	$ Valuation of Commodities (Annual)	
Crop 1							
Crop 2							
Crop 3							
Secondary Crops							
Livestock 1							
Livestock 2							
Secondary Livestock							
Fisheries							
Other							
$ Valuation of Regions (Annual)							Total Dollar Valuation

Note information sources _____

_____

_____

4.0 Diagnosis

The diagnositic section of the Baseline Methodology is designed to assess problem areas within the agricultural sector and to relate those problems to the capacities of the REE system. This diagnosis should enable the team to identify problem areas which could be addressed by strengthening the REE system.

The first step in diagnosis will be to prepare a summary of the personnel and financial allocations of the REE system on a national basis. Then a series of projections will be made to identify major areas of need for further training of REE personnel. The third step of the diagnosis will lead to an evaluation of the production constraints for each client group, commodity and region. The fourth step will require consideration of alternative strategies for increasing agricultural production. This will be followed by a summary of particularly successful elements of the particular REE system under consideration. Finally, reviewing particularly the constraints, alternative strategies and successful elements, a series of major constraint areas for client groups will be developed as a basis for organizing recommendations in Section 5 of the Methodology.

4.1 National Summary of Manpower and Financial Investments of the REE System

The table presented here is identical to that used for Table 2.11. However, this form should be used to summarize all of the data gathered for the various institutional categories in the earlier section. The summary of these data should provide a national total of the REE resources allocated to client groups, subject matter areas, functions and regions.

Table 4.11 National Summary of Manpower and Financial Investments for the REE System

SUBJECT MATTER VARIABLES	Physical Facilities (1-5)	Personnel (Man-years)	Annual Expenditure Current Expend. (current $ figures)	Annual Expenditure Capital Expend. (current $ figures)	Total Annual Expenditure % / year last 5 years	Total Annual Expenditure % / year next 5 years
Resources:						
Land						
Water						
Climate						
Commodities:						
Crop # 1						
Crop # 2						
Crop # 3						
Secondary Crops						
Livestock # 1						
Livestock # 2						
Secondary Livestock						
Fisheries						
Other # 1						
Other # 2						
Management, Technology & Credit						

Table 4.11 (page 2)

	Physical Facilities (1-5)	Personnel (Man-years)	Annual Expenditure Current Expend. (current $ figures)	Annual Expenditure Capital Expend. (current $ figures)	Total Annual Expenditure % / year last 5 years	Total Annual Expenditure % / year next 5 years
Distribution						
Processing						
Storage						
Marketing						
Social & Cultural Limitations						
Public Policy & Planning						
CLIENT GROUP VARIABLES						
Raw Materials (a)						
Producers (b)						
Food Producers (a)						
Export (b)						
Food Producers (a)						
Domestic Commercial (b)						
Local Mkt./Subsis. (a)						
Landless Labor (b)						

Table 4.11 (page 3)

	Physical Facilities (1-5)	Personnel (man-years)	Annual Expenditure Current Expend. (current $ figures)	Annual Expenditure Capital Expend. (current $ figures)	Total Annual Expenditure $ / year last 5 years	% / year next 5 years
FUNCTIONS VARIABLES						
Research						
Nat. & Physical Science						
Social Science						
Education						
Nat. & Physical Science						
Social Science						
Extension						
REGIONAL VARIABLES						
1.						
2.						
3.						
4.						
5.						

Note information sources _____

_____

_____

4.2 Training Needs For the REE System in Meeting Population, Commodity and Regional Needs

This review uses allocation data generated on Table 4.11 summarizing the research, education and extension system and contrasts them with population distributions and agricultural production data to determine weaknesses (needs) within the REE system. Using the personnel distribution in the function variable of Table 4.11 as a guide, the distribution of personnel for each client group (Table 4.21), commodity (Table 4.22) and region (Table 4.23) can be determined. The result will be a fairly precise distribution of REE personnel for these factors. Data drawn from other tables on population distribution and value of agricultural production will provide comparative data for evaluating the adequacy of the REE personnel allotment and distribution.

Table 4.21 Training Needs by Client Group

	(a) Raw Materials	(b) Producers	(a) Food Producers	(b) Export	(a) Food Producers	(b) Domestic Commercial	(a) Local Mkt/Subsist.	(b) Landless Labor	
Research									
Education									
Extension									
Total for Client Group									
Distribution (%) of REE Personnel									Total/REE System
Distribution (%) of Population									From Table 3.11
Total Value (%) of Ag. Production									From Table 3.61

1) Using data from Table 4.11, bring forward the sum of each category of the functions variable in the personnel column (_____research, _____education, _____extension) and convert these figures to a percentage of the total personnel distribution: _____% research, _____% education and _____% extension.

2) Transfer the personnel (man years) data for the client group variable from Table 4.11 to line four, "Total for Client Group," of Table 4.21.

3) Using the personnel distribution percentages for research, education and extension, as computed in Step 1 above, redistribute the personnel man years to complete each category of Table 4.21.

4) The distribution of REE personnel in percentage can be determined by dividing each client group total by the Total/REE System.

Table 4.22 Training Needs by Commodities

	Crop 1	Crop 2	Crop 3	Sndy. Crops	Livestock 1	Livestock 2	Sndy. Livstk	Fisheries	Other	
Research										
Education										
Extension										
Total for Commodity										
Distribution (%) of REE Personnel										Total/ REE System
Distribution (%) of Population										From Table 3.11
Total Value (%) of Ag. Production										From Table 3.62

1) Following the same procedure established in step 1 of Table 4.21, establish a figure for the percentage of personnel in each of the functional categories: _____% research, _____% education and _____% extension.

2) Transfer the personnel (man years) data for commodities from Table 4.11 to line four, Total for Commodity, of Table 4.22.

3) Using the personnel (man years) distribution percentages for research, education and extension, as shown in Step 1 above, redistribute the personnel to complete each category of Table 4.22.

4) The distribution of REE personnel can be determined in percentage by dividing each commodity total by the Total/REE System.

Table 4.23 Training Needs by Region

	Region 1	Region 2	Region 3	Region 4	Region 5	
Research						
Education						
Extension						
Total for Region						
Distribution (%) of REE Personnel						Total/REE System
Distribution (%) of Population						From Table 3.11
Total Value (%) of Ag. Production						From Table 3.72

1) Following the same procedure established in sept 1 of Table 4.21, establish a figure for the percentage of personnel in each of the functional categories: _____% research, _____% education and _____% extension.

2) Transfer the personnel (man years) data for regions from Table 4.11 to line four, Total for Region, of Table 4.23.

3) Using the personnel distribution percentages for research, education and extension, as shown in step 1 above, redistribute the personnel to complete each category of Table 4.23.

4) Compute the distribution of REE personnel (%) by dividing the total for each region by the Total/REE System.

4.3 Constraints to Production

This evaluation will require that the team review carefully all of the information gathered in Section 3. The factors considered are the subject matter categories, used in Table 4.11 and throughout the assessment, as they relate to commodities produced by each of the client groups.

It is likely that the team will have to rely on prior knowledge and expert opinion to supplement the information gathered in the Methodology but in general it should be possible to make the determinations necessary. The sequence of tables in this section will make it possible to review major production constraints for client groups, commodities and regions, respectively and individually.

Presented in Section 4.3 are three sets of three tables each, in sequence reviewing client groups, commodities and regions. For each of these the first table is for an evaluation of constraints to increased production, while the second and third charts are rank orders of these same constraints. Thus, for example, in Table 4.31 it will be necessary to evaluate each production constraint as (1) very important, (2) important, or (3) not important in limiting the production of each client group. No restrictions apply to the evaluation, so any given client group may experience all the constraint areas as "very important" limiting factors, or all may be "not important", or any combination. Following Table 4.31 and considering the same client groups and production constraints categories are Tables 4.32 and 4.33, which require rank orders of production constraints for each client group and client groups for each production constraint, respectively.

Tables 4.34, 4.35 and 4.36 follow this sequence for commodities and production constraints, while Tables 4.37, 4.38 and 4.39 do the same for regions and production constraints.

Table 4.31 Major Production Constraints By Client Group

		Resource Base	Commodities	Distribution Etc.	Management, Credit Technology	Social/Cultural Limitations	Public Policy & Planning
Raw Materials	(a)						
Producers	(b)						
Food Producers	(a)						
Export	(b)						
Food Producers	(a)						
Domestic Commercial	(b)						
Local Mkt./Subsist.	(a)						
Landless Labor	(b)						

Evaluate each constraint area listed on the horizontal axis for each client group on the vertical axis as follows:

1. a very important constraint
2. an important constraint
3. not important as a constraint

Table 4.32 Rank Order of Production Constraints for Each Client Group

		Resource Base	Commodities	Distribution Etc.	Management, Credit Technology	Social/Cultural Limitations	Public Policy & Planning
Raw Materials Producers	(a)						
	(b)						
Food Producers Export	(a)						
	(b)						
Food Producers Domestic Commercial	(a)						
	(b)						
Local Mkt./Subsist. Landless Labor	(a)						
	(b)						

The major production constraints for each client group should be ranked for the most (1) to the least (6) serious confronting each client group. Rank across each client group. Although a perfect ranking is the objective, in some instances it may not be possible to make such refined distinctions, hence two or more constraints may be given equal rank if it is not possible to distinguish among them.

Table 4.33 Rank Order of Client Groups for Each Production Constraint

		Resource Base	Commodities	Distribution Etc.	Management, Credit Technology	Social/Cultural Limitations	Public Policy & Planning
Raw Materials Producers	(a)						
	(b)						
Food Producers Export	(a)						
	(b)						
Food Producers Domestic Commercial	(a)						
	(b)						
Local Mkt./Subsist. Landless Labor	(a)						
	(b)						

The eight client groups should be placed in rank order from the group facing the most serious (1) to the least serious (8) problems vis-a-vis each constraint area. Rank down each production constraint. Although a perfect ranking is the objective, in some instances it may not be possible to make such refined distinctions, hence two or more constraints may be given equal rank if it is not possible to distinguish among them.

Table 4.34 Major Developmental Constraints by Commodity

	Resource Base	Commodities	Distribution Etc.	Management, Credit Technology	Social/Cultural Limitations	Public Policy & Planning
Crop 1						
Crop 2						
Crop 3						
Secondary Crops						
Livestock 1						
Livestock 2						
Secondary Livestock						
Fisheries						
Other						

Evaluate the subject matter areas on the top axis as to (1) very important, (2) important, or (3) not important, as a constraint to further production for each commodity.

Table 4.35 Rank Order of Production Constraints for Each Commodity

	Resource Base	Commodities	Distribution Etc.	Management, Credit Technology	Social/Cultural Limitations	Public Policy & Planning
Crop 1						
Crop 2						
Crop 3						
Secondary Crops						
Livestock 1						
Livestock 2						
Secondary Livestock						
Fisheries						
Other						

The six subject matter areas should be placed in rank order from the most serious (1) to the least serious (6) constraint to production for each commodity. Although a perfect ranking if the objective, in some instances it may not be possible to make such refined distinctions, hence two or more constraints may be given equal rank if it is not possible to distinguish among them.

Note information sources _____

_____

_____

Table 4.36 Rank Order of Commodities for Each Production Constraint

	Resource Base	Commodities	Distribution Etc.	Management, Credit Technology	Social/Cultural Limitations	Public Policy & Planning
Crop 1						
Crop 2						
Crop 3						
Secondary Crops						
Livestock 1						
Livestock 2						
Secondary Livestock						
Fisheries						
Other						

The nine commodities should be placed in rank order from the most severely (1) to least severely (9) restricted by each constraint area. Although a perfect ranking is the objective, in some instances it may not be possible to make such refined distinctions, hence two or more constraints may be given equal rank if it is not possible to distinguish among ~~them.~~

Table 4.37 Developmental Constraints By Region

	Region 1	Region 2	Region 3	Region 4	Region 5
Resources					
Commodities					
Farm Management, Technology & Credit					
Distribution					
Social & Cultural Limitations					
Public Policy & Planning					

Rank each constraint listed as (1) very important, (2) important, or (3) not important as a constraint within each region.

Table 4.38 Rank Order of Major Production Constraints for Each Region

	Region 1	Region 2	Region 3	Region 4	Region 5
Resources					
Commodities					
Farm Management Technology & Credit					
Distribution					
Social & Cultural Limitations					
Public Policy & Planning					

The major production constraints for each region should be ranked from the most (1) to the least (6) serious constraint limiting agricultural production in each region. Rank down each regional column. Although a perfect ranking is the objective, in some instances it may not be possible to make such refined distinctions, hence two or more constraints may be given equal rank if it is not possible to distinguish among them.

Table 4.39 Rank Order of Regions for Major Production Constraints

	Region 1	Region 2	Region 3	Region 4	Region 5
Resources					
Commodities					
Farm Management Technology & Credit					
Distribution					
Social & Cultural Limitations					
Public Policy & Planning					

The regions should be ranked within each major production constraint area from the region having the most serious (1) to the least serious (5) problem with the specified constraint. Rank all regions across each constraint area. Although a perfect ranking is the objective, in some instances it may not be possible to make such refined distinctions, hence two or more constraints may be given equal rank if it is not possible to distinguish among them.

4.4 Identification of Alternative Strategies

One overriding difficulty of a Methodology such as this is its tendency to present and even reinforce a static image of the status quo. Since patterns of current operation and behavior are studied so intensively, these seem to gain acceptance as the best way to achieve certain goals. At best, the recommendations provide avenues for the improvement of the current operations, as these were assessed and described. This section on the identification of alternative strategies is included here in an effort to avoid complete acceptance of current modes of operation.

The central question underlying each of the following tables might be "is there a better way?" No specifics have been provided, and the answer to this question will have to be drawn from the knowledge and experience of the team. But in any case, the emphasis should be on the creative--a search for innovative alternatives in infrastructure, public policy, client groups or farming systems, commodities, and resource base, which might provide the impetus for dramatic and significant change in agricultural development.

It is probable that these alternative strategies could best be identified through open-ended discussion by the team. It might also be that ideas will come to individuals while carrying out field work. A third source might be local experts. But whatever the source, the team should review these alternative strategies thoroughly and attempt to integrate parts or all of them into the identification and rank ordering of major production constraints to be developed in Section 4.6.

Table 4.41 Identification of Alternative Strategies
Infrastructure

Review data on resource base, commodities, client groups, public policy and infrastructure. Holding constant resource base, commodities, client groups and public policy constraints, what alternative strategies related to infrastructure might be identified to address the constraint areas noted in Table 4.31?

Table 4.42 Identification of Alternative Strategies: Public Policy

Review data on resource base, commodities, client groups, public policy and infrastructure. Holding constant resource base, commodities, client groups and infrastructure constraints, what alternative strategies related to public policy might be identified to address the constraint areas noted in Table 4.31?

Table 4.43 Identification of Alternative Strategies: Client Groups

Review data on resource base, commodities, client groups, public policy and infrastructure. Holding constant resource base, commodities, infrastructure and public policy constraints, what alternative strategies related to client groups (this factor might most usefully be thought of as farming systems here) might be identified to address the constraint areas noted in Table 4.31?

Table 4.44 Identification of Alternative Strategies: Commodities

Review data on resource base, commodities, client groups, public policy and infrastructure. Holding constant resource base, client groups, public policy and infrastructure constraints, what alternative strategies related to commodities might be identified to address the constraint areas noted in Table 4.31?

Table 4.45 Identification of Alternative Strategies: Resource Base

Review data on resource base, commodities, client groups, public policy and infrastructure.
client groups, public policy, and infrastructure constraints, what alternative strategies related to resource base might be identified to address the constraint areas noted in Table 4.31?

4.5 Summary of Unique and Successful Elements of the REE System

Throughout Section 2, the team was asked to note features of the REE institutions and system which have been particularly successful in carrying out their mission and meeting the needs of their constituents. This should not be an idle exercise but should provide a valuable resource for further development of the REE system. The greater the extent to which such successes are unique in the system, the greater their potential value as models for study and/or replication. Further, the greater the extent to which such successful institutions have grown and developed in the local environment (without great external transfusions), the greater their value as culturally adapted institutions.

Whatever the background, these institutions or practices should be brought forward and reviewed here. The table which follows is meant as a guide for that review.

As with the alternative strategies identified in the previous section, these unique and successful elements of the REE system should be reviewed thoroughly in conjunction with the identification of the major production constraints in Section 4.6 and the recommendations prepared in Section 5.0.

Table 4.51 Summary of Unique and Successful Elements of the REE System

I. _____
(institution or practice)

A) What is the unique characteristic of this institution or practice?

_____

_____

_____

B) What elements of this institution or situation might be transfered throughout the REE system?

_____

_____

_____

C) Is there evidence it has been transfered elsewhere within the country?

_____

II. _____
(institution or practice)

A) What is the unique characteristic of this institution or practice?

_____

_____

_____

B) What elements of this institution or situation might be transfered throughout the REE system?

_____

_____

_____

C) Is there evidence it has been transfered elsewhere within the country?

_____

Table 4.51 Summary of Unique and Successful Elements of the REE System

III. _____
(institution or practice)

A) What is the unique characteristic of this institution or practice?

_____

_____

_____

B) What elements of this institution or situation might be transfered throughout the REE system?

_____

_____

_____

C) Is there evidence it has been transfered elsewhere within the country?

_____

IV. _____
(institution or practice)

A) What is the unique characteristic of this institution or practice?

_____

_____

_____

B) What elements of this institution or situation might be transfered throughout the REE system?

_____

_____

_____

C) Is there evidence it has been transfered elsewhere within the country?

_____

4.6 Identification and Rank Ordering of Major Production Constraints

Throughout the diagnosis in Section 4, factors restricting agricultural development have been reviewed and evaluated. Of particular importance were the sections on production constraints (4.3), alternative strategies (4.4) and unique elements of the REE system (4.5). These should be reviewed in conjunction with the data from the agricultural sector review (Section 3.0) before completing Section 4.6.

As the team reaches the final stages of its work, the Table 4.61 should be completed to provide a basis for the recommendations to be made in Section 5.0. Each constraint defined should include as many as possible of the variables used throughout the assessment. For example, a constraint might be defined as distribution and marketing for small, domestic commercial producers of secondary crops such as vegetables.

By defining constraints in such a manner, the team will provide a basis for recommendation for improvements in the REE system to address these. Not all factors of all constraints will find direct redress and improvement through the REE system. But, for the most part, these constraints should point to areas in which the REE system should be strengthened.

Table 4.61 Identification and Rank Ordering of Major Production Constraints

Constraint # 1

Constraint # 2

Constraint # 3

Constraint # 4

Constraint # 5

Constraint # 6

Constraint # 7

Constraint # 8

Constraint # 9

5.0 Recommendations for Strengthening the REE System

In this last section of the Baseline Methodology a series of recommendations should be prepared based on the assessment of REE capabilities (Section 2.0), the agricultural sector review (Section 3), and the diagnosis in Section 4.0. Recommendations should cover four areas--institutional development, training, non-human capital and technical assistance needs. Forms are provided in this section to assist in the completion of this task.

Before proceeding with the recommendations, the team should complete, review and thoroughly discuss all previous sections. It is important that all sections be completed and that as much ambiguity as possible be eliminated before embarking on this last effort.

The constraint areas identified in Table 4.61 will be used throughout this section as aguide for making recommendations and should coincide with the horizontal axis on Tables 5.1 through 5.4.

The recommendations made for each constraint area should have three parts, including a specified time sequence for recommended inputs, an estimation of the duration for recommended inputs, and an indication of coordination of recommended inputs. Three code systems are described below.

Time sequence planning code should provide a general break down of timing for project implementation. For example, it would not be logical to rapidly expand the supply of laboratory equipment before physical facilities were available to house them or trained professional available to use them; thus, training and physical facilities recommendations, in this case, should precede the equipment recommendation. Using Roman Numerals, the team should make the following ranking for each recommendation.

I. Recommendations that should be implemented at the earliest possible moment or in the first phase of project work.

II. Recommendations that should be implemented soon after those in the first phase or perhaps two to three years after project work begins.

III. Recommendations that should be implemented only after the results of earlier project work are known and which clearly build on earlier successes.

The second category of consideration is the estimated time duration required to fulfill the need signified in the recommendation. A simple numeric code can be used:

1. Recommendations requiring 1 to 3 years for completion.
2. Recommendations requiring 3 to 5 years for completion.
3. Recommendations requiring 5 to 10 years for completion.

The third category for each recommendation will relate to the need to coordinate certain aspects of differing recommendations during the actual implementation of projects. Training programs, for example, should generally be closely coordinated with programs to expand physical facilities so that facilities are available for trainees as they return to work. An alphabetic key can be used to signify all recommendations which should be closely coordinated, if not as one project, at least in planning and implementation of separate projects. Thus, one group of recommendations to be so coordinated should be marked with the letter A. The next group of recommendations to be coordinated should be marked with the letter B, and so on through the alphabet as needed.

Using these three codes, each recommendation for each constraint area should carry three symbols, perhaps as follows: II/3/B. This recommendation should be considered in phase 2 of project implementation, should require 5 to 10 years for completion and should be closely coordinated with other recommendations labeled B.

Each recommendation on Tables 5.1 through 5.4 should be completed using these three code systems. All recommendations must carry all three codes, unless an explanation is provided as to why these categories may be inappropriate for the particular recommendation.

5.1 Institutional Development Recommendations

Throughout this assessment, the judgmental nature of much of the evaluation has been stressed. This section is no exception and, perhaps, will compound the problem by making recommendations on top of already problematic judgments.

Institutional development recommendations will be divided into those concerning existing institutions and those for new institutions. In both cases, however, the recommendations will be made to confront developmental constraints as established in Table 4.61.

For existing institutions the factors considered will be those evaluated in Section 2--linkages, incentives, critical mass, doctrine, capacity for self-sustaining growth, knowledge base, leadership and organization. Thus, a constraint area in production technology might signal a need for strengthening linkages between small farmers and extension workers or between extension workers and researchers (or both). This same production technology constraint might signal problems of leadership in an institution where production techniques of small farmers are not seen as important matters for research or study.

It should be apparent, then, that institutional development recommendations will probably be interrelated; it is not likely that an institution will be weak in only one area. Institutional development recommendations should also be closely related to the subsequent recommendations for training, non-human capital needs and technical assistance.

In preparing the institutional development recommendations, the team should devote particular attention to the data in tables throughout Section 2, as well as the data from Section 4. The constraint areas should be transfered directly from Table 4.61 and used consistently throughout Section 5.

Table 5.1 and its components provide for the notation of institutional weaknesses only at the subsystem level. Further elaboration in the form of details, as to which specific institutions will require attention, should be provided in separate attachments to Section 5.

Table 5.11 Strengthening Existing Institutions

	Constraint Area # 1	Constraint Area # 2	Constraint Area # 3	Constraint Area # 4	Constraint Area # 5	Constraint Area # 6	Constraint Area # 7	Constraint Area # 8	Constraint Area # 9
Strengthening Research Institutions									
1. Linkages									
2. Incentives									
3. Critical Mass									
4. Doctrine									
5. Self-Sustaining Growth									
6. Knowledge Base and Use									
7. Leadership/Administration									
8. Organization									
Strengthening Education Institutions									
1. Linkages									
2. Incentives									
3. Critical Mass									
4. Doctrine									
5. Self-Sustaining Growth									
6. Knowledge Base and Use									
7. Leadership/Administration									
8. Organization									
Strengthening Extension Institutions									
1. Linkages									
2. Incentives									
3. Critical Mass									
4. Doctrine									
5. Self-Sustaining Growth									
6. Knowledge Base and Use									
7. Leadership/Administration									
8. Organization									

Table 5.12 Developing New Institutions

New Research Institutions

New Education Institutions

New Extension Institutions

Note information sources _____

_____

5.2 Training Recommendations

Determining training needs will require large elements of judgment. The challenge is to estimate effective future demand, together with the feasibility of training x numbers of people by such and such a date. Both of these, of course, will be strongly influenced by government policy, and especially the resources the government commits to REE programs.

Perhaps the most feasible approach is to take something like a ten year planning horizon. The main features of the market to consider, then, are the demand projections for higher levels of training, plus the supply constraints affecting the amount of training. Judgment will be required in resolving disparities between these two.

Two examples will clarify the thought processes that the team might use in assessing this important question. First, suppose the team has decided that sorghum research should be strengthened in a given country. The analysis can begin with a decision on institutional needs to attain this objective in the given time horizon (ten years). Institutional needs will require a determination of the numbers of required centers for sorghum, and then how many and what kinds of scientists will be required to make these viable. This should include judgments about the level of training required (B.S., M.S., or Ph.D.). It should also include some estimates of whether the government may be willing and able to support such a program.

This estimate is in a sense an upper estimate of the training needs. But account also has to be taken of slippage in the training process. Some students sent off for training will not successfully complete their programs. Others will lose interest in this area. And still others will find employment elsewhere than in the proposed system. The magnitude of this slippage will depend on factors unique to the individual country, such as incentives and commitment. It will also depend on the care with which the student selection is made. Feasible cushions for slippage range from 20 to 50 percent.

The next step is an assessment of the supply of people available for advanced training. If graduate training is the issue, this will be determined by the supply of people at the B.S. level <u>who can get through the graduate programs</u>. In some cases the relevant constraint will be English language training. In other cases, it will be the supply of people with M.S. training. No sure guidelines can be provided here, although this assessment of the supply base and constraints is very important.

The conditions in the local market must also be taken into account. If members of the supply base are being paid relatively well and rewards for advanced training are few, the effective supply of trainees may be much less than the apparent supply. By the same token,

weak employment conditions for the trainees and the promise of employment and higher salaries for those who are better trained can increase the effective supply. Again, only judgment can assess these aspects of the problem.

A different kind of problem arises when the thrust of the educational program is along the lines of general education. Here, somewhat more mechanical procedures can be used. For example, if the goal is to double the enrollment in vocational agricultural schools, one can use reasonable coefficients to assess how many more teachers will be required. The training needs can then be derived, again considering the same factors that will affect the supply of trainees as was considered above.

An important consideration here is that training needs can often be met in a number of alternative ways. There can be in-service training programs, intensive training programs, and regular training programs. Decisions will have to be made about which route will be followed in making the final assessment.

Finally, to the extent that a domestic-foreign alternative exists in training programs, some assessment will be required of the domestic capacity to meet the training needs. The main caveat here is caution; it is difficult to estimate local capacity, particularly where the local system may not "look like" the US system. The objective, however, is not to create land-grant colleges all over the globe but to make an objective assessment of the quality and capacity of local training systems whatever their form. Nevertheless, foreign training needs will be the difference between total needs and domestic capacity.

Table 5.2 Training Recommendations

	Constraint Area # 1	Constraint Area # 2	Constraint Area # 3	Constraint Area # 4	Constraint Area # 5	Constraint Area # 6	Constraint Area # 7	Constraint Area # 8	Constraint Area # 9
Research--Domestic *									
1.									
2.									
3.									
4.									
5.									
Research--International *									
1.									
2.									
3.									
4.									
Education--Domestic *									
1.									
2.									
3.									
4.									
5.									
Education--International *									
1.									
2.									
3.									
4.									
Extension--Domestic *									
1.									
2.									
3.									
4.									
Extension--International *									
1.									
2.									
3.									

* Specify Disciplines

5.3 Non-Human Capital Recommendations

Recommendations here should be concerned with adequacy of physical facilities, availability of equipment, texts, resource materials, laboratories, and land to allow the institutions to carry out their particular mission. The extent to which the lack of any of these resources inhibit the development process as related to the previously defined constraint areas is the question of concern. This set of recommendations should take into account the resource evaluation of physical facilities (Tables 2.11 and 4.11), certain data from the Sections on self-sustaining growth and knowledge base (Sections 2.25 and 2.26), certain regional data, and a good measure of additional knowledge and observation.

Recommendations in non-human capital should include land, physical facilities and equipment necessary to support new institutions or expansion of existing institutions as outlined in the institutional development recommendations. These recommendations should also be correlated with training recommendations, in particular the anticipation of needs for adequate physical facilities for returning trainees.

All non-human capital recommendations should take cognizance of the current situation to maintain a realistic perspective. Not every university or research station can acquire a full complement of equipment overnight. Some middle range projections will have to be made, although a reasonable projection of need over ten years can be attempted as pertinent and appropriate. Conversely, the team should not avoid making recommendations on the assumption that the proposal will be of little interest to the host government (perhaps given a recent history of inaction).

Table 5.3 Non-Human Capital Needs

	Constraint Area # 1	Constraint Area # 2	Constraint Area # 3	Constraint Area # 4	Constraint Area # 5	Constraint Area # 6	Constraint Area # 7	Constraint Area # 8	Constraint Area # 9
Research									
A. Physical Facilities									
1.									
2.									
3.									
B. Equipment									
1.									
2.									
3.									
C. Library									
1.									
2.									
3.									
D. Other									
1.									
2.									
3.									
Education									
A. Physical Facilities									
1.									
2.									
3.									
B. Equipment									
1.									
2.									
3.									
C. Library									
1.									
2.									
3.									
D. Other									
1.									
2.									
3.									

Table 5.3 (page 2)

	Constraint Area # 1	Constraint Area # 2	Constraint Area # 3	Constraint Area # 4	Constraint Area # 5	Constraint Area # 6	Constraint Area # 7	Constraint Area # 8	Constraint Area # 9
Extension									
A. Physical Facilities									
1._____									
2._____									
3._____									
B. Equipment									
1._____									
2._____									
3._____									
C. Library									
1._____									
2._____									
3._____									
D. Other									
1._____									
2._____									
3._____									

5.4 Technical Assistance Recommendations

This section should assess the areas and magnitude of needs for foreign advisors. This should be most clearly related to institutional development needs, although some manpower may be necessary for training and non-human capital needs as well. The projections here may be particularly difficult as they relate to institution building which is a long-term effort. Hence a project period of ten years should not be considered unreasonable.

Table 5.4 Technical Assistance Recommendations

	Constraint Area # 1	Constraint Area # 2	Constraint Area # 3	Constraint Area # 4	Constraint Area # 5	Constraint Area # 6	Constraint Area # 7	Constraint Area # 8	Constraint Area # 9
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									