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Allama Iqbal Open University Islamabad

PROJECT IMPLEMENTATION, MONITORING AND EVALUATION-II

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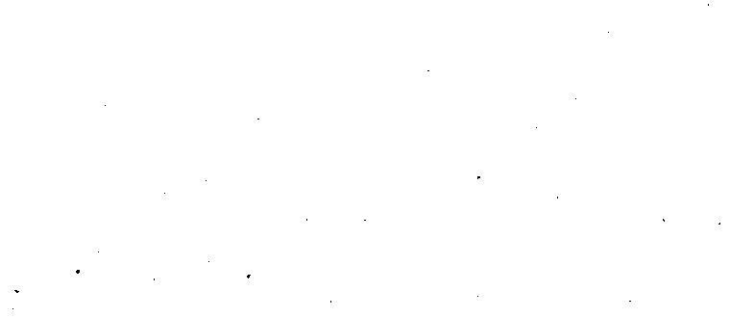
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CONTENTS OF THE COURSE

Preface

Introduction

- Unit No. 1: The Project Management
- Unit No. 2: Project Appraisal
- Unit No. 3: Strategic Management of Development Programmes-I
- Unit No. 4: Strategic Management of Development Programmes-II
- Unit No.5: Monitoring and Evaluation of Projects-I
- Unit No. 6: Monitoring and Evaluation of Projects-II
- Unit No. 7: Summative Evaluation-Evaluating the Impact of the Projects
- Unit No. 8: Case Studies Illustrating Summative Evaluation of Selected Education Projects
- Unit No. 9: Threshold Analysis of Projects



PREFACE

The idea of the course on Education Project Implementation, Monitoring, and Evaluation is based on the experiences of several project managers, evaluations of a number of education projects, and the fate of several education projects in the country. It was, however, during the workshops on Project Planning and Costing organized jointly by the Planning Commission and Economic Development Institute of the World Bank (August - Sept. 1979) and the workshop on -- Planning and Appraisal of Educational Projects organized by the Pakistan Institute of Development Economics and the Project Planning Centre for Developing Countries, University of Bradford, U.K. (4800) that the problems of project planning and implementation became subjects of concern to both the participants as well as the leaders of the workshops. It was felt that there was a need for an extensive and advanced level training course for education project planners and managers. The Institute of Education (now the Faculty of Pedagogy Literacy, Adult and Continuing Education) of the Allama Iqbal Open University, undertook to prepare the course as part of its Master's degree programme in Educational Planning and Management. A proposal in this connection was prepared by the University and under an ODA (Overseas Development Administration of the British Government) assistance programme an arrangement was worked out for cooperation between the Project Planning Centre for Developing Countries (PPC), University of Bradford, U.K. and the Allama Iqbal Open University for development of the course on "project implementation, monitoring and evaluation". Mike Veitch of the PPC who had been associated with the Planning Commission in connection with the review and improvement of the sectoral PC—1 forms, visited the University in December, 1981 and April, 1982

under the ODA assistance programme and drafted a plan for the course in the first phase of the course development.

In the second phase, the work on the development of the course began at PPC in March—April, 1985 with the development of a detailed synopsis of the course and collection of material for the course. Stephen Doherty of the PPC was appointed to assist in the development of the detailed plan of the course, and writing of the course units. Development of the plan of the course and selection of material for the course was preceded by review of project implementation and evaluation, in both developing and developed countries of the world in general and in Pakistan in particular. Problems of inservice education and training, and scope and limitations of the distance learning system were also discussed in detail. This exercise aimed at making the course practical and relevant to the jobs of project planners and managers.

In view of the fact that most project planning and management terms, concepts, and techniques used in education owe their origin to economic thoughts and industrial concerns, they need to be adapted to education projects. The terms, concepts and techniques of project implementation, monitoring and evaluation were, therefore, carefully selected and translated into education terms, and then illustrated by examples of real projects.

Since the conception of the idea of this course in 1979, so many people have contributed to its development that it is not possible to name them all. However, it was Dr. Ahaukat Ali Siddiqui, the then Director, Institute of Education, Allama Iqbal Open University, and present Dean of the Faculty of Pedagogy Literacy, Adult and Continuing Education, who approved and took personal interest in the development of the course. Of course, if

was the financial assistance of the ODA and the efforts of Mr. Alec. Fleming, British Project Team Consultant at this University who contributed to turning the idea into a reality; But it is Mr. Stephen Doherty presently associated with Industrial Training Service Limited (ITS) Area Office Leeds, U.K., whose name will always be with this course as expert, designer, consultant, writer and reviewer of the course.

M. ATHAR KHAN

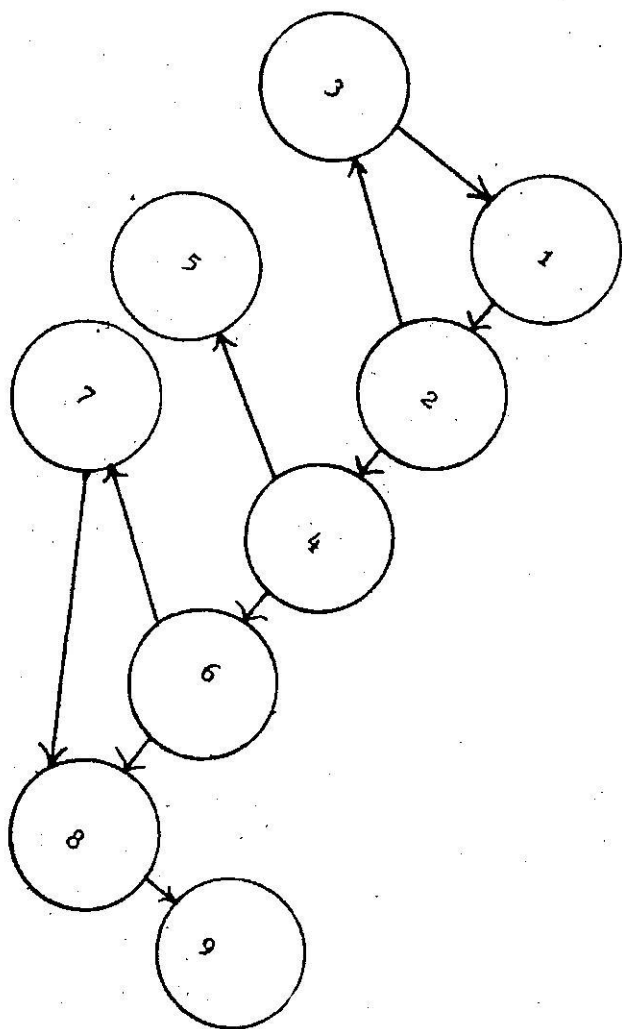
INTRODUCTION

It has been realized both by the trainees and trainers that most of what is learnt and taught during a training or an instruction course in educational planning and management, like many other similar programmes, is not applicable in practical situations with the result that a larger part of the knowledge gained and taught remains unutilized. Besides other things one factor mainly responsible for this situation appears to be interest in the methods of learning and teaching. In these courses a lecturer or writer of course-material takes it for granted that the reader or the student fully understands the concepts and the terms which are used in his lecture or writing. It is a matter of common experience that in 80 to 90 per cent cases, students and trainees do not have standard concepts of the terms frequently used in writings, lectures or discussions. It makes communication defective and the learning becomes intrans-ferable to practical situations. Also most of the terminologies, concepts, tools, and techniques used in educational planning and management are the ones taken from economic and industry etc. and do not in many cases directly relate to education. The course is therefore, designed to give readers a clear concept of a term or concept, translate them into educational context and illustrate them with the examples of their uses in various types of education projects.

For illustrations the authors have depicted the actual projects of the country's education sector. However to conceal the identity of certain projects sometimes the names of the projects have not been re-vealed. Instead, false names have been used for reference.

As shown in the Figure 1, the units of the course are linked together to form a unified whole. They are presented in a developmental sequence. The purpose of the course is not to provide a package of teaching and learning material alone in project implementation, monitoring and evaluation. But the aim is

also to provide the students with a guide or a hand-book which they can use for effective project planning-and management.



This book contains units regarding:

The Project Management

Project Appraisal

Strategic Management of Development Programmes-I

Strategic Management of Development Programmes-II

Monitoring and Evaluation of Projects-I

Monitoring and Evaluation of Projects-II

Summative Evaluation-Evaluating the Impact of the Projects

Case Studies Illustrating Summative Evaluation of Selected Education Projects

Threshold Analysis of Projects

PROJECT MANAGEMENT

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- 1. Project Management; definition**
 - 1.1 History of Project Manager**
- 2. An overview of Project Manager**
 - 2.1 Planning process**
 - 2.2 Goal Orientation**
 - 2.3 Team work**
 - 2.4 Level of Project Management**
 - 2.5 Defining, Planning & Organizing**
- 3. Project Management Process**
 - 3.1 Projection Integration Management**
 - 3.1.1 Project Development Plan**
 - 3.1.2 Project Plan Execution**
 - 3.1.3 Overall change control**
 - 3.2 Project Scope Management**
 - 3.2.1 Initiation**
 - 3.2.2 Scope planning**
 - 3.2.3 Scope definition**
 - 3.2.4 Scope verification**
 - 3.2.5 Scope change control**
 - 3.2.6 Net Present Value analysis**
 - 3.2.7 A Project charter**
 - 3.2.8 A scope statement**
 - 3.3 Project Quality Management**
 - 3.3.1 Quality planning**
 - 3.3.2 Quality assurance**
 - 3.3.3 Quality control**
 - 3.4 Project Risk management**
 - 3.5 Human Resource Management**
 - 3.5.1 Organizational Planning**

3.5.2 Staff acquisition

3.5.3 Team development

3.6 Project Communication Management

Project Management Functions

4.1 Managing scope

4.2 Managing cost

4.3 Managing time

4.4 Managing communication

4.5 Managing procurement

5. Management styles for Project Managers

5.1 Directing, Coaching, Supporting & Delegating

5.2 Situational Management styles

5.3 The use of Projects for Motivation and Staff Development

5.3.1 Challenge

5.3.2 Achievement

5.3.3 Recognition

5.3.4 Job Design

5.4 Project Manager vis-à-vis the functional Manager

5.4.1 Project Manager Objectives

5.4.2 Functional Manager Objectives

5.4.3 Conflicting Objectives

OBJECTIVES

After having gone through this unit, the students will be able to ;

1. Define and explain project management.
2. Understand the history of project management
3. Identify various characteristics that an effective project manager must possess
4. Explain the growing need of better project management specially for educational projects.
5. Describe different Management practices.
6. Elaborate different elements of Project Management process
7. Identify the project management functions



PROJECT MANAGEMENT

1. Project Management; definition

Project management is defined as managing and directing time, material, personnel/labor, and costs to complete a project in an orderly, economical manner and to meet the established objectives of time, costs, and technical and/or service results. Project management is the application of knowledge, skills, tools, and techniques to project activities in order to meet or exceed stakeholder needs and expectations from project. This definition not only emphasizes using specific knowledge and skills, but also stresses the importance of the people involved in project management. Project managers must not only strive to meet specific scope, time, cost, and quality goals of projects, they must also facilitate the entire process to meet the needs and expectations for the people involved in or affected by project activities.

Project management is defined as managing and directing time, cost, personnel, and other resources to complete a project in an orderly, efficient and economical manner while meeting the timing objectives, staying within budget and obtaining quality results. Project management is knowing where you are in a project and managing changes when problems arise to achieve successful project goals. Project management has established itself as an independent profession. A person successfully completing the certification program is qualified as project management functions known as the Project Management Body of Knowledge (PMBOK)

A successful project using the project management approach will consist of three stages:

Planning: understanding what work has to be done including identifying the individual activities and necessary resources to complete the project; then developing a plan of action in a logical order that can be displayed graphically as a project-planning diagram (or network).

- **Scheduling** validating when the work activities need to be done. This stage detail the time allowed for the project and each activity when they are to be started and completed.
- **Controlling**: monitoring (or tracking) progress of the project as it gets under way, analyzing performance, then resolving concerns. It also manages status reporting.

Management Practices

Several significant management practices are instinctively used when applying project management methods. We just require a modest understanding of their applications. A brief description of each of these principles is as under:

- **Network analysis** (also called graphic analysis) shows the plan of action through the use of a graphic diagram (used in project planning for preparing the planning diagram).
- **Management by objectives** is a technique that defines objectives and uses a disciplined method to measure performance against those objectives (used in project planning and project controlling.).
- **Management by exception** is a technique that signals the specific problems requiring management attention. Studies indicate that management should be involved with no more than 20 percent of the total project at any one time (used extensively in project control).

Other management practices that are also very important functions of project Management includes:

- **Cost minimizing:** a procedure used to reduce the time required to complete a project with the least amount of additional cost.
- **Resource allocation:** assigning resources required to complete each project activity. Resources include personnel, labor, cost allocation (assigning costs required to complete each activity), equipment, and material.
- **Resource leveling:** is a method for scheduling the project activities to keep day-to-day resource requirements even.

1.1 History of Project Management

The crux of project management and the project planning diagram traces its origins back to the 1850s, when students in logic and algebra used diagrams to show the flow of logical problems. The military-minded Prussians in the same century developed flow diagrams of tactical movements in the battlefield. They showed where their troops would be, where the enemy troops would be, and how the battle would progress. In the late 1950s, U.S. Navy completed early work in project management combining a project-planning diagram with a computerized schedule. Working on separate terms, the projects they used to initiate their studies had little to common. Both had the same objectives. However to improve the planning, scheduling, and coordination of their projects, they both recognized the need for improved planning and scheduling techniques to help control their use of personnel, labor, material and costs of resources.

DuPont's system was called the critical path method (CPM) with its objectives to improve efficiency, timing, and costs of the company's engineering projects. This system helped reduce the timing of many projects by one-third with significant reduction in costs. Simultaneously, the Navy was devising a system to plan and coordinate the work of nearly 3,000 contractors and agencies engaged in producing the Polaris Missile for launching nuclear warheads from submarines (a consequence of the Cold War with Russia). This system, known as the Program Evaluation Review Technique (PERT), has been credited with helping advance the Polaris' development by two years.

With the success of these programs came a proliferation of project diagramming methods, including PEP (Project Evaluation Procedure), LCES (Least Cost Estimating and Scheduling), GERT (Graphical Evaluation and Review Technique) and more recently, PDM (Precedence Diagramming Method). Those that have surfaced as the more popular methods are CPM (or ADM), the conventional approach, and PDM, favored by software manufacturers.

These diagramming methods are replacing the bar chart (known also as the Gantt chart), which has been the traditional approach to combining both the planning and scheduling phases. For more effective control of projects, the project management approach, using network-planning method, separates the planning function from the scheduling function. The planning function results in the network diagram (commonly called the planning diagram), and scheduling, based on the planning diagram, is a manual or computerized calculation process.

2. An overview of Project Management

Over years of consulting and training in project management a number of project management methodologies have been observed that would seem to differ from one another. On closer examination it has been actually found that there are a number of underlying principles that are present in the more successful methodologies. From them it has been fashioned a project management life cycle that was first published by Weiss and Wysocki. Since then continued efforts have been made to compare this life cycle with client methodologies. The result confirms the assumption of recurring features in successful methodologies. More recently the project management institute has circulated their project management body of knowledge, PMBOK, which has an underlying life cycle remarkably similar to the one we have adopted in our consulting practice. The one that is shared with you parallels PMBOK, if your organization has a methodology in place; compare it to the model given here. You should be able to map your methodology into this life cycle.

2.1 Planning Process

Planning, or rather, effective planning is painful. Planning doesn't seem like real work. Projects are always behind schedule, so we are tempted to skip planning so that we can get down to the real work of the project. Experience has shown that good planning can actually decrease the time required to complete a project, even taking the planning time into account. Planning reduces risk and increases productivity by 50 percent. We find it interesting that project teams do not have time to plan but they do have time to do the work over again.

2.2 Goal Orientation

Every project has some specific goal. It is the agreement between requestor and provider as to what is to be accomplished from this project, the deliverable if you will. The goal tells us where we are going so that when we get there we will know it. In our project management life cycle the goal is bounded by a number of objective statements. These objective statements clarify the boundary of the goal statement scope the project. They become the frameworks within which the entire project planning process is conducted.

2.3 Teamwork

The teams do projects. We have to escape the notion that an individual is singly responsible for the success or failure of the project. True, you can point the examples in which the efforts of an individual brought the project to successful completion, but these are rare events. In contemporary organizations the project team is often cross functional and spans organizational boundaries.

2.4 Level of Project Management

The project management life cycle actually contains three cycles. Which cycle you use in a give project depends on what management needs you are trying to meet. Many organizations have defined a classification of projects based on such project characteristics as risk, business value, length, complexity, and cost. The project profile

determines the classification and classification defines the extent to which the project management methodology is to be used.

2.5 Defining, Planning, Organizing

This is the simplest and is concerned with getting the project going. There is no follow-up on performance against plan. There have been encountered a number of situations in which one person is singly responsible for completing all project activities. In such cases there is good value in planning the project but limited value in implementing the control and close phases. Here the project manager and client is the same person and are interested only in laying out strategy for doing the work. Often this project will have to be planned in conjunction with one or more other projects. The intend is to set a timeline for completing this project in conjunction with others underway. This cycle is closely related to good management practices.

In addition to these three levels, information systems organizations are beginning to introduce a classification scheme for their projects. Projects are typically classified based on length, cost, complexity, business value, risk, and other criteria. Four or five classifications are typical. Each classification has required and optional initiation, definition, planning, control, reporting, and closing requirements. The alternative of one size fits all doesn't make much sense in today's organization, where right sizing, efficiency, and time to market are critical to success.

Advantages of the Project Management

Using project management techniques to guide and control the course of a project affords more confidence in a successful completion. Value judgements are still necessary, and the good result is still the product of dedicated efforts. Most important to the success of project management techniques is the complete support of all levels of management, especially top management. They must understand and accept with its underlying principles. Although project management requires effort, participation, dedication, and cooperation, the resulting rewards make it all worth while. Advantages include the following:

- A clear picture of the scope of the project forms that is readily communicable. It clearly shows responsibilities of those participating in the project.
- It is credible aid to familiarize new personnel on the details of the project.
- It forces those participating in the project to think it through greater detail.
- It provides a means of accountability by assigning those responsible for the specific activities that make up the project.
- It is an excellent way to define relationships among the major areas of responsibility as well as among individual project activities.
- It enables to promote corrections to the project to meet changing or unpredictable conditions. It evaluates strategies and objectives with the help of the project planning diagram and the computerized schedule.
- It advances the professional development of the project team members through training and active participation.

3. Project Management Process

The project management process consist of the following management design

3.1 Project Integration Management

Project integration management includes the processes involved in coordinating all of the other project management knowledge areas throughout a project's life cycle. It ensures that all the elements of a project come together at the right times to complete a project successfully. Many people consider integration management to be the key to overall project success. Someone must take responsibility for coordinating all of the people, plans, and work required to complete a project. Someone must focus on the big picture of the project and steer the project team completion. Someone must make the final decisions when there are conflicts among project goals or people involved. Someone must communicate key project information to senior management. This someone is the project manager. Good project integration management is critical to providing stakeholder satisfaction. Integration management includes interface management. Interface management involves identifying and managing the points of interaction

between various elements of the project. The number of interfaces can increase exponentially as the number of people involved in a project increases. Thus, one of the most important jobs of a project manager is that of establishing and maintaining good communication and relationships across organizational interfaces. The project manager must communicate well with all project stakeholder, including customers, the project team, senior management, other project managers, and opponents to the project. The project management is applying knowledge, skills, tools, and techniques in order to meet or exceed stakeholder needs and expectations. Project integration management must occur within the context of the whole organization, not just within a particular project. The work of the project must be integrated with the ongoing operations of the performing organization. To accomplish project integration management integration management, you must engage in project scope, quality, time, and cost management and human resource, communications, risk, and procurement management. Because it ties together all the knowledge areas, project integration management depends on activities from all eight of the other knowledge areas. It also requires commitment from top management in the organization sponsoring the project throughout the life of the project.

The main processes involved in project integration management include:

1. **Project Plan Development.** This involves taking the results of other planning processes and putting them into a consistent, coherent document the project plan.
2. **Project Plan Execution.** This involves carrying out the project plan by performing the activities included in it.
3. **Overall Change Control.** It involves coordinating changes across the entire project.

3.1.1 Project Development Plan

A project plan is a document used to coordinate all project planning documents and help guide a project's execution and control. Project plans also document project planning assumptions and decisions regarding choices, facilitate communication among stakeholder, define the content, extent, and timing of key management reviews, and provide a baseline for progress measurement and project control. Plan should be dynamic, flexible, and subject to change when the environment or project changes. Plans should greatly assist the project manager in leading the project team and assessing project status.

To create and assemble a good project plan, the project manager must practice the art of integration since information is required from all of the knowledge areas. Working with the project team and other stakeholder to create a project plan will help the project manager to have a good understating of the project along with a work breakdown structure and Gantt Chart. A large project involving a hundred people over three years would have much more detailed project plans. It is important to tailor project plans to fit the needs of specific projects. The plans should guide the work, so they should be only as detailed as needed for each project

3.1.2 Project Plan Execution

Project plan execution involves managing and performing the work described in the project plans. The majority of time on a project is usually spent on execution, as is most of the project's budget. The application area of the project directly affects project execution because the products of the project are produced during project execution.

Project integration management views project planning and execution as interlined and inseparable activities. The main function of creating project plans is to guide project execution. A good plan should help produce good products or work results. What good work results consist of should be documented in a plan, and knowledge gained from doing work early in the project should be reflected in updates to the project plans. Anyone who has tried to write a computer program from poor specifications

appreciates the importance of a good plan. Anyone who has had to document a poorly programmed system appreciates the importance of good execution.

A common sense approach to improving the coordination between project plan development and execution is to follow this simple rule: those who will do the work should plan the work. All project personnel need to experience and develop both planning and executing skills. In information technology projects, programmers who have had to write detailed specifications and then create the code from their own specifications become better at writing specifications. Likewise, most systems analysts begin their careers as programmers so they understand what type of analysis and documentation is really needed to write good code. Although project managers are responsible for developing the overall project plan, they must solicit inputs from the project team members who are developing plans in each knowledge area.

3.1.3 Overall change control

Overall change control involves identifying, evaluating and managing changes throughout the project life cycle. The three main objectives of overall change control are:

1. Influencing the factors that create changes to ensure that changes are beneficial to ensure that changes are beneficial and that project is successful, project managers and their teams must make trade offs among key projects dimensions such as scope, time, cost, and quality.
2. Determining that a change has occurred: to determine that a change has occurred, the project manager must know the status of key project areas at all times. In addition, the project manager must communicate significant changes to top management and key stakeholders. Top management and other key stakeholder do not like to surprises, especially ones that mean the project might produce less, take longer to complete, cost more than planned, or be of lower quality than desired.
3. Managing actual changes when and as they occur: Managing change is a key job of project managers and their staffs. It is important that project managers

exercise discipline in managing the project to help minimize the number of changes that occur.

3.2 Project Scope Management

Project scope management includes the processes required to ensure that the project includes all the work required to complete it successfully. The first step in project scope management is deciding on which projects to work. To decide on which projects to work, organizations should review the organization's strategic plan and then develop an information technology strategic plan that supports the organization's overall strategy.

Project scope management includes the processes involved in defining and controlling what is or is not included in a project. It ensures that the project team has the same understanding of what will be the output of a project at its end and what processes will be used in producing them. The main processes involved in project scope management include.

- 3.2.1 Initiation.** It involves committing the organization to begin a project or continue to the next phase of a project. An output of initiation processes is a project charter, which is a key document for formally recognizing the existence and providing a broad overview of a project.
- 3.2.2 Scope planning.** It involves developing documents to provide the basis for future project decisions, including the criteria for determining if a project or phase has been completed successfully. The project team creates a scope statement and scope management plan as a result of the scope planning process.
- 3.2.3 Scope definition.** This involves subdividing the major project deliverables into smaller, more manageable components. The project team creates a work breakdown structure (WBS) during this process. A work breakdown structure (WBS) is the main output of the scope definition process. It is an outcome oriented analysis of the work involved in a project that defines

the total scope of the project. The WBS forms the basis for planning and managing project schedules, costs, and changes. Good WBS are difficult to create. Approaches for developing a WBS include using guidelines, the analogy approach, the top down approach, and the bottom up approach.

- 3.2.4 Scope verification.** This involves formalizing acceptance of the project scope. Key project stakeholders, such as the beneficiaries and sponsor for the project, formally accept the deliverables of the project during this process.
- 3.2.5 Scope change control.** This involves controlling changes to project scope. Scope changes, corrective action, and lessons learned are outputs of this process. Poor scope management is one of the key reasons projects fail. For information technology projects, it is important for good scope management to have strong user involvement, a clear statement of requirements, and a process for managing scope changes.
- 3.2.6 Net present value analysis** is the preferred financial measure for selecting projects. A positive net present value (NPV) is good, and the higher the NPV, the better. Other important financial considerations are the projected return on investment (ROI) of a project and payback period.
- 3.2.7 A project charter** is a document that formally recognizes the existence of a project. It must be signed by key project stakeholders to acknowledge agreement on the need for and intent of the project.
- 3.2.8 A scope statement** is created in the scope planning process. This document includes a project justification, a brief description of the project's products, a summary of all project deliverables, and a statement of what determines project success.

3.3 Project Quality management

Project quality management is a difficult knowledge area to define. The international organization for standardization (ISO) defines quality as “ the totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs.” Many people spent many hours coming up with this definition, yet it is still very vague. Other experts define quality based on conformance to requirements and fitness for use. Conformance to requirements means the project’s processes and products meet written specifications. For example, if the scope statement requires delivery of one hundred Pentium III computers, you could easily check whether the correct computers had been delivered. Fitness for use means a product can be used as it was intended, if these Pentium computers were delivered without monitors or keyboards and were left in boxes in the customer’s shipping dock, the customers might not be satisfied because the computers would not be fit for use. The customer may have assumed that the delivery included monitors and keyboards, the unpacking of the computers and installation so they would be ready to use.

The main purpose of project quality management is to ensure that the project will satisfy the needs for which it was undertaken. Recall that project management involves meeting or exceeding stakeholder needs and expectations. The project team must develop good relationships with key stakeholders, especially the main customer for the project, to understand what quality means to them. After all, the customer ultimately decides if quality means to them and decides if quality is acceptable. Many technical projects fail because the project team focuses only on meeting the written requirements for the main products being produced and ignores other stakeholder needs and expectations for the project. For example, the project team should know what successfully delivering one hundred Pentium III computers means to the customers

Quality, therefore must be viewed on an equal level with project scope, time, and cost, if a project’s stakeholders are not satisfied with the quality of how the project was managed or the resulting products of the project, the project team will need to make

adjustments to scope, time, and cost to satisfy time, and cost is not sufficient. To achieve stakeholder satisfaction, the project team must develop a good working relationship with all stakeholders and understand their stated or implied needs.

Project quality management involves three main processes:

- 3.3.1 **Quality planning:** It includes identifying which quality standards are relevant to the project and how to satisfy them. Incorporating quality standards into project design is a key part of quality planning. For an information technology project, quality standards might include allowing for system growth, planning a reasonable response time for a system, or ensuring that consistent and accurate information is produced. Quality standards can also apply to information technology services. For example, you can set standards for how long it should take to get a reply from help desk or how long it should take to ship a replacement part of a hardware item under warranty.
- 3.3.2 **Quality assurance:** It involves previously evaluating overall project performance to ensure the project will satisfy the relevant quality standards. The quality assurance process involves taking responsibility for quality during the project as well as at the end of the project. Senior management must take the lead in emphasizing the roles all employees play in quality assurance, especially senior' rule.
- 3.3.3 **Quality control:** It involves monitoring specific project results to ensure that they comply with the relevant quality standards while identifying ways to improve overall quality. This process is often associated with the technical tools and techniques of quality management such as Pareto Charts, quality control charts, and statistical sampling. These tools and techniques are covered later in this chapter.

3.4 Project Risk management

Project risk management is the art and science of identifying, assigning, and responding to risk throughout the life of a project and in the best interests of meeting project objectives. A frequently overlooked aspect of project management, risk management can have a positive impact on selecting projects, determining the scope of projects, and developing realistic schedules and cost estimates. It helps project stakeholders understand the nature of the project, involves team members in defining strengths and weaknesses, and helps to integrate the other project management knowledge areas.

What is risk? A basic dictionary definition says that risk is "the possibility of loss or injury". This definition highlights the negativity often associated with risk and suggests that uncertainty is involved. Project risk involves understanding potential problems that might occur on the project and how they might impede project success..

In many respects, risk management is like a form of insurance. It is an activity undertaken to lessen the impact of potentially adverse events on a project. it is important to note that risk management is an investment there are costs associated with it. The investment a project is willing to make in risk management activities depends on the nature of the project, the experience of management activities depends on the nature of the project, the experience of the project team, and the constraints imposed on both. In any case, the cost for risk management should not exceed the potential benefits.

The reason most people and organizations take is to benefit from opportunities. Even before the introduction of computers, organizations took risks by introducing new ways of doing things. Count Machiavelli in 1513 had insight into project risk. "There is nothing more difficult to plan, more doubtful of success, nor more dangerous to manage than the creation of new system. For the initiator has the enmity of all who would profit by the preservation of the old system and merely lukewarm defenders in those who would gain by the new one." Machiavelli's words apply equally well to new information technology projects.

Several risk experts suggest that organizations and individuals strive to find a balance between risks and opportunities in all aspects of projects and their personal lives. The idea of striving to balance risks and opportunities suggests that different organizations and people have different tolerances for risk. Some organizations or people have a neutral tolerance for risk, some have an aversion to risk, and others are risk-seeking.

3.5 Human Resource management

Project human resource management includes the processes required to make the most effective use of the people involved with a project. Resource management includes sponsors, customers, project team members, support staff, vendors supporting the project, and so on. The major processes involved in human resource management include:

3.5.1 Organizational planning: This involves identifying, assigning, and documenting project roles, responsibilities, and reporting relationships. Key outputs of this process include roles and responsibility assignments. Often shown in a matrix form, and an organizational chart for the project.

3.5.2 Staff acquisition: This involves getting the needed personnel assigned to and working on the project. getting personnel is one of the crucial challenges of information technology projects.

3.5.3 Team development: It involves building individual and group skills to enhance project performance. Building individual and group skills is also a challenge for many information technology project.

3.6 Project Communication Management

As communication is important on projects, every project should include a communications management plan a document that guides project communications. This

plan should be part of the overall project plan. The type of communication management plan will vary with the needs of the project, but such a plan should always be prepared. The main parts of communications management plan include:

A description of a collection and filing structure for gathering and storing various types of information. For example, if a project team member attends a conference and brings back valuable information, where should it be filed and stored? If a supplier sends a new product brochure, where should it be filed and stored? If the new product is used on the project and might affect other areas such as accounting or engineering, how will that new product information be communicated to these areas? Everyone knows it can be difficult to organize his or her individual work, so it is imperative to develop and follow a system for filing important project-related work for many people. In addition, several government agencies require a detailed filing system and hold inspections to ensure their instructions for filing are followed.

A distribution structure describing what information goes to whom, when, and how. For example, are all status reports written or are some oral? Does every stakeholder receive every master schedule update? Do executives receive different formats of status reports?

A format for communicating key project information. Is there a template for project team members to follow in preparing written and oral status reports? Is there a master list of all acronyms and definitions, or do they need to be repeated on different project documentation? Many hours of confusion can be avoided by providing templates and examples of key project reports. You will find several examples later in this chapter.

The goal of project communications management is to ensure timely and appropriate generation, collection dissemination storage and disposition of project information. Projects communication management processes include.

4. Project Management functions

Since 1981, project management has established itself as an independent profession primarily through the efforts of the Project Management institute (PMI). The institute has developed and supported a comprehensive project management professional (PMP) certification program that requires a qualified candidate to be proficient in certain attributes that include adhering to a code of ethics, acquiring adequate job experience, and possessing specialized knowledge known as the project management body of knowledge (PMBOK). PMBOK consists of nine management functions: scope, cost, human resources, communications, quality, contract/procurement, risk, and project integration. These are defined as follows:

4.1 Managing scope

Managing the scope of the project is controlling the project through the aims, goals and objectives of its sponsor.

4.2 Managing Cost

Managing costs required for financial control of the project, is accomplished through accumulating, organizing, and analyzing data and reporting the cost information.

Managing time is planning, scheduling, and controlling the project to achieve the time objectives. Time management and Cost management may form the very substance of project management.

4.4 Managing Communications

Managing communications keeps information flowing among members of the project team and management, helping ensure a successful conclusion of the project.

4.5 Managing Procurement

Managing contract/procurement includes selecting, negotiating, and awarding orders and administering procurement of material equipment and services.

Persons just beginning to apply project management need only be involved with the Functions that the mostly used: managing time, cost, and scope.

5. Management styles for Project Managers

5.1 Directing, Coaching, Supporting, and Delegating

There is a cycle that manager/subordinate relationships follow. It begins at the time an employee begins a new job or new job responsibilities. While the pace of movement from stage to stage will vary with each employee, each stage will be represented in the building of the manager/subordinate relationship. Kenneth Blanchard in *Leadership and the One Minute-Manager* (Morrow, 1985) explains this concept. His model is depicted in figure 1.1

In most cases, when people first join an institution their relationship with their manager is one of mentor and mentored. They are in a learning mode and close supervision is to be expected. After some time and at a point where the manager has

some sense of how a person works, how much instruction is needed, and how self-managed they can be. Begin to loosen their control and direct supervision and move more toward a coaching role. The coaching role is offering advice, and suggestions, and evaluating the outcome. Finally the transition to a supporting role happens. Here the individual is operating quite independently of the manager. Some decision-making authority is vested in the person. At the last stage the person is vested with responsibility for carrying out the objectives of the unit in their area of interest

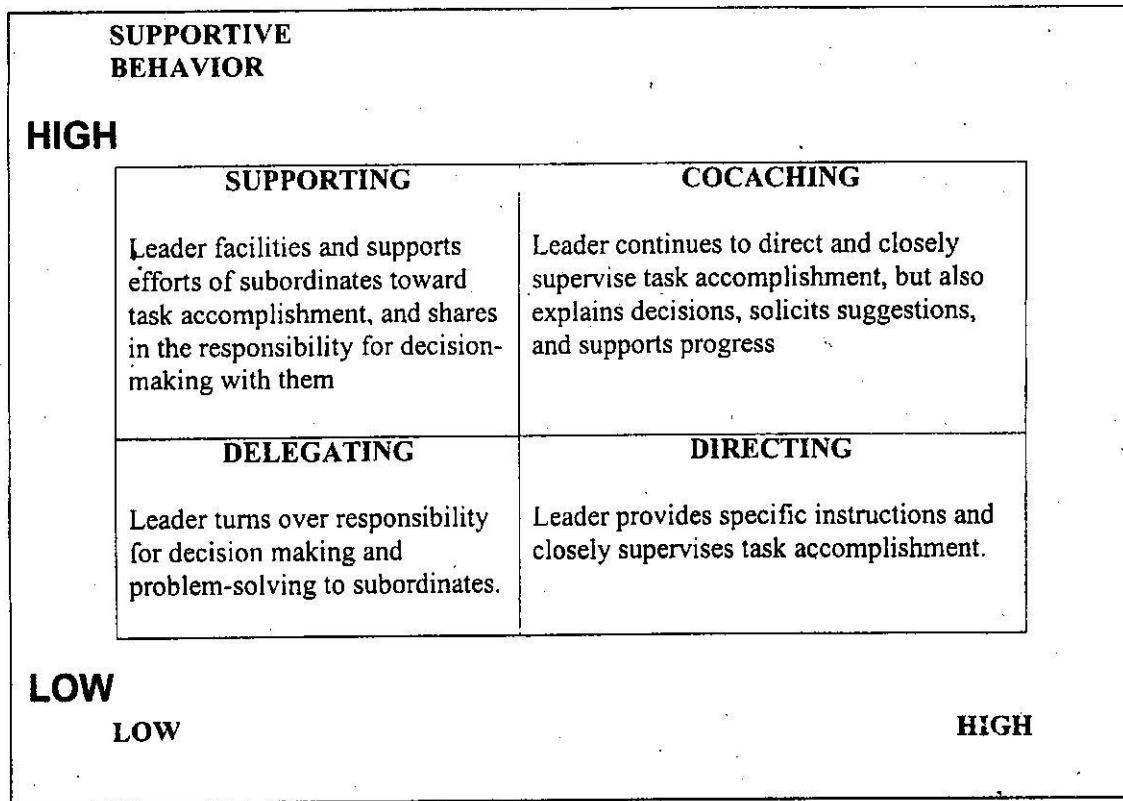
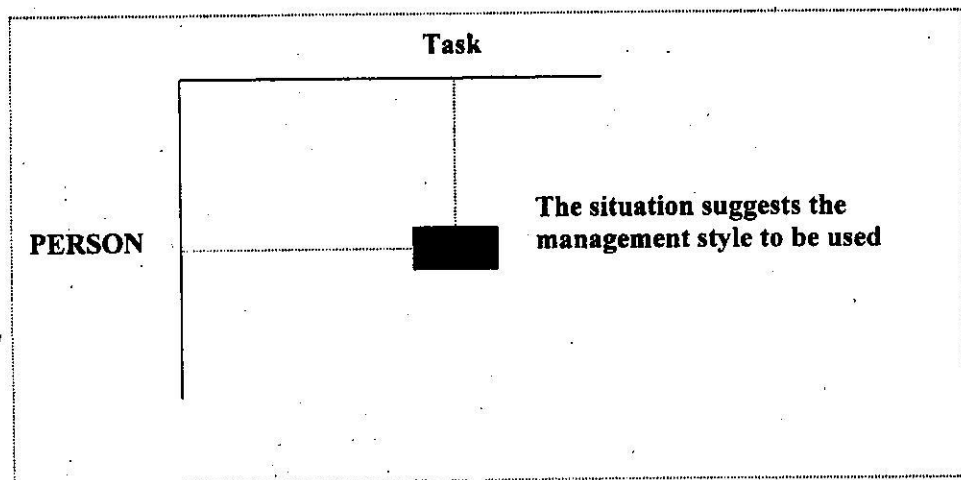


Figure 1.1 Management Styles

5.2 Situational Management Styles

There are two scenarios to discuss: the first is the result of an initiative taken by the subordinate. The second is the result of an assignment given by the manager. Figure 1.2 illustrates the point of this discussion.

When the subordinate approaches the manager with an idea for a project, the question of commitment on the part of the subordinate is mute. Of course they are committed. The relationship between the manager and the subordinate in this case is clearly different from the case in which the manager suggests the project to the Subordinate. While the subordinate may appear committed, there will always be that question. Is the subordinate committed or is the subordinate merely telling the manager what the manager wants to hear? Here the relationship between the manager and the subordinate is much closer than in the former case. The manager will want to closely monitor the subordinate, making sure that the project is moving along as requested. In the former case, however, the manager will simply want a routine status report on how the project is going. There will be little need to direct the work of the subordinate except to make sure that the objective is clearly stated.



This relationship can change as the task changes, and will certainly change from one subordinate to another. For the project manager the challenge is to display even handedness in working with members of the project team. Getting the project done on time, within budget, and according to specification is paramount for the project manager. Having to deal with project team-member relationships is important only in that it contributes or hinders project progress.

5.3 The Use of Projects for Motivation and Staff Development

Not everyone can be motivated. In fact, in most cases all the manager can do to create an environment in which subordinates might be motivated and then hope that they are. It's really like farming. All the farmer can do is pick the crop to plant, the acreage to plant it on, the fertilizer to use, and then hope that Mother Nature supplies the right amount of rain, wind, and sunshine. The same scenario applies to the subordinate.

5.3.1 Challenge

Professionals have always responded to challenge. To tell professionals that something cannot be done is usually all that need be said to get their creative juices flowing. A solution will follow. Nothing is more dreaded by professional to continue practicing skills along since mastered. This is the ground on which errors are grown. Being bored usually leads to daydreaming and lack of attention to detail. In any case errors result. Being challenged does not mean that every moment of every day is spent solving previously unsolved problems. For example, spending only an hour or two on a new and challenging task is sufficient to keep a professional motivated throughout the day.

5.3.2 Achievement

Professional wants to know that they are progressing toward some professional goal. Such is the case if their achievement is not only recognized but also followed with another challenge. Success begets success, and challenge begets challenge.

5.3.3 Recognition

Achievement must be followed by recognition especially among a person's peers. Recognition does not necessarily mean dollars or promotions or titles.

5.3.4 Job Design

Since job is so important, let us look at job design for just a moment. Cougar has identified five dimensions needed to define a job (see Fig.1.5).

CORE JOB DIMENSIONS

- Skill variety
- Task identity
- Task significance
- Autonomy
- Feedback

Figure 1.5

Skill Variety

Jobs that do not offer much task variety, and hence opportunity to learn and practice new skills, become boring for most people. In designing Jobs it is therefore advantageous to consider building in some task variety. This may provide only a diversion from what otherwise would be a tedious and boring work day. On the other hand, it might also provide a break in which the person can learn a new skill. With a little

bit of forethought the manager can find opportunities for cross-training by introducing some task variety for new skills development. Of course, the manager will want to consider the risk involved in such actions. The person may not rise to the challenges of the new task or might not have the native ability to master the skills need to perform the new task.

Task identity

People need to know what they are working on. This is especially true for contracted team members. Help them understand their work in relation to the entire project. Knowing that their task is on the critical path will mean a lot to their attitude and the quality of their work.

Task Significance

Does it make any difference if I am successful? Will anybody notice? Just how important is my work to the overall success of the project? Am I just doing busywork to pass the time of day? They need to know if it makes any difference to the success of the project whether they are successful and on schedule

Autonomy

Professionals want to know what is expected of them what are the deliverables? They don't want to hear the project manager tell the every detail of how they will accomplish their work. Systems people are rugged individuals. They want to exercise their creativity. They want freedom, independence, and discretion in scheduling their work and determining the procedures they will follow to carry it out.

Feedback

Good, bad, or indifferent, professionals want to know how effective they are in their work. Paying attention to a professional is motivating in itself. Having something, good to say is even better. When performance is below expectations, tell them. If you can convince them that they own the problem, then ask them for an action plan to correct their marginal performance.

5.4 Project Manager vis-à-vis the functional Manager

5.4.1 Project Manager Objectives

The objectives of the project manager are clear. Complete the project on time, within budget, and according to the customer's conditions of satisfaction, that is, according to specification. Staff development is not on the list! The only cases when staff development is an objective of the project manager occur when the project manager also has line responsibility for the

5.4.2 Functional Manager Objectives

On the other hand, the resource manager's objectives include deployment of staff to projects, and development of staff skills to meet project requirements. These objectives pertain regardless of the organizational structure.

5.4.3 Conflicting Objectives

The project manager's objectives and the resource manager's objectives will often conflict. Part of the program for developing staff skills will occur through on-the-job training. Resource managers will look for opportunities to deploy staff to project assignment that provides opportunities to learn new skills. In other words, less than qualified staff will be assigned to project activities. The project manager, on the other hand, would rather have experienced staff assigned to project activities, especially activities that are critical to the completion of the project according to plan. They will not be interested in being the training ground for professional staff.

SELF ASSESSMENT QUESTIONS

1. Define Project management in terms of the principles of management.
2. How is project management different from general management
3. List important skills and attributes of a good project manager
4. Discuss the need and importance of better project management in education sector in Pakistan
5. Differentiate between the Project Quality Management and Project scope Management
6. Critically analyze the functions of the project Management
7. Describe project integration management in your own words.
8. Name some projects in your area that have been completed recently or are now under way. Identify any four distinguished characteristics of the project management of that specific project

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PROJECT APPRAISAL

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LIST OF CONTENT

S.No.	Title	Page No.
1.	Project Appraisal Introduction	
2.	Historical perspective	
3.	Aspects of project appraisal	
3.1	Technical aspects	
3.2	Managerial aspects	
3.3	Commercial aspects	
3.4	Financial aspects	
3.5	Economic aspects	
3.6	Social aspects	
4.	Limitations of the project appraisal	
5.	Project formulation and appraisal distinguished	
6.	Project appraisal and cost benefit analysis	
7.	Project appraisal and investment planning	
8.	Causes of project failure	
8.1	Time overrun	
8.2	Cost overrun	
8.3	Performance factors	
8.4	Environmental factors	
8.5	Implementation oriented factors	
9.	Project appraisal techniques	
9.1	Benefit cost analysis	
9.2	Internal rate of return	
9.3	Per unit cost	
9.4	Annual per unit cost	
10.	Project as a system	
11.	The scope of project appraisal	

OBJECTIVES

After having gone through this unit, the students will be able to;

1. Describe the history of project appraisal
2. Analyse different aspects of the project appraisal
3. Identify the limitations of the project appraisal
4. Distinguished between evaluation and appraisal
5. Apply the appraisal techniques to different educational projects.

PROJECT APPRAISAL

1. Introduction

Project appraisal implies determination of the worth of a project as an investment proposition. It seeks to answer two questions:

- i) whether the project fulfills all the conditions to a take off, and
- ii) whether the performance scores attributed to the project by the sponsoring system are optimal and realistic.

Project appraisal makes available data on the basis of which the decision-makers can assign a specific ranking to the project under consideration in situations of resource constraints. Looking forward, management systems also development-oriented administration, have under consideration at any juncture of time, a large number of projects. Resources being limited, it is not possible to clear all candidates projects for implementation, however attractive individual performance ratings of the projects may be a choice to be made.

Appraisal is undertaken to determine the strong and weak points of an investment proposition, to confirm its technical, financial and socio-economic feasibility, to identify implications, which it will have for the sponsoring system as also for other systems with which it will have to co-exist. The idea is to make available to the decision-makers a set of valuations that can be utilized to judge the comparative merits of the project. This help to define the precise role which can be utilized to judge the comparative merits of the project and to define the precise role which the project can be expected to play in achieving the objectives of the sponsoring system as also of the society.

The basic purpose of project appraisal is to provide such information to decision makers, political leaders and aid giving agencies etc. as would assist them in making investment decisions. Project appraisal provides data or

information which implies decision makers to compare different projects and to choose those that are likely to contribute most to development objectives.

Project appraisal is, in essence, a scientific decision making aid. Its strength lies in the adoption of systems approach, use of mathematical tools and utilization of scientific methods for situation analysis. It makes the process of appraisal explicit, which can be used to optimize decision-makers with information, which can be used to decision making in the field of investment approvals.

2. Historical perspective

Way back in the aeons of history when man started using simple tools for hunting and later on for agricultural operations, he discovered the meaning of comparative value of investment opportunities. In the beginning all the resources he had, comprised of nothing more than his time and his skill. He had to evolve rational ways of judging the possible outcomes of different ways in which he could invest his resources and to make a comparative appraisal of various outcomes. As civilization advanced, the availability of resources increased both in variety as well as in sophistication. Side by side with this increase investment opportunities also underwent a phenomenal change. New processes, new techniques, new methods, new materials and new media were discovered and perfected. The expanse of the canvas on which man could write his plans grew almost beyond manageable proportions. The challenges before the decision-makers became awe-inspiring. It became unavoidable for man to find ways and means of meeting these new situations. Mathematics and scientific methods which had primarily served scientists and technologists in the past were drafted into the service of the decision making process. Programmed decision making based on the use of analytical tools and techniques was evolved and put to use as an aid to the management process.

As a formal technique project appraisal is of very recent origin. Till as late as the middle of the current century, its main concern was with the financial performance of investments. The "Capital Goods Model" developed by Walfer Raunten strauch (1930) was the main tools used in the evaluation of projects. Projects were evaluated strictly on the basis of their commercial profit and loss ratings and the impact that they would have on the recorded status of the project.

Jules Dupuit developed his conceptualization of consumer surplus way back in 1844. This concept was extensively used in France to evaluate different investment projects. Though it took quite some time to be assimilated into the technique of appraisal, Dupuit's conceptualization paved the ways for incorporation of external effects into the performance reckoning of projects.

The Flood Control Act (1936) of USA was another important factor which contributed towards the growth of project appraisal as a technique. The Act defined feasibility as a situation in which benefits, to whomsoever they accrue, exceed the estimated costs. More or less parallel approach to project appraisal were developed. These included besides the appraisal technical and financial feasibility, an economic analysis in terms of benefits and costs.

Project appraisal in the sense in which it is now generally understood, owes its present form and content to the interest which organizations like the United Nation (UN) and its organs and specialized agencies like the United Nations Industrial Development Organization (UNIDO), the Food and Agriculture Organization (FAO), the United Nation Education and Social Organization (UNESCO) and the International Bank for Reconstruction and Development (World Bank) have taken in its evaluation. Manual on Economic Development Projects U.N. (1953) one of the first manual published on the subject was prepared by the UN Commission for Latin America in 1958. The manual was mainly concerned with the forecasting method. In 1966 under the

agencies of this Institute John A. King Jr. published his work entitled "Economic Development Project and Their Appraisal".

The World Bank had gathered considerable experience in project appraisal through review of proposals for loans to finance development projects. It was felt that practitioners in the field for appraisal of projects could usefully utilize this experience.

The primary emphasis in appraisal in the early fifties was on technical soundness, economic viability and financial feasibility. Compatibility of the project with the overall economic objectives of the host countries was also considered material for decision making. By the mid fifties most of the formerly dependent countries attained independence and started looking forward with euphoria towards a better tomorrow. Each country had its own ideas about modernization, industrial development and economic growth. Each country had its own value system and worldview. A rational approach to comparative evaluation of loan proposals had to be devised which could besides being fair and explicit be universal in application.

The broad approach enunciated by the world bank was to approve a project not by comparing it with other projects but by measuring it against the estimated real marginal rate of return on newly invested capital in a country. This approach involved the examination of the intrinsic soundness of the project as also of all the circumstances surrounding it and the whole of the economic complex of which the project would be apart. In practice it is meant, "investigating the project from five different aspects including economic, technical, managerial, organizational and financial."

As a result, the Development Centre of the Organization for Economic Cooperation and Development (OECD) which was established in December 1962 started devoting considerable attention to the problems of resource

transfers to developing countries and consequently to identification, formulation and appraisal of projects. It was observed that the lack of knowledge in developing countries of how to formulate a project in such a way that its potential profitability be estimated was one of the obstacles in the path of meaningful industrialization.

The L-M Manual selected cost-benefit analysis as the most appropriate tool for evaluating the comparative merit of projects. The objective function to be optimized was expressed differently in the two books; L-M Manual visualizing the overall impact of the project terms of free foreign exchange and the Guidelines utilizing the current consumption function as the numeraire. Both considered prices obtaining in the market in developing countries as unsuitable for the purpose of evaluation of projects, both approaches took into account the spill over effects and the tertiary effects of the projects. Both agreed that project choice had consequences for employment, output, consumption, savings, foreign exchange earnings, income distribution and other things of relevance to national objectives. The objective of appraisal according to both approaches was to assess the desirability of a project in terms of the consequences, which the project would have on the overall objectives of the national planning effort.

Economic Analysis of Projects was published under the guidance of the World Bank in 1975. A comparison of this book with King's book referred to earlier bring out the changes, which took place in the approach of the World Bank to project appraisal. The emphasis during a period of a decade from 1966 to 1975 was on growth objectives almost to the neglect of the equity objectives. Projects were appraised in term of the contribution they would make to the maximization of output. It was eventually realized that at the margin all units of project generated income were not alike. The successful pursuit of growth objectives under such a situation required that the distributional effect of the project on consumption and investment be included in the overall assessment of project's worth. Similarly the compulsion of the equity objectives required that the

impact which the project would have on the distribution of income between the rich and the poor be also taken into consideration. Attaching of suitable weights to the benefits and costs accruing from the project in the form of consumption or investment and to differently placed beneficiaries was suggested as the way out.

An integration of the L-M method and the UNIDO approach was attempted by John R. Hausen, a member of the World Bank staff in his book *Guide to Practical Project Appraisal*. The Guide was published in 1979 under the auspicious of the UNIDO. It attempted to establish a framework that could bring together the most important aspects of project appraisal including economic and social cost-benefit analysis. Hausen also attempted to provide in the Guide a broad framework within which project selections could be attempted. This framework included an analysis of financial profitability, measurement of distributional impact, consideration of the savings impact and the evaluation of the project in terms of merit and demerit goods and services which it would eventually contributed to the society. A recent addition to the UNIDO Manuals on project appraisal is *Practical Appraisal of Industrial Projects*. The book has been written by John Wass and deals with the application of the principles of social cost-benefit analysis to the appraisal of industrial projects in Pakistan.

Rondenelli refers to the theories which are currently holding ground in the field of project planning and appraisal. The first one is based on Hirschman's principle of the "hiding hand." Hirschman's view is that detailed planning and preparation of projects is a nearly impossible situation and may even be dysfunctional. Detailed analysis is likely either to lead to the elimination of projects from consideration or inhibit "creative responses" which arise when administrators are forced to cope with unexpected events. A hiding hand compensates for time consuming detailed feasibility analysis, design and appraisal. The second theory is based on the formal stance adopted the international assistance agencies to the effect that effective implementation is influenced by detailed preparation and appraisal. There has to be a *prima facie*

assurance, it is argued to the effect that the project will generate the outputs it is expected to produce before money is invested in it. The third theory is linked with the principles of management science. It call for an extensive use of operations research, micro-economic linear and dynamic programming, PERT, CPM and other scientific management aids for ensuring optimal allocation of scarce resources. Development projects must according to this approach be planned in detail, and planning must be undertaken with the help of mathematical logic. There is a lot of commonality between the management science approach and bank ability approach both believe in detailed planning of projects. Appraisal is considered an essential prelude to the commitment of resources for a project by both the schools. Hirschman's approach is an "action oriented" approach and is beset with a lot of unnecessary risk, which the developing countries with scarce resources can hardly if ever afford to take. Projects have to be properly identified, formulated and appraised before investment decisions are taken to ensure success of the development effort.

Literature, whether in the form of guidelines, manuals, articles of special interest, or learned treatises, on project appraisal has in the recent past primarily emanated from international organization, multination agencies and donor agencies and government organizations in industrially advanced countries. Very little has been contributed to the state of the art by developing countries themselves. The main pre-occupation of the newly emerging independent countries has been with planning at macro levels rather than micro levels. This is probably inevitable in a situation where resources are touching the levels of hope is playing hide and seek with the forces of despair, and where something is needed to be done quickly to establish the faith of the common man in the newly established forms of government and leadership. Planning is the most spectacular answer to the challenges of entire modernization ideology and hence its appeal. The euphoria about planning has however, gradually given place to the realization that plans have in the ultimate analysis to be expressed in terms of projects and that the planning objectives have to be achieved through projects.

3. Aspects of project appraisal

The projects differ in their nature and degree of importance attached to them. Projects in social sectors are generally extremely deficient in data that could be used to compute benefit cost of the project. Non availability of data amenable to quantitative analysis does not negate completely the possibility of a thorough appraisal of a project. A project should contain all relevant data and useful information to establish its need, feasibility and profitability. To enable the decision maker to take a decision the project should be appraised from all different points of view. Some of the important aspects of the project, which need immediate appraisal, are given below. This will provide a comprehensive view of the project viability, feasibility and desirability.

3.1 Technical aspects

It is concerned with the analysis of the input and output of the project. Before the implementation of a project, the technological requirements are determined to the utmost details. This is a critical function in the ultimate success of a project. Technical appraisal of a project seeks to ensure that possible alternatives have been adequately considered and that the correct technical solution adopted. The technical analysis of the project often involves examination of the scale of the project. Certain facilities can work economically only on a large scale and to establish such facilities on a more restricted scale may be misuse of scarce resources. Technical appraisal must take into account the appropriateness of location and layout of the project. The examination of proposed location involves question pertaining to resources of raw material, utilities, skilled and unskilled labor as well as market to be served. In the context of education projects location may affect the availability of students' teachers. Location may also increase the cost of the project if residential and hostel facilities have to be created on a larger scale and if utilities are not available. The layout of the project may be important from the point of view of future examination. The examination of the work schedule and identification of likely causes of delay form an important part to the technical aspect of the project

appraisal. The work schedule must take into account seasonal or other variations in working conditions that might interfere with the project. The analysis of estimated cost of creating the facility also form part of technical analysis of the project.

3.2 Managerial aspects

The analysis of managerial aspect is crucial for the success of the project. There is no substitute for good management. Most often good management could make a poor project a success and vice versa. It is therefore essential that the ability and technical know how of the available staff is examined and fair judgement is made whether they can administer the project or otherwise. It is perhaps the most difficult one part because it is an art based on personal experience and judgement. One of the main difficulties arises from the limited concept of the role of management held by many. It is for this reason that exclusive attention is paid to the day to day running of routine business to the utter neglect of some of the other aspects like marketing, labor realigns, financial planning and the like. Shortage of trained and experienced managers is one of the main reasons for poor results of development planning efforts.

3.3 Commercial aspects

The appraisal of projects from the commercial point of view is of particular importance to revenue earring enterprises. The basic questions here are whether adequate arrangements have been made for buying the material and services required to construct the facility and for obtaining required material, services and utilities to operate the facilities and market the output. The commercial appraisal also includes an evaluation of the market demand for the output and the adequacy of marketing channels. This aspect of the project is related to the marketing of the output produced by the project. Careful analysis of demand, identification of potential markets, the mechanism of marketing etc. are essential for the success of the commercial projects.

3.4 Financial aspects

The financial criteria is one of the most important criteria in investment decision making. The financial aspects of the project are crucial in the ultimate decision-makings that whether a project should be undertaken. The financial aspects of the project preparation and analysis include the financial effects on various participants such as government, private firms, etc. The appraisal of projects from the financial point of view also pertains primarily to revenue producing projects. There are two basic issues of concern for financial project appraisal. The first is whether or not sufficient funds would be available for the construction of the project and second whether the enterprise will be able to meet all its financial obligations when it is in operation. The financial project appraisal highlights the needs to adjust the structure and the level of prices charged by the enterprise.

3.5 Economic aspects

The economic aspects are closely related to the financial aspects. In economic analysis an assessment is made to determine the extent of contribution of the project to the economy as a whole. The appraisal of the economic aspect of the project involves benefit cost analysis of different technical solution to arrive the one that gives highest economic return. In project appraisal from an economic point of view, particularly that of revenue yielding projects, it is necessary to take into account the affect of fluctuations on costs of major inputs and outputs, and some other crucial variables. A number of sophisticated techniques are used in benefits cost analysis projects from an economic point of view. These techniques are available in the relevant books on the subject.

3.6 Social aspects

Social aspects are implicitly or explicitly given consideration in most of the projects. This includes emphasis on social aspects of project such as employment, distribution of income etc.

4. Limitations of the project appraisal.

There are a number of shortcomings in the project appraisal techniques described above and these should be fully recognized while using them as decision making tool. Some of these limitations are listed below.

- 1- Quality of the project analysis depends on the quality of data and forecasts made about costs and benefits. Over estimation of benefits and underestimation of costs are quite common to get the project approved if the executing and approving authorities are different.
- 2- In view of the uncertainty about the future it is impossible to quantify completely the risks though sensitivity analysis one way to examine strength of a project against future uncertainties.
- 3- The project analysis is a partial analysis where it is assumed that project will not change the macro economic variables. Such an assumption is not always true and if it does not hold the analysis based on existing prices is not going to give a true picture of the project.
- 4- It is useful device where benefits can be quantified projects related to education where benefits can not be quantified easily benefit cost analysis has little to offer except going for least cost. Similarly project analysis is a useful tool only if major part of benefits are quantifiable.
- 5- Project analysis is useful when there is a definite starting and finishing points. It could not be used for on going services like hospital, educational institutions etc.

5. Project formulation and appraisal distinguished

Project formulation and appraisal are two complimentary and as yet distinct techniques. Both are concerned with the performance ratings of

proposals for investment of resources to generate additional goods or for achieving some other specific social objectives. Project formulation precedes appraisal in point of time. It is concerned with expression of a project idea in terms of certain universal measures of performance. The idea is to make available to the decision-makers a set of valuations on the basis of which they can undertake a comparative appraisal of various projects. The exercise is undertaken either by the project sponsoring system by itself, or with the help of a project formulation team, to identify the optimal performance ratings which a project idea can acquire. There are always a number of ways of implementing a project. Project formulation identifies the best manner of implementation within the resources of the project management system on the one hand and those of the environment on the other hand. During formulation the magnitude, the technology and the design, which will optimize performance, are identified through a process of close collaboration between the sponsoring system and the formulation team. The formulation team collects data and information, explores various alternatives and presents these alternatives to the sponsoring system with or without its own assessment.

Decisions are continuously taken to accept one or the other alternative and the project design is assembled on the basis of these decisions. Project sponsoring systems do not have unfettered discretion at the formulation stage. They have to operate within the constraints of real life project situations. They are free to manipulate certain factors at will (the controllable variables) but they have no control over other factors, which they have to accept as given (the uncontrollable variables). The pay offs from a project can be affected both by the controllable variables as well as uncontrollable variables. Choices have therefore to be restricted to what the two sets of variables taken together will permit. Formulation examines the outcomes of various combinations of strategies and the environment and presents to the sponsoring systems a series of options on the basis of which the comparative worth of the project can be evaluated.

Unlike formulation, which is an exercise in systematic optimization appraisal is basically an exercise in analytical evaluation. Outside agencies, which will eventually participate in the project may be as funding agencies, as beneficiaries, as consumers of the project output or as suppliers of inputs want to know how well the project will perform, how it will affect their own interests, how will it help them in achieving their own objectives. Appraisal provides them with the means of securing the information, which they require.

Appraisal, however, is not an exercise in isolation. It has certain forward and backward linkages. If during the course of appraisal any infirmity is observed in the project design, or in environmental assumptions or in performance ratings, the appraisal team does convey its views and observations to the project sponsoring systems. Appraisal teams in fact do help project sponsors in modifying the project design or in reviewing the parameters of project formulation. Appraisal establishes a communications link between those who will put the project on ground and those who will support or participate in or approve its implementation it gives an opportunity to outside agencies and the decision makers to make their own assessment of the project situation and to know precisely the basis of relationships which the project will establish between them and the project sponsoring systems.

In a situation of resource constraints projects have to be considered not in isolation but with reference to other competing projects. If there are no constraints, appraisal of a well-formulated project is hardly necessary. In real life situations, however, resource constraints are always present. Projects have therefore to be appraised in order to determine not only their intrinsic worth but also their competitive worth.

Project appraisal and cost-benefit analysis

Project appraisal is a multi-faceted exercise. The backdrop for the exercise is provided by the value system of the outside agency or for whom

appraisal is undertaken. Each exercise has to be tailored on the one hand to match the scope of the project, which is being undertaken, and on the other hand to conform to the decision parameters of the agency by or for whom appraisal is undertaken. If the interest of the outside agency is purely financial, it is no use undertaking an elaborate social cost-benefit analysis of the project. If the interest is to know how a particular project will effect the unemployment situation spending energy in evaluating the socio-economic excellence of the project will not meet the needs of the situation. All said and done, however, project appraisal, as it is understood today is a total evaluation of the performance ratings of a project. It covers the technological, the financial as also the socio-economic aspects of the project and presents to the decision-makers not a single figure or numerical value as a measure of excellence of the projects but a set of valuations which encompasses the total performance of the project.

The project has to be evaluated from the point of view of the relationship which exist. It has to be judged from the point of view of technological soundness. The output of the project has to have a market. Project has, therefore, to be appraised from the point of view of the marketability of its output. The project has to provide adequate returns on investment. It has, therefore, to be judged over effects. They give rise to spin effects. Besides, generating new goods or services, project also serve as means of modifying the existing income distributions in a society. The impact which in a society has also to be evaluated to evolve a total picture of the project appraisal encompasses all the encompasses all the issues which are material to decision making in project situations. Cost-benefit analysis is on the other hand only an aspect though an important one, of the appraisal exercises.

7. Project appraisal and investment planning:

Policy planning investment planning and project planning are the four basic facts of the process of planning. Projects are the building blocks of an investment plan. Project planning is concerned with the identification of the best

possible manner of achieving certain specified objectives. Project formulation, the project planning process, defines in clear and unambiguous terms the purpose of the effect, which the effort will have on the project sponsoring system as also on the economy as whole. The process does not confine itself to the analysis of the technical feasibility or financial viability but transcends both technological as well as financial considerations and evaluates the sum total of the effect, which the project will have on availability as well as non-availability in the economy.

Project planning is a step by step exercise involving optimization decisions regarding the scope, the magnitude, the technology, the project duration time, and resource utilization intensity in a heuristic manner, feasibility analysis, techno-economic analysis design analysis, financial analysis and social cost-benefit analysis constitute the main aspects of the project planning exercise.

Feasibility analysis defines the scope of the project, techno-economic analysis the magnitude and strategy designs analysis the duration time and resource utilization intensity of the project. Financial analysis expresses the primary effects of the project in terms of money and develops a profitability profile of the project. The social cost-benefit analysis identifies and aggregates the effects, which the project will have not only on the project sponsoring system but also on the economy as a whole. Project planning expresses the project idea in terms of certain measures of performance, which are relevant to decision making.

A decision to go ahead with a project depends not only on the assessment of whether it would be advantageous for project sponsoring system to go ahead with the project rather than doing nothing but also on a comparison of the performance ratings of other feasible projects. Investment planning takes stock of all feasible investment opportunities and identifies the project mix, which will eventually optimize resource utilization in terms of the overall objectives of the

planning corpus. Project performance data, resource estimates and the policy objective form the main information input for the investment planning exercise. In its own turn investment planning makes available data for the compilation of the resource estimates which are necessary for developing realistic goals and policy irrespective.

Project appraisal is the main tool utilized by investment planners to evaluate the comparative merits of projects of diverse purport. Now two projects are identical in their scope, magnitude, complexity, performance ratings or impact and yet projects of dissimilar characteristics have to be compared and ranked. If resources are unlimited, the problem of ranking would not be there, but it is very difficult to conceive of such a situation in the present day world. Projects have to be compared and ruthlessly evaluated in order to assemble an investment mix which can best serve the purpose of achieving the objectives of the planning effort.

Appraisal helps the decision-makers in applying a uniform yardstick for measuring the performance of various competing projects. It helps in the identifying of the mutual dependencies of various projects and in the selection of a project mix, which is consistent in it makes use of universal measures of performance for project selection and provides an explicitly and verifiable account of the decision making process. It provides data against which the eventual performance of the project can be evaluated. It also provides a reasonable method of ascertaining the real impact of projects and thus makes investment planning more realistic and meaningful.

8. Causes of project failure

Generally project failures are of following types:

8.1 Time overruns:

Time overruns take place when a project is not completed according to schedule i.e., when the time taken to implement the project is more than the anticipated project duration time. Time overruns are the most frequently observed phenomena in the developing countries. Completion of projects on time is an exception rather than a rule.

8.2 Cost overruns:

Cost overruns occur when the actual cost of implementing a project exceeds the project cost anticipated at the time of the investment approval. cost overruns are an inevitable consequence of time overruns, but even where projects are somehow completed on time cost overruns are observed to occur.

8.3 Performance failures:

A project said to fail to perform when it does not yield the anticipated output in quantitative terms or when its output is not of the anticipated quality or when during normalized operations it consumes outputs in larger quantities than what was anticipated at the time of approval. Failure to produce rated outputs is quite a widely observed phenomenon.

Performance failure has a deleterious effect on the profitability of the project. Whenever, a failure occurs the anticipated resource flows both on the input side as also on the output side get violently disturbed. If the changes are of small magnitude new equilibrium levels are soon established but if the changes are large, irreversible processes are set in motion which affect the performance of the project all through its effective life span. Projects form an integral part of the economy. the economy functions in a different manner with a project and without it. The annual value added per unit of investment by a project undergoes a change whenever a change in the performance, or time or cost parameters of the project takes place. The contribution which the project is anticipated to make towards income undergo profound distortions. Aberrations are

introduced in the manner in which the economy is anticipated to function and a number of other activities in the economy are thrown out of gear.

Their area innumerable causes of project failures ranging from design deficiencies to natural calamities, from political interference to non-availability of inputs and from red tape to war. These causes can be grouped into three main categories, viz. environmental factors, design linked factors, and implementation oriented factors.

8.4 Environmental factors

Environmental factors are matters outside the control of the project management systems or matters about which the project management system can do precious little. These factors may be physical, economic, social, political, or administrative in nature. Out of the physical factors the most important are natural calamities and environmental deterioration caused by pollution or over exploitation. Unrealistic planning, shortfalls in foreign aid, failure of infrastructure facilities to develop, uncontrolled inflation are some of the important economic facts which can contribute towards project failures. Changes in government, changes in governmental policies, politicalisation of trade union movement, war and internal disturbances, are examples of political factors, which have a bearing on the performance of projects.

Administrative factors, which can materially affect the performance of projects, include failure of institutional support, lack of coordination amongst various governmental agencies, red tape, and bureaucratic methods. These factors can be as critical to project performance as the environmental factors. Design based factors, which have a direct bearing on project success include wrong data, wrong assumptions, wrong technology, wrong organization design and wrong analysis.

8.5 Implementation oriented factors:

Implementation oriented factors which can lead to project failures may be strategy based, management style based or personnel based. These factors become material at the implementation state of the project.

9 Project appraisal techniques

Broadly speaking any human endeavor, which has specific objective as its goal can be considered to be a project. More specifically, however, projects are endeavors, which involve investment of resources to develop facilities to provide goods or services. A project can also be considered to be a scheme or part of a scheme for investing resources, which can be reasonably analyzed and evaluated as an independent unit. Projects consume resources in highly fluctuation volumes during the implementation phase. Resources are also consumed by projects during the operational phase for assembling the project through-put and for processing it.

In the process of project appraisal various techniques are used but two are most important.

9.1 Benefit cost analysis

The decision to invest in a project is made if the benefits can reasonably be expected to be more than the costs. A project is accepted if the benefit cost ratio is greater than one. This is an extremely simplistic account of highly involved and sophisticated technique. The benefit cost analysis can take various forms and a number of quantitative indices which have been developed to help arrive at a reasonably accurate estimate. There are thus techniques of computing internal rate of return, private rate of return, social rate of return etc. The use of various

techniques of cost benefits analysis presupposes the ability to express project costs and benefits in money terms.

9.2 Internal Rate of return

Internal rate of return is defined as the rate of discount at which the net present worth of the net cash flow (stream of cost minus benefit for each year of the life of the project is zero. Internal rate of return presents the rate of discount at which the discounted present worth of benefits equal the discounted present worth of costs.

9.3 Per unit capital cost

The simplest measure of per unit costs is the capital cost required for creating a facility a seat in an educational institution, a bed in the hospital, providing employment to a worker, providing potable water connection to a housing unit, providing electricity connection to a turbine well etc. This measurement is obtained by dividing the total capital cost of the project by the number of facilities proposed to be created in the project.

9.4 Annual per unit cost

The annual per unit capital cost is obtained by determining separately the capital recovery factor (annual payments required to repay the cost by the end of its expected life) in respect of each investment item and then adding them up.

10. Project as system

Conceptualization of projects as human economic endeavors or complexes of activities yields useful but only partial data about the performance score of projects. A more comprehensive view is possible by visualizing projects as integrated decision making systems designed to achieve specific objectives. Projects in this sense, are groupings of separate but interdependent components

interrelated in their action towards a specific objective. They form a part and parcel of yet another entity, the project universe in which they co-exist with myriad of other systems. Projects derive their sustenance from the universe, which has certain fixed attributes. These attributes taken together constitute the project environment. The project can do precious little about it. For a project to subsist there has to be an internal consistency between its various constituent sub-systems, its resources and its objectives. There has also to be an external compatibility between the project and its environment.

The framework, the structure, the personnel, the funds, the equipment and the management style inter alia constitute the internal thresholds of a project. Projects like other work organizations are distinguished from a crowd or a random assembly of people by a legal framework, an organizational structure, a set of goals and objectives, a code of ethics and compendium of methods. The framework defines the legally accepted form which the project organization will take. It identifies the ultimate decision making authority within the system as also the pattern of ownership. The structure of the system lays down the levels of authority and responsibility in the project entity. It also delineates the parameters of various subsystems in the organization. It has bearing on the management style of the organization and also its code of ethics and compendium of methods. Projects vary in scope, magnitude and complexity/ the project work flow, the way in which activities and events in the project implementation schedule will be sequenced, the project technology, the way in which the project capabilities will eventually be established and the methods of implementation monitoring and control all have a bearing on the success of the project.

The capability of the project to derive adequate sustenance from the project universe and its ability to survive the constraints of the project environment are as material for the success of the project as its economic or technological feasibility. Systems approach enables the appraisal agency to have an over all view of the project and to appraise it not in isolation but in the context of the real

life constraints which the project situation will present as and when the project is taken up for implementations.

11. The scope of project appraisal

Project appraisal, is a step by step process involving the following:

1. The threshold appraisal
2. Design appraisal
3. Cost-benefit appraisal
4. Implementation plan appraisal

Threshold appraisal is undertaken to study the internal consistency and the external compatibility of the project under consideration. Its objectives are to identify the constraints which the limitation of the project management system and the attributes of the project environment impose on the feasibility prospects of a project. The constraints are the hurdles or the thresholds, which the project will have to negotiate during its life cycle. Threshold appraisal is concerned on the one hand with the identification the thresholds and on the other hand with the evaluation of the chances which the project will have of successfully meeting the limitations placed on its development by the thresholds.

Design appraisal is undertaken to evaluate the demand, the technology the inputs and profitability parameters of a project. Project outputs in the form of goods and services have eventually to be absorbed in the economy somewhere or the other. Demand appraisal evaluates the absorption potential of the economy or the target groups qua the output of the project. Technology appraisal takes into account the direct cost as also the indirect costs of the strategy which the project will use as the basis of its design and ascertains the optimality rating of the project strategy. Input appraisal identifies the rate of the abstraction of resources which the project will engender and seeks to match it with the trigger levels of availability of various critical inputs. Profitability appraisal visualizes the

project as a purely commercial proposition and seeks to confirm the financial performance scores assigned to the project. It also seeks to confirm the effectiveness of the financial strategies, the operational strategy and the investment strategy of the project.

Projects in general have implications much wider than what the financial analysis is able to portray. They do not only affect the fortunes of the project management system but also the fortunes of many entity located outside the domain of the project entity. Cost benefit appraisal evaluates the total impact which the project will have on the economy. Some times even a world view of the implications of the project is undertaken so as to assess the impact it will have on the global economy.

Cost benefit appraisal is not an exercise in metaphysics. It is a realistic appraisal of the project situation. Consideration of a project as an isolated activity does not reflect the real life situation. Projects have ramifications for other system with which they co-exist. They abstract resources from the universe which could be used in alternative use by other systems. They disturb the existing state of equilibrium of resource flows in an economy and seek to re establish it at a higher level. Cost benefit analysis takes a total view of the project situation and evaluates the project from the point of view of the overall good it will do to the economy. As has been noted earlier, implementation plans did not generally form a part of the conventional projects reports presented to the decision makers. Once the desirability of implementing a project on the basis of threshold, design and cost benefit appraisal is established it is usual to presume that the implementation planning can be left to the discretion of the project management system. The purpose of appraisal of the implementation plan at the pre-investment stage is not to cramp the style of the implementing agency, but to present to the decision makers as complete and realistic a picture of the project situation as possible.

Investment decision commits the decision makers to an irreversible course of action. While it is true that each and every constraints which will arise during the implementation and the operational phases of a project cannot be visualized and in the fact need not be visualized, it is necessary to provide information to the decision makers on all the matters which are crucial to the decision making process. Project appraisal is not the decision making process it self, nor is it a substitute for the process. It is only an aid, a scientifically evolved technique for the assessment of the total implication of an investment proposition.

Self Assessment Questions

1. Define the project appraisal. How it is different from the evaluation
2. Discuss the role of educational planner in the process of project appraisal.
3. Discuss the importance of project appraisal in the project cycle.
4. Critically analyse different aspects of the project appraisal. To what extent these are helpful in the finalization of a viable project.
5. Elaborate some of the techniques being applied in the project appraisal.

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**STRATEGIC MANAGEMENT OF DEVELOPMENT
PROGRAMMES: PART-1**

**Adapted for
Project Implementation, and
Evaluation Course**

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The contents of the units 10 and 11 are a reproduction of an International Labour Office, Geneva Publication, Strategic Management of Development Programmes by Samuel Paul. The contents have been reproduced with the permission of ILO Geneva, for use in the Allama Iqbal Open University's course on "Project Implementation, Monitoring and Evaluation".

M. ATHAR KHAN

A WORD TO THE STUDENT

The concept of strategic management of development programmes is comparatively a recent development in the management science. It has been included in this course particularly as an aid to project implementation and monitoring. Originally the text was produced by the International Labour Office, Geneva with the financial support of the UNDP Inter-regional Programme as one of its Management Development series. As the titles of the publication and the units suggest the contents relate to management of development programmes. But, it should not lead the reader to thinking that it is not related with the course which is a course about projects. The students of the Educational Planning and Management know that, in effect, when the programmes are implemented they take the form of a project. However, while studying these units the student should always keep in mind that the contents of these units have been written keeping in view a wide range of readers world over. They were neither written with a particular reference to Educational Projects nor was there a reference to the conditions of any particular country. The student will, therefore, find that the strategies of Project Management as outlined and described in these units have a very general application to project management in many areas. The student, of course, has to use his own commonsense and field experiences in education project management to discover elements which are in common with what is contained in these units.

M. ATHAR KHAN

OBJECTIVES

After studying this unit you will be able to:

1. describe the concept and scope of strategic management;
2. use the strategic management in project planning and implementation;
3. explain the fundamentals of strategic management.

CONTENTS

(Part — 1)

	Page No.
ACKNOWLEDGEMENT	145
A WORD TO THE STUDENT	146
OBJECTIVES	147
Introduction	151
1. Development Programmes: Concepts and Scope	154
1.1 Promise and Performance	
1.2 Nature and Scope of Development Programmes	
1.3 Programme Phases	
2. The Pre-conditions of Performance and the Public Context	167
2.1 Three Constraints	
2.3 Pre-conditions of Performance	
2.3 Guidelines for Programme Designers and Managers	
3. Strategic Management: The Basic Factors:	177
3.1 What is Strategic Management	
3.2 The Concept of Congruence	
3.3 Top Management's Role	
3.4 Points to Remember	
4. Reading the Environment	186
4.1 The Role of Environmental Analysis	
4.2 Scope, Diversity and Uncertainty	
4.3 Guidelines for Environmental Analysis	

	Page
5. Formulating the Programme Strategy	199
5.1 The Basic Influences on Strategy	
5.2 The Service-Beneficiary-Sequence (SBS) Strategy	
5.3 The Demand-Supply-Resource (DSR) Strategy	
5.4 Some Guidelines for Strategy Formulation	
SELF ASSESSED QUESTIONS	215

INTRODUCTION

A wide variety of development programmes operate in the Third World today. Governments and international donor agencies have spent considerable amounts of money on them and are concerned about the viability and performance of many of them. Increasingly, it is being said that their planning and implementation leave much to be desired. Even those with the right technologies and enough funds seem to perform poorly. It is not surprising, therefore, that "management" has been identified as a neglected factor. The realisation that technology, capital and management are complementary is an important step forward in understanding development programmes.

Unfortunately, little knowledge exists on how to organise and manage development programmes. Traditionally, the focus has been on the technology and economics of programmes, not on their management. The bureaucrats and managers of programmes were left to improvise and muddle through. Invariably, they ended up adopting the systems, practices and administrative processes common in government. No doubt, specialised techniques and tools were sometimes borrowed to improve decision making. Thus budgetary reform or new systems for recruitment were sometimes introduced. But no over-all framework exists for thinking about and planning for the management of development programmes.

This book is a modest attempt towards filling this important gap. It presents an approach to the "strategic management" of development programmes. The concept of strategic management developed here draws upon the current management literature and related disciplines, and derives support from a recent international study of several successful development programmes.¹ The meaning, scope and significance of strategic management of development programmes are discussed in detail in the following chapters; they are based on an analysis of the characteristics that the successful programmes shared.

In chapter 3, strategic management is defined as the inter-related set of top management interventions which create the framework within which operational decisions and actions are taken to accomplish the goals of a development programme. To create this framework, programme managers must pay special attention to four main influences on a programme's performance. These are the programme's environment, strategy, structure and process.² The essence of strategic manage-

ment is to create a "fit" among these so that the programme gains from their internal consistency or "congruence". Strategic management refers to the process by which top managers identify and influence these factors, and continually create a fit among them. If the operating decisions and actions are to improve the performance of development programmes, the starting point must be the practice of strategic management.

This book is written for programme leaders and managers first of all. In a development programme, it is the leader who must initiate the practice of strategic management. Only he or she can create the management framework within which other members of the organisation can operate effectively. The ideas and guidelines in this book are, therefore, addressed to the programme leader and the top management team.

Management institutions constitute another very important audience of this book. Many of them have identified project and programme management as a priority area of the interventions in the forthcoming years. They are keen to increase their impact on development programmes by helping to analyse problems faced by managers, design and apply more effective management and control systems, define and introduce appropriate criteria of programme performance, and provide various types of practically oriented training in programme and project management. The book should provide some guidance both for practical analysis of problems faced by programme management and for management training programmes which address these problems.

The approach to strategic management presented here will also interest ministers and other policy makers, administrative heads of ministries and planners who initiate and oversee development programmes. These people are responsible for providing the framework within which programmes are designed and operated. When they do this poorly, the performance of programmes suffers. Programme managers undoubtedly need their support and understanding in order to practise strategic management. Only when policy makers and planners understand the implications of strategic management can they create the pre-conditions to make it work. In this sense, the strategic management approach is equally relevant to the political and administrative leaders and technocrats in government who play entrepreneurial and controlling roles in development programmes.

Our focus is strategic management; we do not explore the problems of operational management that development programmes face, even

though these are important, and programme managers do spend significant time on them. A discussion of operational or short-term problems would have made this book too long, and information about operational management is available elsewhere. In fact, most of the consulting and training programmes today are largely concerned with this class of management problem, e.g. performance evaluation, budgeting, pricing, etc. What is lacking is the larger framework within which these problems can be more readily solved. Strategic management should, therefore, assist programme leaders to solve operational problems better.

Finally, a caveat is in order. Strategic management is not a panacea for all the ills of development programmes. When the basic policies of a country are in disarray, its manpower shortages severe, and its financial resources scarce, it will not be able to get its development programmes off the ground. If good leaders cannot be found, programmes will suffer. When people are not motivated, their response to programmes is bound to be limited. Countries differ in the degree to which their peoples are result — or performance-oriented. This problem of achievement motivation is characteristic of many developing societies. It is a constraint which should be considered in assessing the environment of any programme. To put these matters in perspective, the pre-conditions for strategic management are discussed in chapter 2. But the pre-conditions alone do not guarantee good performance. Strategic management is vital even when all the pre-conditions are met.

The book has nine chapters. The nature and scope of development programmes are explained in chapter 1. Chapter 2 examines the pre-conditions of performance in the public context, in which most development programmes are designed and carried out. The concept of strategic management, its components, and their interrelationships are discussed in chapters 3 through 8. The end of each chapter contains questions and guidelines to facilitate a review of the concepts discussed and to help the manager apply them to his or her specific situation. In training programmes, teachers and trainers may wish to use these questions with case studies or experiences of programmes. The concluding chapter 9 offers practical suggestions for policy makers and programme managers on how to put strategic management into action in the particular context of a new or an ongoing development programme.

DEVELOPMENT PROGRAMMES: CONCEPT AND SCOPE

It is nearly three decades since macro-economic planning became fashionable as a tool of development in the poorer countries of the world. Macro planning, also known as development planning, was expected to give a sense of direction to national economies and provide a basis for allocating scarce resources among the priorities for development identified in national plans. Irrespective of their ideologies, many developing countries, which became politically independent in the 1950s and 1960s, were soon attracted towards systems of national economic planning. The scope and sophistication of planning, of course, varied considerably from country to country. Thus India formulated and publicised a series of "five-year plans". Nigeria adopted six-year plans, whereas many other Asian and African countries have had three and four-year plans.

Macro planning entails varying degrees of public intervention in economic and social activities. Development plans consist not only of patterns of resource allocation and long-term national budgets, but also certain strategies for developing different economic sectors. The pace and type of development of agriculture, industry, education and other social services are spelt out in the plan documents. Since the private sector is limited in its capacity to raise the resources and is often regarded as an inappropriate instrument to implement the proposed changes, the State decides to actively intervene and manage many new development activities. This is true not only of infrastructure development such as roads, ports, communication and power, but also of certain categories of industry and critical support systems required for agricultural and rural development. Thus irrigation projects, agricultural extension services and common facilities for small industry development, to cite just a few, are usually promoted under public auspices. Such public interventions are usually termed "development programmes".³ A macro plan consists of several development programmes, depending on the public interventions being envisaged during the plan period. It has been

estimated that in many less developed countries (LDCs), nearly 50 per cent of the annual budgets of governments are spent on development programmes.⁴ The development plans and programmes of LDCs, therefore, consume a significant share of their resources.

1.1 Promise and Performance

Though most developing countries have allocated significant resources to development programmes over the past two decades, performance has not matched expectations. In some countries and in some sectors, results have been impressive. But over-all, the performance of development programmes is by no means encouraging. The impact of development programmes on rural areas, where most people in the developing world live, has been dismal. Almost 20 years ago, Waterson observed:⁵

With many factors accounting for the inability of most countries to achieve targets in their plans, a question arises whether one factor — more than any other — is responsible for this inability. Until very recently, it was thought that the key element in the planning process was the formulation of an economically consistent plan. While the importance of a well-prepared plan based on clearly defined development objectives is indisputable, it was not generally realised that a consistent plan does not ensure implementation any more than an inconsistent one. When the plans they had prepared were not implemented, planners trained as economists assumed, and still

and still assume in some circles, that the failure to achieve targets was mainly attributable to errors in computing and allocating resources or to errors in basic data.

The widening gap between promise and performance has opened the eyes of planners and policy makers to the limitations of macro planning. Planning was a useful aid for choosing development goals and allocating resources. But planning alone does not ensure performance. In many countries, planners have refined their methodologies and introduced new planning models. But there is little correlation between the sophistication of planning and national performance. This realisation has led some planners and international agencies to focus on how to formulate better programmes and projects. A consistent macro plan is still practically useless unless the projects and programmes which constitute it are well conceived and selected.⁶

By far the greatest number of failures to carry out public sector projects and programmes at reasonable cost in reasonable periods of time are traceable to inadequate project selection and preparation. Few less developed countries are fully aware of the necessity for selecting soundly conceived projects with potentially high yields, defining their scope with clarity, estimating their national currency and foreign exchange requirements with a sufficient degree of accuracy, and laying down realistic schedules for their execution; fewer yet have the administrative capacity and the potential will to cope with these needs and, especially, to carry out plan projects and programmes in accordance with carefully developed programmes of action.

In the late 1960s, many countries began to recognise the importance of designing projects competently and choosing them carefully. Project appraisal tools became popular in many planning agencies. National and international organisations disseminated new ideas on project appraisal and cost-benefit analysis through their "manuals".¹ Attention thus shifted from macro to micro planning. Leading financial institutions, such as the World Bank, now conduct carefully project appraisals before they lend money to LDCs for specific schemes. Country officials are trained to use the new methodologies and a new kit of tools has been added to the development planners' armoury.

Analysing the costs and benefits of industrial and conventional infrastructure projects is relatively easy. Technologies are known, demand can be estimated, and monetary calculations are not terribly difficult to make. But, with the growth of development programmes in social sectors such as education, health and nutrition, many assumptions of the new methodology have been called into question. Technologies had to be evolved or adapted. Estimates of demand or public response have generally turned out to be extremely misleading. Projects that were considered viable when formulated and appraised turned out to be low performers when implemented. Even industrial and infrastructure projects, though carefully prepared and evaluated, have actually performed poorly.

Thus, a new class of problem has been identified as responsible for poor performance. It now seems that inadequate attention has been paid to the implementation of projects and programmes. Decision making is tardy and organisation arrangements for managing the projects are vague. Even when projects were physically completed, too little attention was

paid to getting them to perform well and to maintain the facilities. Many observers have called this set of issues "management problems" and have argued that the widening gap between project and programme plans and their performance is largely due to management failures. Unfortunately, planners too often view implementation and management as issues outside their purview. The dichotomy between planning and implementation prevailing today in many countries reflects inadequate appreciation of the interaction between the two. Planners are reluctant to recognise feedback on implementation problems as an input to the planning process. Further refinement of planning tools and models cannot possibly make up for the deficiencies in implementation and management.

This brief review reveals a gradual evolution in our understanding of developmental processes and performance. The concern about management of development programmes can be traced to the dissatisfaction with the performance of development plans and programmes. This does not imply a rejection of planning. Macro planning, micro planning and public management are complementary, not substitutes for each other. This book focuses on the management of programmes. What is special about development programmes and makes them difficult to manage?

1.2 Nature and Scope of Development Programmes.

Development plans typically consist of numerous programmes organised and managed by public agencies. Even countries without such macro plans have many programmes managed by public agencies. Thus development programmes are found in all developing countries, including those who do no macro planning. Agriculture, industry, health, education and housing are important sectors where development programmes have been undertaken. The rice production programmes in the Philippines, the family planning programme in Indonesia, the rural electrification programme in India, the adult education (literacy) programme in Tanzania, etc., are sectoral programmes. Programmes have also been organised for the development of infrastructure such as roads, communication and other public utilities. In some countries, infrastructure and common facilities for small industry development may be provided through an industrial estates programme. Many countries commonly organise such programmes through agencies created by ministries or departments.

Sometimes, development programmes are organised for specific regions or areas in a country. For example, irrigation programmes are feasible in defined areas for physical and geographic reasons. Some countries have programmes to develop backward regions with special authorities or agencies to plan and integrate the different inputs and facilities needed to promote development there. Venezuela's development programme for the country's Guyana region is well-known. India and Brazil similarly have special programmes for their backward regions. Sometimes, sectoral programmes which are nominally national in scope may in fact be confined to limited areas. Agricultural crops may be grown only in certain regions. Thus, the smallholder tea development programme of Kenya operates only in 12 out of nearly 50 districts because tea cannot be grown everywhere.

The third category of programmes are multisectoral integrated programmes. Some sectoral programmes for single commodities or services integrate different inputs and activities to promote the commodity or service under the same programme. Thus the Kenyan programme for tea not only provides extension services, but integrates it with credit, leaf collection, processing and marketing. On the other hand, integration may occur across sectors as in integrated rural development programmes. Though the scope of such programmes varies widely, most are based on the concept that income-generating activities and social services which enhance the quality of life should be provided simultaneously in order to facilitate sustained rural development. This programme design calls for the integration of agricultural development with the provision of health and education, and related infrastructural facilities. According to a recent UN report:

The concept of integrated rural development, and thus the resulting programme configuration, is likely to be defined differently in different settings and in accordance with the definers' frames of reference. Various definitions have been examined at international meetings, and new ones have come out of such meetings. However, there appears to be no overwhelming evidence that fundamental changes in definitions have been made. The current definitions of IRDP, like the old, refer to the interface and mutual reinforcement between social and economic development at both national and sub-national levels, to the consequent need for comprehensive approaches to rural development, to the importance of popular participation and local decision-making and to the multi-faceted character and breadth of the development process. Current defi-

nitions, again like the old, refer to integrated rural development in both substantive and procedural terms and subsume combinations of purposes, strategies and outcomes in the definition itself. However, the current definitions more explicitly identify the poor in the rural areas as the principal clients, and more directly aim programmes at such specific goals as employment, increased agricultural production, augmented income and equitable distribution thereof and greater access by the rural poor to public services.⁷

Integrated rural development programmes are now common in the developing world. In the Philippines, a new integrated rural development programme is being carried out under the supervision of a cabinet sub-committee. Colombia has an Integrated Rural Development Programme. Mexico's PIDER is a national programme to develop rural infrastructure. Many integrated rural development projects operate in limited geographical areas.⁸

Some programmes which started as single sector projects later evolved into multi-sectoral programmes. This was the case with the Cameroon Land Settlement Scheme which expanded into a broad integrated socio-economic development programme. In many countries, all these different types of programmes operate simultaneously. Thus in Kenya, the smallholder tea development programme operates alongside the Special Rural Development Programme. Many programmes emerge as adaptations to local conditions, problems and needs. The "commodity" as against the "area" approach, or "national" as against "regional" scope do not necessarily represent right or wrong choices, but rather options, appropriate in certain conditions, inappropriate in others.

Our threefold classification of development programmes can help us understand the complexity and scope of public interventions. Sectoral programmes generally aim to develop a single commodity or service nationally. Regional programmes also develop sectoral services, but in sub-national (regional) areas. Inter-sectoral (integrated) programmes focus on several sectors and call for a careful integration of diverse sectoral inputs. National integrated programmes exist but are rare. Sectoral and regional programmes are most common, with integrated inter-sectoral programmes gaining in popularity. This classification, however, helps little in judging the superiority or viability of a programme. Many other things must be considered, as we shall explain in subsequent chapters.

Irrespective of classification, all development programmes are "instruments" of public policy and "intermediaries" between the beneficiaries at the grassroots and national or regional governments. Traditionally, governments implemented policy directly through ministries and departments without the "intermediation" of special agencies or institutions. Thus tax collection, maintenance of law and order, etc., have always been managed departmentally without creating separate organisational entities. Development tasks, however, necessitate the creation of new instruments that can better acquire and process complex, specialised and diverse inputs to meet the needs of specific segments of the population. This is the rationale of development programmes.

Development programmes are usually conceived at the national level and operate through sub-programmes designed to cover different regions such as states or different functions and groups of services. A rice development programme might have sub-programmes for extension, irrigation, credit, seeds and fertilisers, each broken down regionally. The sub-programmes in turn might be a series of discrete, interrelated or sequential projects integrated into a relatively permanent delivery system. Programme implementation is expected to occur through its location and service specific components which interface with clients or beneficiaries where they live or work. Thus, for example, agricultural or small industry development programmes may deliver their services through units set up near the farmers or entrepreneurs throughout the region or country.

The terms "projects" and "programmes" are often used interchangeably. Project orientation often dominates because aid agencies tend to design and promote pilot projects or limited-area projects. However, major institutions such as the World Bank have been involved in broader, ongoing activities. The development and management of national or regional programmes to replicate pilot project results are usually the responsibility of the governments. There are, of course, some projects which are of a continuing nature, e.g., irrigation projects. Donor agencies tend to be involved in such projects for a short or medium term. Donors' time perspectives, therefore, tend to be shorter than those of national governments, which have long term responsibilities to manage such projects. Donors' relatively limited involvement in larger programmes partially accounts for the comparative neglect of programme management. Pilot projects and limited-area projects are to national programmes what research and development (R&D) projects are to large

corporations. The products the corporations sell often result from R&D projects, but the corporations' problems of managing commercial production and marketing of such products are distinctly different from, and often more complex than, the problems of managing their R&D projects. Similarly, the management problems of large development programmes are different from those of the pilot projects which supply the "products" to be replicated by programmes. The problems of large programmes also differ from those of the smaller, simpler time-bound projects.

By neglecting to study the larger, national programmes, we have ignored an important class of public management problems.⁹ This gap must be filled, because the replication of project results occurs almost solely through the medium of larger programmes. The ultimate test of the success of pilot projects is the extent to which they are replicated or adapted nationally. The author of a study of selected pilot projects in developing countries once concluded that they were successful because their technical findings were promising. Further investigations, however, revealed that none of the countries extended, adapted or replicated any of these projects. One cannot seriously attribute success to projects that have failed this basic test of replicability!

Studies of development programmes and projects reveal a strong sectoral orientation. Since most donor agencies and LDC governments are organised sectorally, projects and programmes are dominated by sectoral technologies and contexts. Public management problems then appear unique to each sector and cross-sectoral comparison and learning is resisted. For example, few health programme managers know much about agricultural programmes and what each could learn from the other. Researchers follow similar paths. Developments in the theory and practice of public management have consequently suffered.

Sectoral differences do require different management practices.¹⁰ Programmes which provide direct and immediate economic gains should be managed differently from those which do not. Entrepreneurs respond eagerly to industrial development programmes likely to generate profits, whereas illiterate villagers may not want to participate in a preventive health programme. Programme management practices must allow for such differences, but inter-sectoral comparison is necessary to identify which successful practices can be transferred and where distinctly different practices are called for.

To understand better the nature and scope of development programmes, four distinctive features are outlined below:

Policy Sanction

Normally, a specific legislative enactment precedes the creation of a public programme. Thus an authoritative decision of the government stands behind every development programme. The concept of policy sanction is applicable even in countries without development plans. US public programmes, for example, have appropriate legislative approval behind them. In countries with national development plans, an executive decision suffices, since the national plan containing the programmes has legislative approval. Presidential decrees, acts of parliament, etc., reflect formal authoritative government decisions.

Development Focus

In contrast to regulatory programmes whose developmental impact might be indirect, development programmes are expected to generate economic and social outcomes (measurable and immeasurable) consistent with national development goals such as income growth and distribution, and improved quality of life. Their tasks are such that the discipline of the market mechanism is rarely an adequate framework for planning and controlling their operations. Development programmes, therefore, fall between purely regulatory programmes at one end of the spectrum, and commercially oriented public enterprises at the other.

Organisational Identity

A development programme is an entity with its own organisational structure, budget and personnel. Even a programme under the administrative control of a ministry or a government department has its own organisational structure, assignments of tasks and responsibilities and reporting relationships. Development programmes can thus be distinguished from temporary systems and short-lived experimental projects. They are usually set up as authorities, boards, councils and other bodies with their own organisational identity. They may be fully or partly financed from government sources. Some may be self-financing agencies.

Replication

A programme's mission tends to be the replication or adaptation of a "developmental product" or "service" over the entire country, or some

of its constituent regions to benefit specified client groups. The developmental services need not be a physical commodity; it may be a system designed to deliver a product or service inside a specified geographical area and determined by the techno-economics of the sector or sectors and the existing geographic and organisational conditions. Thus in a health programme, the service is not the set of individual health services (which are, of course, of direct concern to the beneficiaries), but the system designed to assemble and deliver them at the village, sub-district, or district level. Similarly, it may be misleading to define the output of a dairy development programme as "supply of milk"; its service might well be a system to integrate services to produce, process and market milk to benefit specified client groups. It is this system which a pilot project tries to test, and a national programme tries to replicate and adapt it over large areas.¹¹

The "service" underlying a development programme is either developed indigenously, or designed abroad and borrowed or adapted from foreign experience. Borrowing or designing models from abroad is extremely common among industrial programmes. Agricultural, rural development and social service programme designs are less easy to import. In fact, such models may not even exist. The concept of the service must then be developed indigenously. Whatever the approach, there is likely to be an identifiable service that a programme attempts to replicate. Again, the nature and scope of the service might well change with experience. The needs of the clients may change, necessitating changes in the service. Serious problems arise in large development programmes when services are specified inappropriately or the service or output is poorly understood.

1.3 Programme Phases

Policy sanction, development focus, organisational identity and replication characterise all development programmes whether sectoral, regional or inter-sectoral. Pilot projects, experimental interventions and "crisis" programmes rarely possess all these four features.¹ However, development programmes which have all these features are not necessarily permanent. Some have permanent missions, others are phased out over time. We need, therefore, to examine their "life cycles".

Life cycles of development programmes can be divided into phases which sometimes overlap. The pilot phase is the initial period when a "product" or service is being designed or adapted. This may or may not

precede the formal launching of a national programme. The Mexican rural education programme organised by CONAFE started with a pilot phase when experimental work was done in a hundred community schools. The Philippine Rice Programme benefited from a pilot project involving 10,000 hectares. Pilot projects did not precede the Indonesian Family Planning Programme, but were undertaken concurrently with the programme. Many large programmes suffer either because pilot projects were never thought of or useful feedback from such experiments was lacking.

The replication or adaptation phase begins when the programme is extended from the pilot area to other areas. This phase offers the maximum challenge to the strategic and operational management of the programme. The growth in the size and complexity of the programme due to spatial expansion creates tough management problems which cannot be studied in the pilot phase. A pilot project confined to a few villages can be supervised personally by the project manager. He manages with simple systems and informal face-to-face relationships. The problems of a complex organisational structure (e.g., motivation and control of personnel, and decentralisation) rarely arise in the pilot project. These occur only when the project is extended or replicated on a larger scale.

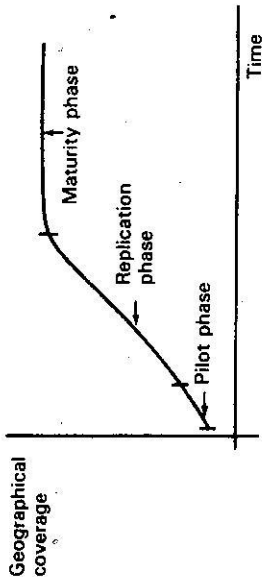
Once a programme has completed its replication phase, its maturity phase starts. Depending on the type of service, the maturity phase takes one or three forms: (1) it may continue indefinitely as long as the service is needed (e.g., the generation and supply of electricity, health services, etc.); (2) it may be terminated if the service is no longer required or the client groups or private agents can take over (e.g., agricultural extension and input services, family planning, etc.); (3) the programme may be diversified, taking on new tasks, but carrying on the original service as part of its broadened mandate. For example, population or health programmes sometimes diversify to provide nutrition services without giving up the original services.

Management problems are most severe during the replication phase because formal systems must replace informal relationships in "scaling up" from the pilot phases, and during the maturity phase if the programme becomes diversified.

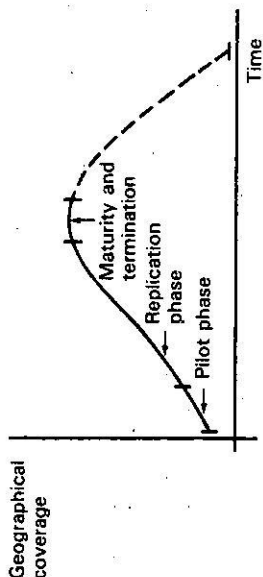
Figures 1.1 through 1.4 illustrate the phases of a programme's life cycle and the different options it may choose at maturity. The horizontal axis represents time in years and the vertical axis represents the

Figure 1 Life cycle and phases of a development programme

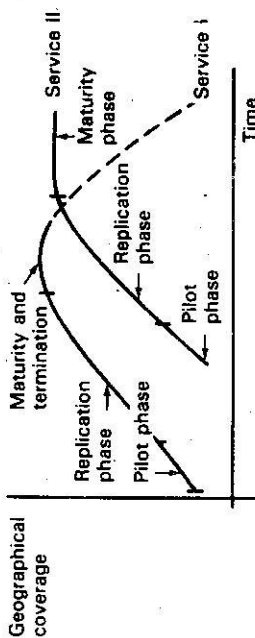
- 1.1 A programme that eventually provides permanent services



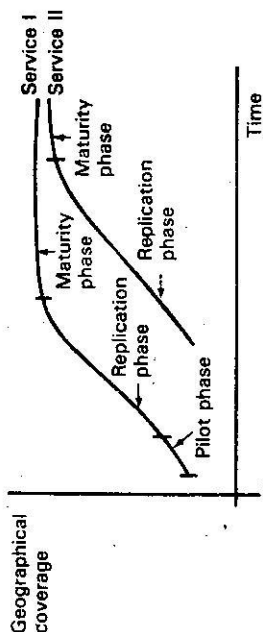
- 1.2 A programme that winds down upon fulfilling its mission



- 1.3 The replacement of one service by another at maturity



- 1.4 Sequential diversification of programme services



geographical coverage. In the pilot phase, coverage is usually quite limited. The time taken to complete the pilot phase is often small compared to the programme's life cycle. During replication, geographical coverage increases. Maturity signifies stability, both geographically and in service delivery.

Figure 1.1 depicts the life cycle and phases of a development programme that takes on permanent services. Figure 1.2 represents a programme which, having fulfilled its mission, gradually winds down and terminates its service during its maturity phase. In figure 1.3, the programme divests itself of one service upon reaching maturity and develops another, repeating the cycle.

"Sequential diversification" is depicted in figure 1.4; service I continues permanently and service II is then added, starting from its own pilot phase. The programme thus diversifies sequentially and offers both services on a continuing basis.

All these alternatives can be found in different countries, even though not all programmes have formal pilot phases. In some programmes, experimental or pilot projects may be currently undertaken when the programme is initiated. This was true of the Indonesian Population Programme. The country already had some experience with family planning when the programme was launched. Many programmes have come to grief because the pilot phase was skipped and programme strategies did not take into account the features of the national or regional environments. Some programmes compensate for the lack of a pilot phase by limiting their geographical spread initially and expanding their scope carefully through a learning process.

In summary, awareness of management problems of development programmes is growing as experience accumulates on the limitations of macro and micro planning. Development programmes have emerged as important instruments of public policies articulated in development plans, but are common even in countries which do not practise macro planning. Programmes must be distinguished from pilot projects and other temporary programmes which lack organic links with the more durable public interventions. Four common characteristics of development programmes are policy sanction, development focus, organisational identity and replication. Development programmes need not be permanent. It is useful to delineate three phases in their life cycle, namely the pilot, replication and maturity phases. A programme may continue to operate permanently when it offers a service in continuing demand or diversifies to provide new services which meet the long-term needs of beneficiaries.

2. THE PRE-CONDITIONS OF PERFORMANCE AND THE PUBLIC CONTEXT

Important differences exist between public and private management which make the public manager's task difficult. Coping with these constraints is part of the role of those who manage development programmes.

2.1 Three Constraints

First, there are constraints on the choice of goals. The broad objectives to be achieved by a development programme are generally laid down by policy makers. A private enterprise, on the other hand, is largely free to choose its goals. A development programme may be given diverse or multiple goals, some of which may be conflicting. The outputs of a programme are often difficult to measure. A rural development programme, for example, may be expected to increase agricultural production, improve the conditions of the poorest people, and provide health and educational services to them. All these goals may have to be pursued simultaneously even if some of them conflict with each other. Private enterprises are seldom loaded with such a diversity of goals and expectations. The limited flexibility available to the public manager to choose programme goals is thus a constraint.

Second, those who manage development programmes usually have fewer means to choose from than those who manage private enterprises. This is because governments often prescribe the systems and processes of decision making in organisations which use public funds. In private management, means are more easily adapted to goals. Organisational processes and practices are more flexible. Results come first, means second. In public management, on the other hand, means are treated on a par with goals. The constraints on means often hold back goal attainment. The rigid norms prescribed for purchase of goods and services, budgetary sanctions, and performance evaluation may be such that operational decisions consistent with efficient goal attainment may be discouraged. Thus public managers seldom get the instruments necessary to achieve programme goals.

Third, the orchestration of goals and means is often constrained. Goals and plans must be modified to match changing situations. The means to achieve goals must be adapted. But adaptation is difficult when goal setting and policy making are isolated from the process of

implementation. Policy making and implementation can be separated successfully only if policy makers have enough information about implementation and the environment is stable so that midcourse corrections are unnecessary. Neither assumption is valid for most development programmes. Policy makers are seldom fully informed about the course of implementation nor can they anticipate all future problems. The environment does change over time, necessitating frequent adaptation of policy and implementation decisions.

163

The public sector customarily assigns different sets of actors to the policy making and implementation roles. The goals and design of a development programme are usually specified by top government policy makers, including political leaders. Another set of officials, minimally involved in policy and planning, usually implement and manage the programmes. Political appointments at top government levels strengthen this cleavage. The people who establish goals and task thus commonly fail to understand implementation problems and those who implement often fail to understand the goals. Planning agencies, external donor agencies and high level staff groups in ministries design the policies and leave implementation to lower level civil servants to newly recruited managers from technical colleges. Design changes usually require the approval of policy makers.

Sharp cleavages between policy and implementation are rare in the private sector. There, managers at different levels are encouraged to generate policy-design ideas and interact actively with corporate planners before formal decisions on policies and designs are made. Chief executives play crucial integrating roles. Those who are called upon to implement or manage new projects or plans may well have been active participants in the initial formulation, and are given adequate powers to adapt to changing conditions.

It could be argued that the state has a greater control over its environment than the private sector does and that the task of goal-means orchestration is therefore easier for government agencies. But in practice, a public agency's ability to achieve such orchestration is limited for several reasons. The large size of government with its centralised decision making processes and multiple programmes restrict manoeuvrability. The relatively weaker emphasis on accountability for results reduces the pressure for achieving orchestration. The diverse political pressures on programmes and the consequent compromises public managers make also weakens orchestration.

The three constraints on goals, means and goal-means orchestration operate in varying degrees in all development programmes. Many cases could be cited to show how programme performance was hurt as a result of delayed responses to the need to adapt to changing conditions. Slow approval from higher authorities in government and slow concurrence of donor agencies weaken orchestration at the programme level. This problem is by no means unique to LDCs. Studies of public programmes in the USA in urban development, employment generation and education^{1 2} provide evidence of similar constraints in developed countries too.

If a programme is to succeed, government should choose goals consistent with the means available or adapt the means to fit the goals, and create organisational structures and processes which facilitate the orchestration of the two. The failure of most governments to fulfil these conditions makes the task of public management more complex and onerous. The private manager has more control over these matters than his public counterpart. Those who manage development programmes thus start with a handicap. Exhortations to public managers to practice what is best in private management ignore the significance of the relative difference between the two environments.

2.2 Pre-conditions of Performance

Performance of development programmes is influenced by more than quality of management. While management interventions are an important determinant of performance, many observers have noted the critical role of political commitment and support, resource availability and the quality of programme leadership in facilitating successful outcomes. Programmes which lack these cannot perform satisfactorily even if managers are competent. A useful way of characterising their role is as follows: political commitment, resources and leadership are enabling conditions. Their presence facilitates the contribution that management interventions can make to improved performance. Let us examine the three pre-conditions.

Political Commitment and Support

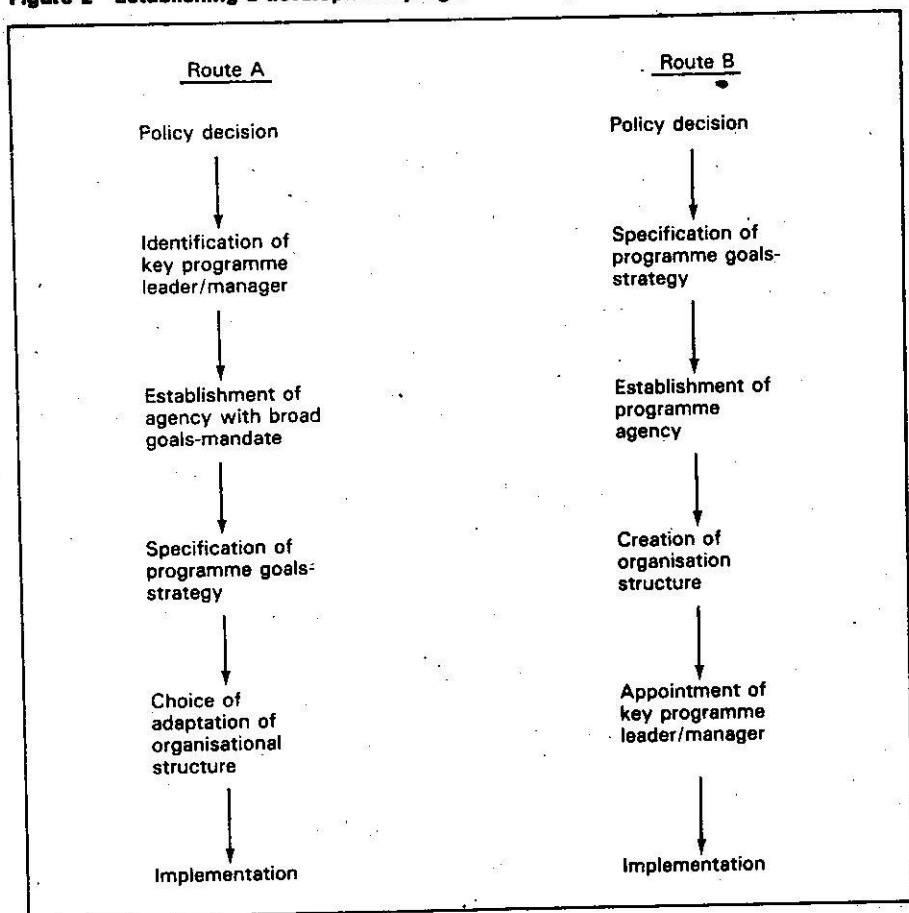
All public decisions are, in the final analysis, political. A decision to allocate increased funds to rural development or set up industrial estates to support small-scale industry reflects some political commitment to these policies and programmes. The degree of political commitment and support to different programmes varies. The stronger the

support and political consensus behind a programme, the greater the likelihood that programme managers will work in a favourable environment. Thus when a president, prime minister, cabinet or other key groups which wield political power are seriously committed to a programme, many external and internal obstacles which normally constrain good performance may be removed or weakened. Similarly, where top political support is feeble or nominal, programme managers find it difficult to mobilise the needed resources and achieve the intended impact. This applies even to policies and programmes included in national development plans. No effective action on policy decisions and programmes can be taken even when they are part of a plan. Often, the problem can be traced to a lack of political commitment. Some pilot projects and more durable programmes sponsored by donor agencies also experience the same fate. New projects may be initiated by an LDC government goaded on by a donor. When the latter withdraws, the projects fall apart or are not extended. Analysis often shows that there was no strong political commitment to these projects from the outset.

How a programme is set up tells us much about the political commitment behind it. Figure 2 depicts two alternative routes which political leaders often take in establishing development programmes. Top political leadership should be broadly interpreted to cover the top bureaucrats in a country who advise political leaders and whose views therefore influence final decisions in these matters. Route A is typical where a political policy decision is made to launch a development programme. The need for a public intervention is established, but detailed strategies are not worked out. Instead, a search is started for a suitable leader to plan and manage the programme. When the key leader is identified, a public agency is formally created or adapted with a broad mandate to formulate a strategy and mount the programme. It is the programme leader or manager who then draws up the detailed strategy and recommends plans for implementation including the organisational structure. Route A clearly reflects a high degree of trust in the programme leader by the political leadership and the latter's willingness to share "power" with him in the programme's planning and implementation.

Route B also starts with a top policy decision. The sequence of decisions or actions from then on, however, is quite different from that of Route A. The policy decision is followed by the specification of programme goals and strategy. A programme agency is established and its organisational structure is designed. The key programme leader or mana-

Figure 2 Establishing a development programme: sequence of interventions



ger is then appointed. His responsibility is to implement the programme. Here, the political decision is followed by a sequence of actions which do not involve the programme manager. He steps in only as an implementor. The strategic choices have already been taken by the top political-bureaucratic personalities. This is a classic illustration of the policy-implementation dichotomy. It also reflects a relatively low level of political commitment and support. The "power" allocated to the programme leader is limited and there is little appreciation of the need for interaction between policy and implementation by the programme leader.

Route A and B are stylised versions of two extreme approaches to the sequence of decisions which flow from policies to programmes and finally to implementation. In reality, the sequences are likely to fall somewhere between the two extremes. They are, however, useful in understanding the enabling role that top level political commitment and support plays in the management of development programmes.

Route A may be taken also when the political-bureaucratic leadership finds it difficult to operationalise highly complex projects and programmes (technologically) along route B. In such cases, a programme manager may have considerable latitude and room for initiative. Scientist-managers in some countries who organised atomic energy programmes and other technically complex projects benefited from this, though in these cases political commitment was not deliberately planned. In effect, the consequences for the programme and their managers were not significantly different.

Resource Availability

No programme or project can achieve results without adequate resources, both financial and human. A programme with strong political support usually gets adequate resources. However, poor countries, in spite of political commitment, usually lack adequate funds. Often, funds may not be made available on time. Severe skilled manpower constraints may render implementation extremely difficult. Unlike private commercial enterprises, some development programmes may not be able to raise their own resources, although, in fact, good public managers may also find innovative answers to resource problems.

In both private and public programmes and projects, the issue of resources should be separated from that of management. In the private sector, when a new venture is launched, the generation of resources is seen as a priority task. The board of directors which approves and supports the new project, also allocates adequate funds and manpower to get it going. The same approach holds good for development programmes. Resources thus are a pre-condition for programmes and projects. When this condition is not fulfilled, the ability of programme leaders to perform their tasks will be severely constrained. Good management cannot be a substitute for financial resources and trained manpower. Rather, these are the essential inputs on which good managers build. Resources are a pre-condition because resource availability by itself (like political support) cannot make a development programme per-

form. Some analysts differentiate between physical and technological resources, and financial and human resources. But financial and human resources can be used to acquire physical and technological resources. Thus technology can be bought or adapted and new facilities or physical assets can be created. Many programmes have resources in abundance, yet fail to deliver the goods.

Leadership

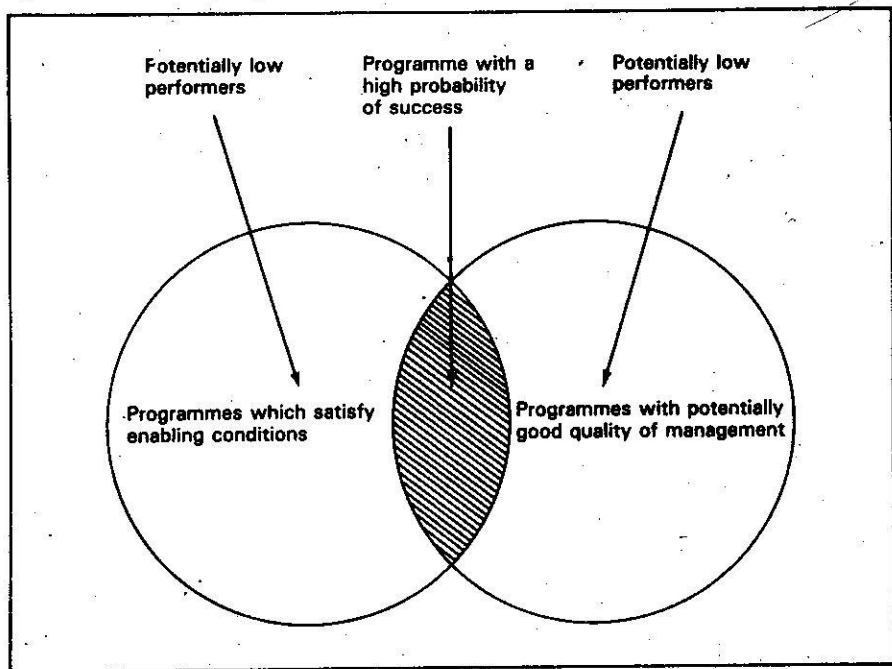
173

Development programmes, especially large new ones, need good leadership for two reasons: (a) planning and initiation of new programmes require entrepreneurial thinking. The person picked to lead a programme, therefore, should have entrepreneurial characteristics such as strategic vision, creativity, initiative and willingness to take risks and try out new solutions; (b) he or she should be capable of mediating between the political leaders and the environment of the programme on the one hand, and the programme's administration on the other.¹³ The leader's commitment to the programme, his or her ability to build teams and develop and motivate people, and skills in building linkages should be distinguished from the management interventions which we shall discuss in the rest of the book. The leader's ability to motivate his or her staff and beneficiaries will, of course, be influenced by their attitudes and values in terms of achievement orientation and team work. Countries differ in their achievement characteristics, a factor which programme leaders must be sensitive to, and take into account in their practice of strategic management.

The choice of the programme leader is directly related to the degree of political support and commitment attracted by a programme. When top political leadership is strongly committed to a development programme, the search for a suitable leader will usually also be seriously undertaken. A person thus identified is more likely to enjoy the trust of the political leadership than one selected routinely without active support from the top. Since the quality of programme leadership is critically important to programme performance, it should be treated as a precondition for programme success. Top political support is usually necessary for a programme to get enough appropriate resources; thus appropriate programme leadership cannot be over-emphasised.

Political commitment, resources and leadership alone do not guarantee success. Nor can well-planned management interventions alone guarantee good performance. As figure 3 illustrates, only those prog-

Figure 3 Probability of programme success



Programmes which have both good management and proper enabling conditions are likely to succeed. Programmes on the left-hand side will perform poorly because they lack pre-conditions. It is only at the intersection of these two sets that both conditions (satisfying pre-conditions as well as good management) are met. Only those programmes located where the two circles overlap meet both requirements and therefore have the potential for success. In designing programmes, it is important to ensure that these conditions are satisfied while simultaneously taking steps to strengthen programme management.

2.3 Guidelines for Programme Designers and Managers

Those of you who design or manage new development programmes, or are called upon to restructure or adapt ongoing programmes cannot directly control the pre-conditions discussed above. Nor can you do much about the constraints operating on programmes in general. You can, however, often influence them in your favour. The following guidelines and questions can help designers and managers do this:

Political Commitment

1. How strong and stable is the political consensus behind the policy decision leading to the proposed programme?
2. Are the key actors in government (political and bureaucratic) concerned with the policy decision solidly behind the programme?
3. Has the Government spelled out in detail the goals and strategies of the programme or given a rather broad mandate?
4. Has the Government assigned an agency to be responsible for the programme and specified its structure?
5. Did the Government identify the person to head the programme prior to the setting up of the agency and specification of its goals?
6. Is there mutual trust between political and bureaucratic leaders and the programme head?

Resources

1. Is the Government likely to allocate adequate resources to the proposed programme?
2. Are the sources of funds for the programme fairly stable and reliable?
3. Is the top political commitment strong enough to ensure adequate resources to the programme in the future?
4. Are human resources (trained manpower, etc.) likely to be readily available to the programme?
5. Will the physical and technological facilities needed by the programme be available?

Leadership

1. Did the search for the programme leader emphasise entrepreneurial qualities?

2. Has the chosen leader been involved (is he likely to be involved) in the specifications of programme goals, strategies and the structure of his programme agency?
3. Is he likely to be a pro-active leader or one who will merely be an implementor?
4. Is he capable of building teams, and developing and motivating people?
5. Does he show evidence of a strong commitment to the programme?
6. Is he inclined to provide continued leadership, given his terms of appointment, and the conditions and conventions in the public environment?

Definitive answers to these questions will be difficult to obtain when a development programme is being initiated. No one is likely to have enough information to come to conclusions on all these pre-conditions. On the other hand, the questions can help you assess the potential impact of the "pre-conditions" on programme performance.

3. STRATEGIC MANAGEMENT: THE BASIC FACTORS

It was argued in chapter 2 that development programmes perform well only when the pre-conditions of political commitment, resources and leadership are satisfied and competent programme management is practised. In this chapter, we probe the second part of this proposition. That good management crucially determines programme success will hardly be disputed by anyone. The problem is to define the focus and content of management. After all, managers and administrators in any development programme, or for that matter in any organisation, make many decisions and actions. If decision making is efficient, and actions and choices are based on competent analysis, and their implementation is effective, then the quality of management is enough. But what makes this happen? Are some key management interventions critical to programme performance?

The answer appears to be that a set of key management interventions exists. Evidence from successful development programmes shows that critical interventions by top management decisively influence outcomes and provide a framework within which operational decisions and actions can be taken by others in the organisation.¹⁴ An understanding of these interventions can help programme managers improve their performance and make operational decisions more purposeful and efficient. We shall call this set of top management interventions "strategic management". When day to day management or operations of a programme are not informed or guided by proper strategic management, performance suffers.

3.1 What is Strategic Management?

There are diverse views on the critical dimensions of management in a development programme. Some argue that "good management control" ensures performance. Others emphasise the importance of "community participation".¹⁵ Another group highlights political and bureau-

cratic bargaining processes as the major determinant of outcomes.¹⁶ This diversity of views comes partly from the different types of development programmes which have been examined by different authors. For a rural education programme, whose outcome depends on the interaction between children and teachers, and adaptation to the local needs of communities, participation at the grass roots is important. An infrastructural programme to build and maintain roads, on the other hand, needs standard systems and good management planning and control. For regulatory programmes which require close collaboration among several public agencies (e.g. industrial development and licensing), political and bureaucratic bargaining may be crucial. Thus the dominant problems of different types of programmes lead observers to emphasise certain management interventions and to exclude others. The proponents of different views have neither understood nor articulated the fact that their prescriptions emerge from an analysis of only a few programmes. We all generalise without fully realising how key interventions will differ with the environment and nature of different programmes.

Strategic management therefore must consider four key influences which together determine the performance of a development programme. These are:

- (1) the environment of the programme,
- (2) the programme strategy,
- (3) its organisational structure, and
- (4) its organisational processes.

The performance of a programme is influenced not only by each of these factors, but also by how they interact, i.e. by the degree to which they are consistent with and reinforce one another. So top managers should try to influence each factor and also their interactions.

In any development programme, there are many factors at work, and a manager can easily get lost in a maze of details. The secret of strategic management lies in identifying the key factors. Successful agricultural development programmes, for example, emphasise evolving a package of inputs (seeds, fertilisers, water, practices, etc.) most conducive to increased productivity, and price incentives to farmers to encourage them to adopt the new package, and creating a network of agencies to effectively plan and implement this strategy. These are dimensions which only top management can envisage and influence. They constitute a manageable set, and do not lead managers to lose sight of the

wood for the trees. Perceptive leaders almost instinctively identify the critical factors relevant to their programmes and organisations. But in complex situations, commonsense alone may not suffice. An understanding of the key factors and ways of relating them to one's own setting can be of considerable assistance.

This may sound abstract and academic to the hard-headed practitioner. Let us therefore look at this framework and its components more closely. First, we shall define the key factors.

Environment.

The environment includes the forces outside a programme which create opportunities for, as well as constraints on, its growth. The environment of industrial enterprises includes their consumers and their income levels. The environment of an agricultural development programme includes the farming population, their levels of technology, water and soil conditions and climate. The environment of most development programmes includes prevailing political conditions and the local institutional and bureaucratic set-up. These conditions change at different rates, and from place to place. Top managers must not only be familiar with them, but also appraise the environment in order to identify opportunities for the programme's growth while minimising the impact of any emerging constraints. Favourable environments improve a programme's potential for survival and expansion. Unfavourable ones provide programme managers with difficult struggles.

Strategy

Strategy is the set of long-term choices the programme leaders make in terms of goals, services, policies and action plans. Successful strategies must meet both the broad programme objectives set by government and by the environment. For example, a governmental programme to promote small-scale industries throughout the country must have goals and services consistent with the literacy and background of potential entrepreneurs, the potential demand for various goods and gaps in the infrastructure. Strategies that meet the government's objectives and match the environment are more likely to succeed than those that do not.

Organisational Structure

The organisational structure of a programme is the durable arrange-

ment within a programme agency to perform the tasks defined by its strategy. These include the distribution of authority and responsibility, the reporting relationships and the mechanisms for integrating its functions. Some strategies and environments require decentralised structures, other require centralised ones. When diverse services are offered, divisions based on the type of service may be appropriate. When the programme operates in far flung regions, a structure based on regions may be justified. Structures therefore are not fixed or permanent. Existing structures often limit the choice of strategies. Rigidities in government structures often limit the ability of conventional government departments to engage in commercial operations. Hence the practice of setting up government corporations when such needs arise. No single structure is good for all strategies and environments. Many development programmes fail because they are unable to adapt their structures rapidly to evolving strategies and changing environments.

Organisational Processes

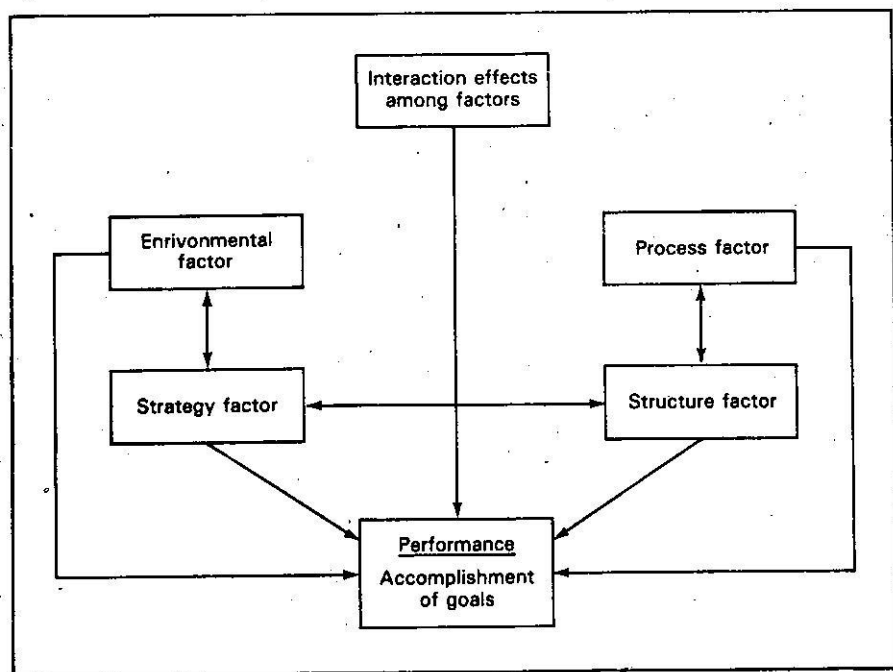
Organisational processes are the instruments for influencing the behaviour of employees and beneficiaries of a programme. If the staff of an organisation are to accomplish common goals, managers need the means to motivate and influence their performance. Participative methods used to set goals, allocate resources and implement the programme are one set of organisational processes. The monitoring methods for evaluating and controlling performance are another. Such processes and systems are commonly found in industrial enterprises. They are equally relevant in public programmes. Processes for human resource development (selection of staff, training, etc.) are another set of instruments. Too few programme managers seem to realise that these are not fixed processes and that to be effective, they must be adapted to particular strategies and structures. Thus the motivation processes for a family planning programme may have to be quite different from that used in a commercial crop development programme. The right mix of processes can improve performance; an inappropriate mix will be counter-productive. Proper organisational processes are sources of power and influence in the hands of top management when they are tailored to the strategy and structure of the organisation.

In the following chapters, we shall elaborate on each of these factors and explain how programme managers can analyse and influence each of them. For the present, let us summarise three important features.

- (1) There are four factors, environment, strategy, structure and process change.
- (2) They are not independent. They interact. Environment but it can sometimes be influenced itself by management's strategy.
- (3) Programme managers can influence, modify and match them to improve programme performance.

A schema of how these factors interact and influence performance is shown in figure 4. In addition to these four factors, the diagram has a fifth box to represent the interaction effects among them.

Figure 4 The basic components of strategic management



3.2 The Concept of Congruence

Good farmers know how to apply several inputs such as seeds, water, fertiliser and cultural practices in the right proportions to obtain high yields. The right proportions vary from one crop to another and

from one physical environment to another. A farmer also knows that while the quality of each input contributes to his crop yield, the right combination of inputs raises his yields more than any individual input alone does. Thus high yielding varieties of rice seeds are more productive than traditional varieties. But when these seeds are grown with the right dosages of water and fertilisers, yields tend to be much higher than when inputs are missing or inadequate. For example, if fertiliser is not applied, these varieties will yield very little. Similarly, if fertiliser is applied without simultaneously providing adequate water, then again, productivity will be low. Different inputs can thus reinforce each other to yield increased outputs. There is a "synergy" in the combination that no single input alone can generate. Much of the high yield is therefore attributed to this synergy. Many examples of synergy are found in the fields of technology and industrial production also.¹⁷

Synergy is vital to good strategic management. The four factors work together to make strategic management powerful and effective. For them to work together, they must be consistent with one another very much as seeds, water and fertiliser reinforce one another in crop production. We call this phenomenon of mutual consistency "congruence". Performance of a development programme improves when there is "congruence" among environment, strategy, structure and process. No arbitrary combination of these is likely to yield good results. For example, a small farmer development strategy that does not effectively cope with the uncertainty of weather or markets in the farmers' environment cannot succeed. On the other hand, a strategy that guarantees reasonable prices to farmers or provides marketing support is likely to attract farmers. Given such uncertainty and variations between different areas, a rigid, centralised organisational structure that gives extension personnel little freedom to adapt will perform poorly. If extension staff must adapt to changing local conditions, and the internal organisational processes for training and motivating them are weak, then again, there will be no congruence between such internal processes and other factors and the programme will again perform poorly. Planning and integration are required so that the four basic factors work together.

3.3 Top Management's Role

Programme managers' critical role is to influence environment, strategy, structure and process to create a state of congruence among them. Then the programme will benefit from the synergy that flows when these factors reinforce each other. Sometimes programmes succeed

solely because their environments are favourable or their political support strong, but most programme leaders can succeed only when they consciously create and maintain congruence among the key factors.

In private enterprises, top managers are always expected to do this. If they do not, market competition ruthlessly eliminates them. The market test is so powerful that strategic management must be seriously practised by private enterprises. Perhaps this explains why the concept itself was developed in the context of business enterprises. Most of the literature and experience on this subject has been confined to the business world. Public sector organisations tend to survive and even grow, irrespective of their performance. This is partly why political leaders and public managers seldom give priority to practising strategic management.

Development programme managers rarely receive a mandate to practise strategic management and achieve congruence among the four factors. In chapter 2, we highlighted three constraints on public managers. Governments tend to impose multiple and often conflicting programme goals, resources are seldom sufficient and the goals — means orchestration is limited in public organisations. These constraints make it difficult to practise strategic management in development programmes. On the other hand, for the same reason, every effort should be made to analyse and influence the four factors as much as one can. When you carefully analyse the environment and the different constraints, new strategic or structural interventions suggest themselves. This, in turn, enables the programme manager to achieve congruence among the different factors. Here are three examples of such adaptive interventions:

- (1) Though governments tend to prescribe multiple objectives and services for development programmes, successful programme managers often begin with only one dominant goal or service. As they gain experience and credibility, they take up other goals. Alternatively, when several goals are to be pursued simultaneously, they choose closely related goals or services, and not unrelated ones. The managers of the National Dairy Development Programme of India focused first on milk, even though their programme agency had multiple objectives. They subsequently diversified into oilseed development after a decade when they had stabilised their dairy development mission. Indonesia's successful Population Programme concentrated first on family planning and took up nutrition as a ser-

vice after it had built up an effective family planning service. In Kenya, though the Government had initially set up a new programme agency to develop five different crops for African small farmers, it permitted the agency to focus on tea, thus modifying its original mandate for the programme.¹⁸ In fact, growing evidence supports the view that if top programme managers can evolve strategies to achieve goals sequentially in view of the environmental problems facing them, reasonable governments will support such strategic adaptations.

- (2) When hierarchical structures, common in government, are slow and unwieldy, some programme managers have successfully turned to local communities to perform selected tasks. Sometimes, private markets and channels have delivered certain inputs or services which had been delivered less efficiently by government agencies. In China's public health programme, the population was mobilised in preventive campaigns to fight environmental and parasitic diseases. The barefoot doctors who served the rural areas were farmers or workers who worked part time to provide health services. In a rural education programme in Mexico, small rural communities were given the responsibility to build modest schools and feed and house their young instructors. This programme agency also stayed small and compact by subcontracting services and expert inputs to perform programme tasks.

184

- (3) Several successful development programmes follow careful phasing strategies. In view of their complex environment and limitations of structure and manpower, they cover selected areas of the country first and gradually extend their services to other parts. Simultaneously expansion all over a large country would have imposed heavy strains on their structures. Such strategic adaptations contribute to congruence. India's Dairy Development Programme covered the country in two phases. Indonesia's Population Programme was implemented in three phases.

3.4 Points to Remember

The major points that programme managers should bear in mind about strategic management are:

1. Strategic management is the set of top management interventions which provides the framework for all operational decisions and actions and hence facilitates effective performance.
2. Programme managers should monitor and influence four key factors in order to practise strategic management; these are the programme's external environment, strategy, structure and internal processes.
3. Since these factors interact, congruence among them is a prerequisite for improving performance. The individual impact of the different factors as well as their interaction can be influenced by managers.
4. The programme leader's critical role is to analyse, influence and orchestrate these factors to achieve the best results. By orchestration, we mean the achievement of consistency among the factors.
5. Whenever the programme environment or objectives change, management should realign the factors. Thus, orchestration is not a one-time task; programme leaders must continually monitor changes among the four factors and orchestrate them when necessary.

4. READING THE ENVIRONMENT

The environment of a development programme is the set of external forces that influence its outcome. When a programme is limited to a small area or region of a country, the local or regional environment may have a stronger influence on its performance than does the national environment. If a programme's activities are affected by international developments either on the out-put or input side (e.g. international markets, aid prospects, etc.), then trends in the international environment may effect its performance. The nature and scope of the environment relevant to a development programme depends largely on the programme's objectives and scope, sectoral focus, and spatial coverage and linkages. Environments and programmes interact dynamically. A programme to develop a single crop, for example, has a more limited environment than a programme for multiple crops. A programme to integrate multiple inputs (e.g. seeds, fertilisers, extensions, water and credit) must interact with more organisations and actors than one which only provides extension or credit. A programme covering the entire country has a more complex environment than a regional programme. Sometimes, the large size of a country or an unfavourable environment leads policy makers to limit a programme's goals.

4.1 The Role of Environmental Analysis

Most programme managers agree that "reading" the environment is important, but very few clearly understand how to go about this complex business. In the business world, managers can more easily monitor certain key environmental indicators or trends. Market prices, competitors' outputs, growth of national income, etc., are data on the environment which may be readily available. Managers of development programmes should similarly look for data and signals in the environment which can assist them in making important strategic decisions. Reading the environment is essential for both strategic, long-term decisions as well as tactical, short-term decisions. We discuss below five areas which require important inputs from the environment.

- (1) Diagnosis of the problems of the sector or services.
- (2) Identification of the programme's beneficiaries and clients.
- (3) Demand for the programme's services.
- (4) Supply of the programme's services.
- (5) Key actors influencing demand and supply.

Diagnosis of the Problems of the Sector or Services

The basic data and insights on the key problems of the sector served by a development programme can be generated only from that programme's environment. Possibly in formulating a national development plan, these sectors have been analysed. However, the problems and gaps identified in a macro exercise are unlikely to be adequate for the design of a specific development programme. A programme needs a well-defined output or service. To make it effective, the elements that make up the service and linkages must be determined by analysing the problems in the environment. In an agricultural programme, several inputs (seeds, water, fertiliser, etc.) may have to be provided to the farmer simultaneously in order to increase crop yields. Whether all of these need to be provided by the programme, however, can be ascertained only by a careful analysis of the environment. Possibly farmers can generate some inputs themselves. Alternatively, private channels may exist to do this effectively.

Programme designs imported or developed with inadequate environmental analyses usually fail. A realistic design or concept of service can be generated only by carefully diagnosing the problems and gaps in the environment. A major reason for undertaking pilot projects is to assist in this diagnostic and design function.

Identification of Beneficiaries and Clients

Environmental analysis can enable the programme authority to understand and focus on relevant client groups. Though the programme objectives enunciated by the Government may specify the broad beneficiary and client groups, detailed analysis will be required to identify and segment the beneficiaries into homogenous groups. Many programmes implicitly assume all beneficiaries to be alike. A small scale industry development programme, for example, may define its client, the small entrepreneur, as one who starts an industrial venture with an investment below a specific limit (e.g. US \$ one million). A standard service is then provided to all clients based on the assumption that all these entrepreneurs need identical services. In fact, nothing could be far-

ther from the truth. An urban entrepreneur with education and experience may need quite different services from those needed by a new rural entrepreneur. Location, skills, infrastructure, and type of industry are some criteria by which entrepreneurs could be segmented. This analysis may well lead to the conclusion that providing the same service to these diverse groups will not yield the desired results.

Beneficiary or client groups are part of the environment of the development programme. A programme is effective only to the extent that its benefits reach the intended beneficiaries. The diagnosis of problems discussed above is closely intertwined with the client focus of the programme. Base line studies, market surveys, etc., are used to assess the basic characteristics of beneficiaries and their changing needs. Continuous monitoring of the clientele is an essential part of environmental analysis as changes over time may have implications for the strategic interventions of the programme.

A sector's problems can be analysed while ignoring the question of who benefits from the programme. When an agricultural programme focuses on a crop, the techno-economic inputs needed for its development dominate the design of the programme service. It will be assumed that all farmers will follow the advice of the programme's field staff. If the farmers are a heterogenous lot, this approach reflects a failure to perceive important information available. A proper reading of the environment helps the programme manager to segment the farmers into groups and consider the strategic question of whether all segments should be served at once or provided the same service, especially if the diagnosis of the problems of the sector reveal considerable diversity.

Consider an agricultural programme which offers farmers only high quality seeds and extension. Farmers who respond to this programme are likely to be those who on their own can obtain the remaining inputs. They can buy their own fertilisers, get water for irrigation, and raise investment funds. But, if the farmers differ in terms of income and farm size, many farmers may fail to find these inputs on their own. Thus smaller and poorer farmers may need special assistance which the first set of farmers did not need. Questions about diversity among the beneficiaries and the need for offering different types of services can be answered only through a process of careful environmental analysis.

Demand for the Programme's Service

The managers of many development programmes assume that

demand exists for the programme's outputs or services. They seldom ask why clients should use these services or what could be done to improve public response. This attitude does not create major problems as long as demand exists for the programme's output.¹⁹ When demand is poor, services are offered, but public response is poor.

Analysing the environment helps one solve a programme's demand problem. Barriers as well as support may be found in the political, economic, socio-cultural or technological dimensions of the environment. In the Indian dairy development programme, the urban cattle keepers and milk traders were politically strong and did not wish to see rural milk co-operatives grow. The Indonesian family planning programme recognised early that an important environmental barrier was the socio-cultural attitudes of people towards fertility control. The religious leaders opposed the programme. The Indian dairy programme managers found that the technological improvements introduced by the railways to facilitate long-distance haulage and refrigeration favoured the setting up of rural refrigerating plants away from the cities, and thereby elicited a more positive response from small dairy farmers in rural areas. Many crop development programmes have found that response to their services is poor when farmers face severe economic risks due to uncertain weather.

These examples reinforce the importance of scanning the political, economic, socio-cultural and technological forces in a programme's environment. Creative strategies for harnessing the positive forces and minimising the effects of the negative forces will be thought of in the scanning process. Technical specialists who design programmes often tend to overlook or ignore how these forces can affect the demand for programme services.

Pilot projects are one means of testing the strength of demand for a development programme. Extrapolating from the experience of pilot projects, however, may be misleading, especially when the larger national environment differs significantly from the local environment of the pilot project. More systematic ways to assess the forces operating in the national environment and setting up several pilot projects in different parts of the country are some of the approaches programme managers might consider when going national.

Supply of the Programme's Service

Though "supply" or "service delivery" is the focus of many

development programmes, few programme managers and designers know enough about the implications of environmental factors for their supply function. Mechanistic or standardised approaches to the design and delivery of services work well when the environment is reasonably homogenous in terms of clientele, physical conditions, logistics, etc. As a programme expands in size and geographical coverage, these features usually change. It is extremely important, therefore, for programme managers to search for the following features which may have a direct impact on their supply tasks.

- (1) *The degree of diversity in the environment:* When there are heterogenous groups of clients or beneficiaries in the country, the supply system must take this into account if supply and demand are to match properly. Problems and requirements may differ from one group to another and also over time due to cultural or social backgrounds, experience, etc., or to physical and geographical factors which make differences between regions significant.
- (2) *Problems of logistics:* The quantity and quality of transport, storage and communications vary a great deal from country to country. Environmental analysis helps us assess the adequacy of facilities and skills before planning the supply strategy.
- (3) *Adequacy of institutions:* Programmes that do not completely control production and delivery systems must carefully investigate the strengths and weaknesses of the institutions with which they must collaborate. These final choices have strategic implications. The larger the size and coverage of the programme, the more critical the analysis of collaborating institutions.

Keys Actors Influencing Demand and Supply

The environment includes not only impersonal forces and features which influence programme performance, but also actors who can affect the demand for and supply of the programme's service. We have highlighted the beneficiaries or clients who are important key actors to be influenced by programme managers. There are also important political, economic, socio-cultural and technological actors who can affect the demand or supply sides of the programme. In the Indonesian population programme, religious leaders were important actors with whom the

programme managers had to talk. Some actors, like political leaders and senior officials in the Government, play a key role in supporting or defeating a programme's strategy. Some may determine the amount of resources a programme receives from the Government or other sources. They thus influence the programme's ability to supply its service. Local community leaders may have considerable influence on the response of clients to a programme. Search for and identification of the key actors of a programme calls for a good understanding of the different segments of the society. An important reason for reading the environment is to be close to the key actors who influence the forces of demand and supply of the programme, and to mobilise their support.

The aspects discussed here are important for assessing the complexity of the environment. Strategic interventions must be based on the degree of environmental complexity. Given extreme complexity, programme managers should limit the programme goals and services until they are adequately familiar with the environment. When the environment is complex, programme expansion should be cautious. These assessments will vary as conditions change. An analysis of the environment can facilitate the strategic choices of any development programme. These strategic choices will be discussed in detail in the next chapter.

4.2 Scope, Diversity and Uncertainty

The preceding section discussed the size of the programme, diversity among client groups and uncertainty about public response. These examples illustrate the impact of the environment on the programme.²⁰ It is useful, therefore, to examine these basic dimensions systematically and understand how they could be integrated into an exercise in environmental analysis.

Scope

The size or spatial coverage of a development programme usually tells us something about the "scope" of its environment. Pilot projects, for example, serve limited areas and need not reckon with complex national environments. A programme which deals with one crop or commodity has a more limited environment than a multi-crop programme or a programme which attempts to integrate agriculture with social services. The size of the programme is not an adequate index of the scope of its environment.

The identification and diagnosis of a sector's problems are more complex when a programme's environment is wide (e.g. when a project expands into a national programme). Mobilising demand is more difficult when the scope of its environment gets progressively wider. Generally speaking, environmental complexity tends to be directly related to the dimensions of scope. A strategic response is to sequence the programme in space and time. For instance, a new programme may be first implemented in one region and later extended to the rest of the country in phases.

Diversity

A programme's environment is rarely homogenous. Its physical-geographic features, and economic and socio-political characteristics are usually diverse. These and other historical forces create considerable diversity among the beneficiaries or clients and the terrain where search for homogenous client groups or homogenous clusters of these features to support decisions about our five strategic areas. When the environment is diverse, a programme should provide differentiated services to the diverse groups rather than a standardised service for all. Failure to generate and utilise such insights causes serious problems for large agricultural programmes and in social services such as education. When a standardised service fails to meet client needs, the problem manifests itself in a fall in demand or public response to the programme. The more diversity, the more complex the environment of the programme.

Uncertainty

Environments are seldom stable. Changeable weather patterns greatly influence farmers' behaviour and responses to a programme. Changes in political conditions influence the strategy a programme should adopt. Changes in the perception of clients or their dissatisfaction with a service can significantly change their response to a programme. Even rumours in the village can upset the response to sensitive nutrition or family planning programmes. Environments vary in the degree of uncertainty underlying their political, economic, and social conditions. When changes are frequent and unpredictable, the programme strategies should be flexible. Participation of beneficiaries or clients in the design and delivery of services, increased autonomy of field staff at the grass roots to enable them to adapt to emerging situations, and forging of close linkages with key factors in the environment are good strategies for programme managers confronted by uncertain environments.

The analysis of environmental uncertainty should consider each of the five areas discussed above. Strategic responses should vary depending on whether problems arise from uncertainty, diversity or scope. To illustrate, diverse client needs may call for differentiated services. Uncertain client response may call for client participation or the use of strong economic incentives. Wide scope may call for indirect ways of mobilising clients (e.g. mass communication, use of a network of institutions, etc.), since direct control of, or contact with, a nation-wide clientele may be infeasible. These responses have important implications for the structural and process interventions of programme which we shall deal with in subsequent chapters.

193
Scope, diversity and uncertainty do not necessarily move together. If the environment is homogenous, a programme may expand its scope with no serious problems posed by diversity. Economic or political uncertainty may be high, irrespective of the scope or diversity of an environment. In short, environmental complexity increases as uncertainty along these three dimensions increases. They share no common scale. Their usefulness lies in the analytical insights they offer towards understanding the environment in which development programmes operate.

Some illustrations may make these ideas clearer. Japan is a large country (scope); yet the people are remarkably homogenous in language and culture. A much smaller country such as Kenya may have greater diversity because of traditional language and other differences and the disparities between urban and rural areas and high and low income groups. Sometimes, environmental diversity may be low, but uncertainty of market or climatic conditions may be high. Most Philippine farmers are small operators (low diversity), but fluctuations in weather conditions and consequently in market prices and profits create considerable environmental uncertainty.

4.3 Search for Information.

Since it is difficult to assess these dimensions and their impact on the five strategic areas through an abstract analysis or desk research, many development programmes adopt pilot projects to help them understand the environment. The problems of a sector or service, the nature of the client group, and issues relevant to the demand for and supply of the service can be better appreciated through pilot projects. If it is likely that scope, diversity and uncertainty will pose problems, pilot

projects or experiments may be organised in different parts of the country and under varying conditions. When the environment is complex, a "live" analysis of this type can be valuable. When a programme is extended to cover a large region, the insights gained from the different experiments must be fed into the design of strategic and structural interventions.

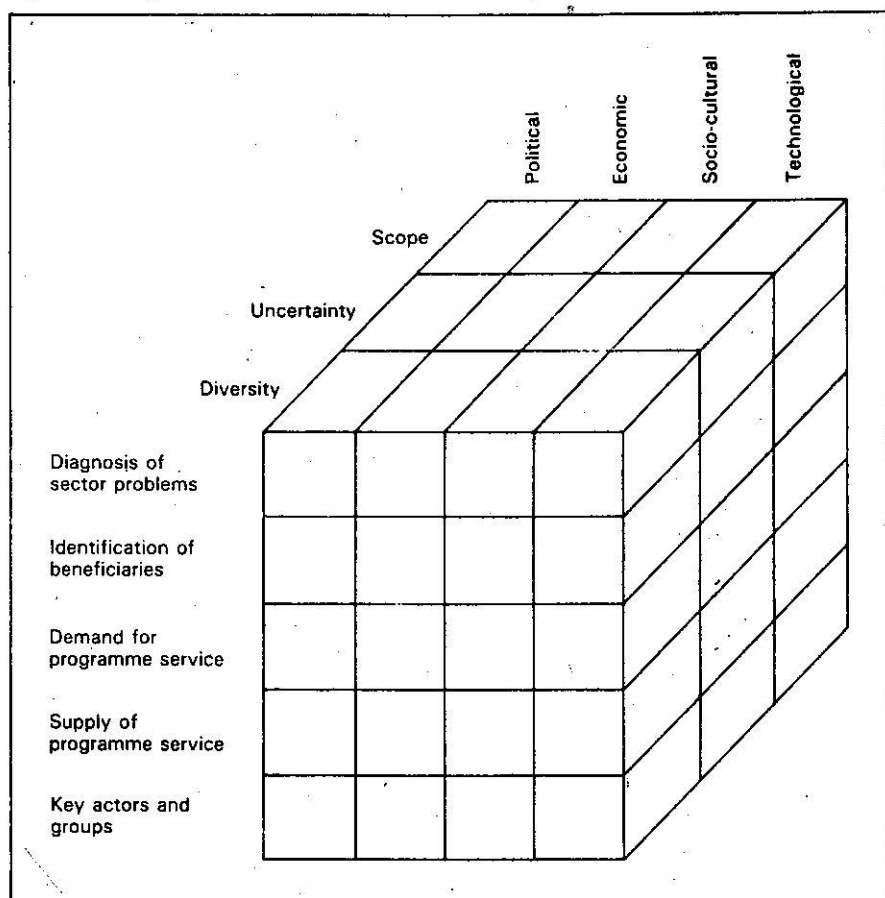
Pilot projects, however, do not help us assess some segments of the environment. For example, since a pilot project is usually located in a small area, the potential impact of political forces and pressures on the programme when it covers the country cannot be gauged from the pilot experience. Problems of logistics and supply cannot be easily extrapolated from pilot project experience. On the other hand, the techno-economic insights gained from pilot projects may be relevant to all parts of the country. Additional evidence on certain segments of the environment may therefore need to be gathered when pilot projects are scaled up and the scope of the environment is widened. Specialised surveys of the relevant population and leaders, demand studies, analysis of national networks and channels of distribution, etc., are some techniques used to obtain supplementary information.

The limitations of pilot projects highlight the need for a careful analysis of the *different segments of the environment*, each of which may have both positive and negative features. Though the segments relevant to different programmes vary, it is advisable to scan all major *political, economic, technological and socio-cultural* segments of the environment. Opportunities as well as threats to the programme could be identified by examining each segment in relation to the five strategic areas. Problems posed by scope, diversity and uncertainty may exist in all segments.

Environmental analysis is a three dimensional exercise. We need inputs from the environment to enable programme managers to make the best decisions in each of the five *strategic areas*. The *Different segments* of the environment must be investigated to generate the inputs relevant to each strategic areas. In the process of this investigation, the problems posed by *scope, diversity and uncertainty* in each segment and their likely impact on the strategic areas must be identified. Figure 5 depicts the relationships among these three dimensions.

The search for environmental information and insights can be better focused with the aid of figure 5. Take the first strategic area "diagnosis of sector problems". The horizontal cells call for an analysis of environ-

Figure 5 Simple framework for environmental analysis



mental data from each of the relevant segments of the environment. The cells above this row emphasise the need to examine each of the environmental segments from the standpoint of the dimensions of scope, diversity and uncertainty. The relative importance of segments and dimensions may vary from one programme to another. But the general framework is useful for all.

The Indonesian population programme illustrates this framework for environmental analysis. In the strategic area of "diagnosis of sector problems", it was important to consider the influence of religious leaders and other local elders hostile to the programme. This was a *socio-political* factor. There was some *diversity* among the leaders as there were two groups, the Muslim majority and the Hindu majority. The potential hostility of leaders meant that public

response was *uncertain*. This factor was not limited to any one area and was therefore national in *scope*. The military regime was also a political factor. Both were relevant inputs in evolving the programme strategy.

The *economic* effects of population pressure could be easily identified. On the other hand, there would be no immediate and visible gains to the people from fertility control. This had implications for the motivation of the public. In perceiving gains, urban and rural people might differ (*diversity*). There was more *uncertainty* about the likely response of rural people. Again the *scope* of this economic factor was national.

In the *socio-cultural* area, village communities were highly structured and local leaders had considerable authority over rural people. Similarly, religious objections to surgical operations for fertility control was a factor. The influence of these factors extended *across the country* and response to the programme was *certain* to be negative if they were ignored.

Some technologies for fertility control were more strongly resisted than others. Use of technologies more consistent with the environment (e.g. oral pills) was a response to this problem. The non-availability of medical facilities in villages was also a factor to be considered in the choice of technologies. Response to the programme could be made more *certain* by taking these factors into account.

A similar search for critical forces or factors needs to be undertaken to identify beneficiaries, demand for programme service, etc. This is a somewhat specialised exercise which goes beyond the scope of this book. However, this illustration, though brief, suggests how figure 5 could be used for planning a more systematic analysis of the environment in many programmes.

4.4 Guidelines for Environmental Analysis.

Environmental analysis should be undertaken not merely when a programme is established, but throughout its life cycle. A standard format or a specific sequence of steps for analysis cannot therefore be prescribed to fit the needs of all programmes. A great deal of adaptation to the prevailing circumstances and nature of the programme is called for

whenever programme managers undertake this exercise. The general considerations for an environmental analysis are summarised below:

1. The starting point is a clear *focus on the strategic areas* or, for that matter, any major decision for which environmental data are being sought. The five areas discussed in this chapter may meet the needs of most development programmes. Managers should review these decision areas and make sure that they are relevant to their situation.
2. Analyse the *different segments of the environment* to identify and interpret both positive and negative factors and forces which may have an impact on each strategic area. A limited view of the environment (e.g. exclusive focus on technology or economic focus) may lead to the neglect of some environmental factors which may turn out to be critical later.
3. Analyse the *dimensions of the environment* such as scope, diversity and uncertainty. Since the impact of these dimensions is not uniform across all segments and decision areas, the search for data and insights may call for considerable specialised knowledge.
4. *Information on the environment* should be generated in a variety of ways using diverse sources. Initial project reports often contain valuable basic data. Surveys of specific sectors undertaken by the government or donor agencies may shed light on environmental conditions. On significant aspects, special field studies or experiments may be commissioned if no organised knowledge exists (e.g. demand studies, attitude surveys, demonstrations; etc.). Pilot projects are another major source of environmental data. Interactions with key actors in the environment can provide useful insights on the forces at work and likely changes in future. A variety of sources, both formal and informal, is a must precisely because no single source is likely to have access to the entire range of data being sought.
5. Since environments change over time, every programme should develop its own *system for monitoring ongoing developments and updating its stock of data*. In addition to specialised

efforts, periodic reviews of developments by the top management with all those within the organisation who interact with the environment can play a useful role in the monitoring and updating process.

6. The approach presented in this chapter is designed to assist the programme manager in his search for relevant environmental data. The framework depicted in figure 5, which looks formidable and comprehensive, has value only to the extent that it enables the manager to ask the right questions. Both time constraints and paucity of data may prevent him from undertaking a comprehensive analysis in many a situation. However, even in the face of such constraints, he will be better off organising his data search with the aid of this framework than without it.

5. FORMULATING THE PROGRAMME STRATEGY

Technology generally dominates the strategies of development programmes. Technologists and other specialists tend to dominate design decisions. Consequently, programme design tends to be viewed narrowly. A common tendency is to concentrate on technology and ignore other aspects of design. Developing countries often import programme designs from abroad, without reference to the environments in the different ways in which a country's environment influences programme performance. These influences are not limited to technology, but include economic and political factors and the attributes of beneficiaries. These cannot be analysed or understood through any single discipline. Technology is important but not sufficient for strategic planning and implementation. In this chapter, we shall discuss the building blocks of strategy formulation and demonstrate the need to pull together knowledge and insights from different sources and aspects of life and experience. Strategic thinking is a "synthetic" effort and cannot be left to any single group of specialists. Top programme managers must actively participate in this process.

5.1 The Basic Influences on Strategy

Strategy is the set of long-term choices about the operating goals, policies and action plans of a programme. Two important factors influence these choices. The *objectives* laid down by government and the *environment* of the programme will influence the strategy. Few programme strategies take these factors adequately into account. Programme performance suffers when they are ignored.

The objectives laid down by the government usually indicate a programme's direction. These objectives provide a basis for choosing among strategic alternatives. If the goals of a programme do not fit the objectives of the government, the programme leaders will find it difficult to get resources and support. Since government seldom spells out the goals specifically, the programme leadership can choose its operating

For example, the National Food and Agriculture Council of the Philippines was charged with developing several crops such as rice and corn, and fisheries and fruits and vegetables. The Government, in fact, had given multiple objectives and tasks to this organisation. To achieve these simultaneously would have meant creating a huge multi-service programme covering the whole country. It would certainly have taxed the Council and its limited skills and manpower. The environment was complex. Weather, market prices and responses of farmers were all uncertain. Each crop or subsector required special attention to the unique inputs needed for its development. The problem, however, was most severe for rice, the country's staple food. With the Government's explicit support, the Council therefore decided to focus on the achievement of self-sufficiency in rice as a goal, deliberately giving less attention and resources to other crops. This was clearly a case of choosing a *dominant operating goal*, and assigning lower priority to the objectives given by the Government in relation to other sub-sectors. The intention was to reduce complexity by first focusing on a single or dominant goal and *sequentially* moving towards other goals. It was the careful attention given to the environment and the objectives laid down by the Government that led the programme leadership to this strategic choice of a dominant operating goal.

The choice of operating goals is merely the starting point of strategy formulation. In order to be useful guides to action, these goals need to be spelt out in detail and the major tasks which flow from them should be identified. There are two sets of components which are influenced by the operating goals. We shall call them *service-beneficiary-sequence* (SBS) strategy and *demand-supply-resource* (DSR) strategy. The former is concerned more with *goals* and the latter with *tasks*. They are interdependent building blocks in so far as goals influence the scope of tasks and the complexity of tasks in turn affects the scope of goals. We have separated them into two sets for a better understanding of their roles. In reality, they are merely different dimensions of the same phenomenon that we called strategy. The linkages among the building blocks may be seen in figure 6. The six components of SBS and DSR hang together as well shall explain below.

5.2 The Service-beneficiary-sequence (SBS) Strategy.

Three questions must be asked in formulating strategy:

- (1) What is the service or output of the programme?
- (2) For whom is it developed?
- (3) When is the service to be provided?

The goals of a programme are achieved through the services it provides. The concept of the programme service therefore is an important dimension of strategy. The content of the service must meet the needs of the beneficiaries. The question, *for whom*, is critical, though those who view programme design narrowly seldom ask or answer it. The third question concerns the time sequence (*when*) of service delivery. The answer depends on the nature of the service as well as the complexity of the environment.

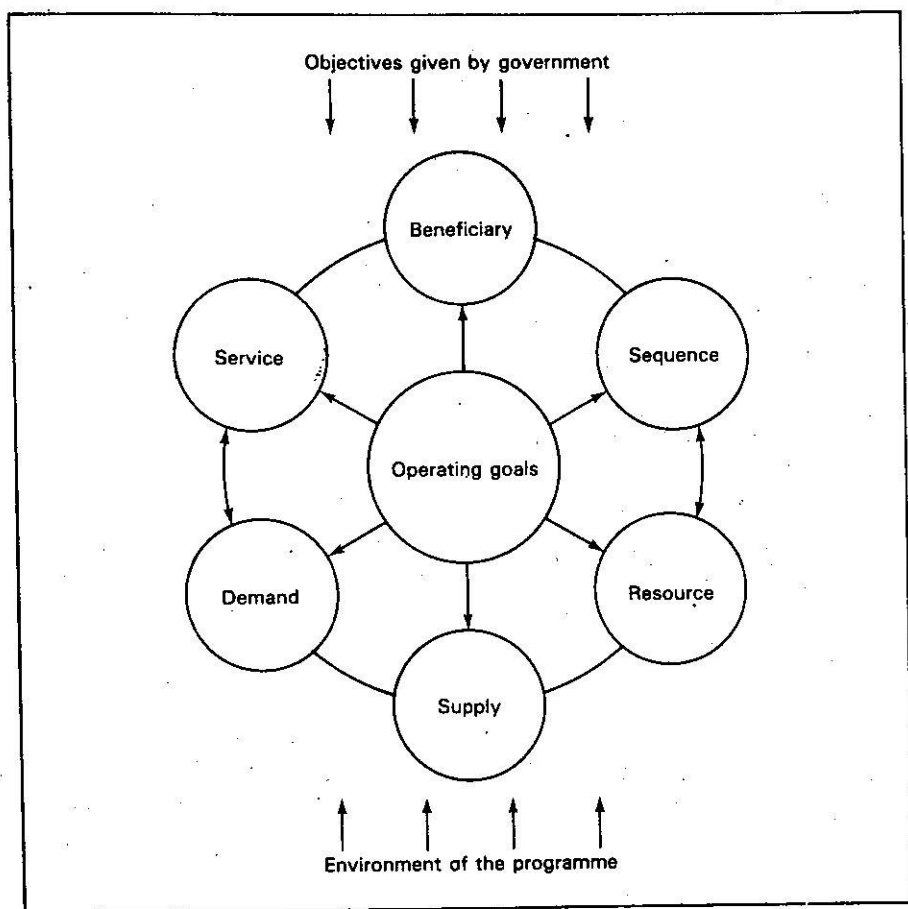
Every programme offers some output or service to its beneficiaries. We use the term "service" since few programmes offer physical outputs or products. Physical inputs and the manner in which they are integrated are part of the service. What the people finally receive is a service. Thus, in the Indian Dairy Development Programme, though the focus is on a physical commodity, milk, the programme's service consists of the provision of a set of interrelated activities such as assistance in milk production, procurement, processing and marketing which help farmers to increase milk production and earn higher incomes. Viewing the programme service as milk production is wrong. It is important to ask what the concept of service is so that a comprehensive view can be taken of what the programme does to assist the beneficiaries.

Integration of Inputs

Many programmes offer services to compensate for the beneficiaries' inability to perform certain tasks on their own. In defining the programme service, it is useful to ask how it performs this role. If beneficiaries could easily buy the service or its components in the market and integrate the components themselves, there would be no need for the programme.

In most developing countries, agricultural inputs such as high yielding varieties, irrigation, fertilisers and new cultural practices are not readily available to all farmers. Even if available, few farmers, especially the small farmers, are likely to be able to integrate these inputs themselves. Their motivation to use new practices may be low because of uncertainty about crop prices. Private markets may not offer adequate,

Figure 6 The building blocks of strategy



stable incentives to farmers. Under these conditions, an agricultural programme's service should be designed not only to offer these inputs individually, but also to integrate them. This is the rationale of the functional and vertical integration strategy found in some of the more successful agricultural programmes.

Kenya's smallholder tea development programme, the Kenya Tea Development Authority not only integrated inputs such as tea stumps, extension, fertilisers and credit for the small farmer, but also integrated tea production, procurement, processing and marketing. The latter is an example of vertical integration while the former reflects functional integration at the farm level. India's Dairy Development Board first integrated the inputs needed to enhance

milk production (veterinary care, artificial insemination, fodder and extension) and then added milk procurement, processing and marketing to create the necessary vertical linkages. It would have been difficult for small farmers with limited knowledge and bargaining power to establish these linkages on their own. Both the Kenyan and the Indian programmes had a strategy of integration that compensated for the inability of their beneficiaries to integrate inputs on their own.

Dimensions of Service: Multiplicity, Relatedness and Measurability

Few programmes provide a single service. Some offer multiple services because their goals are multiple. Multiple services may be related or unrelated. Inputs and outputs may be measurable or unmeasurable. These features complicate strategy formulation. It is useful therefore to examine them closely. Three dimensions of service need to be explored.

First, the programme's service may be *single* or *multiple*. The dimension is the *diversity* of services. When a programme focuses on a single crop, we regard it as a single service programme even though it integrates multiple inputs to provide this service. On the other hand, an integrated rural development programme concerned with the development of crops, health and education is providing multiple services. Each diverse activity requires different types of services. Hence there is a *diversity of services* in an integrated rural development programme. Each service must integrate unique inputs. Thus if there are four different services, there will be four different combinations of inputs for the programme to manage. Multiple services assume considerable competence and leadership by the programme managers.

Second, multiple services may be *related* or *unrelated*. A programme concerned with two agricultural crops grown by the same farmers and requiring several common inputs (e.g. fertiliser, water, credit), is providing *related* services. The common elements in the services make their management relatively simple. It is more complex to manage the services of two unrelated crops. Such services are then *unrelated*. Integrating inputs for unrelated services is complex. A health strategy which combines curative care and preventive care provides related services. But when curative care and primary education are offered, we treat them as unrelated services. Their inputs are totally different. The beneficiaries are also likely to be different. Services are more related when their inputs and beneficiaries have more in common. When the services are unrelated,

the problem of diversity is more severe.

A third dimension of service is the *measurability* of inputs and outcomes. If the inputs of a service as well as its outcome are measurable, management control is relatively easy. Where these are difficult to measure, monitoring and control become more difficult. Programmes with economic goals pass the test of measurability better than those with social goals. The outcome of a preventive health care strategy or adult education strategy is more difficult to measure and evaluate than that of a rice programme or an export promotion strategy. In some cases, programme inputs can be measured, but not their outcomes. This permits at least the monitoring of inputs, but not of the programme impact.

The three dimensions of *diversity, relationship and measurability* of services have a direct bearing on programme strategy. When services are divers, unrelated and difficult to measure, the task of management can be made easier if the programme starts off with a single service and subsequently moves into other services. This is a means of reducing complexity. We call this the strategy of *sequential diversification*. Another means of reducing complexity is to choose *related* goals and services. If sequential diversification is impossible, then the second-best course is to increase the relationship between programme services. A third strategy is to measure inputs and outputs *indirectly* where measurability is a problem. A search for *surrogate measures* is initiated to cope with the problem of measurability. Examples of these different strategic interventions can be found in a variety of programmes.

Sequential diversification has been used by several successful development programmes. The Indian Dairy Development Programme started with a single service that focused on milk for twelve years. Then it took up oil seeds development as an additional activity or service. The Indonesian Population Programme concentrated on family planning in the first decade, and then diversified into nutrition and other population activities. The Chinese Public Health Programme, which had multiple goals, emphasised two related services, curative care and preventive care. In the Indonesian Programme, the immediate impact of family planning was difficult to measure. The strategy, therefore, focused on the number of acceptors, their problems and the supplies and services delivered to them. These were surrogate measures, but useful for monitoring and control. Minimising non-measurability was a strategic intervention by programme leadership.

Beneficiaries: The Problem of Diversity

The service concept entails some implicit assumptions about the characteristics of programme beneficiaries. Some services are meant for the entire population of a country or region, e.g. health services, infrastructure facilities, etc. Others benefit only segments of the population, e.g. farmers, small-scale entrepreneurs, etc. A programme often fails to elicit the relevant public response simply because the relevant analysis of the beneficiaries and their needs was not adequate. Irrigation projects fail due to poor utilisation of water when they ignore the needs of different groups of farmers. The native assumption that the delivery of water was a standardised service was proved wrong by farmers who wanted the delivery to be tailored to their differing needs, by time of day and day of the week, for example.

As programme size and geographical scope increase, diversity among beneficiaries also increases. The same service may not meet the needs of diverse groups of beneficiaries. For instance, family planning services for urban people may need to be very different from that for rural public. Pilot projects are initiated in different regions of a country to understand variations to be built into the programme service to match the needs of different segments of the population. Even a simple service for significantly diverse beneficiaries may have to be *differentiated*. For example, a rice development programme in a country with diverse climatic and farmer characteristics must offer differentiated services. When the differentiation required is high, a strategic decision has to be made on whether separate programmes are required to cater to the needs of different groups of beneficiaries. Thus a small farmers' programme may be separately set up because the service required by them has to be significantly differentiated from the service offered to larger farmers, even though both groups cultivate the same crop. Water supply and sanitation services for rural communities are usually differentiated from those of urban centres. Thus, for example, the Philippines have established three water programme agencies: one for large municipalities, another for 600 small cities and another for thousands of rural communities.

Sequence: Phasing Over Time and Space

When services' beneficiaries are diverse and the scope of the environment wide, it becomes necessary to plan implementation in phases. Though this may look obvious, many governments implement programmes to cover the country all at once without considering these prob-

lems. Programme failures arise from the lack of a strategy for sequential expansion. Even a phased expansion tends to be a response to financial constraints. It is seldom recognised that environmental complexity and service-beneficiary diversity are important reasons why careful phasing of the programme implementation should be built into the strategy itself. Expansion programmes become unmanageable without careful phasing.

Phasing strategy is different from sequential diversification of services discussed earlier. The latter may be regarded as adding on new goals or services which are not part of the programme to begin with. Phasing, on the other hand, is concerned with how a given service is to be implemented. To illustrate, the Indonesian Population Programme covered the country in three phases. In the first phase, it operated only in Java and Bali, which were the two most densely populated islands of the country. In the second phase, the programme extended to one set of the outer islands which were sparsely populated. In the third phase, the remaining islands were covered. Extending the programme to all three simultaneously would have over-burdened management. Abundance of funds does not necessarily eliminate the need to phase programme implementation. Sequential moves also help the programme to learn as it goes from one phase to the next, thus enhancing its ability to improve performance over time.

5.3 The Demand-supply-resource (DSR) Strategy

SBS brings the operational goals of a programme closer to action. Design of the service, focus on specified beneficiaries and the extension of the service to desired areas (geographical phasing) over time are critical steps in translating goals into action. DSR, on the other hand, calls for careful planning at the very inception of the programme. The two together provide the basis for designing the action plans of the programme.

DSR highlights three basic tasks (1) public response to a programme service (demand), (2) the task of delivering the service to the public (supply), and (3) mobilisation of resources for the programme through the key actors in the environment. The mix of these tasks differs from one programme to another. For example, in programmes which are more concerned with social services like preventive health care or adult literacy, mobilising public demand may turn out to be a more important task than in other programmes. Let us look at each of these tasks.

Many development programmes are managed as *supply systems* with explicit recognition of the role of service delivery alone. When there is excess demand for certain services, this approach may be adequate. When imports are cut off, domestic enterprises can sell all their products even if they do not advertise or drum up demand. Faced with shortages, enterprises do well even when they do nothing about mobilising demand.

Every programme manager ought to probe the demand aspects of his service well before its design is frozen. In fact, an understanding of the needs of the beneficiaries and the factors influencing them assists him in adapting the service to the environment. Beneficiaries may fail to respond because of problems of either *willingness* or *ability* or both. There are different ways of responding to the demand problem depending on the difficulties facing the beneficiaries.

- (1) If unwillingness is the constraint, *information* as well as *incentives* are useful for mobilising demand. Unwillingness may be due to ignorance. Dissemination of information and advice may stimulate demand. The adoption of new agricultural technology and practices by farmers is facilitated by an information and advisory service. If unwillingness is due to the low gains or benefits perceived by the people, the demand strategy may need to pay increased attention to incentives. For example, in programmes for agricultural crops, it is important to ask whether additional returns to farmers are adequate incentives for them to respond to the new strategies.
- (2) Service must sometimes be adapted to the changing needs of beneficiaries. Standardised services may be inappropriate for beneficiaries who become increasingly unwilling to respond. In nutrition and family planning, this a major problem. When such uncertainties exist, *participation of beneficiaries* in operational planning and implementation can mobilise demand. Participation makes the service more relevant to the needs and more adaptive to the environment of the beneficiaries. This, in turn, increases their motivation to respond.
- (3) If beneficiaries cannot take advantage of a programme's service, information and participation cannot fully improve response. Even a "free" service may extract indirect costs beyond

their means. Few poor farmers and labourers can send their children to free primary schools because the children's earnings are too valuable to be exchanged for the uncertain, long-term gains from education. Under these conditions, *income generation* is a pre-requisite for mobilising demand for education. As long as incomes do not cross a threshold, beneficiaries cannot and will not demand the services of certain types of programmes. Influencing income generation then becomes strategic intervention.

- (4) Sometimes, major institutional reforms are needed before response to a programme can occur. Land reform, for example, may be a condition for tenant farmers to invest in agriculture and adopt new technologies. Such reforms seldom take place without the use of *power* through the government or people's own organisations. The ability of farmers to respond to the agricultural programme increases when they own land.

Both income generation and use of power entail complex strategic interventions. Programme managers must examine closely the twin aspects of willingness and ability of beneficiaries and choose the most appropriate mix of interventions. The four types of interventions explained above merely offer broad guidelines to facilitate this choice.

Supply

Technology-intensive programmes tend to emphasise supply while ignoring demand. Irrigation projects which ignore water utilisation, and agricultural programmes which put their faith in miracle seeds and forget the farmer's other requirements are examples. Supply should be closely linked to the demand side of the programme. Three strategic considerations, which govern the supply task, are differentiation, testing and efficiency.

First, it is important to analyse the degree of *differentiation* needed in the programme service to match the diversity in the needs and beneficiaries. A nutrition programme operating in diverse geographical regions may have to differentiate its service to suit the needs of beneficiaries in different regions. If the programme diversifies into family planning and health, similar differentiation may be necessary in these services too. The complexity of managing the supply of these widely differentiated and multiple services will be enormous.

Second, learning from the pilot project is an important aid to the supply task. Testing out production and delivery of service is facilitated by pilot projects. How to integrate the lessons of pilot experiences into the replication of the service should be a major concern of the supply strategy.

Third, efficiency of service delivery is low in many programmes. Special attention to keeping adequate supplies of inputs and organising logistics is required to avoid shortages so common in developing countries. Strategic planning rather than purely adhoc moves are needed to ensure efficient service delivery. A programme may make use of public as well as private channels for service delivery.

Mobilisation of Resources

Programme designers commonly think of resources in financial terms alone. However, resources, including funds, are often mobilised with the support of a variety of key actors in the government. They may be political or administrative leaders, and others who hold sway over potential beneficiaries, and agencies whose co-operation could make some difference to programme performance, e.g. religious leaders, local elders, heads of local governments, etc. These key actors may be persons and groups capable of influencing a programme either on the demand or supply side or both. Thus, building external linkage is a key function of the top management in many programmes. Designs on paper amount to little without a strategy for mobilising key actors whose support is essential to implementation. Identification of key actors and the kinds of resources (resolution of conflicts, funds, facilitating public acceptance, etc.) they can provide, is a strategic task of many programmes.

In the Indonesian Population Programme, the initial emphasis was on the dissemination of information and advice as the primary means of mobilising public response. Soon when it was found that demand was not growing, the programme leaders hit upon the idea that an active role of the village communities in planning and implementation might create greater interest in the programme service. Participation of beneficiaries thus became an important instrument of demand mobilisation. Supply was organised to match demand for the service being created. It was recognised very early that logistics could prove a major hindrance to the timely delivery of the service in rural areas. The strategic decision to maintain li-

beral stocks of contraceptives on a decentralised basis and the flexible funding procedures used to obtain foreign aid to import and distribute these supplies reflect interventions to strengthen the supply task. An example of mobilising resources through key actors is the programme's careful strategy to win the support of the religious leaders and village elders for family planning.

The demand, supply and resource components of strategy are clearly derived from the operating goals and the service-beneficiary-sequence components discussed earlier in this chapter. However, feedback from DSR may also help to modify and tune the SBS strategy. Thus, if demand mobilisation is expected to be very difficult, it may well be reflected in the phasing strategy or decisions about the beneficiary groups. SBS and DSR are, therefore, interdependent and must be treated as different parts which hang together. No programme manager can possibly prepare a grand design of these parts all at once. Design may have to be based on trial and error by setting up a pilot project. Evidence from the field could then be used to test whether a concept of service or a strategy for mobilisation of demand or any other component is appropriate to the environment.

Phasing cannot be tested through a pilot project. But most other components can be tested in pilot experiments. Important aids to strategy formulation are pilot experiments which consciously planned to provide insights for evolving strategies for larger national programmes. Launching pilot project without deliberate plans and ignoring the process by which knowledge is transferred from experiments to the larger programmes are the weak points of some programmes. Those managing national programmes who did not work in pilot projects usually have difficulty in understanding and integrating lessons into their strategy. Sound strategies usually depend upon how pilot experimentation was planned and used as a learning device by programme managers. Pilot projects in national programmes are the counterparts of research and development projects in industrial enterprises.

5.4 Some Guidelines for Strategy Formulation

Our discussion of SBS and DSR should not lead the reader to conclude that strategy formulation is a mechanical process. On the contrary, creating the building blocks and putting them together requires imagination and a sound understanding of the environment. It is essentially an *interactive process*; those who are involved learn, adapt and resolve

conflicts as they move on. While it is useful to know components of a strategy, planning cannot be reduced to a series of simple steps. We will, therefore, pose a series of key questions to help designers and managers evolve programme strategies.

General Questions

1. What are the operating goals of the programme?
2. Do they flow from the objectives given by the government?
3. Will the pursuit of multiple goals overburden the programme?
4. Have pilot projects been used to assist in programme design? How are they linked to the programme to maximise learning?
5. Has the achievement motivation (motivation to achieve results, performance orientation) of the staff of the programme and the potential beneficiaries of the programme been considered in the formulation of the strategy?
6. What are the critical tasks indicated by the analysis of SBS and DSR?

Service-beneficiary-sequence

1. Are the programme services single or multiple?
2. If multiple, are they related or unrelated?
3. What is the degree of measurability of their inputs and outcomes?
4. Do the services flow from the operating goal(s)?
5. Does the integration of inputs underlying the service(s) match the beneficiary needs?
6. Are the service(s) consistent with the operating goal(s) and environmental complexity? If the technology is imported, how is its adaptation to local conditions ensured?

7. For whom are the service(s) meant?
8. Are the beneficiaries homogenous or diverse?
9. If multiple services are involved, are they meant for the same group of beneficiaries or diverse groups?
10. Is the combination of inputs designed to match the inability of the weaker section of beneficiaries to integrate inputs on their own?
11. If diverse beneficiary groups are involved, is it necessary to differentiate the service for them?
12. Is it advisable to extend the programme to the entire country all at once or should it be done in phases?
13. If phased implementation is better, what is the most useful basis for ensuring programme expansion?

Demand-supply-resource

1. Is there likely to be a demand problem for the programme?
2. What factors seem to inhibit demand?
3. What are the most appropriate interventions to help mobilise demand?
4. If demand appears to be a serious problem, what modifications are called for in the SBS components?
5. Is supply (service delivery) a more or less serious problem for the service than demand?
6. What specific interventions are called for to facilitate supply in terms of service design, logistics and delivery?
7. What strategic interventions are needed to ensure that strategies do not hamper the supply task?
8. Is it necessary to use private channels and sharing of costs with beneficiary groups (communities) to minimise the overload on the supply task?

9. Who are the key actors in the environment whose support needs to be mobilised in favour of the programme?
10. Who among them are influential on the demand side? Who will be influential on the supply side?
11. What specific resources or influences can be mobilised through these key actors?
12. What strategic interventions are needed to win the support of the key actors?

Each of these questions could be followed by sub-questions to probe each component further. This set of questions is by no means exhaustive. Rather it is a suggestive checklist which the designer or manager can adapt to his specific setting. The insights provided in this chapter could be used to add to this series of questions. These guidelines should be viewed as an aid to the creative process of designing a strategy consistent with the programme environment and not as a substitute for this very important process.

SELF ASSESSMENT QUESTIONS

- 1. What do you understand by development programme and what guidelines would you suggest for programme designers keeping in view the specific conditions of project management system in Pakistan?**
- 2. What, in your opinion, should be a good-working definition of strategic management?**
- 3. What are the essential elements of strategic management?**
- 4. Why is it necessary to study the environment for formulating strategy for development programmes?**
- 5. What guidelines should be followed for preparing a strategy for management of a development project?**

FOOT NOTES

1. Sometimes they are also called "public programmes". We shall, however, use the term "development programme" in this book.
2. Economists use the term "development expenditure" to differentiate this category from the normal maintenance expenditure of governments.
3. A Waterson: *Development planning: Lessons of experience* (Baltimore, Maryland, Johns Hopkins University Press, 1965), pp. 332-333. See also U. Lele: *The design of rural development* (Baltimore, Maryland, Johns Hopkins University Press, 1975) and *Public service delivery systems for the rural poor* (Bangkok, United Nations ESCAP, 1980).
4. A Waterson, *op.cit.*, pp. 320-321.
5. For example, UNIDO: *Guidelines for project evaluation* (New York, United Nations, 1972) and I.M.D. Little and J. Mirrless: *Manual of industrial project analysis in developing countries* (Paris, OECD, 1969).
6. *Public administration institutions and practices in integrated rural development programmes* (New York, United Nations, 1980), p. 6.
7. For a detailed discussion of such programmes see *ibid.* Also see *Rural development: Sector policy paper* (Washington, DC, World Bank, 1975).
8. Interestingly enough, scholars located in developing countries or who have opportunities to be in the field have paid greater attention to the problems of such national programmes. Of course, if countries have not gone beyond the stage of pilot projects, opportunities for such involvement cannot possibly exist.
9. L. Stifel et al.: *Education and training for the public sector in development countries* (New York, Rockefeller Foundation, 1977), p. 7. US scholars who have worked on public programme implementation have, on the whole, avoided the sectoral bias. Comparisons across sectors and departments have been a part of their general approach. The problem has been more serious for scholars working on LDC programmes, possibly because of their long-term sectoral involvements.
10. The design of the individual services or end products is an important technical rather than management problem. Projects and programmes have to generate design, production and delivery systems which enable beneficiaries to receive the intended services, consistent with available resources and norms of efficiency.
11. We are here referring to pilot projects which have not been consciously planned to lead to larger programmes. Crisis programmes are short-term emergency programmes to deal with catastrophes like floods, droughts, famines, etc.

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12. See J. Pressman and A. Wildavsky: *Implementation* (Berkeley, University of California Press, 1971); M. Derthick: *New Towns in Town* (Washington, DC, The Urban Institute, 1972); W. Williams and R. Elmore (eds.): *Social programme implementation* (New York, Academic Press, 1976).
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13. For a discussion of the mediating role, see H. Mintzberg: "Patterns of strategy formulation", in *Management Science*, May 1978, pp. 938-940.
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14. See S. Paul: *Management development programmes: Lessons of success* (Boulder, Colorado, Westview Press, 1982) for an analysis of some outstanding examples.
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15. See D. Korten: "Community organisation and rural development: A learning process approach", in *Public Administration Review*, Oct. 1980.
16. J. Pressman and A. Wildavsky: *Implementation* (Berkeley, University of California Press, 1971); M.S. Grindle, (ed.): *Politics and policy implementation in the Third World* (Princeton, New Jersey, Princeton University Press, 1980).
-
17. We have earlier used the term "interaction effects" to signify synergy effects. Economists use the term "production function" to represent the relationship between output and its underlying input combination.
-
18. Programme managers may sometimes have more flexibility in these matter than they realise. Some people simply do not take advantage of their opportunities.
-
19. This happens often in economic programmes. Enough entrepreneurs or farmers may be aware of the benefits and willing to respond to some programmes. If supply is extremely limited, then again, the same phenomenon may occur.
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20. Organisational theorists have analysed a variety of environment properties and their implications for organisational structure. See J. Galbraith: *Organisation design* (Reading, Massachusetts, Addison-Wesley, 1977).
-
21. This behaviour has been observed in the context of firms. See H.A. Simon and J. March: *Organisation* (New York, Wiley, 1958) and R. Cyert and J. March: *The behavioural theory of the firm* (New York, Prentice Hall, 1973).

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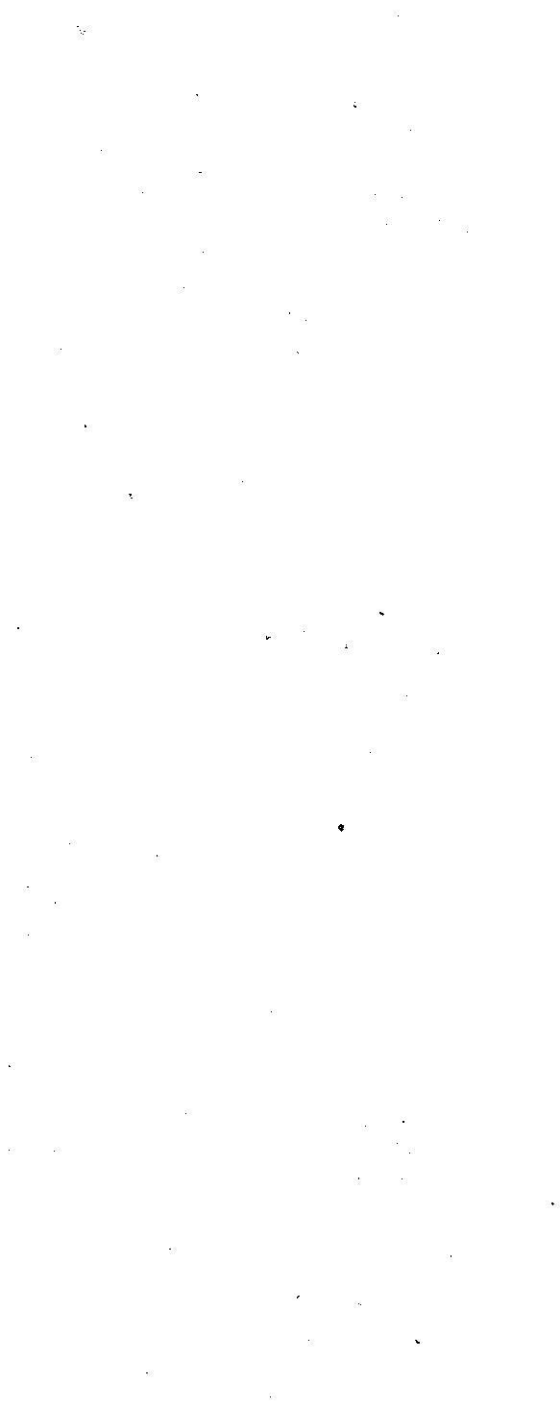
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Unit:4

STRATEGIC MANAGEMENT OF DEVELOPMENT PROGRAMMES: PART 2

**Adapted for
Project Implementation, Monitoring
and Evaluation**



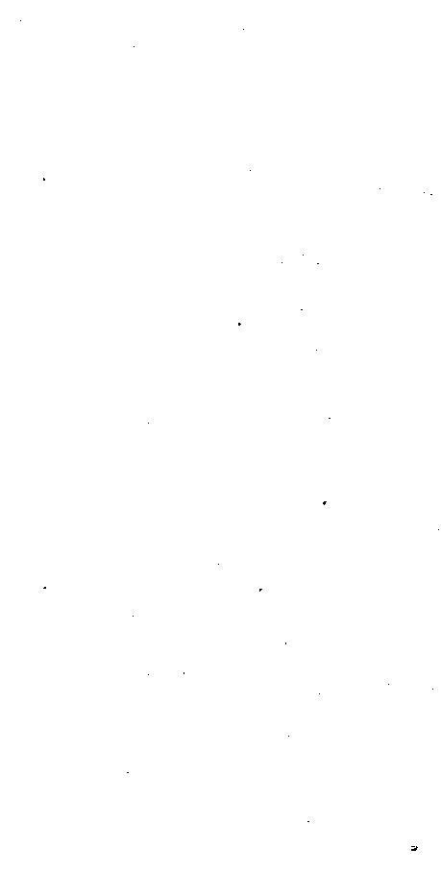
A WORD TO THE STUDENT

This Unit—11 is a continuation of the Unit—10 and forms part of the ILO publication "Strategic Management of Development Programmes" by Sameul Paul. The contents of this Unit, therefore, intend to achieve the objectives specified in the Unit—10.

CONTENTS
(Part - 2)

Page No.

6.	Structure: The Key Dimensions	225
6.1	Structural Forms	
6.2	Degree of Decentralisation	
6.3	Organisational Autonomy	
6.4	Some Guidelines for Structural Choices	
7.	Process Interventions	240
7.1	Governmental Processes	
7.2	The Participation Process	
7.3	Human Resource Development Processes	
7.4	The Monitoring and Control Process	
7.5	The Motivation Process	
7.6	Some Guidelines for Programme Managers	
8.	Orchestration of Congruence	255
8.1	The Meaning of Congruence	
8.2	Congruent Combinations: Some Illustrations	
9.	Putting Strategic Management into Action	263
9.1	Preparing New Development Programmes	
9.2	Applying Strategic Management to Ongoing Programmes	
9.3	Taking Action	
	SELF ASSESSMENT QUESTIONS	272
	Appendix 1 Further Readings	275
	Appendix 2 Glossary of Selected Strategic Management Terms	282



1. STRUCTURE: THE KEY DIMENSIONS

In chapter 3, we defined "structure", as the durable organisational arrangements by which a programme accomplishes its tasks. For example, programme tasks must be allocated among members, of the organisation. Authority must be distributed to enable responsible managers and officials to perform their tasks. Reporting relationships and controls must be established to facilitate efficient task performance. Grouping activities, distributing authority to match the responsibility pattern in the organisation and clarifying the formal reporting relationships among those working in the organisation create the major elements of organisational structure. Most of these issues are dealt with informally in small organisations, where the boss is in personal contact with all members and oversees all activities directly. But as organisations grow larger, no single person or group can manage all activities and people directly. It then becomes necessary to formalise relationships and create formal structures in which other managers and staff share responsibility and authority with the boss.

Anyone familiar with small pilot projects and experiments will appreciate how personal involvement and supervision can accomplish common tasks. A formal organisational structure, delegation of powers and control systems seem alien to the needs of these small groups of committed workers. Nevertheless, when pilot projects are successful and are to be replicated on a larger scale by setting up a regional or national programme, the old, informal organisational arrangements seem to be unequal to the new tasks. Those brought up in the informal culture of the pilot projects may mourn the passing of a tradition, but there is no way to avoid a formalisation of the organisational structure and the growing shift to impersonal transactions.

Governments do recognise the importance of creating new organisational structures and reforming old ones, though they do not always act fast enough to deal with the problem. The creation of public sector organisations, for example, reflects the belief that the corporate form of

organisation is more appropriate for manufacturing or commercial activities than the departmental form. Commissions and task forces are often set up by governments to recommend structural reorganisation to fit the changed task requirements. Ministries and departments are regrouped and sometimes abolished when a new government takes over. When strategies change, structures need to be realigned. In industrial enterprises, this is quite common. In fact, many cases have been reported of enterprises whose performance suffered when their structures failed to match their changed environments and strategies. Among the more successful enterprises are those who recognised this problem and realigned their strategies and structures.¹

Furthermore, some researchers have observed that the process of periodically realigning structures renews people's interest in their organisation and often helps them become more productive.

We will examine these dimensions of structure in this chapter. First of all, the manner in which tasks are divided (differentiated) into manageable components and then pulled together (integrated) is important. The structural form adopted by a programme reflects its approach to the differentiation and integration of activities. Second, a critical dimension of the structure is the degree to which it is centralised or decentralised. A third aspect concerns the extent of autonomy enjoyed by the programme organisation. The following sections will probe each of these dimensions.

6.1 Structural Forms

Governments worldwide are characterised by hierarchical structures which depend largely on the use of *rules* and *authority* to accomplish tasks. Each ministry or department which performs a set of tasks generally has a self-contained bureau or unit for each task. The staff of the bureau or unit perform the functions relevant to the task and report to a single boss who is responsible for the entire operation. There is a clearly defined line of authority which makes the structure hierarchical. Defence, public works, etc., are good examples of this *functional structure*. We use the term "functional" to mean that the sub-tasks are broken up according to the functions relevant to the service. It is the integration of these functions that the administrator performs.

Since development programmes are normally initiated by ministries, the temptation is generally strong for the sponsor to prescribe for a programme its own structural form. And what is more, a functional

structure often fits the needs of many programmes. Yet, when complex programmes whose tasks require different structures are launched, this standardised approach causes serious problems of performance. The appropriateness of a structure can be judged only in relation to a programme's strategy and environment. The designer should start with the goal, and tasks identified in the strategy and search for the best ways of differentiating and integrating the relevant activities. When a programme (1) deals with a single service and (2) is relatively small, when (3) technology is simple and production processes are standardised, and when (4) processing of information is relatively easy, it is possible that the functional, hierarchical structure will suffice.

Other structural forms are often better for complex development programmes. We discuss below three structural forms and the conditions under which they are better for a programme. Mixed forms and other adaptations of these structures are sometimes needed. Interested readers may consult the specialised writings on this subject.²

Functional Structure

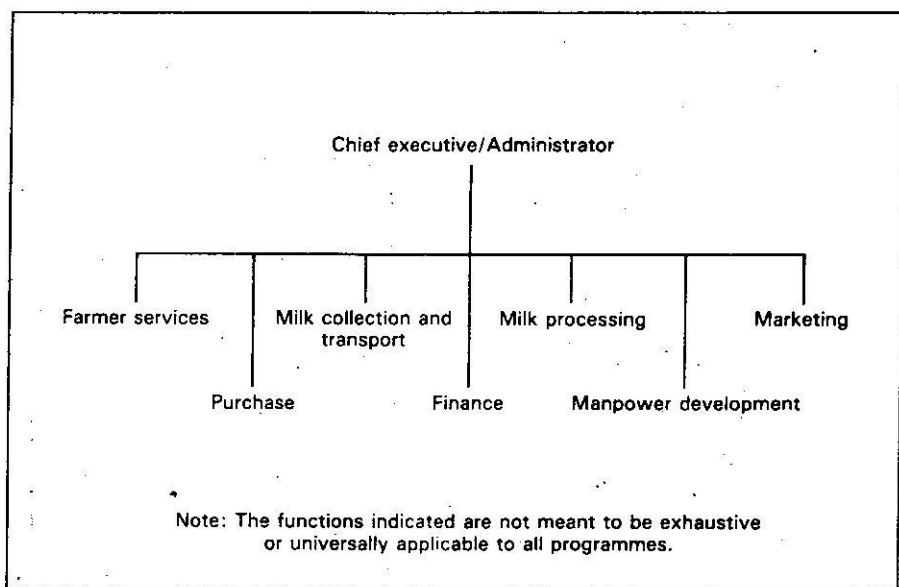
When an organisation deals with a single product or service, it can be managed by subdividing its activities into sets of complementary functions. To illustrate, in a dairy development programme four basic functions were identified. Providing services to farmers (extension, inputs) is one function; milk collection, quality control and transport another. Milk processing and marketing are the two remaining functions. There are several supporting functions too. Thus purchase of materials, finance, and manpower development can be treated as common services which facilitate the performance of the basic functions. Taken together, all these functions complement one another and each function has considerable uniformity in terms of its focus, skill requirements and internal communication. These functions are integrated at one place in the organisation, namely at the level of the chief executive, with the assistance of the heads of functional departments or units. The structure is functional in that the basic criterion for differentiating and integrating activities is the interdependence of functions.

When a programme grows larger geographically or adopts a multiple service strategy, a simple functional structure may no longer work. Many development programmes require much local adaptation of services. Remote control from distant headquarters by functional heads is often

ineffective. Similarly, when a single service-oriented programme diversifies, the original set of functional groups may no longer be competent to supervise, support and control the additional services. For example, if an agricultural programme diversifies into health and education, its original functional departments will soon find themselves unequal to the task of managing the new services. Enterprises often adopt a product-based divisional structure when they diversify. For development programmes, this kind of divisional structure will probably be unsatisfactory. Matrix structures are increasingly used when programmes diversify their services or expand.

Figure 7 shows a typical functional structure, using an example taken from the Indian dairy programme agency.

Figure 7 Functional structure of a dairy programme agency

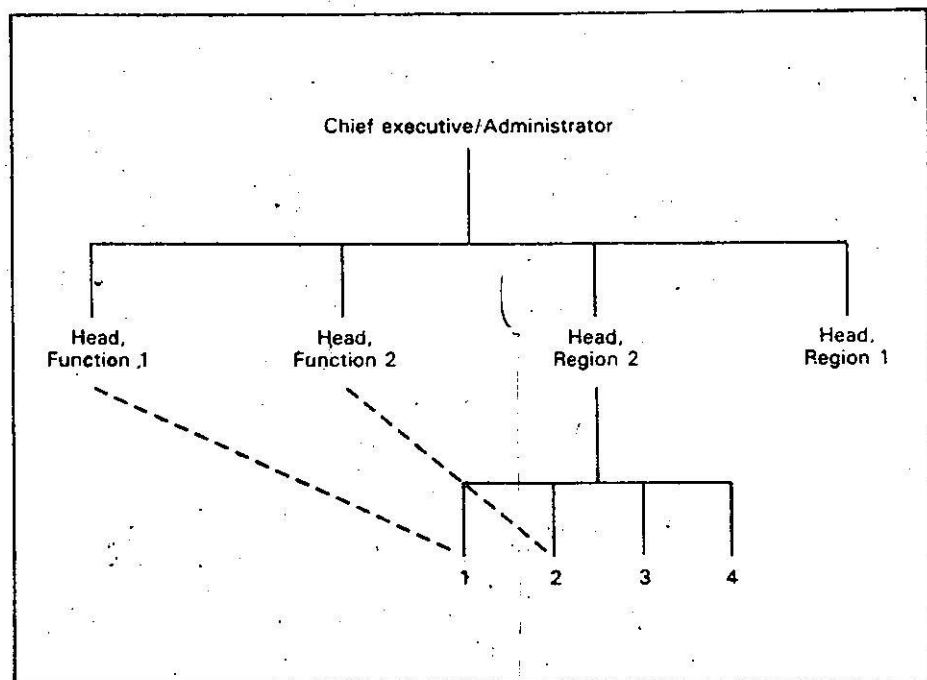


Matrix Structure

The matrix form of organisation³ operates under *dual authority*. In the functional structure, the line of control (hierarchy) is quite clear. In the matrix form, on the other hand, many members of staff have two bosses, at the same time. For example, a single crop programme may be divided into several regions covering the entire country with a manager in charge of each region. The regional offices might have a complement of staff drawn from the different functional groups. These staff are members of two departments or groups simultaneously. They are res-

possible to the regional manager or administrator in the field as well as to the head of their respective functional departments for technical matters. Sometimes, these functional departments may be in the parent ministries, but the concept of dual membership and authority is still valid. This arrangement is common in multiple service programmes. Per-

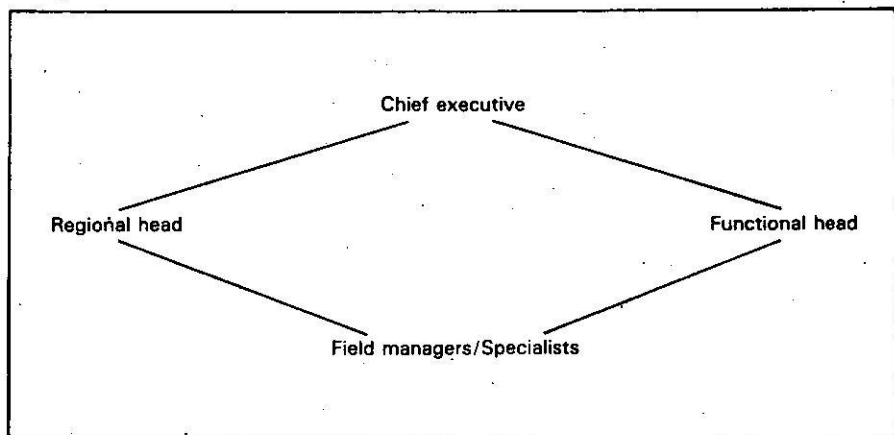
Figure 8 Matrix structure of a dairy programme agency



sonnel for health and educational services in our earlier example may be drawn from the relevant ministries of government on the understanding that the technical back-up for the services will be provided by the latter. Thus the matrix form makes use of the principles of *specialisation* (functional) and *service* (substantive or spatial).

Figure 8 illustrates an organisation that is differentiated by both function and region. In Region 1, Managers 1 and 2 report to Head, Region 1, but are also controlled by the Heads of Functions 1 and 2 (the numbers are illustrative). The integrating role is now performed at lower levels (Managers 1 and 2) as well as at higher levels (regions and head office). The matrix form thus permits more decentralisation than does the functional form. There are usually more conflicts with this structure because more decisions are jointly made. But it is more appropriate when multiple regions or services are involved, and integration at lower levels and local adaptation are desired because of environmental uncertainty, diversity and scope.

Figure 9 Dual control



The managers working under the heads of Regions 1 and 2 in effect have two bosses. For operational matters, they are controlled by regional bosses. In technical or professional matters, they are controlled by their functional bosses. This dilemma of "dual control" is depicted in Figure 9. Dual authority is clearly a source of ambiguity and conflict in operating any programme. Managing the matrix structure calls for considerable sophistication, cooperative attitudes and willingness to negotiate when differences arise.

In a matrix structure, as a last resort, one tries to resolve conflicts at higher levels in the organisation. Dual authority merges into a unified command at the top. In large, complex development programmes, however, joint decisions and resolution of conflicts often require the formal co-operation of several organisations outside the programme agency. A structure that facilitates interorganisational co-operation is more appropriate under these conditions than a functional or matrix form which assumes that a single organisation has full authority over all relevant decisions and actions.

Network Structure

Few lead agencies can formally control other organisations or agencies whose participation is essential to a programme's success. To function effectively, the lead agency must often create a *network* of the relevant public and private agencies which it influences in different ways. The lead agency co-ordinates, but does not control. The network, performs well only if the lead agency can influence its collaborators by joint allocation of funds, joint planning of activities, political support and review at higher levels.

The fact that an agency must use a network is evidence of its limited ability to control. A programme agency has different degrees of influence over the members of its network. It can exercise authority

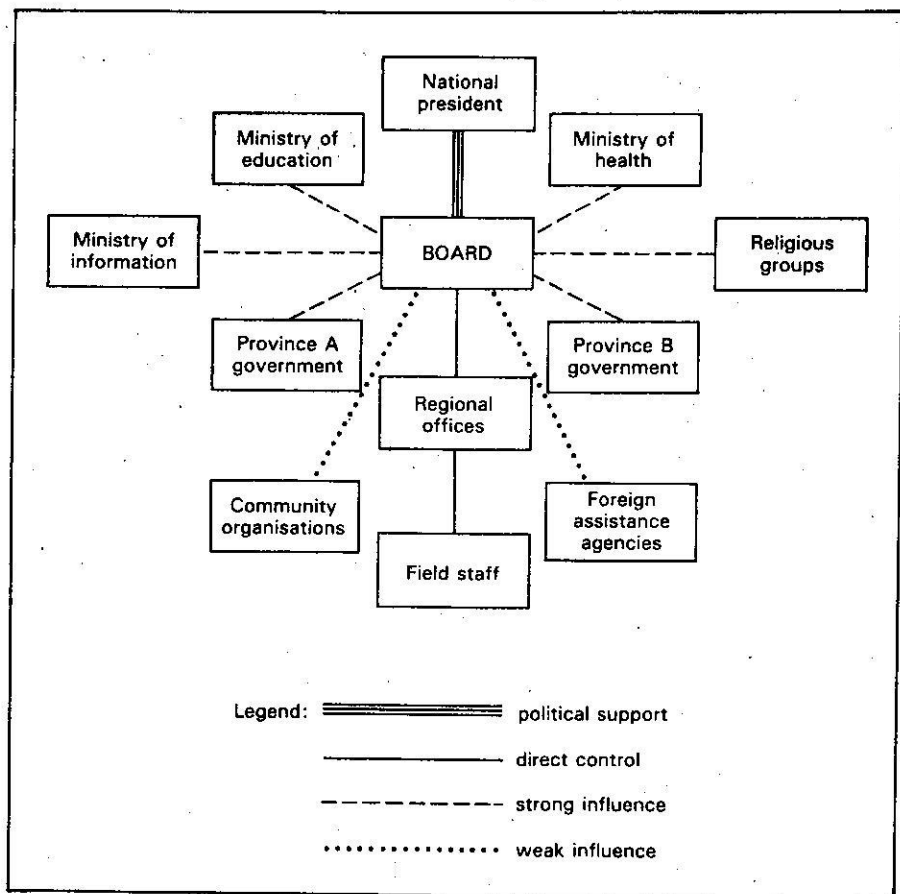
only over those who belong to its own organisation (e.g. field staff). Beneficiary groups, though dependent on the programme agency or other members of the network are not under its control. Accurate depictions of network structures become very complex because of the multiplicity of agencies and their varying degrees of influence.

Figure 10 illustrates the network structure of the Indonesian Population Programme. In this network, we can distinguish several types of influence involving the Population Board, the lead programme agency. First there was presidential *political support*, which was the single most important source of *influence* for the Board. The Board *directly controlled* only its own regional officers and field staff. Next, it *strongly influenced* co-operating ministries, such as health, education, religion and information. The Board had *strong influence* also over provincial governments which participated actively in the programme's implementation. Control over budgetary allocations to the participating agencies, joint planning and periodic review by the President were the means by which influence was exercised. The Board had no such direct influence over community organisations whose co-operation was essential to the programme's success. The Board had only a *weak influence* over these organisations. It used participation of the people and other motivating devices to elicit community co-operation.

In a population programme, several ministries (education, information, health, etc.) offer important inputs to the programme agency. State agencies may be critical to operational planning, implementation and local resolution of conflicts. Participation of community organisations may facilitate demand mobilisation and service delivery. Yet the programme agency does not control these organisations. If the programme agency can plan activities jointly with the other organisations and allocate funds to finance their part of the work (through a council, board, etc.) the network is likely to be more effective. In other words, the programme agency must have ways to influence the behaviour of other members of the network. Whether a programme will have a functional or matrix structure or move towards a network structure depends very much on its strategy and environment.

The Kenya Tea Development Authority, which organised almost all the inputs required by the tea farmers under its auspices (functional and vertical integration), performed well with a functional structure. Its use of network structure was quite limited. On the other

Figure 10 Network structure of the Indonesian population programme



hand, the Philippine Rice Programme, which depended on several agencies for diverse inputs and functions, depended heavily on the network structure. The National Food and Agriculture Council, which was responsible for this programme, co-ordinated the work of nearly 30 agencies, public and private, and provincial and local governments. Its sources of influences were joint planning, alloca-

tion of funds and mobilisation of demand through field staff and political support. Programme strategy and environment clearly had much to do with the structures that emerged in their cases. Structures seem to have followed strategies in both programmes.

6.2 *Degree of Decentralisation*

Why decentralise, and how much? These questions are seldom asked by planners who design development programmes. Centralised structures, common in government ministries and departments, tend to be imposed on programmes. The differences between the structural requirements of the central systems of government and the field-oriented programme agencies are too often ignored.

On the other hand, some designers and researchers argue for decentralised structures for every programme without analysing its strategy or environment. They do not appreciate that the degree of decentralisation should vary depending on these factors. They do not weigh the gains of decentralisation against the costs of the increased complexity of management control and difficulty in finding the needed well-trained personnel at lower levels. Certainly, decentralisation increases the opportunities for participation by programme staff and beneficiaries. This is truly valuable by itself. Nevertheless, the barriers to decentralisation should be considered and ways of over-coming them planned for.

What conditions require decentralised structures? Generally, when the job requires flexible, quick decisions at the grass-roots level, centralised structures simply get overloaded and perform poorly. Four conditions call for greater decentralisation.

(1) When beneficiaries of the programme have diverse requirements, much local adaptation is called for. If there are different groups of farmers working under different climatic and social conditions, the field staff will need to exercise considerable discretion to meet their divergent needs. Higher authorities cannot possibly make good rules for every situation or foresee and solve all problems.

(2) When demand for the service depends on speedy programme responses, decentralised structures perform better. Centralised structures invariably involve delays in decision making as issues move from one level to another. Delayed decisions and actions may fail to meet beneficiary needs. A popular example is the provision of credit to farmers.

Referring their applications upwards and getting approval from the top may take so long that by the time the money arrives, it is too late for the farmers to sow their crops'. Farmers often then distrust the centralised structure and turn away from the programme.

(3) When vital information for decision making is generated only in consultation with the beneficiaries, decentralised structures often work best. Take nutrition programmes, for instance, where services are designed and delivery planned and organised centrally. Public response has been poor in most places, because these services were too standardised. Close contacts are needed with beneficiaries, whose concerns and preferences often change. The services should be designed in collaboration with communities using decentralised structures, because central authorities cannot analyse the necessary information or be sensitive to changing local conditions.

(4) When responsible participation of field staff and beneficiaries in programme planning and implementation is conducive to good performance, decentralised structures often work best. Social programmes, which do not offer direct and immediate economic gains to beneficiaries, work best when beneficiaries participate in programme planning and implementation to motivate them to respond to the programme. This logic applies as well to field staff. Those who enjoy some local autonomy and feel that they can influence decisions and actions are likely to work more enthusiastically for the programme. This happened in the Indonesian Population Programme; village communities actively participated in its work and the field staff took greater initiative in adapting their services locally.

How decentralised a structure should be can be decided only in each situation. Three principles should be considered, however. *First*, decentralisation does not mean that all functions are decentralised. Even in a decentralised structure, some functions are centralised. For example, functions involving considerable economies of scale and highly specialised knowledge may remain centralised. Bulk purchases, certain research and development activities and allocation of funds are often better organised centrally, whereas operational planning, detailed service designs and service delivery may be decentralised. *Second*, the four conditions discussed above also indicate the kinds of functions which need to be decentralised. Broadly speaking, those functions which facilitate local adaptation of services, reduce the overload on central information processing, stimulate demand for services, and strengthen participation

should be decentralised. *Third*, the degree of decentralisation should be determined in conjunction with the programme agency's ability to develop enough skilled managers to manage the decentralised structure. When there are practical problems in influencing the new structure, care should be taken to move cautiously and, if necessary, in phases.

In summary, the choice of a structural form does not necessarily imply a precise degree of decentralisation or centralisation. Functional structures can be centralised or decentralised. Matrix and network structures are generally more decentralised than centralised. But which functions should be centralised and which decentralised can be determined only by considering the criteria discussed above.

6.3 *Organisational autonomy*

Some programme organisations enjoy more autonomy than others do. By autonomy, we mean the amount of independence from the parent ministry in important areas of decision making and action. For example, a programme agency that does not need its parent ministry's approval for internal allocation of funds, appointment and promotion of its personnel, operational plans and related decisions enjoys a high degree of autonomy in these critical areas. Complete autonomy is an unrealistic expectation for programmes sponsored and funded by government. The latter is bound to exercise some control over all its programmes. Ideally, governments should exercise strategic control over their programmes and leave operational decisions to their leaders. Thus approval of the programme budget, top level appointments and review of performance are aspects of strategic control. Autonomy gets eroded when government officials interfere too often in the programme's operational decisions. When hesitant programme managers refer operational decisions back to the ministry, it is difficult to avoid delays and a dilution of accountability. When the government grants some organisational autonomy to a programme, it should also have the will and ability to monitor its performance and hold its management accountable for agreed-upon results or outcomes. But no programme can be completely autonomous.

The degree of organisational autonomy is usually clarified when defining a programme's structure. The legal form of organisation created for the programme yields important clues about its autonomy. For example, when a corporate form is given to a programme agency, there are likely to be legal provisions to ensure it some measure of autonomy. Agencies organised as part of the ministry or department usually

enjoy less autonomy. Legal structures are important insofar as they formally define the extent to which an organisation can depart from the norms and practices of its parent. We shall refer to this as *nominal* autonomy. However, *the effective autonomy* an organisation enjoys may well exceed or fall below what is permitted legally. Organisations in both public and private sectors earn some autonomy from their sponsors or supervising authorities. Thus, the trust and support of political leaders or top administrators in government may bestow on a programme agency a degree of *effective autonomy* that exceeds its *nominal autonomy*. We shall call the difference between the two *induced autonomy*. Induced or earned autonomy occurs because those who have authority can also use discretion to augment a programme's effective autonomy. It is, of course, true that programme managers often do not use all the effective autonomy they have.

A programme's strategy and the complexity of its environment yield clues about the degree of organisational autonomy it requires. In designing a programme's organisational structure, one should ensure that it has enough autonomy. For instance, a programme that operates in an uncertain environment needs more effective autonomy than a programme in a stable environment.

The Indian Dairy Programme agency, the National Dairy Development Board, was set up as a semi-autonomous public agency and not as an integral part of the Ministry of Agriculture. Apart from the legal (nominal) autonomy given to it, the Board induced additional autonomy through some innovative changes in its sources of funding. Its good performance no doubt persuaded the Ministry to grant it a degree of effective autonomy far in excess of its original nominal autonomy. For a programme which had to deal with sensitive milk markets and thousands of small farmers whose response could be volatile, a high degree of autonomy was essential.

An effective way to stretch limited organisational autonomy is to involve relevant voluntary and private organisations and local communities. Some parts of the programme's activities could be efficiently performed by such agencies. Some activities might be subcontracted to private firms and small entrepreneurs. The rigidities of government systems will not apply to them and hence they will be able to deliver the goods faster and cheaper. In the Philippine Rice Programme, for example, private rural banks provided credit to farmers and private companies distributed pesticides and other inputs. Thus the programme

agency responded to farmers with greater flexibility. In population programmes, voluntary family planning agencies often perform certain functions with considerable flexibility. Thus, it is possible for a programme to enhance its effective autonomy by letting private or voluntary organisations perform some tasks which they can do efficiently.

We have discussed in this chapter three important dimensions of the organisational structure. We have argued that structural choices are neither self-evident nor uniform. Structure must be adapted to environment and strategy. In the public context, there are limits to flexibility in altering structures. A government may be unwilling to try out a new organisational form, decentralise programme management or grant adequate autonomy. If so, there is a case for limiting the strategy of the programme and aligning it to what is feasible in terms of structural changes. There should be a mutual adaptation between strategy and structure. A "fit" between the two is essential. When the two do not match, performance will suffer. Second, when environmental conditions and strategy change, structure must be realigned to fit the change. Part of top management's function is to be sensitive to these changes and take steps to realign strategy and structure.

6.4 Some Guidelines for Structural Choices

First, one must analyse the critical features of a programme's environment and strategy. The choice of the structural form, degree of decentralisation and autonomy can be derived from such an analysis. The questions posed below should be followed up by a detailed analysis.

Environment and Strategy

1. How large is the programme? Is its size and geographical spread such that control through hierarchical authority will be feasible?
2. How diverse are the beneficiaries? Do they have significantly different needs and problems in relation to the programme?
3. Can the inputs for the programme service be organised within the purview of the programme agency? If not, will it have to depend on the active collaboration of a variety of agencies to obtain and integrate the needed inputs?

Structural forms

1. What is the best way differentiating the tasks or activities of the programmes (by function, service, region, or a combination)?
2. What are the best integrative mechanisms which can be derived to pull together the subdivided tasks?
3. If the programme must make use of the matrix form, what steps should be taken to ensure that dual authority will be accepted in the organisation?
4. If the network structure is adopted, what sources of influence are available to the programme agency to make it work?
5. What role can the programme offer non-governmental agencies (private, co-operative and beneficiary groups) in the network for the planning and delivery of services?
6. Does the nature of the strategy require that the structure be placed outside the purview of any single ministry? If so, who in government should be responsible for the programme?

Decentralisation

1. Does the diversity among beneficiaries call for considerable local adaptation of the programme service?
2. Does response to the needs of beneficiaries require speedy decisions and actions at the local level?
3. Does the design of the service have to be made in consultation with beneficiaries at the grass roots level?
4. Is participation by staff and beneficiaries in planning and implementation likely to contribute to improved programme performance?
5. If answers to the above questions indicate the need for a decentralised? Why?
6. Which functions should be centralised? Why (economies of scale, specialised knowledge)?

7. Assuming that decentralisation is desirable, will the programme have enough trained manpower to manage a decentralised structural change be phased over time?
8. Do the gains of decentralisation outweigh its costs?

Autonomy

1. Will programme performance be hurt if departures from government norms, practices and decision making process are not feasible?
2. In which areas of management are such departures most critical (financial, personnel, policy making, etc.)? Why?
3. How far can legal autonomy provide the needed flexibility?
4. If there are limits to legal autonomy, are there ways of inducing or earning additional autonomy?
5. What measures of performance (outcomes, services, efficiency indices) can be provided to the government to facilitate its monitoring and review functions?
6. If adequate autonomy cannot be obtained, what can be done to minimise performance problems by assigning additional responsibilities in the structure to beneficiaries and non-governmental groups in the planning, implementation and resource generation of the programme?

PROCESS INTERVENTIONS

In chapter 3, we defined organisational processes as the instruments by which managers influence the behaviour of the employees and beneficiaries of a development programme. Business enterprises are well known for the ways they motivate their staff, for example through financial incentives linked to individual or group performance. Their ability to make decisions quickly shows how flexible their internal processes are. In contrast, it is often said that governmental processes are rigid. Slow decision making and the failure of internal procedures to motivate staff are often given as limitations of governmental organisational processes. These organisational processes are concerned with "how" decisions are made and how actions are taken. Strategy, on the other hand, focuses on the "content" or "what" of the decisions. Understanding the internal processes of a programme tells us much about its problems of implementation.

7.1 *Governmental Processes*

Since governments initiate and control development programmes, governmental processes are regularly transferred to programmes. Uncritical adoption of these processes is a major problem of many programmes. Thus, we must first examine the basic features of governmental processes. *First*, governmental processes of decision making and implementation are heavily dominated by hierarchical authority, especially in ministries and departments which are part of the executive branch of the government. While the legislative branch may well follow participative and democratic processes, executive departments operate as if only those in authority have the right and proper knowledge of what needs to be done. The subordinates must carry out their instructions or orders. In formulating a programme strategy, allocating funds and choosing a structure, heads of ministries or departments commonly convey their decisions to subordinates for implementation. Centralised government

structures reinforce this practice. Those below in the hierarchy have little discretion in this "top-down" process of decision making.

Second, governmental processes generally focus on observing procedures rather than on achieving results. Monitoring and control processes are designed to ensure that expenditures are incurred in accordance with government rules and regulations with scant attention to the purposes achieved or services generated. Procedures for selecting personnel focus on whether the norms and practices of government have been adhered to rather than whether candidates are suitable for their jobs. This may have worked reasonably when governments were solely concerned with maintaining law and order, the outputs of which were difficult to define or measure.

Third, the processes of government are less flexible than those of the private sector. When tasks and programmes change, governments adapt their processes slowly and with great difficulty. Consequently, processes become standardised and routinised, and "precedents" determine the course of decision and action. To illustrate, central decision making often prescribes a standard design for a programme in diverse regions of the country. The recruitment process may be kept inflexible despite the differing requirements of programmes. Equity and justice, rather than results, dominate the choices. Modifying internal processes to suit the situation are seen as improper and discriminatory by those affected by the decisions and actions. Here again, where law and order decisions and revenue collection alone are involved, purely equity-oriented processes have considerable merit. But when conditions and tasks change, and the results of programmes are adversely affected by standardised and inflexible processes, their rationale deserves a fresh examination. Most of these processes and their inbuilt inflexibility arose from traditional government functions carried out by central systems. Development programmes are seldom concerned with these functions. Nor can they be operated as part of the central systems of government. They are often field-oriented activities which succeed only when adapted to varying local conditions. Political and bureaucratic leaders in LDCs must appreciate these important differences and encourage programmes to adopt internal processes consistent with their goals and environments.

Four, critical organisational processes which must be adapted for development programmes to succeed are (a) participation, (2) human resource development, (3) monitoring and control and (4) motivation.

Several other processes, such as budgeting and performance evaluation, are also at work, but these four capture the essence of decision making and action in most programmes.

7.2 *The Participation Process*

In many poor countries, it is not uncommon for facilities and services to be created and offered to people, who then fail to use them satisfactorily. Many drinking water supply schemes have been set up, but the women, the traditional water-carriers, do not use the costly pumps installed by the programme agency. Rural housing is often built which people refuse to live in. Many factors may be responsible for these failures, yet fundamentally the facilities were not designed for the special needs and problems of the intended beneficiaries. This happens when decision making processes exclude the participation of those affected when decision makers assume that people need certain basic economies of the services, ignoring the match between perceptions of beneficiaries and the services and facilities offered.

Contrast this with the Japanese practice of extensive consultation with all concerned when reaching important decisions on key issues. This process of building a consensus consumes much time, but once the consensus is reached, implementation is fast and efficient. What appears to be tedious and cumbersome in making a decision turns out to be effective in achieving results.

Thus, participative decision making processes are often more effective because they bring about a better "fit" between what beneficiaries want and what the programmes provide. *Participation facilitates implementation* because the motivation to build and use the services will be stronger when the participants have agreed upon the course of action. Participative processes improve *knowledge* about programme service and strengthen *commitment* to implementation by the programme staff and beneficiaries.

Participation as a Goal

Participation is not only a way to improve programme performance but also a goal in itself. Many argue that participation should be encouraged because it is essential to human development and self-reliance. All development activities, it is argued, must mobilise people's active participation. Only then will they learn to do things for themselves and stand

on their own feet. Poor countries often tend to encourage and perpetuate dependency and subservience through authoritarian government structures and decision processes. Participation is an antidote for this and an essential step towards helping people to develop themselves.

Participation can be encouraged in many ways. Individuals can play decisive roles in key decisions affecting them. Democratic elections are good examples of this process in politics. Members of co-operatives which organise economic activities also play a similar role. In development programmes, groups of beneficiaries can be involved directly in planning and implementation, and sometimes they are represented through local organisations or traditional local structures which have specific responsibilities within the programmes. Several studies show that programme outcomes are more successful where local organisations actively participate.⁴

Economic programmes which offer substantial economic incentives to beneficiaries and whose services are largely standardised can succeed with little participation by beneficiaries and field staff in decision making. Social programmes with weak economic incentives and many local adaptations need much participation. Of course, some participation is needed in economic programmes, but the degree of participation and its relative importance varies. Why is this so?

Consider the Rice Development Programme of the Philippines. When rice farmers found that the new programme would give them much higher outputs, guaranteed prices and high incomes, they willingly followed the advice and instructions of the field staff. Individual incentives were strong and individual action was adequate to increase rice output. The fact that farmers did not formally participate in planning the programme or its implementation did not reduce their response to it. Contrast this with the Indonesian Population Programme. Its early attempt to manage the programme through a "top down" process soon ran into serious problems; the response from the rural public began to taper off. When villagers were encouraged to participate in the planning and implementation of the programme, public response increased. This social programme did not offer people immediate economic returns. Instead it called for changes of attitudes and behaviour by people who were influenced by strong social customs and values. Their response could be changed only through their own communities and leaders active in the change process. In this case, participation

created commitment towards the programme in the communities and a willingness to generate and share resources. The field staff also contributed more effectively to the programme as they felt that they had greater internal autonomy and a larger role than in other more hierarchically controlled programmes. Working with rural communities in different parts of a country with considerable diversity called for responsiveness to local problems and the ability to adapt the service to local conditions. The decentralised structure of the programme and its participative process enable the staff to do this effectively.

Why don't governments encourage the participative process more? Generally, for three reasons:

(1) The belief that only those in authority have the knowledge to plan and act discourages participation. Countries with strong civil services steeped in traditional styles of administration find it difficult to decentralise and share decision making with others. Specialists and scientists who have joined the bureaucracy strengthen this belief. They believe that they have the requisite knowledge and that others need only follow their instructions.

(2) The view that response or action in the field can be enforced through the use of authority is also deeply entrenched in government. Few recognise that response to many programmes must be generated through persuasion, mobilisation of demand and proper incentives. That participation is a powerful way to generate commitment and response is too rarely appreciated.

(3) Those in authority hesitate to decentralise and let others participate in decision making and action for fear that the latter would make mistakes. No doubt, field staff and beneficiaries will err. However, those at the top also often make mistakes, especially when they lack the necessary information and have neither the skills nor the time to adapt programme services to diverse environments. Top administrators too seldom appreciate that beneficiaries and implementing staff are engaged in a process of learning and that mistakes can be minimised only by letting them learn by doing.

Role of Non-Governmental Organisations (NGOs)

Though many development programmes call for a greater degree of

beneficiary participation, beneficiaries are seldom sufficiently organised to participate in decision making and implementation. This happens when they are too poor and lack organisational and leadership skills. The programme leadership, working under the governmental constraints, is often unable to perform its mobilising role. When this occurs, it is appropriate to invite NGOs (also known as voluntary agencies) to help mobilise the beneficiaries. NGOs are generally more familiar with local people and conditions and are more flexible in their internal decision making processes and structures. They may also be more effective in encouraging the beneficiaries to participate in and respond to the programme.

The adult education programme in India is national programme of the government where local voluntary agencies (NGOs) were responsible for local planning and implementation. In earlier years, when the government directly managed the programme exclusively through its civil service, progress was unsatisfactory. NGOs distinctly improved the programme performance because they could make participative processes work locally. Similarly, in Mexico, a rural education programme was successfully organised through the active participation of village communities and their committees which supervised the working of their rural schools.

Thus governments should very actively seek the cooperation and support of NGOs and other local groups in managing development programmes which need much beneficiary participation and mobilisation, especially if the bureaucratic machinery cannot cope with this challenge.

7.3 Human Resource Development Processes

Two components of this process need to be discussed separately. First, the human resources for a programme must be identified and brought on board. This is "selection". Second, they must be equipped and oriented suitably for their jobs in changing environments. This is their "development" process. Both aspects must be organised simultaneously.

Staff Selection

Inflexible, and sometimes unsuitable, government selection processes are common in many development programmes. Governments rarely grant autonomy to their programme managers in selecting staff.

Consequently, programmes are unable to find the people who can perform their developmental tasks. However, most successful programmes were allowed considerable flexibility in personnel selection.

Programmes which need diverse skills need broad, open sources of recruitment. The practice of using "seconded" staff from the parent ministry runs counter to this. Multiple sources of talent must be searched to attract different skills. Competent staff are not rare in government, but processes designed to attract staff only from government severely constrains a programme's search for the right talent. For example, those who worked on a pilot project and produced good results are often best equipped to manage a national programme. The selection process should emphasise the search for the right people for the task's rather than to explicitly or implicitly limit the sources of personnel.

In the Philippine Rice Programme, while extension staff were drawn from the Agricultural Ministry, special care was taken to give key roles to the extension technicians who had successfully worked and gained valuable experience in the pilot project. The latter were deliberately assigned to train the newly recruited staff of the programme. In the Indian Dairy Programme, deputationists from government departments were seldom recruited. Most staff were drawn from institutions relevant to the programme. The most important of these was the "Amul Dairy", a highly successful farmer co-operative which was the model adopted by the new dairy programme. Flexibility in selection was an important feature of the autonomy enjoyed by the Indian Dairy Board.

Staff Development

Selection and training are key processes available to programme managers to match their staff to tasks. Many programmes fail because no effort was made to prepare the staff to perform their tasks. Even where staff have been carefully selected, they usually need to be trained and developed to fit the roles planned for them in the programme. Further, training is not a one-shot affair, but a continuing activity, because staff need to be upgraded and re-oriented to the changing requirements and challenges facing the programme. Top management's duty is to attach priority to staff development processes and to ensure that it operates effectively.

Three aspects of staff development deserve mention.

(1) That training can create appropriate skills and attitudes is generally understood. Many governments, however, are reluctant to train people away from their jobs. While much can be learned on the job, development programmes invariably call for skills, understanding of new approaches and different ways of dealing with beneficiaries. A systematic understanding of these skills and attitudes require both specially-organised training as well as on-the-job experience. One is not a substitute for the other; they complement and reinforce each other.

(2) Training can aid development of commitment, which is an important motivator for those working in programmes. The staff development process can be used not only to impart skills, but also to create a sense of belonging among the people, pride in their work and a belief that they are engaged in important nation-building tasks. Programmes are seldom able to offer monetary rewards in proportion to the results achieved by the staff. But by strengthening their identification with the cause of the programme, their motivation to perform is strengthened. Thus successful programmes create meaning in people's lives.

(3) The development and training process should focus on both the staff and beneficiaries of the programme. They are partners in a common endeavour. Beneficiaries, when properly oriented and trained, can make the tasks of the staff much lighter. Yet this is an aspect of human resource development which seldom receives attention. Certainly, organising client training and orientation is more difficult than staff training. The former are not within the programme manager's control, nor are they likely to be a homogenous and pre-selected lot.

Studies of several successful programmes testify to the power of training. In the Mexican Rural Education Programme, training of the young instructors for imparting skills and to create commitment played an important role. In fact, at the end of their training, candidates who did not measure up to the challenge ahead were weeded out. Training thus aided selection. In the Kenyan Tea Development Authority, farmers as well as the field staff were trained. The Authority had its own training schools. In the Indian Dairy Programme, farmers from different parts of the country were brought to Amul Dairy as part of an orientation programme. The Philippine Rice Programme invested heavily in the training of its

field staff and also organised training for farmers in different regions. In fact, a common feature of the successful programmes is the high priority they attach to the human resources development process. The match between the people and their tasks was achieved through the conscious use of this important process.

1.4 The Monitoring and Control Process

The monitoring and control processes of governments in developing countries reflect their interest in the observance of procedures and rules rather than in the achievement of results. Those who monitor and control programmes are concerned about how money was spent and whether the proper procedures were followed. Violation of procedures and norms in vogue attracts censure from those in authority. Lack of performance, on the other hand, rarely invites penalties. Of course, procedures are important. However, the processes of successful programmes focus more on performance and outcomes than solely on procedures and operational decisions.

Development programmes are field-oriented activities whose beneficiaries and field staff are often scattered over vast areas. Personal supervision and monitoring by the leadership are difficult. As programmes and their environments become increasingly complex, monitoring and control must become more systematic, but not too complex for field staff to respond to and understand. Monitoring systems should be simple, compact and yet sophisticated in design. Is this a contradiction in terms?

Simplicity and Sophistication

Systems can be simple, compact and sophisticated at the same time. A system that can be organised and managed by the people who furnish the data and those who use the data is simple. Monitoring often fails when the data requested are too voluminous and complex for those who have to supply them. If data requirements are not understood or cannot be easily assembled by the field staff, their response is unlikely to be helpful. A *compact* system implies brevity and precision. Field staff are busy and often short of resources; their time is best utilised when the information to be sought is precise and brief. Vague questions attract vague replies. Inadequately explained information requirements tend to be interpreted and defined in diverse ways. Being precise, clear and brief in seeking information therefore has considerable

merit. Brief, simple information systems need considerable *sophistication in design*. Designing a one-page reporting format is more difficult than preparing a ten-page one. The choice of data and their inter-relationships must be carefully weighed. It takes time and thought to design simple, sophisticated systems that characterise successful development programmes.

Critical Dimensions: What and How

The monitoring process can help programme managers only when the information reported is of direct interest to top management, when they realise what information top management uses and how it is used. First, information gathered should be of direct interest to top management. When the top managers seek and use information, it gives strong signals to other members of the organisation. They, in turn, take monitoring more seriously when they realise that information is used. The question of *who* is concerned about information is significant because it conveys to others the nature of information being sought. For example, when programme managers monitor results and the progress of the key tasks assigned to their staff, the latter pay more attention to these aspects. On the other hand, when the focus is on the observance of procedures and rules rather than on the achievement of goals, the staff will concentrate on adherence to procedures and ignore goal-oriented performance. Thus *what* information is sought makes a difference. Third, *how* the information is used also matters. When moni-

toring is not systematic and feedback is not regularly given to those whose operations are being monitored, the motivation of the latter will be adversely affected. When programme managers fail to analyse the information furnished to them or do not utilise the findings to take appropriate action, those who work with them are unlikely to take monitoring seriously. Generally speaking, information and analysis of a post-mortem type, which do not feed back into the decision making channels of the programme agency, will not be seen as useful by operating staff. Post-mortem evaluation has its place, but should be distinguished from managerial evaluation and feedback which is crucial for improving the performance of ongoing programmes.

The monitoring process works both *formally* and *informally*. For development programmes which operate in difficult environments, field visits by supervisors for informal gathering and sharing of information are as important as formal information systems. A difficult environment

is one with limited communication facilities, and beneficiaries and field staff whose skills and sophistication in operating formal systems are limited. Personal discussions and surveys often generates more useful insights and understanding than formal reports. As a programme expands and increases in scope, programme managers may have to depend more on formal monitoring.

Many successful programmes bear eloquent testimony to the importance of the monitoring process. In the Indian Dairy Development Programme, a monthly report from the district union dairy forms the corner-stone of the formal monitoring process. It is a one-page report which seeks information on milk procurement, prices, content, progress on farmer organisations, services to farmer members, milk processing and sales revenue. The design is simple, yet extremely sophisticated and provides detailed instructions to the respondents on how to prepare the report. In addition, the Dairy Board also gathers regular information on the urban dairies and the new plants being set up. The Indian Programme gets regular reports on the functioning of the village co-operatives through the reports submitted by supervisors who visit the field. Their reports not only highlight the progress of individual societies, but also the problems identified by them in the field. This is an example of using informal sources of information, without loading the local staff with heavy reporting work. Though the information system appears to be simple, it is efficient, timely and fast in terms of the feedback given to the constituents of the programme.

7.5 *The Motivation Process*

We have already mentioned some relationships among human resource development, monitoring and motivation of programme staff. Motivation is complex and is affected by more than staff development and monitoring. Traditional government bureaucracies have often believed in the power of *authority* to motivate people to get things done. Once orders are given from above, it is believed that those below would implement them. It is too rarely recognised that different motivators are often at work in different activities. In economic activities, for example, *economic incentives* are often the key motivators. In many organisations, other motivators such as *status and recognition, participation and autonomy, and ideological commitment* are significant. There is thus a mix of incentives and factors which motivate the participants in a development programme.

No standard motivation process or mix of incentives is best for all types of development programmes. The nature of the programme and its environment generally indicate which incentives are likely to work. The incentives that work for the programme staff are seldom appropriate for programme beneficiaries. Most developing countries have found that the use of authority is a very poor motivator in development programmes. Authority is more useful in regulatory than in development programmes. In socio-economic development, one must persuade and win people's hearts and minds to new ideas, practices and behaviour so that they eventually perceive these to be in their own interest. Programmes which carry out economic tasks (agriculture, industry, etc.) can use economic incentives effectively, as long as a distinction is made between motivators for staff and motivators for programme beneficiaries. Economic programmes which do not make these distinctions often perform poorly.

Social programmes which do not offer direct economic gains to the beneficiaries can use few economic incentives. Programmes in literacy, preventive health care, family planning, etc., focus on social change. Their staff need adequate monetary rewards which can seldom be linked directly to staff performance. Recognition of good work, creation of commitment, and a sense of internal autonomy to plan one's own work is likely to elicit healthy responses from the staff. Beneficiaries of such programmes are motivated better through participation in the planning and implementation. Competition between communities and community pride are often excellent motivators. Individual incentives to motivate beneficiaries are usually counter-productive in programmes which require co-operation among members of the community and staff. Thus, one must carefully consider the nature of the programme and its strategy when determining the mix of incentives for motivating the staff and beneficiaries. One must also often separate the motivational needs of the staff from those of beneficiaries as well as distinguishing between the motivators available to economic and social programmes.

Successful agricultural development programmes almost always have stable, adequate procurement prices as part of their strategy to motivate farmers to respond to their services. Farmers generally ignore programmes with inadequate or fluctuating "farm gate" prices. The Kenyan Tea Programme and the Indian Dairy Programme

consider this to be an important incentive motivating their members. Economic incentives for staff also played a moderate role in the Kenyan Programme and the Philippines Rice Programme. In the Kenyan Programme, most staff came from the Ministry of Agriculture and received about 10 per cent more money than at the Ministry. Those who did not perform well were not fired, but were sent back to the Ministry. On the other hand, social programmes such as the Chinese Public Health Programme do not show any evidence of motivating their staff and beneficiaries through the use of economic incentives. Their behaviour was influenced more through the use of commitment creation, participation and local autonomy. In fact the Indonesian Programme discontinued the use of economic incentives to individual field workers when it was found to be counter-productive.

In general, development programmes seldom have much flexibility in rewarding their staff monetarily in line with their performance. This is in contrast to industrial enterprises which rely largely on economic incentives and disincentives. Programme managers should therefore be innovative in using indirect rewards for their staff. For example, good performance should be taken into account when promotions are considered. Opportunities for self-development should be available to those who perform well. Accelerated increments can sometimes be offered to deserving personnel. Thus there are ways of providing economic rewards indirectly even where elaborate schemes linking performance to economic incentives cannot be put into effect. Such approaches, reinforced by non-economic incentives such as recognition of work and enlarged work roles suitably adapted to the programme setting, can often motivate those staff who can be motivated.

7.6 Some Guidelines for Programme Managers

The questions below can help programme managers become aware of their choices and options when designing the internal processes of their organisations. Using the insights offered in this chapter, additional questions may be asked and answered in light of the specific contents of each programme.

Participation

1. Does the parent ministry or programme manager have the knowledge necessary to design and implement the programme? If not, can the participative process be used to improve the strategy and implementation of the programme?
2. Does the programme service have to be adapted to suit diverse local conditions? What are its implications for participation?
3. Does public response to the programme call for considerable participation by beneficiaries?
4. Is it important to generate local resources to support the programme?
5. Is the creation and strengthening of self-reliance an important goal of the programme?

Human Resource Development

1. How diverse are the skills and talents needed by the programmes? Can they be found within the government bureaucracy?
2. What are the potential sources of staff recruitment?
3. How much autonomy does the programme need to evolve its own selection process?
5. Is the training process designed to match the people to their tasks?
6. Is training used only for acquiring skills, or also for creating commitment among staff?
7. Does the process contribute to the development of beneficiaries?

Monitoring and Control

1. Does the process focus on goals and results or on procedures and operating decisions?
2. How well is the information system designed to fit the limitations

of the programme environment?

3. Are the programme leaders committed to the monitoring and use of information to improve performance?
4. Does the monitoring process provide fast feedback to those who have to take corrective action?
5. How frequent and regular is the feedback to the field?
6. Is the programme geared to using informal sources of information in addition to the formal sources?
7. Does the reporting system impose an undue burden on the field staff?

Motivation

1. Do the monitoring and development processes positively motivate the staff and beneficiaries of the programme?
2. Is the mix of economic and non-economic incentives designed to motivate the staff and beneficiaries?
3. Does the motivation process distinguish between the needs of staff and beneficiaries?
4. Do the programme leaders have the flexibility to adapt its mix of incentives to the changing needs of the programme?
5. Does the mix of incentives support the strategy and structure of the programme? If not, how should the motivation process be adapted to play a reinforcing role?

ORCHESTRATION OF CONGRUENCE

In chapter 3, we mentioned that the factors examined in detail so far work together to produce a "synergistic" effect on programme performance. While each factor alone is important, when there is "congruence" among them the programmes perform better. Agricultural production was used to show that only the proper combination of inputs (seeds, water, fertiliser, etc.) yields the most output. Higher output is not merely due to the contribution of the individual inputs, but more importantly due to the power of a specific combination of inputs when matched to the specific conditions of the crop, its soil, etc. The term "congruence" described this combination. Any reduction in one input relative to others reduces output significantly.

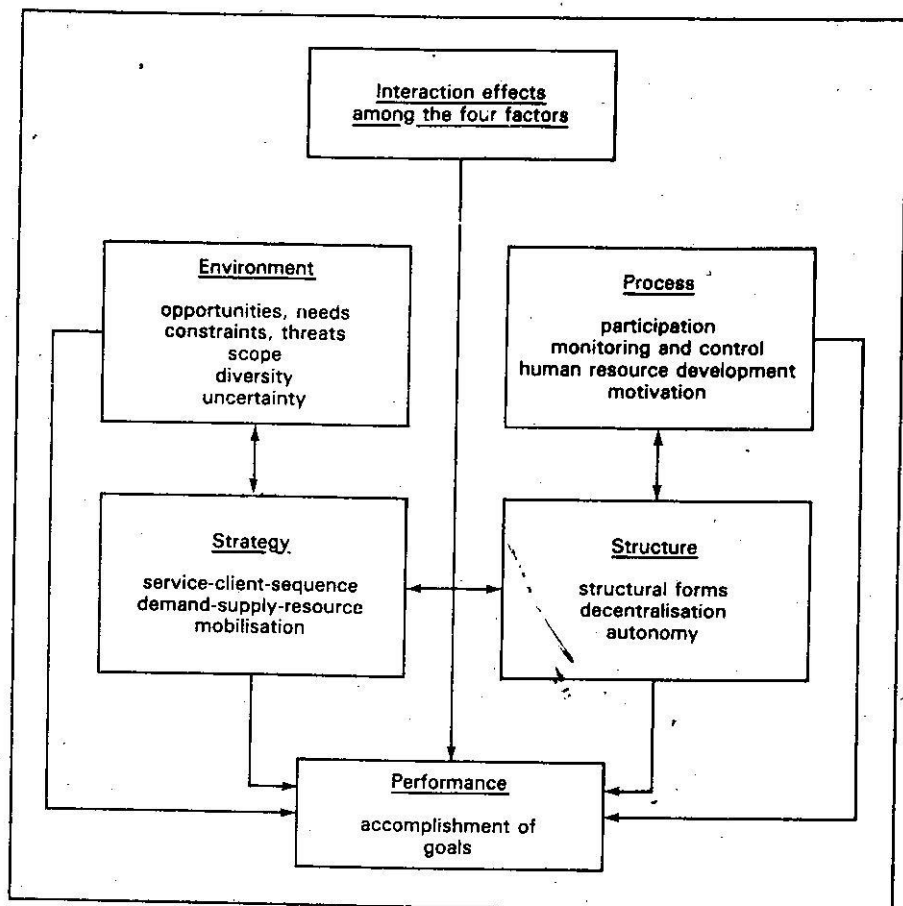
In a development programme, interrelationships among its environment, strategy, structure and processes are similar to the organic relationships among the inputs of a crop. Having discussed these four factors in detail, we can now depict strategic management more completely in Figure 11 than we did in Figure 4.

Figure 11 shows how congruence is achieved by adapting the strategy, structure and processes of a programme to its environment. Environment is the least influenceable of these. The programme leaders and the government can manipulate the other three within limits. When they are congruent, their interaction creates synergy which cannot be explained by any one factor alone.

8.1 *The Meaning of Congruence*

Policy makers and programme managers often lose sight of the 'synergy' phenomenon. Policy makers usually emphasise only one relevant factor at a time. For example, programme design often receives much attention at one time while decentralisation of structures or moni-

Figure 11 The four factors: linkages and performance



toring may receive exclusive attention at another. Each of these may surface as a serious problem on different occasions. What is ignored, however, is that these must be viewed together with all other factors shown in figure 11. The strength of strategic management lies in its ability to help us see their totality and search for congruent combinations.

Let us illustrate a congruent combination. Consider a national environment with diverse types of beneficiaries scattered throughout a large country. What should be launched there? Should it attempt to promote many diverse crops simultaneously? Where the environment is

diverse, the strategy should first promote a single crop or a few related crops and expand in phases. The input services for the same crop in different parts of the country may have to be organised differently, testing them first in the field. The diverse requirements of different groups of farmers often calls for a decentralised structure. The programme may have to elicit the response of farmers through an imaginative use of economic incentives (e.g. remunerative prices). One specific combination of strategic, structural and process interventions may turn out to be more appropriate than any other. It would be too difficult to operate this large programme with diverse beneficiaries with a centralised structure. A motivation process that ignores economic incentives would elicit little response from the beneficiaries. Viewed thus, congruence among factors crucially influences programme performance. If the combination lacks congruence, excellence in one factor cannot possibly compensate for the weakness in others. An innovative programme not supported by an adequate structure will fail. A well-designed structure lacking proper internal processes will fail too. A decentralised structure with weak monitoring processes poorly managed, or with untrained or poorly motivated field staff will also fail. The secret of strategic management lies in the "orchestration of congruence".

8.2 *Congruent combinations: Some Illustrations*

We have discussed many strategic, structural and process interventions. Their proper combination can be worked out only when one understands the programme goals as well as its environment. In order to show how congruent combinations vary under different conditions, in figure 12 we present a simplified, yet suggestive diagram which shows a few, selected interventions. This illustrates the concept of congruence without claiming to be comprehensive. The reader may wish to add other dimensions of strategy, structure and processes and see whether a more complete and congruent set of interventions could be identified for each of the quadrants of the diagram.

Programme Types

First, our diagram divides programmes into four categories. Programmes are classified according to "goals" as well as their "environmental complexity". Goals may be primarily economic or social. Programmes with mixed goals are not shown here. Some programmes have

Figure 12 Congruent combinations

Goals		Single economic goal ← → Multiple social goals	
Environment			
Complexity ↑ Low 			

a single goal, others have multiple goals. The diagram, for the sake of simplicity, divides programmes into two extremes in a wide spectrum of goals. Complexity increases as one moves from single economic to multiple social goals.

Irrespective of goals, the environmental complexity varies. High diversity, uncertainty and scope add to environmental complexity, as discussed in chapter 4. Though many shades of complexity exist, we have illustrated only two, "high" and "low" complexity. The two dimensions of environmental complexity and goal complexity give us four categories which we shall call types A, B, C and D. Type A programmes have simple environments and a single economic goal. Type B programmes also have a single economic goal, but are environmentally complex. Type C programmes are environmentally simple with multiple goals. Type D programmes have multiple social goals and high environmental complexity.

Though these seem abstract, it is easy to find real life examples. Thus, many small single-purpose economic programmes operating in limited and homogeneous regions come close to type A (road development, electrification, etc.). National programmes focusing on specific commodities and operating in diverse, unstable environments correspond to type B (programmes for wheat, cash crops, small industry, etc.). Local or regional integrated development programmes offering multiple social services resemble type C (small urban or rural development programmes). Extremely large national programmes for integrated rural development operating under diverse conditions fall under type D. Therefore, we can relate the congruent combinations shown against the four types of programmes we see around us.

Figure 12 shows only three interventions in each programme type though many others might be considered⁵. These three interventions illustrate how congruence leads to good strategic programme management. The logic applied to their congruence can be extended to other interventions as well.

Some Illustrations

Assume that type A is an agricultural development programme. A single economic goal implies a sharp focus as in programmes for single commodities, such as rice, wheat, etc. Environmental complexity (diversity, uncertainty and scope) is low. This would occur where there is

little diversity among farmers, fairly stable conditions in cropping and the programme covers only a small region. Low environmental complexity allows management to adopt a single standardised service to integrate the required inputs for the farmers. Service can be standardised where beneficiaries face similar problems. If, instead of a crop, the programme focuses on a single task such as extension or credit, the same logic applies. Extension services, too, can be standardised when farmers face similar problems. This strategic intervention fits the programme goals and environmental conditions.

A functional structure fits a single, standardised service. The basic functions supporting the service are the main consideration in structuring a programme agency. Multiple services usually require other structures.

The limited role of the participative process reflects both the strategy and structure. A standardised single service and low environmental complexity imply that planning and implementation can be centralised. Beneficiaries usually respond to economic incentives even if their participation in the programme's decision making is limited. In other words, while participation is valuable in itself, the economic programme will probably succeed even if participation is limited. The process intervention indicated against type A is therefore consistent with the other two interventions discussed above.

Any departure from these three interventions could be shown to be too costly or inefficient for the programme. Thus matrix structures, which are often difficult to manage, are rarely needed by programmes offering a single service. Multiple services designed for different groups of farmers are unnecessary when diversity among them is low. The congruent combination indicated for type A, therefore, is *optimal* (efficient) from the standpoint of performance.

The combination of interventions for type B is distinctly different from type A. While the programme goal remains the same, type B's environmental complexity is higher. The strategy intervention is a single, but differentiated service. This can be interpreted as follows: beneficiaries are more diverse in type B. Services must be adapted to local conditions. The service is thus differentiated according to the needs and problems of different groups of beneficiaries. A standardised service would simply fail to meet the requirements of all but a few beneficiaries.

The need for local adaptation and the increased scope of the programme (e.g. national scope) call for a more decentralised structure because many decisions will have to be made in the field. The organisational structure therefore approximates a matrix or network form. Joint decision making, problem solving and action rather than the use of hierarchical control become necessary to implement the strategy. In turn, this implies the participation of beneficiaries in decision making and action, and the recruitment of staff willing to take initiatives.

Again, this set of strategic, structural and process interventions is congruent. The structural and process interventions shown against type A would have been too weak for type B, given its environment and the need to offer differentiated services. For example, increased decentralisation and reduced participation would be incongruent and hence inefficient for achieving the programme goals.

Types C and D have multiple social goals. A comparison between the two shows how, as environmental complexity increases, the need to differentiate multiple social services and adopt a decentralised network structure becomes imperative. These interventions in turn must be reinforced by strong participative processes. This is illustrated in large integrated rural development programmes. The larger the geographical coverage, the more necessary it is to adapt these services to diverse local conditions. Planning and delivery necessitate collaboration among several organisations, possibly both public and private, with no single agency fully controlling the entire range of tasks. Only if decisions and actions are taken participatively, can the programme goals be achieved. The interventions required by type D are distinctly different from those in type A. Each set must be congruent with its environment and goals.

We cannot, therefore, prescribe a standard set of management interventions for all types of programmes. The trick lies in finding a combination that matches the programme objectives and environment. The fit creates congruence.

As the environment or programme goals change, new interventions are needed. The questions about congruence must be asked again. In other words, congruent combinations do not last forever. When conditions change, the search for congruence must start afresh.

In this chapter we have discussed the most critical aspect of strategic management; the orchestration of congruence. In preceding chapters, we offered several guidelines on strategic management. Unfortunately, no simple guidelines can yet be offered for orchestrating congruence. Putting the components together is facilitated by an understanding of environment of the programme and the nature of the objectives. Questions which help create congruence include:

1. How well do the strategic, structural and process interventions fit the environment of the programme?
2. Is there any evidence of inconsistency among the different interventions?
3. Are there any major changes in the programme environment that necessitate redesign of any of the interventions?
4. Is the programme or government leadership committed and stable enough to facilitate the orchestration of congruence?

PUTTING STRATEGIC MANAGEMENT INTO ACTION

How does a programme manager put strategic management into action? Both policy makers and programme managers are bound to ask this question if they are convinced about the practical value of strategic management. The way this approach will be introduced depends on each programme's unique setting. Thus, a standardised manual is neither feasible nor likely to be of much value. It is useful, however, to highlight some important areas of early action that practitioners should bear in mind when they plan to introduce strategic management.

These are presented below in two sections. Section 9.1 suggests ideas and experiences of interest mainly to those in charge of designing and organising new programmes. Section 9.2 focuses on existing programmes that can still be improved if their management and co-ordination is re-examined in the light of what has been discussed in this book. These guidelines are not to be confused with a step-by-step sequence of what managers should do. Rather, they should be treated as the critical actions and moves to be initiated by policy makers and managers in order to make strategic management work.

9.1 *Preparing New Development Programmes*

Strategic Thinking Precedes Project Formulation

Strategic management should begin when a programme idea is born. It may be too late to think about it when a programme is already under way. However, this error is common in development planning. Programme formulation should be seen as a key part of the strategic management process. Programmes which are uncritically imported or formulated as mere techno-economic packages will probably be redesigned considerably if only the questions raised in the preceding chapters are asked

adult education, nutrition, etc. A programme manager could avoid this pitfall by taking time to understand the forces operating in his environment including the motivations of the key actors and groups (e.g. beneficiaries, local leaders, etc.) likely to be affected by his programme. Strategy formulation should not be viewed as a purely technical exercise or as a task to be left to a set of specialists who are not sensitive to what goes on in the programme's environment. Of the different elements described in chapter 4, the motivations of the beneficiaries and the staff, and the constraints imposed by the governmental structures and decision making processes, should be considered very early. Equally important is the careful assessment of the actors who may have either positive or negative impacts on the programme. The strategy must suggest how to influence these actors to support the programme. The programme manager should use both formal and informal ways of probing the environment and cultivate this skill in his team members.

While staff support can aid environmental analysis, the top management of a development programme should be continually sensitive to the environment and regard its interpretation as a key task. For example, sensitive political changes or shifts in political or bureaucratic coalitions in the national environment may have implications for a given programme. It is the programme leader who is more likely to sense such changes and their potential impact on his tasks. Younger staff members may or may not always be sensitive to such environmental changes or adept at proposing strategic responses to these emerging developments. Strategic management should not be viewed as the work of a specialised unit. It properly belongs to top management.

Pilot Project

When formal and comprehensive analysis of the environment is not feasible, a pilot project is usually the best way to acquire environmental insights. Here, the emphasis should be on initiating pilot projects at the very outset and building their lessons into the programme for replication. Where this is not possible, pilot experiments should be undertaken after the programme starts. The understanding and insights generated by them can still be fed into the ongoing programme. Pilot project experience often already exists, in which case the manager should learn from it. Failure to integrate the learning from pilot projects has been a major problem in many countries. Programme managers should certainly try to recruit persons who have played key roles in successful pilot pro-

jects, as this is one of the most effective ways of learning from these experiments.

However, one pitfall is to be avoided: do not assume that the programme can be managed in the same style as the pilot project. The pilot project may have benefited from particularly favourable material and staffing conditions or paid special attention to project monitoring to make it successful. Learning from pilot projects also includes reviewing such special conditions. The question is: will it be possible to create the same or similar conditions for the whole programme? What needs to be done to create such conditions? If not, what adaptations or innovation responses are needed?

Phased Replication

A frequent error is to expand a programme without realistically assessing the problems of managing fast expansion. A phased plan for expansion facilitates strategic management because programme managers then have an opportunity to learn and absorb as they move along. Simultaneous expansion all over the country can hurt this learning process a great deal. Political leaders are seldom sensitive to the risk of fast expansion. It is the duty of programme managers to make them aware of such risks and persuade them to avoid the "grand slam" approach.

Autonomy Appropriate to the Programme's Tasks

Once the objectives are known and the complexity of the environment appreciated, a programme manager should assess the degree of organisational autonomy his programme agency requires. Admittedly, this is easier to do in new programmes. In ongoing programmes, the pattern is set and change is more difficult. But even in new programmes, managers are often reluctant to raise the question of "autonomy". This may be a serious mistake. When a programme is being evolved, a programme manager can often influence his ministry's thinking on autonomy by demonstrating how limited autonomy can reduce the programme's performance and success. Certainly, the early planning phase is the right time to seek autonomy. If the manager fails to get the autonomy he sought, he may have to work towards earning it, as explained in chapter 6. The point to remember is that the question of autonomy should be raised well before the programme design and structure are frozen, not afterwards.

9.2 *Applying Strategic Management to Ongoing Programmes*

Clearly, applying strategic management is an uphill task for a manager who takes over an ongoing programme. He has inherited strategies and structures. Work habits and practices are difficult to modify overnight. Needless to say, if an ongoing programme is in serious trouble, a new manager may well be given adequate powers and autonomy to redress the situation. But even where this flexibility is not granted, programme managers can do several other things to pave the way for strategic management.

Operational Versus Strategic Management

In theory, there should be no conflict between strategic and operational management, the latter being used to implement strategy and monitor the everyday course of a development programme. In practice, however, many senior administrators and managers are totally absorbed by the course of operations. They claim that they have little time for strategic management. In reality, their problem is that they spend too much time on operational problems. They usually argue that middle managers and officials at lower levels are neither competent nor motivated to make the right decisions. The answer lies in strengthening the skills and motivation of the staff through training and development. When little attention is given to equipping people to perform their tasks well, it is not surprising that they are unable to discharge their duties. This important area in programme management deserves urgent attention. Top managers will be able to devote more time to issues of strategic management only when they develop their subordinates and delegate operational decisions increasingly to them.

Strategic Audit

It is often possible to initiate a formal comprehensive review of an ongoing programme to identify and evaluate strategy that has been followed since programme inception and propose changes in strategy and in the management system of the programme. Such a strategic audit might follow the line of thought presented in this book, using the questions given at the end of chapters 2 to 8. In any case, the programme goal and objectives, environment, strategic choices, resources, organisational structure and internal processes must be reviewed.

This might be time-consuming and technically difficult. Also, political objections may be raised and resistance to change found among the managers who have developed certain habits and who might think that strategic management would demand more than their competence and commitment permit.

There is, therefore, an important question of tactics: how should a strategic review of a programme be started so that it has a good chance of success right from the start? In particular, programme managers must consider the attitudes and policies of government as well as the experience and attitudes of the managerial staff. Thus, there might be situations where a strategic review of an ongoing programme should start from the outside, e.g. by appointing a review committee to examine the facts, interview all people concerned and come up with concrete proposals for changes. However, such external review committees might often be perceived by the programme managers as too administrative a tool for solving complex technical and human problems, and even good review reports may be given no follow-up. Initiating a strategic review from the inside with the active participation of the programme manager may be a more viable approach. The group should start by identifying the key problems faced by the programme and the causes of deficient performance. This tends to be more effective for three reasons: (1) the analysis can be concrete, starting from the problems faced by the staff in everyday operations; (2) it can be an important learning exercise, since analytical, planning and other skills of managers will increase during the exercise, and (3) it generates more commitment to applying and utilising new ideas and proposals thus developed than would be the case if the proposals came from an external body known to the managers concerned only through a few interviews.⁶

If inadequacies in strategic management are identified, the programme manager should initiate action to inform, educate and influence the key actors in his supervising ministry and other collaborating agencies (if he has to manage a network structure). This has to be done tactfully, in both formal and informal ways. Obviously, the ability to build relationships and demonstrate how common (shared) goals could be achieved through the proposed changes will come in handy at this stage. This applies particularly where a programme manager has to achieve his goals through collaboration with a network of agencies. A great deal will depend on how much bargaining power or clout he has vis-a-vis his ministry and other agencies.

Step-by-Step Approach to Changes

Where reforms are necessary and feasible, the wise manager does not start with the most difficult and complex changes. Resistance and organisational problems will be more severe here. Instead he should attempt to introduce simpler performance inducing changes. For example, initiating a participative planning process with the staff or introducing a simple, yet regular monitoring system may help to build confidence and credibility, and in the process prepare the ground for more complex changes necessary for strategic management. This means that while the programme manager needs an over-all concept of the directions in which the programme should move, he is prepared to feel his way through, for tactical reasons. This approach may take considerable time in the case of complex ongoing programmes. But this approach is likely to be more rewarding than attempts to rush in with a formidable set of drastic reforms. In the final analysis, it is the programme manager in consultation with his ministry who should decide on the alternative most appropriate in his situation.

Workshops and Seminars

Many managers of development programmes have never had an opportunity to exchange experience about strategic management with their peers and learn about new trends in the practice and theory of strategic management in training workshops and seminars. In general, more such training is needed in most developing countries. However, general lectures and discussions, based on foreign materials and experience, are not enough. Wherever possible, strategic management workshops should be tailor-made and pay considerable attention to the specific problems that exist in given programmes. Theoretical knowledge can also be provided, but this has to be related to concrete problems faced by the managers involved. The managers' active participation is to be encouraged; it may well be that such a workshop will become an effective starting point for an internal strategic review of an important development programme.

Using Consultants

Training efforts can be coupled with consultancy on strategic management. Sometimes, consultancy may be the best starting point, especially if the top management is convinced of the need to introduce strategic management. Often, a combination of consultancy and training

turns out to be a powerful tool. Consultancy should not be viewed as a mere "design job" with the consultants disappearing as soon as the report is finished. Consultants should see through the critical phase of implementation and assist in resolving issues and providing training support wherever necessary. While this approach is well known in industry, in development programmes consultancy is often viewed as a one-shot affair. Hence the need to emphasise the continuing and supportive nature of the role consultants ought to play in the development context. Management schools and consulting organisations must both recognise this requirement and assist programme leaders in appreciating the importance of this approach.

However, not all consultants fully appreciate the special problems of managing development programmes, and there is an urgent need to train more consultants who do. Thus, programme managers who decide to invite consultancy organisations to help implement strategic management should carefully specify their requests and screen the proposals to ensure that the consultants are fully competent, both in strategic management and the problems of development programmes.

9.3 *Taking Action*

This book has been designed to help programme managers think about and practise strategic management. They should therefore view training, consultancy, internal reviews and audit exercises as useful steps that lead to action. It is important, therefore, that they are clear in their own minds as to how interventions should be planned and sequenced to achieve this goal. A programme leader who is ready to initiate the progress of strategic management should ensure that his team of managers are active, committed participants in this endeavour. Where the initiator or change agent is not the programme leader, he must take special care to win the commitment and full participation of the programme leadership, including managers at all relevant levels. The workshops, training programmes and consultancy activities, and other joint exercises referred to in earlier sections, are experiences which the entire team should share together. The very process of sharing these experiences helps improve mutual understanding and commitment to shared goals, clarifies broader constraints and provides a common language and mode of thinking which facilitates communication.

The programme leader and his top team should view the exercise as one of *learning by doing*. The guidelines and criteria in this book are

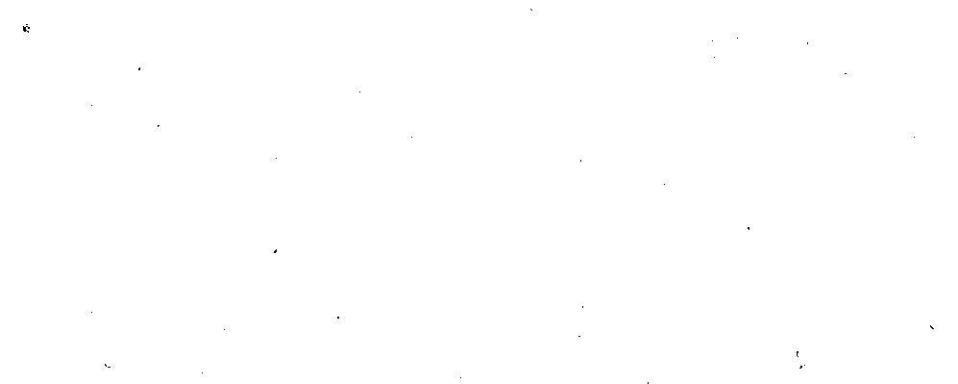
unlikely to yield blueprints ready for mechanical implementation. Rather, they are more likely to lead to ideas on interventions which need to be tried out, modified and improved as experience is gained and adaptations to changing conditions are made

SELF ASSESSMENT QUESTIONS

1. What type of organisational structure is essential to ensure the strategic management of development programmes?
2. What are the process interventions which a project manager should be aware of?
3. What is the significance of congruence in the strategic management?
4. What steps should be taken to put strategic management in action?
5. What are the advantages and limitations of strategic management in education projects in Pakistan?

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3. See, for example, K. Knight (ed.): *Matrix management: A cross-functional approach to management* (Farnborough, Hants, Gower Press, 1977).
4. See Uphoff and Esman: *Local organisation for rural development: analysis of Asian experience*, RDC Monograph No. 19 (Ithaca, NY, Cornell University Press, 1974).
5. See chapter 5, 6 and 7 for a comprehensive set of strategic, structural and process interventions. Strategic, structural and process interventions are represented in the set shown in figure 12.
6. Of interest in this connection is an ILO publication describing a problem identification and problem solving approach used in a number of public agencies. See R. Abramson and W. Halset: *Planning for improved enterprise performance: A guide for managers and consultants* (Geneva, International Labour Office, 1979).



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Autonomy: the degree of freedom a programme agency enjoys from its parent ministry/development in important areas of decision making and action, such as internal fund allocation, operational plans for service delivery, recruitment, remuneration and promotion of personnel.

Demand Mobilisation: the use of media, incentives, participation and leadership to make beneficiaries and the general public aware of and utilise a programme. This implies the use of financial, physical and human resources to provide services to meet mobilised demand.

Dominant Goal: a clear, well focused, major objective of a programme expressed in qualitative and quantitative terms.

Economic incentives: include the economic and non-economic benefits and bonuses available to staff members and the prices paid to suppliers.

Effective Autonomy: the degree of autonomy an organisation actually enjoys, which may differ from that defined in its legal charter.

Environment: those forces outside a programme which create opportunities for, as well as constraints on, its growth. Forces inside an organisation's boundaries are generally subject to management control. Important forces outside its boundaries, in its environment, can only be influenced, or if not *influenced*, must be understood and appreciated.

Functional structure: where an organisation's tasks are divided according to its functions and these tasks are integrated hierarchically and performed according to rules and authority.

Information systems: the procedures for reporting, monitoring, and for reviewing and controlling the achievement of objectives.

Matrix structure: a form of organisation designed to focus on both diverse outputs or services and the functions relevant to them. Under this arrangement, many members of staff simultaneously report to two bosses. Thus there is a dual authority (control) structure.

Network structure: where several public or private agencies must formally collaborate to achieve common goals, but where the lead agency cannot exercise direct hierarchical control over participating agencies. Sources of influence used to achieve collaboration include joint planning and review of activities, control over budget (resource allocation) and common membership of committees.

Nominal autonomy: the legally defined extent to which an organisation can depart from the norms and practices of its parent organisation.

Organisation structure: the durable arrangements within a programme agency by which it performs its tasks. These include the distribution of authority and responsibility, the reporting relationships and the co-ordinating machinery.

Organisational processes: the instruments for influencing the behaviour of staff and beneficiaries of a programme. These include the goal setting and resource allocation (budgeting) methods, the monitoring, evaluation and control processes, the human resource development (selection and training) systems of a programme, and the motivational processes (use of incentives, creation of commitment).

Personnel selection and development: the process of attracting the best available people, hiring them and training them to do their jobs as well as possible.

Pilot project: a small project undertaken to test and adapt a development approach to a particular social and geographic situation.

Sequential diversification: a strategy under which the programme starts with a single service and subsequently moves into other services. This reduces managerial complexity and is a good strategy, especially when services are diverse, unrelated and difficult to measure.

Source of influence: the groups of people or organisations that programme managers can count on in getting laws changed or funds allocated.

Strategic management: the inter-related top management interventions which provide the framework for operation decisions and actions to accomplish programme goals.

Strategy: the set of long-term choices the programme leaders make in terms of goals, services, policies and action plans.

Structural differentiation: dividing organisational tasks/functions into manageable components.

Structural intergration: putting together the differentiated organisational tasks or components to achieve the over-all objectives of the programme or agency.

Technological change: The process of improving the way activities are performed and the way tools, methods and equipment are employed.

MONITORING AND EVALUATION OF PROJECT – I

Adapted from:

**A HANDBOOK ON MONITORING AND
EVALUATION OF AGRICULTURE AND
RURAL DEVELOPMENT PROJECTS**

By

**D.G. Casley &
D.A. Lury**

ACKNOWLEDGEMENT

The contents of the units 12 and 13 on *Monitoring and Evaluation of Projects* have been reproduced and adopted from *A Handbook on Monitoring and Evaluation of Agriculture and Rural Development Projects* by D.J. Casley and D.A. Lury, published by the Monitoring and Evaluation Unit, Agriculture and Rural Development Department CPS of the World Bank in November, 1981 (a non-copy right publication of the World Bank).

M. Athar Khan

A WORD TO THE STUDENTS

Project monitoring and evaluation are important aspects of project management. Lack of proper monitoring of development projects, particularly in education sector, have resulted in partial or total failures of projects to achieve the objectives for which they had been undertaken. Over-run in cost and time estimates in education projects have been so common that their occurrence neither surprises any one nor are they considered anything unusual happening to a project. This block of the units 12 & 13 is intended to provide the project managers with useable guidelines on monitoring and evaluation of projects.

While studying these units, the students should, however, bear in mind that originally the contents were produced for the agriculture and rural development projects. It is, therefore, for the student to discover for himself the elements in education projects which are identical with the projects referred to in the text of these units. So far as the methods and techniques of project monitoring and evaluation (such as the logical framework; project evaluation models; selection of indicators for monitoring and evaluation; sources and methods of data, their analysis and presentation) are concerned they have a universal application in the world of projects. The student will find no difficulty in using them in education projects.

OBJECTIVES

After studying this unit the student will be able to:

1. elaborate the basis of project monitoring and evaluation,
2. explain the roles of monitoring and evaluation in project management,
3. formulate objectives and identify indicators for monitoring and evaluation of projects,
4. identify sources of data required for monitoring and evaluation of projects,
5. discuss the role of direct observation in project monitoring and evaluation.

ACKNOWLEDGEMENT

A WORD TO THE STUDENTS

OBJECTIVES

**PART — 1: THE FRAMEWORK FOR MONITORING AND
EVALUATION OF AGRICULTURE AND
RURAL DEVELOPMENT PROJECTS**

- 1.1 Introduction
- 1.2 Monitoring and Evaluation: The Basic Framework
- 1.3 Monitoring and Management
- 1.4 Evaluation: An Assessment of Results
- 1.5 Monitoring and Evaluation in the Project Cycle

PART — 2: MONITORING

- 2.1 Managing and Monitoring
- 2.2 Specification of Objectives and Targets
- 2.3 Monitoring and Financial Accounting
- 2.4 Monitoring of Staffing
- 2.5 Monitoring of Infra-structure and Delivery System
- 2.6 The Role of a Monitoring Unit
- 2.7 Concluding Comments

**PART — 3: EVALUATION: CONCEPTUAL ISSUES AND
BASIC OBJECTIVES**

- 3.1 Introduction
- 3.2 A Scientific Experimental Model

- 3.3 Quasi-Experimentation: Nonequivalent Group Design
- 3.4 Quasi-Experimentation: The Interrupted Time-Series Design
- 3.5 Investigating Relationships Through Case Studies
- 3.6 Practical Conclusions

PART — 4: THE SELECTION OF APPROPRIATE VARIABLES AND INDICATORS

- 4.1 The Criteria for Selection
- 4.2 Scaled Response and Proxy Indicators
- 4.3 Indicators for Monitoring
- 4.4 Indicators for Evaluation
- 4.5 Background or Classifying Information

PART — 5: SOURCES OF DATA FOR MONITORING AND EVALUATION

- 5.1 Existing Data and Data Collection Agencies
- 5.2 Use of and Compatibility with Non-project Data
- 5.3 Sources of Project-Specific Data
- 5.4 Case Studies or Sample Surveys
- 5.5 Combining Methods of Enquiry

PART — 6: DIRECT OBSERVATIONAL METHODS

- 6.1 Direct Observation
- 6.2 Rapid Assessment: Observation and Enquiry
- 6.3 The Case Study

SELF-ASSESSMENT QUESTIONS

LIST OF TABLES

1. Random Variations about a Trend
2. Number of Farms by Farm Size
3. Maize and Groundnut Yields and Gross Production for the 1971 Harvest Periods
4. Maize and Groundnut Yields and Gross Production for the 1972 Harvest Periods
5. Maize: Average Yields Per Acre and Gross Production, 1971/72
6. Maize and Groundnuts: Percentage Changes in Average Yield per Acre and in Gross Production, 1971/72
7. Target and Performance by Area
8. Distribution of Farm Size
9. Adoption of Practice by Project and Non-project Farmers
10. Differences in Area Performance due to Structural Differences
11. Calculation of Standardized Rates
12. Values of B , b_2 , when $b_1 = 2$, $b_2 = 1$
13. Effect of Random Measurement Error on the Correlation Between a Ratio (Y/Z) and its Common Component
14. Income per Beneficiary
15. Number of Farms by Number of Land Parcels
16. Percentage Distribution of Parcels by Area

LIST OF FIGURES

1. Project Cycle: Data Requirements and Sources
2. Assessment of Extension Agents Performance
3. A Checklist of Information on Crop Management Practices
4. An Example of a Household Composition Form
5. Crop Pattern by Plot
6. An Example of a Household Questionnaire
7. An Example of a Pre-Coded Form
8. An Example of a Structured Questionnaire
9. Target and Performance by Area
10. Cumulative Performance Graph
11. Lorenz Diagram

PART 1:

THE FRAMEWORK FOR MONITORING AND EVALUATION OF AGRICULTURE AND RURAL DEVELOPMENT PROJECTS

1.1 Introduction

This Handbook has been prepared in conjunction with Guidelines for the Design of Monitoring and Evaluation Systems for Agriculture and Rural Development Projects. In the Guidelines, issues of significance to the establishment and operation of such systems are introduced without elaboration; This Handbook provides further discussion of these issues and sets out recommendations for dealing with them.

The Handbook is directed primarily to those working within a specific project, whose task it is to operate the monitoring and/or evaluation systems, and secondly to those responsible for management of the project so that they may better assess what they can expect their monitoring and evaluation operations to provide.

With this as the aim, one constraint becomes immediately apparent; while the correct structure of the project management team, and its relationship with the monitoring and evaluation staff is of prime importance in most instances, those using the Handbook will be faced with a situation where these issues have already been decided. Some adjustment may be possible as the project gets under way, but it may be difficult either to alter the management structure or to make a substantial realignment of the monitoring and evaluation staff within that structure.

Another major concern is the role of evaluation in assessing management performance. Once again, a Handbook addressing evaluation in a project specific context can offer little discussion of this for the assessment of individual performance is carried out elsewhere; and comparisons across a set of projects or assessments of projects against the national development programmes will be part of a central evaluation effort that may or may not include responsibilities for individual project evaluations.

Moreover, recommendations for the collection of baseline data *before* project implementation are better directed to those responsible for the preparation of projects, than to those whose first contact with

the project is when implementation is beginning.

These issues cannot be entirely ignored, since activities have to be considered in their overall framework. However, they are often addressed in a warning context. Given a particular management structure and location of the monitoring and evaluation staff, the objectives of the latter must be set accordingly. In particular, attempts to remedy the lack of a pre-project data base in the early days must not absorb such a proportion of the resources available that the current information needs of management are neglected.

Because it is oriented towards a wide readership, the Handbook includes some elementary (but fundamental) material. The experienced practitioner may find some sections redundant or repetitive, but it is hoped that the Handbook will be "consulted" as well as "read".

As the title indicates, the Handbook addresses agriculture and rural projects. These encompass a wide range of project types, but there are common features for which general monitoring and evaluation principles may be developed. These are

- a. The target population is the rural population (or part of it) within a specific area of a country;
- b. The impact is generally to be achieved by providing an impetus to change in farming patterns or farmers' response to perceived constraints, so as to alleviate these constraints. (Other components may be included with this main focus, but rarely in isolation of it);
- c. The majority of the intended beneficiaries are usually drawn from the small farmers of the area (by definition in the case of rural development projects, but in relative terms this applies to many agricultural projects also), but general change at the community level is also commonly envisaged;
- d. Although the technological package supplied may be well proven—both experimentally and in terms of experience—in other areas, the response of the recipients in a particular case cannot always be predicted with precision in advance of project implementation; and
- e. The intended impact may be obscured in the short term by natural and man-made phenomena outside project management control, which may have larger effects than the project.

Viewing the project objectives as a sequence, shown below, will assist in distinguishing between the functions of monitoring and evaluation.

- a. The immediate objective is to provide *inputs* that are necessary to achieve agriculture and/or rural development.

Example: Inputs may be provided in the form of a physical facility such as an irrigation system or health clinic, advice which the beneficiaries are to be encouraged to adopt, or supply of such services as credit, fertilizer, water supply, medicine, etc.

- b. It is expected that the use of these inputs will result in *outputs* by the project beneficiaries.

Example: In many projects the outputs are in terms of crop or livestock production but outputs may also be skill acquisition, larger school attendance, greater use of health facilities, etc.

- c. These outputs will, in turn, generate *effects* amongst the target population.

Example: Commonly, the effect will be change in income and expenditure levels and patterns but health and other social consequences may also be expected.

- d. Finally, these effects will have an *impact* on the social and economic life of the community.

Example: As a result of improved incomes, services may develop in the area providing wider income and employment opportunities, or, as a result of better health and education, the general quality of life may improve.

Effects and impact shade into each other; the difference is largely one of degree along three dimensions; namely, time, scale, and scope. Effects will show through sooner, apply to the direct beneficiaries and relate to specific aspects of rural activity. The impact measures the final total result, taking into account direct and indirect effects and allowing for diffusion and imitation that produce changes in the community as a whole.

Physical inputs and outputs are measurable, at least in theory. The effects and impact, however, are not only difficult to measure but may not easily be attributed to the stimulus of the project. The project design will have adopted certain 'reasonable' assumptions regarding the likely

effects and their causal links to the project, but these require constant review in the light of developments during actual project implementation.

Monitoring and evaluation systems must be designed to reflect the achievement of these project objectives as expressed in targets to be met over time. Imprecise targets to be achieved at indeterminate times will lead to loosely-defined monitoring. However, a balance must be maintained; precision must reflect what is possible. There is a danger that excessive precision of targets and timing may lead to an excessively large-scale data collection effort. This effort will not usually be cost effective in terms of its contribution to decision-taking.

The costs of the monitoring and evaluation effort must be related to the likely returns in improving implementation and the spin-off effects in improving the design of follow-up of similar projects.

1.2 Monitoring and Evaluation: The Basic Framework

The monitoring and evaluation functions are related but distinct. Monitoring is the provision of information, and the use of that information, to enable management to assess progress of implementation and take timely decisions to ensure that progress is maintained according to schedule. Monitoring assesses whether project *inputs* are being delivered, are being used as intended, and are having the *initial* effects as planned. Monitoring is an internal project activity, an essential part of good management practice and therefore an integral part of day-to-day management. *Evaluation* assesses the overall project *effects*, both intentional and unintentional, and their *impact*. It involves comparisons requiring information from outside the project either in time, area, or population. The relative roles of monitoring and evaluation will vary with the type of project. The supply over a wide area of a well-proven package aimed at a specific crop or farm activity needs careful monitoring, but possibly less emphasis on evaluation. An innovative, but small-scale, project may be easier to monitor, but evaluation will be both difficult and critical.

The initial steps for designing monitoring and evaluation systems are

- a. A review of the project objectives in order to systematize them according to the sequence indicated in Section 1.1 above; and
- b. Identification of the users of both the monitoring and evaluation

information. For monitoring, the users will be the hierarchy of project management. The type of information transmittal will be geared to the needs of each level of project management. The users of evaluation analysis range from project management through the responsible directorate/ministry, to the national planners.

Evaluation will draw on the data generated by the monitoring system to help explain the trends in effects and impact of the project. Data generated by the monitoring system will help to explain the trends in effects and assess impact of the project. Monitoring data may reveal significant departure from expectations which may warrant the undertaking of an *on-going evaluation* exercise to examine the assumptions and premises on which the project design was based. Such a review, as also in the case of *ex-post* evaluation, can be of great value to sectoral management in its policy formulation role.

Monitoring must be integrated within the project management structure; but evaluation with its wider horizons requiring comparative information is not necessarily such an integral component. A central evaluation facility may be justified on the grounds that:

- a. The demanding professional skills required to interpret evaluation data are either unavailable or uneconomic for each project individually;
- b. The data needed extend from before a project is initiated to a period long past its completion; and
- c. It is necessary to have comparable data from within and without the project population to achieve some form of rudimentary control comparisons.

Although the design and analytical facility for evaluation may be centralized, the data collection resources within a project will be used to provide much of the required data. If the same unit is collecting data both for eventual evaluation and for quick, timely monitoring of the latter must not suffer due to the greater demands of the former.

1.3 Monitoring and Management

Within the project the primary need is to monitor progress. Given that the project has been carefully appraised, i.e., that there is a strong *a priori* assumption that certain stimuli and inputs will achieve certain outputs, effects and impact, the role of management in the early imple-

mentation phase is to create the conditions that will allow this chain of events to occur.

In the early years of project implementation, the emphasis will be on monitoring the physical and financial progress and the delivery of the inputs to the intended recipients. The main source for this aspect of monitoring is properly organized project records. The other concern of management, at this stage, is the use to which these inputs are put and the reaction of the recipients.

Adoption rates, and more important, repeat adoption rates, give management a strong inference whether the project is succeeding or not. Information on the recipients' attitudes and perceptions is important in order to explain any departure in response behavior to that postulated in the project design. Such unpredicted behavior may determine the success or failure of the project.

The information required for monitoring of project implementation does not require complex data systems. A monitoring system will exist even if it is merely a subjective accumulation of impressions by project staff. If common sense rules of good standard management practice are adhered to, the monitoring system can be limited to the minimum of parameters to be recorded regularly over time. The goal is to make the data collection, summarization and presentation of the information to the decision-makers. The need for recording of progress by project with their subjective impressions is not replaced by the existence of a monitoring unit—rather, such reporting is an essential source for the system.

Once management has satisfied itself that the delivery system is working, its attention should shift to the outputs generated; i.e., are they materializing according to expectation? Focus on output measurements must not, however, be at the expense of monitoring the input delivery system. The measurement of outputs is more properly a function of evaluation, for identifying trends is not an easy task in view of the exogenous influences at work, and is often impossible without an extended time-series over many years. Nevertheless, management will need estimates of production, and the means of obtaining them is discussed later in this Handbook.

The key to successful monitoring is the provision of regular, timely, decision-oriented information to the project management. This can be achieved if the necessary staff are in place early, are seen to be part of the management team, and are given guidance on the priority information needs of management.

1.4 Evaluation: An Assessment of Results

Evaluation aims to determine whether the project objectives set in terms of expected outputs, effects and impact are being, or will be, met. This leads to an assessment of the results achieved, and the lessons to be drawn for future improvements in a later phase or in similar projects elsewhere.

Output levels are a measure of the result of the inputs utilization by the beneficiaries. If the changes in outputs are considerable, they may be detected even during the implementation phase of a project. In other cases, the effects, for example, on health, arising out of the provision of health services as an input, may not be quick to appear. And the *impact* of such effects on the general quality of life of the community will, in most cases, be a slow-developing process. An evaluation system will require the development of a series of data commencing before the project is implemented and continuing well past the completion of the implementation period. Unlike a monitoring system with its emphasis on rapid assessment, an evaluation system requires a longer time span before even tentative conclusions can be drawn.

The extent to which even moderate variability can affect the picture is not always appreciated. The following example shows how it might operate, by simulating three sets of results obtained by subjecting an underlying simple linear trend to random variation. The trend is from 1,000 to 2,000 over five years; the variability used in the simulations is normal (in the statistical sense) with a standard deviation of 15 per cent of the trend values. The three series were the first obtained; there has been no searching for extreme patterns.

Table 1: Random Variations About a Trend

Year	Trend	Simulations		
		1	2	3
0	1000	950	632	1163
1	1200	1170	1284	1423
2	1400	1213	1522	1316
3	1600	1596	1714	1748
4	1800	1942	1945	1498
5	2000	1658	2192	1668

The simulations are equally likely, and all assume that the underlying trend is in fact taking place as the basis on which random variation is imposed. Suppose, however, that three project areas all had the trend figures as annual targets, and that they produced the series shown above as their results. Would they be regarded as equally successful? It is important, therefore that the role of natural variability should be considered before any hasty conclusion about relative performance are drawn.

Evaluation will go beyond quantifying changes that occur to an assessment of the contribution of the project in achieving them. But the project area and the beneficiaries are subject also to exogenous influences beyond the control of the project, these are unpredictable in their timing and magnitude. Therefore, establishment of causality between project inputs and the effects and impact poses the most difficult problem in evaluation. These issues are taken up in Part 3.

In addition to the analysis of data series over time, evaluation will usually require in-depth studies of the validity of certain assumptions implicit in the project justification. Are the socioeconomic determinants of intended beneficiary behavior understood? Will the market for the intended incremental production hold stable when the increased supply enters the system? Will the income generated benefit the dependents of the beneficiary or be siphoned away from the household? These are questions that project management, taxed with many implementation issues, has no time to consider unless the unexpected impact of one or more of these factors threatens the implementation process; and by then it may be too late. Such studies will contribute to the process of ongoing evaluation referred to earlier and some involvement by the monitoring team will be required. This illustrates the point, returned to below, and in Parts 2 and 3, that there are close relationships, in practice, between monitoring and evaluation despite their distinct functions.

To what extent should data collected within a project be standardized to contribute to inter-project comparisons or national data series? Viewed as a single project covering only a small area of the country and unique in the type of development to be undertaken, the answer may be very little. But agriculture and rural development projects often cover large geographical areas individually, and collectively cover a large part of the country. Monitoring and evaluation resources within each project may, in total, be a very significant part of the total statistical resource of the country. There is then a strong case for these resources to contribute to the broader aspects of information needs, by introducing standardi-

zation of survey design, data content, or analytical treatment to the extent appropriate. Many of the data needs on outputs and socioeconomic aspects of the population are similar in different projects and similar again to national requirements. Such standardization need not divert attention from the needs of project management—indeed may help to assist project management identify its broader needs.

Moreover, if confined solely within a project, the data collection and analytical skills may be dissipated, once the project is completed. This would not benefit the overall state of statistical development in the country. The mutually supportive roles of national data agencies and project monitoring and evaluation units need to be identified and exploited for the benefit of both.

1.5 Monitoring and Evaluation in the Project Cycle

In Bank terminology, the Project Cycle is:

1. Identification
2. Preparation
3. Appraisal
4. Implementation, and
5. Completion

Figure 1 sets out these stages and identifies the main data needs and their possible sources of supply. The summary phases in the Figure cannot of course cover many of the aspects that arise across the whole project range, but they give the broad picture.

The first three phases precede the actual project activities in the field, but they are shown here to indicate the background. The information will also help those staff in ongoing projects who are, as is often the case, involved in preparing proposals for further phases of project activities, either by continuation or by repetition elsewhere. Their presence also makes clear that some monitoring and evaluation activities in phases 4 and 5 can hope to succeed only if they are planned and provided for in the first three phases.

Broadly speaking, monitoring is in phase 4 and evaluation is in phase 5. But, as already indicated, and discussed further in Parts 2 and 3, there is no hard line between the two functions in practice, of the kind drawn across Figure 1 to illustrate the separate phases.

The essential decision in the pre-implementation phases is whether (or not) to conduct a major baseline survey. The decision on this affects the whole evaluation effort during future years. A baseline survey using a probability sample is justified if it is intended to collect the same information at other points during the project cycle, including the period after project disbursement is completed. The emphasis for evaluation will be on longitudinal comparison of these random samples. Desirable though it may be for such a survey to be mounted, executed and analyzed in an appropriate pre-implementation phase, it requires the existence of a capable survey organization on hand. Contracting it to a university institute with experience and capability only in the area of micro in-depth studies will not usually be desirable. If no suitable organization exists, the alternative is to rely on the monitoring system for simpler, but more continuous longitudinal indicators supplemented by small-scale, possibly purposively selected, sample surveys that aim to reflect change in relative terms across groups (including the concept of at least a quasi-control group). For this, the involvement of local institutions may well prove helpful.

Some data on the demographic and socio-economic characteristics of the population are necessary at the project preparation stage, quite apart from any baseline survey. A quick interview survey using a purposive or quota sample, possibly including a community-level questionnaire, may well serve this need. Only approximate levels are required at this stage; thus the issues of recall periods and oversimplification of the questions, inevitable in a short interview, may not be limiting. The cost of such a survey will be modest relative to other project preparation and appraisal costs, but the reason why it is rarely accomplished may be the lack of a survey capability in the country.

A socio-economic investigation by one or two skilled professionals into the attitudes and constraints affecting the likely beneficiaries could also be of great value at this stage. Many projects assume certain beneficiary responses which do not materialize due to a lack of insight into these.

Once the implementation stage is reached, the monitoring system remains within its objectives. It is not the role of this system to undertake, late in the cycle, surveys that should have been undertaken earlier.

Some evaluation time-series data will be available at the completion stage only if there has been a baseline survey. If this was accomplished it

will need to be repeated twice or thrice over the years. This will be a substantial commitment, and if the same external agency that executed the baseline can be contracted for the further rounds, so much the better. Not only is continuity achieved but the internal monitoring system is not diverted into these time-consuming exercises.

Each project—with the possible exception of straightforward follow-up efforts—is to some extent unique. A typology and timetable for monitoring and evaluation would, therefore, be misleading in masking the individuality of a project that requires a 'tailor-made' information system.

Part 4 discusses the choice of indicators in some detail and the sources of the data are discussed in Part 5, 6, and 7. Before proceeding to these issues, the distinctive features of monitoring and evaluation are considered further in Parts 2 and 3.

Figure 1: Project Cycle: Data Requirements and Sources

Cycle	Data required	Source
Identification	Project area, current outputs, beneficiaries & environment.	Administrative files, census, national and local survey. MOA estimates.
Preparation	Technical inputs.	Professional review. Feasibility studies.
	Socio-economic characteristics of project population.	Existing rural surveys and/or <i>specially commissioned</i> ad hoc study by NSO or others.
	Market information.	Administrative files, existing market survey, and/or <i>specially commissioned</i> ad hoc market study.
	Attitudes of beneficiaries, constraints affecting them.	<i>Specially commissioned</i> case study.
	If base-line survey required for long term evaluation, specify survey content, basic approach, and scale.	<i>Specially commissioned</i> baseline survey (preferably by NSO).
Appraisal	Financial and O. & M.	Ministries, district organizations, agencies.
	Macroeconomic factors.	National-accounts, sector studies, development plans.
	Project area indicators.	Area specific data generally available and results obtained at earlier stages.
Implementation	(a) Financial Staff Construction Physical inputs Service inputs Marketing Input usage Production Adoption rates	Much of these data will come from internal project activity (see Part 2), either as part of regular reporting process or as the result of special enquires mounted from project resources.
	(b) Beneficiary reaction Problem identification <i>If previously planned</i> , Mid-implementation Project survey Time-series analysis and external data comparisons	Here the borderline between monitoring and evaluation is blurred. Case studies and surveys, and detailed analyses, may require resources from outside the project
Completion	(a) <i>If previously planned</i> Post-project survey. Coordination of data for reviews and analysis.	See entry directly above. Evaluation will require analysis involving persons outside project
	(b) Long-term evaluation of persistence of results.	<i>Specially commissioned</i> survey and/or case studies. Relevant results from continuing NSO & MOA activities.

MONITORING

2.1 Managing and Monitoring

The interactions between monitoring and evaluation have been outlined in Part 1. The existence of these interactions has led to a common perception that monitoring and evaluation are inseparable, as indicated by the ubiquitous abbreviation, M&E. But there are clear distinctions in their roles as explained in Part 1; and experience shows that monitoring is not successful unless distinguished from evaluation. Only then will it play its proper role as a management tool within the project's management information system.

Monitoring arrangements must be regarded as part of general management, and be estimated for and funded accordingly. A common complaint by managers is that monitoring units do not provide information that is relevant or timely. This is usually the case where the unit is imposed on management as a parallel organization, leading managers to conclude that its main function is to provide information to outsiders, with little or no commitment to the project. This will not happen if monitoring is viewed as a management function, under the control of managers, designed to meet their information needs, and working to an agreed timetable, with given resources.

In general, independent consultants should be considered only for the following monitoring functions:

- a. advice on general design of the monitoring system at project preparation stage;
- b. specific ad hoc enquiries, when they are brought in with precise terms of reference as to what they do, to whom they are responsible, and how they report. These could include technological/scientific, quality control, and causal studies; and
- c. training and advice on survey methodology.

Evaluation is a different matter, and must include participants from outside the project management: in this context, evaluation of the pro-

ject results and of project management performance includes evaluation of its monitoring performance.

This separation of monitoring and evaluation reduces, what a Workshop identified as, "the fear of the evaluation components of the M&E unit . . . which infects all divisions of the project. In these circumstances, the monitoring unit can make a very limited contribution to the project's progress." The integration of monitoring into the management activity will not of course, remove all the suspicions that may be felt against any group who carry out this type of function.

This emphasis on management monitoring does not require management to identify all its information needs from the outset. Such identification will be a continuous process, as implementation proceeds, involving interaction and advice flowing upwards as well as downwards. But it must be unmistakably clear whose needs have priority and who has the final decision.

Difficult institutional problems may occur with this manager-oriented approach to monitoring in complex projects involving several different agencies as commonly encountered in agriculture and rural development projects. But these difficulties do not relate to monitoring alone: they are basic to the setting up of an effective management structure for the project. If management responsibilities are clearly defined, it is not difficult to fit in the monitoring unit appropriately and to identify the reporting channels to the separate lines of management. If an effective management structure cannot be set up, there is little point in proceeding at all. So the argument is the same as before: the managerial function includes monitoring what it is doing; management can only be effective when it has feedback.

When several specialized agencies are each responsible for separate components of a project, the 'top management may be primarily a coordinating body. In such a case, the design of the project should have considered not only the location of a central monitoring unit (ensuring a flow of the required information to the coordinating management), but also the arrangements for the exchange of information between the line agencies involved in the various levels of field operations. A responsibility of the monitoring unit then is to develop these lines of communication so that the needs of each management level are met and unnecessary duplication in information systems is avoided.

Organized in this way, monitoring will still produce information

which needs to be carried forward for evaluation. An example is given by a project monitoring report that included a section "on the individual performance of settlers, in which a revealing feature has been that the weaker ones are mostly the local people . . . One reason for this appears to be that their standards are limited to what was an offer before the project began . . . Comparatively, those who have come from outside seem to work harder and have a greater desire to succeed." Arrangements must be made to ensure that monitoring results of this kind are available to those engaged in evaluation: indeed, evaluators should have access to all monitoring data. This should not cause difficulties if management has provided itself with a satisfactory monitoring system and acted on its information during project implementation. In these circumstances, they will want evaluation to take this into account.

Sometimes, monitoring may require close integration with evaluation, because it is expected that monitoring data is of particular importance in causal explanation (see Part 3). Special care is needed then to prepare and coordinate the scope and timing of data collection.

2.2 Specification of Objectives and Targets

Detailed specification of project objectives facilitates monitoring as the following cases show.

CASE A The project involves completion of a settlement scheme and the improvement of drainage on low-lying coastal lands. In the settlement part, 8,000 acres of rolling land will be cleared for sugar cane and settled by 800 families. A sugar tramline extension, road improvements, and sites and services for a new township are to be provided. The drainage improvement involves reconstruction of seawalls and of internal drains on 26,400 acres of sugar cane land. There are physical production targets of sugar cane.

This project is relatively straightforward. Its operations can be functionally divided and monitored accordingly, by reports of money spent, work completed, etc., flowing to a small unit under the project manager. Since the crop is centrally processed and paid for, production, yields, and crop income can be recorded at the centre and made available with little trouble.

CASE B Major objectives are:

- a. to extent multiple cropping technology coupled with improved livestock activities to increase the intensity of land use as well as raise farm incomes;
- b. to provide additional employment opportunities for subsistence farmers and in particular, landless labourers;
- c. to support research activities in multiple cropping; and
- d. to improve rural welfare through health support services.

Secondary objectives include infrastructural improvements. Here the objectives are more numerous, and multi-sectoral in nature. They will require evaluation, but their description gives no obvious guidance for the monitoring system. However, implementation targets that will lead to meeting these objectives will normally have been specified in the project documentation. The task of the monitoring unit in consultation with management will be to choose the indicators for measuring these target levels and the units in which they are to be measured. Questions that arise include how to measure land use intensity, incomes, employment creation, rural welfare, etc., and the relative weights to be given to each of these aspects (including which of them can be tackled only through longitudinal evaluation surveys).

Thus, for monitoring, it is the operational *targets* shown as the intermediate steps to reaching the project objectives that are particularly relevant. The danger of vague objectives is that the target specifications may also be vague or inappropriate. It is the job of senior management to break down the specified targets to the area or functional level for use by the lower echelons of management, and the job of monitoring is to measure progress against these target levels.

The information obtained in the monitoring process will sometimes lead to adjustments in the targets for various project components and the resources allocated to meet them. This, in turn, will cause adjustments in the monitoring system, and so on.

Targets for financial disbursements, staffing ratios, and infrastructure construction should be specified with considerable precision and monitored with accuracy. Beneficiary reactions and outputs can be tar-

geted, but excessive precision in stating these should be avoided. The difficulty of monitoring output targets when random exogenous influences are involved was demonstrated in the hypothetical example of trend increases in Part 1. Year-to-year figures may give little guidance until a lengthy time-series has been established and the examination of such time-series is more properly an evaluation task.

2.3 Monitoring and Financial Accounting

Management accounting procedures and financial reports play a major part in most information systems for management control; their relationship to other monitoring information must be recognized. Financial controllers need to be involved by project management in the design of the monitoring system. They and their staff need to be involved throughout both in financial and nonfinancial monitoring. Plans for financial monitoring also need to be thoroughly examined by management to see that the financial reporting system will—like the rest of the monitoring arrangements—provide the needed data when it is wanted. Accountancy units are sometimes as poor as other monitoring units in providing timely, well-presented data.

Consistency of classification across the accounts produced for planning, reporting, and for comparison with monitoring data is essential. In particular, the distinction between capital and current expenditure has to be applied carefully. An example, at a disaggregated level, is the need for expenditure on small tools to be recorded consistently under the same head of expenditure. Consistency of valuation is also essential, or an agreed system of adjustments must be followed.

Accounting information must not be left passive or in isolation. The comparison of statements of expenditures and of physical progress helps to prevent cost overruns, and improves control over worksite performance. It also acts as a check. One project, for example, states there was a tendency for some sectoral reports from agencies and ministries to exaggerate their performance; but that if financial accounts did not show that the relevant amount had been disbursed, the physical performance report was ignored until otherwise confirmed.

The financial report is often, but not necessarily always, the more accurate of the two. Sometimes the financial information is delayed: when; for instance, small-scale construction schemes are carried out locally by several agencies, the information is often received quite some time after the physical work is completed. The financial statements may

even be incorrect. In a project involving freezing and canning plants, both profit margins and sales figures were understated and production costs and overheads overstated for the purpose of tax evasion. Only vigilant, on-the-spot management supported by cross comparisons can prevent these offences. Once again, financial and physical progress monitoring must work hand-in-hand.

2.4 Monitoring of Staffing

The first step in monitoring project staffing is to check from administrative records whether the recruitment of project staff is proceeding according to the timetable. If specialist staff are not being recruited on time, or there have been delays in setting up offices in one or more areas, urgent action must be taken, and the timetables re-programmed. Managers should, of course, have already identified crucial elements and kept a watch on them. Again, a flexible, iterative system is required, or what is crucial at one stage may differ from what is crucial at another.

Staff turnover is a major and persistent problem. It is particularly serious for staff in key positions, since they are usually more prone to offers of attractive alternative employment. For example, if the full potential of computers is not always realized, it is because it is difficult to keep competent analysts in their posts long enough to see large scale processing through to completion. Recommendations on the design and analysis of inquiries have been framed in this Handbook with this constraint in mind. Close monitoring of staff turnover will assist in the development of contingency arrangements and the optimal deployment of the available resources.

Monitoring the quality of work undertaken by the staff is more difficult. In an extension project, for example, the intended buildup of the numbers of extension agents will be clearly specified and can be monitored with relative ease. The delivery of the extension service can also be monitored by recording the time spent in the field and the number of visits made. In most cases, these indicators will provide a reasonable guide to the potential efficiency of the service and will also enable a first ranking to be made of the levels of performance. For this purpose, extension agents must keep individual logs of their activities, and the supervisors of the extension services must use a standard reporting format. Although, of necessity, subjective in nature, the assessment of performance against common criteria will enable preliminary judgements to be made. If the criteria can be agreed upon, a simple scale for measuring performance may be introduced. An example scale for

measuring performance may be introduced. An example is shown in Figure 2 in which assessment on a scale of five levels is required.

Figure 2: Assessment of Extension Agents Performance

CRITERIA	Scale				
	1	2	3	4	5
A. Proportion of time in field					
B. Adherence to timetable					
C. Knowledge of techniques					
D. Performance at observed sessions					
E. Farmers' feedback					
F. Initiative					

It will be difficult at the beginning to get a large number of supervisors to operate these scales uniformly, and meaningfully. A universal rating of average will not help. An even number of points in the scale helps to prevent clustering on the mid-point. The distribution of ratings should itself be monitored to ensure that the basic purpose of detecting exceptional performances (both good and bad), is achieved. Improved standardization of assessment should be possible as the project proceeds and comparisons are made with the more direct indicators.

Other measures of extension effort can be devised; since the main concern is to encourage change in farming patterns and behavior, the ultimate monitoring indicators are the adoption rates for the recommendations made and their derivatives, e.g., farmer demand for inputs. These can be monitored using a sample survey of recipients of the service; their reaction to the service provided can also be included. This measurement of adoption as a monitoring tool is taken up in some detail in Part 4. However, the results of these indicators are not the final answer. At a Bank workshop, it was reported that, "Some extension workers feel that the present performance indicator, farm productivity, serves to discourage those assigned in depressed or poor communities where farm production inputs are rarely available and/or farmers cannot afford to use them. They suggest that additional indicators apart from productivity be devised to measure their individual performance." The staff reporting system outlined in the preceding paragraph will go some way to meeting this request. In addition, the reports will throw light on the supervisors'

capabilities. This quote also illustrates the importance of building morale and team spirit. The monitoring system should take account of this also, by detecting evidence of changes in these attributes.

2.5 Monitoring of Infrastructure and Delivery Systems

Progress of physical construction according to a predetermined critical path and measurement of input delivery against targets are obvious monitoring tasks. The choice of indicators is usually clearcut.

Special checks on the quality of construction and the materials used for it are required. These should be planned and carried out by those technically competent. Some checks will be timed to coincide with stages of completion, and are often specified in the contracts. Inspections at random intervals help to ensure that substandard materials are not being substituted, or that work is not being skimped. Identification of bad work even after completion is better than uncritical acceptance of whatever has been done. One of the most effective ways of preventing things going wrong is to make it evident that continuous monitoring is going on; and that evidence of deficiencies is being promptly transmitted to the management for remedial action.

Monitoring in this context is a wider function than that carried out by a small unit. Project staff in the requisite professional disciplines such as engineering will be responsible for these checks and inspections. It has been stated that the monitoring unit must be seen as part of the management team; it is now clear that monitoring itself is part of the function of all members of the management team.

Similarly, when fertilizer, insecticide, or equipment is being made available, the delivery system must be monitored to ensure that it is reaching the intended recipients at the right time, in the right quantity, and at the right price. In a credit scheme provision should be made in every case for brief documentation of the criteria used for selection, the period taken for decision, and the numbers rejected, as well as the numbers granted.

Vigorous, continuous, input delivery monitoring of this kind will be effective only if the monitoring staff and managers spend a lot of their time in the field and receive the support of the field supervisory staff. They should keep daily logs of their activities, and submit regular returns showing the proportions of time spent in the field. Each level of management requires inspection by its superiors: those carrying out the

monitoring functions must expect to be checked in the same way.

The question of timeliness can be treated under two heads. First, were the inputs made available at the time planned? This aspect can often be covered by monitoring the administrative records and staff reports of physical performance. It should be possible from these sources to show that not only were x tons of fertilizer delivered, but also that they were delivered to a specified destination at a certain date. Difficulties may arise when the goods are passing through the hands of more than one agency and there is—as is often the case—agency competition or rivalry. Any discrepancies in reporting must be closely investigated by the monitoring staff.

The second question is, if the inputs were delivered at the time planned, was this the appropriate time in the light of current conditions? The timing of planting for example, may have been advanced due to the early onset of the rains, whereas the delivery of seed may have been timed for a more normal rainfall pattern. In such a case, the monitoring system will be put to its greatest test. Was it able to detect the problem in time to allow management to remedy the situation?

Achievement of project objectives will involve a sequence of planned operations, each of which has to be completed at a specified time so that subsequent stages can proceed. A number of procedures for management, such as critical path analysis, have been developed in recent years. If one, or more, of these procedures are adopted by management the monitoring system must be organized to service such a procedure. If no such method is used initially, monitoring may indicate the need for their introduction if delays and breakdowns are beginning to occur.

2.6 The Role of a Monitoring Unit

As stated above, the monitoring function is a management responsibility and is one of the responsibilities of each member of the project staff. A monitoring unit assists in the operation of the monitoring system in the following ways:

- a. identification with management of the targets for project implementation and the indicators to measure progress against these targets;
- b. collation, summarization, and dissemination of the information flowing from the various agencies and staff engaged in implementing the project.

- c. analysis of the administrative files and records that pertain to the project implementation;
- d. collection and analysis of data from beneficiaries that are needed to supplement the available records and reports;
- e. maintenance, in a retrievable format, of the various data series over time as an aid to later evaluation; and
- f. preparation of reports that highlight the findings of the various analyses and, to the extent appropriate, present a range of logical options requiring decisions by management.

The type and frequency of reporting is discussed in Part 10. As discussed there, the communication of information will range from the frequent updating of a graph on the manager's office wall, to substantive state of the project's analytical reports. Flexibility must be incorporated in the organization of the unit's work so that it may respond quickly to major changes in the situation as they occur. A drought, a change in government policy, or other unexpected occurrence will require special analysis and emergency reports.

In order to report with an agreed frequency, deadlines must be set for the data or information to reach the monitoring office. The deadlines will depend on the dispersion of the project both geographically and over agencies, and the efficiency of the communication system. It is important to set deadlines that are sensible and which can be met. It is better to have a fifteen-day period for submission of routine returns (after the end of the reference period), which is adhered to, than a ten-day one which is not.

The successful integration of the unit within management requires that it does not appear to be acting as an 'overseer' or 'inspectorate' of project activities. Its role in making recommendations or participating actively in the decision-making process will depend on the type of management structure. But much will also depend on the personalities of those involved and their success in acting as an information service agency for the project.

2.7 Concluding Comments

The introductory Part has emphasized

- a. monitoring is different from evaluation;
- b. monitoring is an integral part of management;
- c. the monitoring unit must be a service unit for management, closely identified with it;
- d. prosaic, infrastructural records, both administrative and financial, are at the heart of a monitoring system;
- e. information from project staff is an important input for monitoring purposes;
- f. supplementary data collection must be used to fill information gaps, not to duplicate existing sources; and
- g. the key to success is a combination of timely action, concise reporting, and flexibility in response to unexpected developments.

PART 3:

EVALUATION: CONCEPTUAL ISSUES AND BASIC OBJECTIVES

3.1 Introduction

Experience shows that the management aspects of monitoring need the particular emphasis put on them in Part 2. This does not mean, however, that evaluation can be ignored within an individual project context. As stated in Part 1, evaluation aims to determine whether the project objectives have been, or are being met. Ideally, evaluation not only aims to quantify the achievements, but assesses the role of the project in bringing them about. Further, unexpected changes, both beneficial and detrimental, are looked for and their possible causal relationship to the project examined.

The accumulated experience of socioeconomic investigations demonstrates that only rarely are these ideal objectives fully realized. This part shows why this is so and then sets out less rigorous objectives for project specific evaluation with indications of how these can be achieved. The logical background for establishing both change and causality of

change is provided in order to indicate the difficulties of applying it in the evaluation of agriculture and rural development projects and to demonstrate why a number of the scientific approaches are not likely to be effective. The more limited procedures then suggested can be assessed in the light of these arguments.

The most exact method of establishing causal chains is the experimental method developed by the natural sciences. An examination of a scientific experimental model reveals the features that are crucial to its effectiveness, but which cannot usually be reproduced in project evaluation studies. The human sciences have developed a series of quasi-experimental techniques to adapt the natural science model to the social world. An alternative, also successful, is termed the *modus operandi* method, which works much as a burglar's standard method of crime works to reveal his identity to the detective. This method relies on common sense expectations about behavior generated within a society's daily life. An example in the agriculture is: when a new seed generally operates in a certain ways, the expectation is that it will continue to do so. Results will be attributed to it unless other factors are seen to be at work.

The human sciences—the social sciences (including law) and history—employ and adapt both methods. The experimental model is common in social psychology. The *modus operandi* method is used by historians to establish a sequence of actions followed by an individual or a group (who was where and who did what), consider their probable repercussions, and so attribute responsibility. Often circumstantial evidence is used.

A related method is to evaluate the likely impact of an action by asking: "What would have been the likely course of events if X had not occurred?" This device is known as a counterfactual. The hypothetical counterfactual sequence of events, against which actual events are compared, is generated by a sequence of plausible causal relationships.

Two general comments are made. First, questions about cause and effect have occupied the minds of many of the best thinkers, past and present. This is reflected in a vast and continuously expanding literature. In this Handbook a "common sense" view of causation provides the framework for discussion.

Secondly, the human sciences have not been very successful in establishing causal laws of the kind found in the natural sciences. Among the reasons commonly cited are:

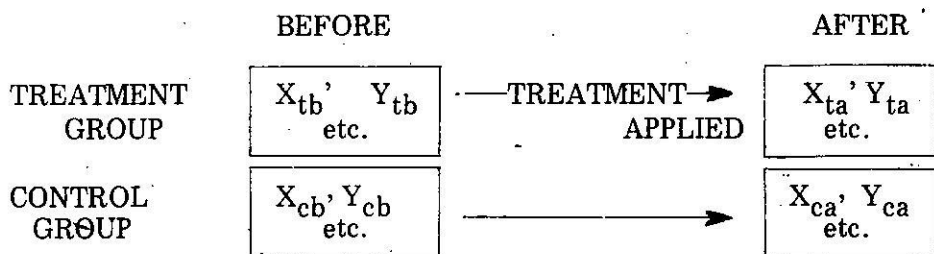
- a. the great diversity and variability of human behavior;
- b. the adaptive and reactive nature of human behavior; and
- c. the inability to experiment, and to replicate experiments, in most social environments.

Thus, it is usually impossible to establish, with full rigor, the causal chains that it is the job of evaluators to find. They will normally have to be satisfied with showing that it is "plausible" that the project has had the impact expected, and that there have been no substantial adverse side effects to offset its benefits. The question then is: "What is to be regarded as 'plausible'?" Such a question, however, by its very nature, has no single, simple answer. The rules, techniques and suggestions put forward in this Handbook, taken as a whole, provide a framework for deciding what is plausible in the specific circumstances of individual projects.

Major development projects are not experiments, except insofar as they include research components, or else in the very general sense that relatively self-contained interventions in social systems may be described loosely as "social experiments". Projects are planned and financed because there already exists a body of knowledge and experience indicating that certain activities can be expected to produce certain results—in other words, that they have a *modus operandi*. Evaluation in this context is to establish whether these expectations have been realized in a particular case. But this is, perhaps, to jump ahead in the argument: consideration must be given first to the scientific model.

3.2 A Scientific Experimental Model

The basic approach divides the subjects under study into two groups. One of these, labelled the treatment group, will be subjected to the predetermined causal stimulus or intervention, generally referred to as the "treatment" (it will be the project in the context of this Handbook). The other, labelled the control group, will not receive the treatment; its progress providing the basis for comparison. The situation is re-



Effect variables (the features of state or behavior that the intervention is expected to change—denoted by X, Y , etc.,—in the diagram) are measured in the two groups, both before and after the treatment is applied. Changes in the levels of these variables in the treatment group are then compared with the corresponding changes in the control group: differences in these changes in the two groups are attributed to the treatment. If the treatment is of a kind that can be applied at different levels (for example, extension officers visiting once a month, or once every three months, or once a year), then there can be a number of treatment groups, one for each level. Such an extended system will usually give more powerful results, since relating changes in the levels of effects to changes in levels of treatment will clarify the causal relationship and can lead to more effective control in further applications.

When nonliving material is involved, a control group may not be necessary: it can be assumed that material not subject to the treatment will remain the same and no observations of it are required, but this constancy cannot be expected with human populations.

For inferences about cause and effect to be made with certainty, the two groups should have identical composition before the treatment is applied to one of them. Such identity is, of course, impossible, and so a looser relationship, "equivalence", may be attempted; for example, the study of identical twins. A restriction to this level of equivalence would clearly limit enquiries very severely; so a looser matching or "blocking" is attempted. Members of the two groups are matched according to their position on variables that are thought likely to influence reactions to the intervention. Matching variables used could be age, sex, socioeconomic status, level of education, area of holding cultivated, or size of household. It is a demanding task to obtain and maintain a successful match on one variable: to do so on several variables is very difficult.

One frequently used method of achieving equivalence is by randomization. This involves allocating subjects at random to the treatment

and control groups, so that they are equivalent at an "average" level; with neither of the groups likely to react especially favorably or unfavorably to the treatment. Thus, in a fertilizer trial, land is divided into a number of plots, and the different fertilizer treatments will be allocated at random to them. (There are, of course, much more complicated experimental design arrangements than this simple random model, but they are not relevant to the argument here.)

The restricting nature of this model should be realized. It is not just a question of obtaining a random sample of subjects: those subjects must then be randomly assigned to the treatment and control groups. In several schemes in the past, where random allocation was feasible, it was not done because people were allocated on a basis of need rather than at random: for example, the poorer children have been put into the treatment group to get free milk, i.e., the treatment.

Random assignment will usually be impractical in agriculture and rural development projects. It may be that a project will include certain villages and exclude others nearby which are similar in some respects. But it is very unlikely that the villages in the project have been selected at random (although commencing work in a part of the complete and homogeneous project area may be considered a close approximation). The fact that *they* have been chosen usually means that they are different in some way from those excluded; and it is often expected that these very differences will influence reaction to the intervention made by the project. If the scheme is designed to affect the poorer farmers, then a control group of the better-off farmers is not effective. Nonrandom groups provide information of value (see Section 3.3) but conclusions drawn must pay regard to their nonequivalence.

With living subjects, there will be natural change over time, a maturing (or maturation effect as it is called), and this will complicate the assessment even if the groups are equivalent at the outset. Moreover, the environment will also influence the variables selected to measure project effects. Some of these environmentally induced changes may be larger than those anticipated from the project. In agriculture and rural development, fluctuations within the year and large variations from year to year are common, due primarily to climatic variability. The "message" or "signal" of the project will often be obscured by the welter of the effects of these other changes. Nor is it likely that the two groups will experience exactly the same sequence of environmental changes over time and space. There may be a new market in one area or a new road in another.

It is then difficult to partition differences between the treatment and control groups into those which are due to the treatment and those which are due to exogenous causes.

In the experimental model the treatment and control groups can be effectively isolated from each other as well as from the outside world. Such isolation is not possible in most project circumstances. One aspect of this is imitation. If some farmers adopt new practices, others may copy them. This imitation is often part of the project design, even when it is not, it is undersirable on ethical grounds to prevent it. In all cases its existence is important in any final evaluation of the project impact.

Human reactions may upset the experiemental conditions in other ways. In medical trials the control group is given a placebo—a pill or treatment expected to produce no physiological change—to allow for the possibility that results are being caused by the psychological effects of being given any treatment, rather than by the substantive effects of the particular innovation under trial. It would, of course, be ridiculous to consider a placebo in an agricultural context: visits by extension workers which did not transmit any useful information would be difficult to arrange, a waste of resources, and counterproductive.

A similar situation affecting the treatment group is called the Hawthorne effect, named after the factory in which experiments showed that productivity was stimulated by the circumstances deriving from the group being a focus of interest, rather than by actual changes in conditions of work. It is conceivable that a group of farmers, previously neglected, might respond favorably to almost any project involving them, no matter what its content.

Yet another confounding factor—common in medical trials and guarded against by the “double-blind” procedure—can arise. This occurs when the administrators of the treatment give more attention to those receiving treatment than to others. Thus, an extension worker may give more detailed and careful advice to farmers who are receiving credit than to those who are not. It would be undesirable to discourage keenness or enthusiasm in putting a project into effect, but the danger is that part of the recorded effect may be due to this general encouragement rather than to other specific project inputs. Evaluation must include consideration of what happens when intensive pressure, which is part of the project package, is withdrawn or reduced.

These effects could, of course, be considered as project benefits, arising from the project organization rather than its content. But evaluation will normally have as its objective a measure of the effectiveness of the specific inputs provided.

In scientific experiments there is usually little loss from either group. In human studies the respondents may not be prepared to continue their participation as the tedium of interviews builds up over time, or they may migrate. The composition of farmers involved in some PIDER schemes (in Mexico) has continuously changed, although the changes have been concealed in relatively stable total population figures. Losses of this kind are particularly damaging if they occur at different rates in the two groups. Since the final project impact cannot be assessed until long after its completion, it is extremely difficult to maintain effective groups, even if it is possible to set them up in the first place. In addition, the longer the implementation period, the greater the possibility of substantial maturation and environmental changes, affecting the groups in different ways.

Summing up, therefore, it is not usually possible in development projects to obtain equivalent groups or to achieve random assignment; the demands of matching are exacting and, even when equivalence is obtained at the beginning of the project, differential dropouts will almost certainly introduce non-equivalence during the project. Methods other than the scientific experimental model are therefore needed. This leads to consideration of quasi-experiments, developed for circumstances when cause effect relationships are looked for in situations where control and treatment groups are nonequivalent, or there is no control group.

3.3 Quasi-Experimentation: Nonequivalent Group Design

Quasi-experiments have been defined as "experiments that have treatments, outcome measures, and experimental units, but do not use random assignment. . . comparisons depend on nonequivalent groups that differ from each other in many ways other than the presence of a treatment whose effects are being tested. The task . . . (then) . . . is basically one of separating the effects of a treatment from those due to the initial noncomparability between the average units in each treatment group."¹

1. T.D. Cook, and D.T. Campbell. *Quasi-Experimentation* (Chicago: Rand McNally, 1979);

There are two basic designs for quasi-experiments. The first is a "nonequivalent group design". It retains the idea of a control and a treatment group (or a number of treatment groups), illustrated in the previous section, but without random assignment. Matching or blocking is done at the analysis stage after the groups have been set up in the light of the situation in the field. Although matching is postponed, the intention to do so later must be taken into account at the planning stage. The choice of the data to be collected will determine how far the available analytical techniques can be used in the later stages of evaluation. Thus variables that can be used later in an analysis of covariance, or for standardization, must be identified before starting data collection. The complicating factors discussed above that can weaken causal inferences even when randomization or detailed prematching is possible will, of course, continue to operate in nonequivalent group designs. It is difficult to judge in advance whether they may be more or less damaging.

The additional problems of nonequivalent group designs relate to establishing whether or not causes other than the treatment may have been responsible for differences in the changes of the two quasi-experimental groups. The factors of environmental change and maturation are likely to be aggravated with nonequivalent groups. Their nonequivalence may result in their being exposed to different developments in socioeconomic change. If there is a series of observations, rather than just "before" and "after" enquiries, it may be possible to identify (and therefore possibly allow for), any disturbing environmental events. Differential maturing is particularly likely if the treatment group is self-selected, since it then probably consists of the more energetic or able, or of those who are in a position to benefit most from the treatment.

One version of this problem is the tendency for the rich to get richer, and the poor, poorer; or "nothing succeeds like success." In this situation, even if a treatment group—in this case, the poor—remain poor (or, indeed, are worse off), in relation to the richer control group, it may be argued that its position would have deteriorated even more *but for the treatment*. Such an argument may be true: but it is difficult to demonstrate. It is an example of a counterfactual argument, and needs a strong data base from which to establish with a reasonable degree of confidence what the trend would have been without the treatment. This is an example where a joint approach of also using time-series information is necessary.

When groups are equivalent, the same indicators and techniques of measurement will work similarly with both. So long as the nonequivalent groups are not too diverse this situation should continue to apply. However, if there are particular differences between the groups along some variables, additional problems will arise. Indicators measured by scales are especially hazardous, owing to "floor" or "ceiling" effects which arise because the extremes of the scale operate in a different way to the rest of the scale around the middle. For example, if one group is, at the outset, near the top of a scale (that cannot exceed 100%), its rate of growth using this indicator will be very different to a group starting from a much lower scaled value.

If the change likely to be effected by the treatment is not large in relation to changes being generated by the ordinary interplay of social and economic forces (and this is the case with many projects), then the size of the sample required to measure the impact will be large. (A more detailed discussion about sample sizes is given in Part 7.) The control group, may have to be of about equal size. Using a considerable share of available resources to collect data from those who are not of direct interest to the project will often meet with resistance. There is a natural tendency to concentrate attention on the treatment group. This may be offset if the control group will be beneficiaries of a later phase of the project; the "control" data will, at a later stage, become useful "baseline" data.

However, in quasi-experimental designs it may be possible to use an existing sample group as a control. There may be other sample enquiries going on in the neighborhood of the project. If the project has a wide area of application, data from a regional or national enquiry may be available for control purposes. If there are ongoing investigations which are only partially relevant, it may be possible to have them extended to provide additional useful information. Such a procedure will almost certainly be less expensive than the setting up, maintenance, and observation of a special control group, and will release resources for the intensive study of the treatment (project) group or associated case studies. An additional advantage of using an existing survey group in this way is that data for the group may extend back into the past. Further, questions about indicators and methods of collecting data will already have received attention, and this experience can be used.

Not every existing enquiry provides a useful control group, but the growth of survey capability in many developing countries, and the increasing number and extent of enquiries into rural households suggest that this possibility should be investigated.

When special treatment and control groups are set up, data will normally be recorded for each individual in each group, and may be analyzed at this level. But sample groups may not maintain constancy of membership over the project period; in this case it is particularly important for the analysis to include a detailed study of within group variation as well as between group differences. When a sequence of groups of changing composition is being used, within group variation is one of the few tools left for disentangling causal factors.

3.4 Quasi-Experimentation: The Interrupted Time-Series Design

The second type of quasi-experiment is an interrupted time-series design. In its simplest form this merely involves a before and after comparison of a treatment group. If the treatment is spread over a period, as in most agriculture and rural development projects, the before/after comparison will be strengthened if a mid-term picture is also obtained. As the name "interrupted time-series" implies, however, this design works best when the data are available in a regular time-series and the treatment is a sharp shock of relatively short duration at some point in the series; for example, a change in pricing policy for a crop, the change coming into effect at a specified date. This latter condition militates against the model in many projects where the inputs to change are distributed, of necessity, over a long period.

This simplest design is the most practical proposition for most agriculture and rural development projects. If adopted, every means of strengthening what is a weak design must be incorporated. How this may be done is discussed below.

Successful identification of causal chains will be more likely if the interrupted time-series design can be combined with the nonequivalent group design introduced above. If no control group can be identified, or only a rudimentary control from other sources of survey data is likely, the beginning of the time-series has to act as a control against which developments in the treatment group will be assessed. A pre-implementation survey is, in these circumstances, essential, since this is the only way of ensuring that the "before" situation measurement is not "contaminated" by any project effect. If the project involves large-scale construction, whose benefits will not come on stream until the engineering works are completed, then the base point for the time-series can be carried out during this phase of the project. However, the construction, and the employment it generates, will almost certainly have some sub-

stantial effects. For example, in one series of projects the benefits of the employment provided by well boring were so welcome to the farmers that they preferred to seek continuing employment in extensions of the construction programme, rather than return to their holdings and use the newly available water for increasing production, as had been intended.

Any inferences about cause in this nonexperimental framework will depend on detailed information about the progress of the project obtained from the monitoring data. Such a combination provides the basis for the *modus operandi* approach mentioned at the beginning of this part. The description of the sequence of events occurring during the project will go some way to explaining the effects and towards arriving at a plausible conclusion concerning the cause.

The interrupted time-series is used to detect changes in levels and rates. These changes are likely to require time to diffuse through the treatment group or community. Even when the project provides a sudden intervention, e.g., the water starts flowing through the irrigation canals, the ultimate benefits may only accrue after some time. Thus, the period of postimplementation evaluation—the “after” survey—must be sufficiently long to measure the change and also the *persistence* of the change. The longer the time-series, the more possible it will be to make allowance in the analysis for seasonal and cyclical changes.

Special care is necessary to ensure that the survey methods and data collection quality are maintained throughout the period of reference. Changes in these may result in spurious signals emerging from the analysis.

3.5 Investigating Relationships Through Case Studies

The discussion to this point has assumed that the examination of change and causality of change is conducted through the medium of surveys with the groups selected in such a way that inferences can be made about the population at large. Detailed examination of “representatives” of experimental and control groups is possible if the number of cases is kept very small. The necessary *equivalence* can be achieved and the depth of study that a skilled observer can achieve at this microlevel enables the determinants of differential change to be identified, at least within the reasonable or plausible confidence limits suggested earlier.

More will be said on the circumstances under which it is appropriate to employ sample surveys or case studies in Parts 5--7. But it is emphasized here that case studies may be the evaluator's most appropriate medium for investigating causality. They are certainly simpler to organize than the longitudinal data series with its demands for an appropriately timed baseline and a continuation beyond the implementation period.

3.6 Practical Conclusion

Starting from the framework of a strict experimental model and taking account of the difficulty of applying it as used in the natural sciences, this Part has attempted to progress towards a set of practical objectives for project specific evaluation.

The following summarizes the guidelines offered:

- a. Adopt designs predicated on the use of matched control groups only when the exacting conditions for their selection can be met;
- b. Search for and utilize looser control data from other enquiries, particularly national or regional surveys;
- c. Commission detailed case studies to probe in-depth specific phenomena that are postulated to be affecting project performance, utilize the findings of these case studies to help draw "plausible" conclusions on relationships;
- d. Rely on time-series analysis only if a baseline is commissioned in due time, with provision for follow-up enquiries;
- e. Select indicators that can be measured accurately by available data collection methods;
- f. Maintain comparability of the data over time by consistency in survey methodology, quality of data collection, and analysis; and
- g. View the monitoring and evaluation system as a whole, using the interplay between the different reflections it offers on project progress to ensure that conclusions of routine statistical analysis are substantiated by observed evidence.

THE SELECTION OF APPROPRIATE VARIABLES AND INDICATORS

4.1 The Criteria for Selection

The opening parts of the Handbook have set out the basic precepts in the design of monitoring and evaluation systems for agriculture and rural development projects. In this Part, the crucial issue of the variables or indicators to be measured within these systems is addressed. Clearly, in view of the wide diversity of projects and the differing levels of resources available for data collection, it is impossible to set out a definitive list of variables to be measured: what is appropriate in one project may be inappropriate in another, and what is possible to measure in one environment may be impossible in another. On the other hand, the purpose of the Handbook will not be served by merely listing all those that have been suggested in various guidelines or used in a number of projects with greater or lesser success. A review of the accumulated experience to date provides a body of evidence that enables one variable to be recommended as likely to be useful in the majority of cases, or another to be flagged as one which has proved difficult to collect or to relate to project objectives. Such an attempt is made here. Variables recommended should at least be given first consideration. Those that are criticized may be appropriately included—but with the prior knowledge that they will demand particular skill and resource in their use.

A distinction is sometimes drawn between a variable and an indicator, reserving the latter for derived ratios of variables, or transformations of the value of a variable into an index or scaled format. But the distinction is a blurred one: a variable may be chosen as an indicator because, in some way, its value represents more than its direct meaning in its limited context, e.g., infant mortality is a variable that has been widely used to represent much more than *infant* deaths, rather, it has often served as an indicator of the relative position of the society in terms of health development. So, to avoid confusion, the word 'indicator' will be used here to also mean 'variable', unless the point being made requires a distinction to be drawn.

The general questions to be asked while selecting indicators include

- a. Can it be unambiguously defined in the conditions prevailing?

- b. Can it be accurately measured in the conditions prevailing, and, at an acceptable cost?
- c. When measured, does it indicate 'the state of a condition'; in a specific and precise manner?
- d. Is it an unbiased measure of the value of interest?
- e. When viewed as one of a set of indicators to be measured, does it contribute uniquely to explaining part of the variation in the situation it reflects?

Before proceeding to consider appropriate indicators for measuring project progress towards each objective separately, introductory comments on these questions serve to set the scene.

(a) Unambiguous Definition

Many economic and social indicators that have been precisely defined in relation to a cash-oriented, industrial society are often inapplicable to small semisubsistence farmers in developing countries. Examples are: unemployment or underemployment, and income.

In a wage-earning environment, unemployment and underemployment may be capable of clear definition, although there are difficulties here too. The definition of these terms in relation to small farmers has been a source of great difficulty and is still debated in international forums and in the social literature. What is a full day's work in the context of family labor maintaining a one hectare food crop farm? What meaning does 'actively seeking employment' have in a situation when there is no possibility of finding any?

The income of a semisubsistence farming household is capable of an almost infinite number of definitions. Is food produced for home consumption to be valued, and if so, at what price? Changes in the size and composition of the livestock holding raise income versus capital asset problems. What is to be done about exchange of food between neighbours? "The economists who determine the value of family labor (if it is to be charged as a cost of production),

and of family consumption have far more control over reported levels of income than do the farmers themselves."²

(b) Accurate Measurement

Even when defined, many indicators are difficult to measure when dealing with farming communities which are illiterate and are not accustomed to dealing in standard units of measure. The demographic literature shows how difficult it is to obtain accurately even such fundamental data as age or mortality.

Yields can be measured accurately by crop-cutting methods (see Section 4.4) but such methods require time and skill and, as usually applied, may only produce aggregate community estimates rather than farm-by-farm estimates.

Measuring income, however defined, is extremely difficult, and not for small farmers alone: The report quoted above concludes, after a review of many attempts to measure income, that "If . . . the purpose of income measurement is to capture statistics (mean values) at one point in time, remeasure income at a second point in time, and attribute the differences to the intervention of the project, then the present state of the art of statistical surveys will not generate income measurements with sufficient accuracy to validate such conclusions."

As income is such a prime requirement for most potential users of evaluation data, this is an important finding and will be considered further below.

(c) Specificity and Precision

These will tend to decline as one proceeds along the sequence of inputs, outputs, effects, and impact. The delivery of inputs within a controlled project area may be specific—a change in the rate of delivery reflects a real change in the implementation of the project. The output achieved as a result will be less so as yields may move seasonally according to climatic variations by more than the underlying trend due to the use of the inputs. Income as a measure of the effect of the project may be influenced to an even greater degree by exogenous influences outside the control of the project.

2. *Information for Decisionmaking in Rural Development: Report for USAID* (Washington, D.C.: Development Alternatives Ltd., 1978).

In terms of monitoring implementation, precision may be a practical criterion in the choice of indicators; for evaluation of results, precision may be impossible to achieve. Fortunately, however, when evaluation is undertaken, there should be at least a reasonable series of values of the indicator over time; used as a time-series, the *trend* in the indicator may be detected reflecting the trend in the condition it is meant to represent, with the confounding effect of seasonal and random influences allowed for.

(d) Bias

Clearly, it is desirable that an indicator should, whenever it is measured, reflect the true value of the condition it is representing. However, in measuring change over time, a bias in the absolute level at each point in time may not matter so long as the size of the bias remains constant, either in absolute or relative terms, for different levels of the indicator.

Thus, for example, the volume of a crop purchased by a marketing board will usually be a biased estimate of the total crop marketed (unless a monopoly exists), but changes in the volume purchased by the board may be a good indicator of change in the total volume marketed so long as the board's share of the total market remains constant. Similarly, a farmer's estimate of production may be biased, but if the relative bias remains constant, a proportionate change in his estimate over time will reflect accurately a true proportionate change in production.

The problem is whether such an assumption of constancy in absolute or relative bias is justified. In years of large harvests, the price on the open market may drop and farmers may sell most of their crop to the marketing board at a guaranteed stable price. In lean years, the farmer may take advantage of high prices in his nearby market and the sales to the board may decline proportionately much more than the decline in total marketed volumes. Or, farmers may increasingly understate their production as the true figure rises—not wishing to indicate that their prosperity has increased.

(e) Contribution to Explanation of Variation

In selecting indicators for a monitoring and evaluation system,

the objective is to put together a set wherein each indicator, individually and separately, explains a part of the overall variation in the condition being studied; and, together, explain a substantial proportion of the total variation. In a well-documented and quantified system, the contribution of each variable can be identified by statistical techniques such as multi-variate analysis—identifying the contribution made by each in a step-by-step manner and deciding on its inclusion in the explanatory equation according to its unique contribution. Such possibilities do not normally come the way of the designer of monitoring and evaluation systems. Nevertheless, previous studies or even intuition may identify an indicator that is so closely correlated with another indicator that the inclusion of both contributes little more than the inclusion of either one alone. Examples of pairs that are sometimes, but not invariably, highly correlated are

income	—	expenditure
area planted	—	quantity of seed used
literacy	—	years of formal education
cash crop production	—	cash crop sales.

There will be instances when the extent to which the relationship breaks down is itself of interest; thus poor correspondence between quantity of seed and area planted may be revealing of bad sowing practices. In such a case both indicators are, of course, necessary. Another reason for including two indicators that are closely interrelated relates to the sources of error in their measurement. If an indicator can be measured only approximately, or with a degree of bias, it may seem worthwhile to measure another related indicator in the hope that the two together will strengthen the conclusions that may be drawn, even though both are subject to measurement errors. This may be so if the sources of the error are different for each indicator, but is likely to create false confidence if the sources of error are the same, as both may then be equally misleading for the same reasons. Thus, if income estimates are biased due to deliberate understatement by respondents, it may be useful to collect expenditure if the errors in these responses are due to memory errors, rather than concealment, even though the true values of each are highly correlated. If both reveal similar orders of magnitude, more trust may be placed in the results.

4.2 Scaled Response and Proxy Indicators

Of the criteria listed above, the one of most practical importance from the designer's viewpoint is the ability to measure the indicator accurately, at reasonable cost on the scale required. Inability to do this may require a search for a proxy indicator that can be measured more easily and which appears to meet, or partly meet, the other criteria.

Consider first the example of indicators of the area under maize. The questions asked of a farmer can include the following, in ascending order of difficulty:

- a. How many plots did the farmer plant?
- b. How much seed did the farmer use?
- c. What was the area of maize (e.g., to the nearest tenth of a hectare)?

Either (a) or (b) may serve as a rapid assessment aimed at producing an indicator of whether the incidence of maize planting is above or below previous seasons. (a) will be particularly useful if the plots are cadastrally mapped and of approximate equal (and known) size. For many purposes, however, a more precise area may be required; but if the farmers do not know the area in these terms, a massive quantum jump in survey scale is required in order to physically measure the land using one of the acceptable techniques.

At the time of harvest, a set of options might include these.

- a. How many plots were harvested?
- b. How many bags were harvested?
- c. What was the production to the nearest 10 kilograms?

(a) is of little practical use, even for rapid assessment. At best, it will indicate how many farmers achieved no harvest at all due to drought, pests or whatever. The choice is between (b) and (c). The farmer may be able to reply to (b)—in bags or other local unit—with the implied margin of error due to recall lapses, varying moisture content, conversion from cobs to volumes of grain, etc. The resulting distribution for the group of farmers studied will be crude, but certain approximate parameters may be calculated from it, (c) will probably require a survey that includes direct weighing of the harvest in the required state and with procedures for standardizing weights to a fixed moisture content; without these precautions, the level of accuracy implied by the recorded figure is spurious.

It is this major direct intervention effort, necessary to obtain accurate measurements, that is the bane of surveys of small farmers who keep no records and who are unlikely to be familiar with standard international units of measurement.

Even if resources for a direct measurement survey are deployed, the time involved in data collection and analysis will usually make it inappropriate for rapid monitoring for, say, judging the success of the planting effort, or assessing the likely marketed volumes that may require project intervention. For monitoring purposes, the cruder scaled distribution approach may be necessary even if the more elaborate survey involving objective measurements is also mounted.

A different example is provided by certain social indicators. Consider indicators of nutritional status as a proxy measure of the general quality of life. As will be discussed below, simple measures of age, height and weight may be used to calculate indicators, particularly for children, that reflect not only the nutritional status of the individual but may, in appropriate circumstances, be used as a proxy for general well-being. The plausibility of establishing such linkages is involved here (see Part 3). If it can be shown that the anthropometric indices of children have improved relative to an established standard, is it plausible to infer further that their general well-being has improved also? These are difficult questions, but the extent to which such indicators can be used not only to reflect a direct state of a narrowly defined situation, but also to act as a proxy for a wider situation merits consideration at the design stage of the data collection systems.

In summary, therefore, it is recommended that before complex measurements are embarked upon in large-scale surveys, the following questions be answered:

- a. Will an approximate scaled response provide an adequate distribution to meet most of the analytical objectives?
- b. Can a proxy indicator, obtained from simple measures, be used in place of the direct indicator, with reasonable confidence that a change in one reflects a change in the other?

4.3 Indicators for Monitoring

Although precise indicators are not identified, the groupings below

provide the outline of a recommended set of indicators for project monitoring. It has been stated in Part 1 that monitoring assesses whether project inputs are being delivered, are being used as intended, and are having an initial effect as planned.

The first group of monitoring indicators includes

- a. financial disbursement figures;
- b. progress of physical construction relative to a predetermined critical path; and
- c. staff and equipment usage rates.

The source for these should be the administrative records maintained within the project. There are no difficult conceptual or data collection issues here; what is required are good record maintenance and rapid collation, summarization, analysis, and communication of the results to project management.

A second group of monitoring indicators includes

- a. technical parameters requiring instrument recording, e.g., water flows, evaporation, soil moisture;
- b. environmental parameters, e.g., meteorological data; and
- c. economic parameters e.g., crop and livestock prices.

These are usually well identified and defined and are seen as useful by project management. Regular price recording of relevant standard commodities according to agreed procedures should be a feature of most agriculture and rural development monitoring. Seasonal cycles and annual trends in local prices affect project implementation. The not infrequent neglect of prices as an indicator is an example of overlooking the simple in favor of the complex.

Moving on to the first project/recipient interaction, there is a need for indicators of input supply; examples are:

- a. credit
- b. direct farm supplies;

- c. extension advice; and
- d. educational, health or social facilities.

Data for (a) and (b) in terms of input supply should also be available from project records. Indicators will include numbers of recipients and the resulting percentages of predetermined targets; the distribution of these numbers by various quantity size classes and the parameters of this distribution (mean, standard deviation, quartiles, etc.)

At one level, indicators of extension services are simply to devise with administrative records as the source of data (see Section 2.4). For example, the number of recipients of visits or training; the frequency of visits or length of training received by the recipients; the number (and ratios) of first-time recipients and repeat recipients. Of greater difficulty, both in terms of definition and measurement, is the derivation of indicators of the quality of delivery of extension input. A proxy for this is the rate of adoption of the advice or message conveyed. This is considered below under adoption rates.

The delivery of educational and health facilities can be measured not only by the number of buildings for providing these facilities and their staffing (see first group above), but also by the number of persons attending these facilities for training, examination, treatment, etc. In these areas, the supply of the input becomes confounded with the usage or adoption rates; for further details on which, once again, see below. However, to the extent that attendance at the facility does not necessarily result in adoption of the treatment, e.g., family planning practices, the attendance or input supply data may be fruitfully used as a denominator in usage or adoption rate calculations, rather than the total population 'at risk'.

Up to this point, the monitoring system requires little in terms of surveys of beneficiaries, rather, it involves the maintenance and proper use of available records. The next set of indicators, however, move the focus to beneficiary observation involving the use of the received inputs, and, in the case of credit, repayment performance. They include

- a. input usage rates;
- b. adoption rates; and
- c. repayment rates.

The usage of physical inputs by the beneficiaries will require a survey to determine the practices adopted, e.g., seeding rates, method of

planting crops to which the input was applied, and so on. It is desirable to keep the questions on usage simple, and not to confuse it with farm management or detailed study; simply questions can be put to a sample of sufficient size to provide valid estimates for the total beneficiary population.

Adoption rates are, perhaps, underexploited as monitoring tools. They are of use as a proxy for the success with which a message is communicated through training or extension visits, and are also relevant measures of acceptance of medical benefits given at clinics. In the simple example, a member of the population may attend a clinic and depart with prescribed pills, but that is not to say that the pills will, in fact, be taken as instructed or that the course of treatment will be maintained after the initial experience is evaluated by the recipient. Follow-up contact with a sample of the recipients of the advice or prescription is then required. This is a task for the monitoring unit.

Adoption rates of varying degrees of complexity can be conceived. The simplest kind require data relating to current year only. Thus, if:

T is the target number which should be reached,

A is the actual number reached,

D is the number adopting the recommended practice,

the following rates can be calculated:

$$\text{Performance index} = \frac{100 A}{T} \dots (1)$$

$$\text{Penetration index} = \frac{100 D}{A} \dots (2)$$

$$\text{Achievement index} = \frac{100 D}{T} \dots (3)$$

The 100's are introduced to put the indexes in percentage form; and it will be noted that $(3) = \frac{(2)(1)}{100}$

Note that, in order to calculate this range of indicators, and if the definition of adoption is unambiguous, no measurements or long inter-

views are required; merely a set of observations relating to receipt and adoption of the recommendation provided.

But, there are problems in the definition of adoption. If the recommendation covers a group of combined operations—to plant at a certain time and at a certain spacing—is the recipient an adopter if he follows some, but not all, of the recommended practices? It is possible to consider the advice as a set of recommendation and collect figures for each component of the set. If the recommendation is to use X kilos of fertilizer per hectare, is the farmer an adopter if he uses X/2 kilos per hectare? The answer may depend upon the purpose of the index. Using X/2 kilos may represent acceptance of the message and thus indicate effective work by the extension worker. If this is what is to be measured, the farmer is classified as an adopter. On the other hand, if the effective improvement of production is being assessed, and X/2 kilos per hectare is insufficient to affect production, the farmer should not be regarded as an adopter.

If appropriate records over time are kept, it will be possible to identify repeat adopters and 'dropouts', and even relate these figures to whether the message has been repeated each year, or whether some other practice is being emphasized. The related rates can then be calculated and plotted on graphs.

If a monitoring system provided nothing more detailed than some of these indices, it would tell project management a great deal about the reaction of the intended beneficiaries.

The need for, and usefulness of, such measures is clearly illustrated in a recent case where detailed studies of farming practices had continued for some years with little feedback to management. Belatedly, a quick survey concerning adoption rates was carried out in a matter of weeks which revealed that 70 percent of the original sample of recipients were no longer participating in the programme. Another example of overlooking the simple in the desire for the complex.

For the monitoring of the repayment rates of credit similar rates may be used. Detailed consideration of this problem is given in a recent paper.³ One common indicator is the collection index for an accounting

3. J.D. Von Pishke, "Quantification of Loan Repayment Performance," Course Note 42, Economic Development Institute of the World Bank. (Washington, D.C.: July, 1979).

period. It is dependent on the period and is of the form:

$$100. \frac{\text{Volume of collections or repayments for the period}}{\text{Volume of loans or installments due in period}}$$

Another commonly used index is the percentage of the portfolio which is in arrears, obtained as follows:

$$100. \frac{\text{Total arrears at end of period}}{\text{Total loan portfolio at end of period}}$$

This may be misleading, as a varying proportion of the loan portfolio may represent new lending on which repayments were not due. A slightly more complicated index is suggested. It is a repayment index, R_t , derived as follows:

$$R_t = 100 \frac{(1 - \Sigma A_t)}{\Sigma A_{\max}}$$

where ΣA_t is the cumulative total of balances in arrears (net of any pre-paid balances) over the life of the loan or portfolio study horizon t extending from period 1 to period n , and $\Sigma A_{\max}$ is the cumulative total of balances in arrears which would have accumulated if no loan repayments were made. An Index number of 0 indicates total default, while 100 shows repayment exactly on time, or an overall performance consistent with timely repayment behavior.

In the range of monitoring indicators, the measurement of outputs have yet to be considered, (as well as the assessment of beneficiary reaction.) Output measurement and its corollaries are considered, for convenience, in Part 4.4 below. Assessment of beneficiary reaction, other than adoption and usage rates introduced above, cannot be summarized into simple indicators. Studies involving in-depth interviews with selected beneficiaries may reveal considerable insights into the attitudes and reactions likely to affect the project, but the interviews and the interpretation of the results require probing and analytical skills that are more individual in nature. Such studies are particularly necessary when the simple indices indicate that something is wrong. Problem identification is an important monitoring objective (see Parts 2, 5, and 6).

4.4 Indicators for Evaluation

The design of evaluation systems has been discussed in Parts 1 and 3. The emphasis on direct survey methods and the likely necessity of viewing the analysis as an examination of a time-series of the data have been noted. Within this context, and bearing in mind the criteria discussed earlier in this Part, what indicators can be recommended for inclusion in the evaluation system?

For introducing the presentation in sequence, the range of indicators may be classified into three groups:

- a. output indicators, including disposal of output;
- b. economic indicators; and
- c. quality of life indicators.

Output Indicators

In most agriculture and rural development projects, outputs are expressed in terms of production; whether crops, livestock, forest products, fish, etc. Where manufactured outputs are involved, the indicators need individual identification and lie outside the scope of this Handbook.

In general, quantification of production may be through direct measurement or the producer's stated estimate. If the producer keeps records, the problem is, of course, solved, but for projects addressed by this Handbook, that is rarely the case.

If direct measurement is adopted, the following common categories of production can be identified;

- a. seasonal crops—areas and yields per unit area;
- b. tree crops (including forestry)—numbers of trees and yield per tree (or area and yield per unit area);
- c. animals—live numbers, and off-take numbers; and
- d. animal products (including fish)—volumes, weights.

The indicators, therefore, are well defined; numbers, areas, yields, volumes, and weights. It is the measurement of these indicators that presents the problem. Livestock numbers by type, age and sex are feasible only if the herds are available for inspection; volumes and weights of daily or weekly milk yields or fish catches are very demanding in terms of repeat visits to the chosen units; areas and yield measurements require

careful timing and take considerable time and expertise to execute.

The rule with such direct measurement of indicators must be that the time and resource that are required can be justified only if high accuracy is both needed and achieved. Unfortunately, this level of achievement can be guaranteed only if the survey is on a small scale, commensurate with the, probably limited, availability of skilled and experienced personnel necessary to make the measurements.

Frequent visits to take direct measurements make it practicable to collect other data that also require closely grouped multiple visits, such as input costs; e.g., labor inputs to achieve the outputs.

The conclusion, therefore, with respect to detailed observations and measurements is in line with the recommendation in Part 5 and elsewhere, namely, that studies incorporating such measurements are best suited to indepth case study surveys rather than large-scale sample surveys: the experience with farm management studies, for example, bears this out.

The estimation of crop production deserves special mention. A well-documented and popular method is to conduct a crop-cut of a small portion of a known area of the plot in order to estimate the average yield per hectare for the crop. The problems that arise even with the objective method are described in Section 8.2. The alternative to direct measurements of production is to obtain estimates from the producer. A decision to do this requires positive answers to all the following questions:

- a. Did the respondent ever know the answer?
- b. If so, can he recall it at the time of the interview?
- c. Is he able to report it in standard units?
- d. Will he be willing to report it correctly?

If the land has never been measured, it is useless to ask for the area. If the cows are milked by a herdsboy and consumed by the family, the respondent may have little idea of milk yields. Virtually, no one has even an approximate idea of the weight of firewood gathered by the family for domestic use.

Even if the answer was once known, the respondent may not be able to recall it accurately. The memory error is likely to be related to

the length of the recall period and the definition of the reference period. These issues are discussed in Part 8.

The respondent may report in terms of local units of measure; if so, conversion factors must be calculated to standardize the results in kilos or litres.

For this method to succeed, the respondent must be willing to recall the required figure and to report it accurately to the best of his ability. He must, therefore, be informed of the purpose of the enquiry and his good will established.

In many cases, concerning production, farmers can, if the interview is well-timed and the questions appropriately phrased, give estimates that—within certain rounded limits—reflect reasonably accurately the true value of the output. The use of farmers' estimates as an indicator should not be overlooked. There is a tendency to assume that such estimates will be so biased as to be valueless, but there is some evidence from the Philippines and elsewhere that farmers estimates are sufficiently accurate for monitoring purposes.

To record, for example, that farmers' estimates of yields are below those obtained from crop-cuts, and conclude that the farmers' estimates are wrong is not necessarily correct. A difference of 15-20 percent may be explained by different harvesting techniques and biases in the crop-cutting method.

The decision on these alternatives can only be made on the spot, perhaps following a pilot study. But a preliminary general recommendation is:

In micro, multipurpose case studies use objective measurements of outputs to the extent possible; in large-scale sample surveys, farmers' estimates may serve as a proxy for the objective record.

Indicators of disposal of output present similar alternative choices; postfacto reporting or measurement at the time of disposal.

Gross volumes passing through the market channels as estimated at certain points in these channels are a measure of total sales, but they often cannot be analyzed according to source.

Moreover, estimates of household consumption of home production and informal disposals by way of gifts or exchanges require multivisit household budget surveys. In the project evaluation context, such surveys can usually only be justified on a case-study basis from which general patterns of disposal may emerge.

If a cash crop, e.g., cotton, is marketed almost exclusively through a single official agency, the records of that agency or its local depots may be the source of indicators of quantities sold, even down to the farm level.

Economic Indicators

The postulated economic benefits of a project are usually expressed in income terms; so income is the obvious choice as the indicator to measure; and popular practice confirms this. However, as indicated earlier, in the case of small farmers, the accurate definition and measurement of income is difficult; in fact it has rarely been satisfactorily accomplished.

Data on income from a cash crop may be possible to obtain, particularly if it is marketed through a limited number of traders or agencies whose records provide a check on farmers' responses. Prices of crops or other agricultural produce can be collected regularly at selected markets or buying centers and together with estimates of production can be used to provide independent estimates of cash receipts. In aggregate terms for a zone or stratum, such estimates of total income may be satisfactory for evaluating the economic benefit of particular crops or products.

If total farm or household incomes need to be measured, the difficulties become extreme. There are the definitional problems outlined earlier and response problems. Income generation is erratic, linked to sporadic marketing; the income of each household member is difficult to obtain from a single respondent; and informal activities, such as beer brewing or small-scale trading that produce income are notoriously difficult to cover in an income survey. Moreover, income is a particularly sensitive area of enquiry to most respondents in any environment; objective responses cannot usually be easily elicited.

The measurement of expenditure does not present some of these definitional and response problems. The experience of many budget surveys is that expenditure is recorded more accurately and completely

than income; to the extent that in many reports containing cross-tabulations of one variable against income classes, expenditure classes are used as a proxy for these income groupings. Expenditure can be fairly accurately recorded if the recall and reference periods are appropriate. For casual daily expenditures, the recall period may need to be no longer than two to three days. Items such as rent, services, school fees, etc. may need a reference period of one month; and irregular major expenditures on household or farm items may be reported on an annual basis. Problems of prestige expenditure in an attempt to impress have to be considered—this is taken up in Part 8.

There may not be an exact equivalence between expenditure and income in absolute terms, but in many population groups, changes in expenditure reflect, fairly accurately, changes in income. Can expenditure then be used as a proxy for income in evaluating change?

The reason why the answer to this is only a qualified 'yes', is that expenditure surveys may require multiple visits throughout an extended time period in order to accurately assess total expenditure over that period. The maintenance of such a survey on an almost continuous basis is not something to be undertaken lightly. Given that major expenditures can be recollected over a fairly extended reference period, the problem is the frequency of visits required to estimate average daily minor expenditures. One possibility is to conduct a one-to-two week survey (with several visits within the period), repeated at certain selected times in the year (reflecting, say, pre-harvest, post-harvest and other major seasonal highlights), and to average the daily expenditures recorded in each of these phases of the survey.

The use of expenditure in this way needs to be carefully tested in each situation, but may well provide an easier method and a more accurate indicator of income change than an indifferent record of actual income.

When survey resources are very limited, total major expenditure on housing, household furniture and equipment, and simple transport and recreational items such as bicycles or radios, may serve as at least a rough proxy for income change. Even changes in the inventories of consumer durables in households—data which can be obtained by question and observation in a relatively simple fashion—can be illuminating.

Qualify of Life Indicators

Indicators of output and benefits, though difficult to define and measure, refer to identifiable and tangible phenomena. The choice of indicators of quality of life is even more difficult because the very concept is vague.

Aspects commonly agreed to affect quality of life include, food consumption, health, education, shelter, access to essential amenities, and life expectancy. They are not, of course, independent of each other:

Food consumption in terms of individual or household food *intake* is an even more demanding survey topic than income, and has been as rarely successfully accomplished, except in microlevel detailed dietary studies. Domestic food production and food purchases through expenditure surveys may be the nearest proxies that can be measured.

Accurate assessment of health requires physical and clinical examination by qualified personnel, which is usually practicable only on a small scale. Nutritional status merits consideration as a proxy composite indicator for health and food consumption.

An accurate determination of nutritional status may be no easier than assessing the level of health; this is particularly true of adults. However, the measurement of age, height and weight of young children enables a set of three indicators to be calculated (weight for height, weight for age and height for age), which taken together and assessed against the now widely accepted standards, is a good yardstick of the general nutritional status of the child population. In effect, such anthropometric indicators are proxies for the nutritional status of the child population and these, in turn, are used as proxies for reflecting the general levels of health and food consumption of the population under study. The great advantages of anthropometric indicators lie in the ease of collection of the necessary data on large samples and their reasonable sensitivity to change in the underlying variables of interest. Clearly, they do not mirror the population's specific health problems, but as indicators in the set of quality of life measures can be strongly recommended for more general evaluation purposes.

One rider needs to be added. Accurate age determination of young children may be difficult; although evidence is mounting that in many countries this is becoming less of a problem, demographers still detect biases in age reporting in many instances. If age is recorded inaccurately,

the ratios of height or weight for a given age will be biased. Where such a problem exists, weight for height may be the most useful indicator of the three suggested.

Education is easier to define and measure. Literacy and years of schooling are measures of individual attainment, and percentage enrollment of schoolage children in primary education may be a suitable community-level indicator. Literary and educational level of adults, however, measure the past and are unlikely to change within a short period. Their use as project evaluation indicators is, therefore, limited. Age-specific enrollment rates for children is of much greater usefulness.

Shelter can be assessed by measures of quality of housing; e.g., number of persons per room, and type of construction. It is, however, slow to change and is somewhat culturally specific. Expenditure on maintenance, improvements, and contents may be more useful.

Access to amenities and type of amenities are useful social/health indicators, but again are slow to change, unless the project includes a component to directly affect their availability.

Life expectancy—an indicator whose accurate calculation requires very large samples (assuming that vital registration is not universal)—is more likely to be feasible at the national level, through population census and very large-scale surveys, than at the project-specific level. Moreover, in most developing countries, the calculation of life expectancy relies upon sets of 'model' life tables and the use of stable population models. As a project-specific indicator, it cannot be recommended.

Infant and child mortality may be feasible indicators if the full population in the project area is enumerated and a household register maintained. Otherwise, these too require such large samples as to be impractical.

Attempts have been made to assemble various combinations of quality of life indicators into one single composite indicator: one such suggestion is to combine life expectancy, infant mortality, and years of education. There are serious difficulties in interpreting the results of such a composite which implies equal weighting of indicators with no conceptual framework for doing so. Moreover, the lack of independence between the indicators confounds the position further; patterns of mortality exist covering the whole span of life, and these patterns underlie the models used to derive life expectancies in many developing countries.

If quality of life measures are required in a rural development project, the following is suggested as a reasonable list:

- Child nutritional status (anthropometric measurements);
- School enrollment by age;
- Expenditure on shelter improvements and contents;
- Distance or time to potable water; and
- Use of clinic.

These are tentative recommendations and need to be reviewed to suit local circumstances.

4.5 Background or Classifying Information

In the sections above, the prime focus has been on identifying a number of practical indicators of direct interest for monitoring and evaluation. For the use of such indicators to be meaningful, it is necessary, in almost every case, to classify them against explanatory variables. These, also, have to be measured. Thus, in a rural community, the survey, whatever its main objective, will include a questionnaires on the general socioeconomic condition of the respondent. Likely topics include:

- a. geographical location and community characteristics;
- b. household composition and demographic characteristics;
- c. farm size and type; and
- d. main economic activities or occupation.

Indicators of these topics are not without their definitional and measurement difficulties. There are almost as many definitions of a household as there are household surveys; the definition of employment is one that has defied many students of the rural scene; and measuring age still causes problems in many communities.

Some of these issues re referred to elsewhere in this Handbook and most are dealt with in detail in manuals and handbooks issued by the UN Statistical Office and other specialised agencies and institutions. The point to be made here is that, although important, the collection of the background information is secondary to the collection of the monitoring and evaluation indicators; the survey must not be designed according to the dictates of the former at the expense of optimising the collection of the latter. There have been cases where the major part of the enumerator training period was devoted to the problems of defining and collec-

ting data which were not of major importance in meeting the prime objectives of the survey.

Above all, the tendency to include everything that *may* be of interest in cross-classifying the main indicators must be avoided. It is this tendency that leads to monstrous book-length questionnaires, and results in poor quality of data collection for the important indicators. One result of such an unfortunate design is a report that is heavy on cross-classifications of the background variables against each other, but light on tables of the indicators that led to the survey. The extreme result is that processing delays become so acute that *no* report is published.

Of course, in many cases, certain of the explanatory variables may be of crucial importance in understanding what is happening to the beneficiary population. Family labour constraints, for example, may be the critical factor influencing the population against adopting recommended procedures. In such cases, the inclusion of such a variable may well come within the purview of the monitoring and evaluation systems.

PART 5:

SOURCES OF DATA FOR MONITORING AND EVALUATION

5.1 Existing Data and Data Collection Agencies

The initial identification of data sources and assessment of data availability by those responsible for monitoring and evaluation of the project will be greatly influenced by the results obtained during the project appraisal stage. This appraisal depended on the collection, examination and testing of the whole range of available data. It will have identified the more reliable series; and indicated, by the use made of them, how to make the most of less reliable information, and of ad hoc material. Frequently it will have found deficiencies of coverage which were not possible to remedy during appraisal, and which the monitoring and evaluation will now have to fill or compensate for. If the appraisal's identification of these gaps led to an official data collection effort to cover them, the initial monitoring and evaluation effort may be geared to establishing contacts with the agency concerned and 'following through' on any further review of these data.

For the appraisal of a project, existing data supplemented by the necessary degree of estimation, extrapolation and even intuition, are used to assess the current position and project expected results. Project monitoring and evaluation commences by reviewing the existing data against a different set of objectives. To what extent can existing data series be used for deriving indicators relevant for project monitoring? Does the body of preproject data provide an adequate baseline for a time-series for eventual project evaluation? If so, will the existing machinery for updating these data be sufficient to generate the required time-series? Can the available data series be disaggregated to the project-specific area with sufficient accuracy? And are the concepts and definitions used in the past consistent with those applicable to project requirements?

To the extent that the answers to these questions are in the affirmative, the necessary arrangements must be made to maintain the relevant data series or to collaborate with the responsible agency in this task. New data series and survey activity must also be identified.

Contacts, both formal and informal, with key local and central officials involved in statistical development are required. Some of these contacts will be easy to establish through the project team. For example, in an agricultural project, links with relevant officials in the Department of Agriculture should be possible, both through daily contact with the staff of the Department and through the coordinating mechanisms built into the project management structure. Getting to know centrally based statistical agencies and the individuals in key positions will require a special effort.

Sources of data in any country are numerous and diverse. Much may be unpublished, since many enquiries are never fully analyzed, or written up. The material will be of widely varying quality and assessing the quality is as difficult a job as finding the data.

The following is a list of institutions which commonly exist and are likely sources of information. Actual titles and the relative importance of the bodies for data purposes will, of course, vary from country to country.

(a) National Statistical Office

This may be responsible for census and certain national series, acting in other areas mainly as a coordinating body, leaving detailed data

collection to statistical groups in other ministries. It may, however, be responsible for carrying out all major statistical activities; if so, this clearly simplifies the task of keeping abreast of new series and developments, and close contact must be established. The national accounts section will normally have a detailed overall view of data sources and their relative reliability.

(b) Ministry of Finance, Economic Planning Ministries, and the Central Bank

These are sometimes responsible for the calculation of national accounts. They will certainly include economists who use the available data and who are therefore in a position to indicate the sources and provide some continuing assessment of data quality.

(c) Production Ministries

These will often carry out data collection themselves. Licensing and marketing information may be centralized. For certain commodities, detailed information may be available in the Marketing Boards which may be independent or quasi-independent of the Ministry concerned.

(d) Service Ministries

If social and quality of life measures are relevant to the project, the data sources and experience of ministries such as those of Health and Education should be drawn upon. Project quality of life measures may need to be beneficiary or household specific, but school and clinical records of the area, together with data from specific social surveys may be useful in more general ways.

(e) Official Research Institutes

Although research data may not be directly applicable to project beneficiaries, they provide a check or target against which project-specific data can be assessed, and are useful preliminary data for rapid assessment enquires (see Part 6).

(f) Other Institutions

These include universities and their attached research institutes, international institutions, trade associations, and private market research

companies. In particular, universities and development institutes are major sources of indepth, microlevel data and are, potentially, major collaborators with the project in certain specific studies.

(g) Output from Monitoring and Evaluation of Previous Bank Projects

Experiences in collecting and using data in other projects, even those operating in similar environments in the same country, are frequently overlooked, due to poor dissemination of the findings. Such experiences are not only of potential use as a source of background data, but may help in identifying indicators that proved to be both possible to collect accurately and of relevance in monitoring and assessing project progress. Too commonly, the same problems are encountered, and the same errors committed by each monitoring and evaluation unit in turn.

5.2 Use of and Compatibility with Nonproject Data

It is appropriate at this point to reiterate the potential, of a national survey programme as a 'primitive' control group (see Part 3).

Rural surveys, even though designed with different objectives, may reflect general production and socioeconomic levels. Health and education data, if they exist, provide a general picture of the prevailing situation. Project-specific data can often be thrown in sharper relief by using these other broader data files as a 'backdrop' for comparative purposes. The relevant agencies may even be willing to expand or modify their survey design and content to improve the potential use of the data for such comparison or control purposes.

In one area in particular, serious efforts at coordination are indicated; namely, the standardization of concepts and definitions. Many potential comparative analyses between data sets are impossible because the underlying concepts and definitions differ. It is common practice for such fundamental definitions as household and holding (farm) to differ from one survey to the next even within the same survey organisation.

In the monitoring and evaluation context, careful attention should be paid at the initial planning stages to adopting, wherever possible, such standard concepts and definitions as may have been developed. Departure from such standards is often due not so much to different objectives, but ignorance that such standards exist. Comparative analyses of evaluation data with other non-project data sets will be easier if the following definitions, in particular, are common:

- . Household composition;
- . Migration;
- . Holding (farm);
 - parcel
 - plot (field);
- . Treatment of crop mixtures;
- . Occupation;
- . Employment (particularly informal and part-time family); and
- . Units of measurement.

The collaboration between national agencies and project monitoring and evaluation units should not be seen as merely a one-way process. As stated in Part 1, the available monitoring and evaluation resources within a number of projects in a country, add up to a very significant part of the total statistical resource of the country. Although the design of monitoring and evaluation surveys must be geared to servicing specific project needs, these needs will often be similar to those of national planners.

Identification of these common interests by both parties, i.e., project and national authorities, will be mutually beneficial. Indeed, such an identification process often serves to both broaden and focus project management's perception of its own needs.

5.3 Sources of Project-Specific Data

The contribution made by nonproject data notwithstanding, the main sources of data for monitoring and evaluation will be project specific. These may be listed as:

- a. administrative records;
- b. rapid observation;
- c. case studies;
- d. sample surveys; and
- e. census results for the project area.

These will be considered in detail in other sections, particularly Parts 6 and 7. They are briefly described here to show the linkages between the different sources and the monitoring and evaluation system.

(a) Administrative Records

In one sense, administrative records, if they include certain information on *every* beneficiary of a project, may be regarded as a census; i.e., a complete listing of the population under reference. But in practical usage there is a distinction.

Much of the information required for measuring project progress will already be included in existing project files. Examples are financial accounts, construction and service records, credit applications and disbursements, marketed production figures, school enrollment, and clinic attendance records. No survey should be commissioned without first investigating whether the required data are available from such project records. One project evaluation unit undertook direct beneficiary interview surveys to obtain information, most of which was available, more accurately, in the individual beneficiary files maintained by the extension and credit agencies.

The use of administrative records requires a system for their rapid collation and summarization in order to turn voluminous files into succinct, decision-oriented information. Often, it is this system, rather than the data, that is lacking.

(b) Rapid Observation

This comprises the technique used when making a quick tour of an area in order to obtain a general picture of the situation prevailing. It involves recording what is observed along the itinerary of the tour, what is obtained through discussion, both with persons encountered casually and with those specially selected (either purposively or by random procedures). It can be an exploratory visit, or one on which a special report is required (perhaps an emergency), or one of a regular series. It may provide general information about an area of interest, or be very concentrated, providing data for trouble shooting in a crisis. An agricultural officer, for example, will periodically tour his district and write regular situation reports (or informally accumulate his impressions, sometimes without written reports). The methods of observation which, of course, have been used since the earliest administrations, have recently been called quick and dirty methods; but, although they are quick, they do not have to be dirty in the sense of providing unreliable information.

(c) Case Studies

The term 'case study' may be used in different ways. It is frequently used to describe a report of one particular case, event or project which is presented as a valuable item for study, as a guide or example, as with a medical case history. In this Handbook the term is used to describe a long and detailed field study of relatively few households or persons, which examines in depth their lives and behavior, or some selected aspect of them. Common types of case studies include community (or village) studies, trace studies, and detailed activity studies (for example, farm management studies). They may be exploratory studies, research oriented, using experimental or quasi-experimental designs to provide evidence in support of large development projects. Obviously, in such cases, the monitoring and evaluation of the resulting project needs to include the original case studies in its 'data bank.' During a project, case studies are useful in finding out what has gone wrong if a project hits a major snag. More generally, case studies provide one of the ways in which the unfolding of causal mechanisms can be studied, as discussed in Part 3. In many instances, plausible causal inferences will be possible only if more general survey data are supplemented by a case study, examining in detail the project impact on a small number of beneficiaries.

The case study is usually carried out by a single professional investigator (or small team), perhaps with a few assistants. The number involved is small, but of high calibre. They must also be dedicated, for the investigation may involve a long period 'in the field.'

(d) Sample Surveys

Samples (either purposive or probability) are very adaptable. They may be for descriptive or analytical purposes; or more frequently for a mixture of both. They can range from a quick study involving one topic in one area, requiring just a single visit for a short interview, to a project-wide multi-purpose study involving multivisits spread over a long period. Since the number of respondents is greater than in case studies, it is easier to achieve representativeness of the population, and thus to generalize from sample to population. On the other hand, the survey is less suitable than a case study in examining intentions and attitudes and the way these work through to behavior and actions.

(e) Census Data

A national census is justified mainly on the grounds that the data to be collected from each individual is required at a very low level of aggregation; i.e. for very small administrative subareas of a country. It follows that if a census file exists it should be possible to obtain tabulations that are specific to the project area—or a very close approximation to it. This is a specific instance where collaborative arrangements with the main statistical agency in a country can result in access to such special tabulations. However, a census is infrequent (commonly decennial) due to the massive administrative undertaking involved, and the range of questions it can cover is limited. If available, census results, disaggregated to the project level, provide a starting point for almost every conceivable social and economic study using quantitative data. The census also provides the frame for many sample selection schemes.

Census of particular subsets of the population such as businesses or large farms may also be relevant in the project-specific context. If the most recent census was taken several years prior to the project, the continuing validity of the data needs to be reviewed. Moreover, assessment of the quality of census data is required. If a technical assessment is not already available, the monitoring and evaluation team will have to carry out its own if it has to make crucial use of census results.

5.4 Case Studies or Sample Surveys?

As already indicated, and as reiterated in Section 5.5 below, the appropriate answer to the question in this heading may well be 'both'; plus use of the other sources described above. Nevertheless, for particular data collection enquiries, the issue often facing the survey designer is whether to recommend a microlevel, in-depth study or a larger scale sample survey that allows more numerous inferential possibilities. In extreme cases the choice may be clear. Detailed, multivisit observations involving interrelationships between the whole complex of farming practices are difficult (and expensive) to control on large samples; conversely, adoption rates measured on the basis of very few observations may not reflect overall adoption rates of the target population. For in many cases the choice is not a clear one. Obviously, availability of sources is a major factor, but there are technical grounds on which the decisions may also rest; the following classification may serve to illustrate these. The criteria shown are the scale of the enquiry in terms of the phenomena to be investigated and the geographical coverage desired; the type

of interview to be used; the method of observation and measurement required to collect the rate of interest; and the frequency with which the collection has to be made. In each of these, three classifications are shown; somewhat arbitrarily chosen, to represent points in what may be a more subtly changing distribution. For example, questionnaires may contain both open-ended and closed questions; a complex measurement in one environment may be simple in another; and so on. But the typology offered provides some clues in the choice between case studies and sample surveys.

CRITERION	CLASSIFICATION		
	A	B	C
1. Scale of enquiry	Phenomenon of interest rare and clustered.	Village or community level. Specific site or institution.	Phenomenon of interest widely distributed throughout area.
2. Interview type	Free-ranging; unstructured.	Open-ended questions; attitudinal studies.	Close and/or structured questionnaire.
3. Observations and measurements	Technical, requiring professional skill.	Accurate and detailed.	Simple counts and measures.
4. Frequency	Continuous or very frequent.	Multi-visit over year.	Single visit.

Enquiries involving any classification including one or more (A) types should be based on case studies. Rare phenomena, free-ranging interviews, professional examinations, and continuous observation—none of these are well-suited to large sample surveys due to the demanding nature of the enquiry in terms of identification of appropriate respondents, and time and skill required of the investigators.

Enquiries involving classifications including (1B) together with (2B) are also best suited to case studies. Indeed, almost any combination involving (2B) would indicate a case study as the first option, for enquiries involving any appreciable number of open-ended and attitudinal questions are not easily controlled if large numbers of enumerators are involved—differential enumerator/respondent biases become potentially very serious.

The sample survey is well suited for classifications of type (1C) with (2C) together with combinations of (3B) or 3(C) and 4(B) or 4(C). If 3(B) is included the measurements need to be taken with great care and accuracy, and the field teams require especially careful training if a sample survey is to succeed. Multi-visit sample surveys, (4B) are feasible but expensive to operate. A sample survey may also be appropriate for classifications of type (1B) with (2C).

The classic sociological case study may be described as:

Type (1B) X (2A) X (4A)

A farm management study may often be:

Type (2C) X (3B) X (4B)

This combination may be suited for a sample survey (see above), although the need for accurate and detailed measurements together with multi-visits make it a difficult and expensive operation. But, frequently, farm management studies veer towards type (2B) x (3B) x (4A). This combination is more suitable for a case study approach.

A study of a particular health problem may be:

Type (1A) X (2B) X (3A) X (4C)

This demands a case study approach. But note that a nutrition survey involving anthropometric measurement of children may be:

Type (1C) X (2C) X (3C) X (4C)

and lends itself to a sample survey approach.

Enquiries requiring the identification of particular types of respondents at a particular location, e.g., market trader interviews, are of Type (1B). If Type (2A), i.e., free ranging, unstructured interviews are involve. (see Part 6), the enquiry is best handled on a case study basis. However, a regular but simple price collection is of:

Type (1B) X (2C) X (3C) X (4B)

and this can be operated on a sample survey basis.

5.5 Combining Methods of Enquiry

The characteristics of the main data sources and the strengths and weaknesses of each have been described so as to indicate the issues to which they are separately relevant. In this context it is natural to 'set' one possible choice against another as in the section above. But this Part would be misleading if it did not finally stress that the main task in designing monitoring and evaluation systems is to *combine* the different methods in a total programme that will use resources most effectively.

For monitoring, this combination will often be a mix of:

- a. analysis of administrative records;
- b. rapid assessment;
- c. sample surveys of adoption rates and
- d. problem-oriented case studies.

For evaluation, which has the monitoring data to underpin its efforts, the mix will frequently be of:

- a. causality-oriented case studies; and
- b. sample surveys over time.

The case study based on a professionally conducted intensive investigation will provide the kind of insight that cannot possibly be replicated on a sample survey scale of operations. These insights will identify key relationships and constraints and will generate hypotheses, thus focusing the range of enquiry more narrowly and suggesting indicators that *can* be collected by a sample survey. This combination of the results of case studies and of a sample surveys will provide powerful evidence for assessing the plausibility of statements about the project impact and the manner in which it operated.

For example, a case study may show that only farmers with family labor equivalent of at least a wife and two children can cope with the essential tasks during some part of a proposed new cropping system. A sample survey can then establish the proportion of farmers with the required labor resources. It can thus be plausibly argued that the new cropping pattern is viable in areas where "x" percent of farmers display such characteristics.

Similarly, a case study may reveal the failure of a parastatal marketing organization to offer the guaranteed price for a food crop to small farmers, who are, therefore, dependent on the price offered by local traders. If this price falls below "y" units per bag, the farmer will be disinclined to produce a surplus for sale. A sample survey can monitor the price farmers are receiving. From these two enquiries the likelihood of farmers increasing their production can be plausibly derived.

These examples also illustrate staffing issues. A change of statistician during the sample survey should not make much difference (given general competence). The case study is, however, much more dependent on the experience of the chief investigator, and an attempt to substitute here may well result in a need to make a fresh start.

DIRECT OBSERVATIONAL METHODS

6.1 Direct Observation

The collection of data through rapid assessment (or reconnaissance) methods, and by case studies are jointly described as "Direct Observational Methods," since the responsibility for the whole work of designing, observing, analyzing, and presenting the results is concentrated in one person or in a small team. This is one of the key features that distinguish these methods from the sample survey; another, already emphasized earlier, is that the logical basis for formal probability inference is lacking.

This concentration of the whole process of data collection and analysis in one person, or in a small team working closely together through the enquiry, is a source of great strength, as has been described in Part 5. The bringing together of diverse strands of experience and information and the balancing of different kinds of evidence within a common intellectual focus, can lead to insights, the generation of hypotheses, and the formulation of problems with a range of potential solutions in an economical and effective fashion. Its success is, of course, heavily dependent on the qualities of the investigators, and the way these qualities match the subject of the enquiry.

The economic, social and cultural features of rural communities vary widely across the world; may indeed be very different within the boundaries of one nation. It is, therefore, dangerous to state that they have certain common features. There are, however, two characteristics of rural communities, reported so frequently and widely in rural studies, that they form a common background to be taken into account when planning direct observational studies.

First, there is usually a hierarchical structure in a village. The hierarchies will be based on different characteristics in different places, but will generally give positions of local power to the better-off farmers. Therefore, the views of those at the top will be more accessible and evident. Their contributions to, and domination of, discussions may produce the impression that there are generally held views on topics, problems and choices. Such unanimity may, however, not exist in fact. The differences will be difficult to uncover, since the poorer people, the

landless, the women, or others may be unwilling to reveal their views readily in a group discussion in the presence of members of the 'elite.' Even in private individual discussions it might not be in their own interest to disclose opposition to village leaders, or indicate a different order of priorities.

Second, many villagers have an insider/outsider scale, ranging from close identification with their near kin living in the same community, through their kin in other settlements, neighbors in general, and then on to others who are 'outside' (ranging from local extension workers through to more senior officials who are less frequently seen).

Villagers will be naturally cautious in talking frankly to those they class as outsiders. Sometimes they say what they think the outsiders want to hear; or they may reproduce what they regard as the 'official' view, in the hope of receiving favors or special treatment from the enquirers or from their official connections. There may be intra-community or intercommunity conflicts which lead respondents to portray a view to gain support for, or approval of, their own side.

This is not to say that reliable information cannot be collected by outsiders on even their first visits to farmers or a village. There are, however, three important implications of this situation that affect the organization of monitoring and evaluation.

The first is the substantial improvements in quality of data and insights into situations that result from *continuity of good staff*. As observers make repeated visits they begin to lose 'outsider' status, they become aware of the villagers' deeper attitudes, intentions, aspirations, and priorities. They begin to grasp those implicit features of rural community life which are often crucial to the success or failure of the project.

The second implication is the need to adjust the time scale of the collection process to the kind of information required. The physical framework of an irrigation scheme may be readily observed. The ramification of the organizational system by which the water reaches a farmer's field in particular amounts at particular times will take longer to identify; and probing for causes of failure to provide community labor to clear silted channels will be a still more complicated task. A study of a project in rural Afghanistan notes that "the complexities of the water distribution system, water rights, negotiations between users at the head and foot of irrigation canals, could not be captured by survey

technique (sic) . . . information on the potential for change . . . was generated through informal interviews, combined with in-depth discussions with knowledgeable local officials." In particular, case study methods adapting anthropological techniques will be needed to seek causal relations between input and effects; and to look for constraints affecting farmer behavior. Such enquiries need not take the very long time period common in classic anthropological studies. There is growing evidence to show that valuable 'applied' results can be obtained in shorter periods. Nevertheless, any agricultural enquiry may take more than a year to study those aspects (and they will be numerous), which require close observation of the sequence of operations over a complete farming cycle.

The third implication is that a conscious effort must be made to establish the points of view of the less vocal groups in rural communities. Thus women may be particularly concerned about water supply and fuel sources, and be in a much better position to judge needs in these areas, and present alternatives to male dominated strategies.

In Part 8, the way memory problems of respondents determine suitable recall periods in survey design is discussed. There is another aspect to the memory problem, namely, the manner in which the recall ability of the investigators determines procedures when using direct observational techniques. The rule is that information must be recorded at the earliest possible moment. Some information can be recorded as it is collected, for example, the result of an investigator's observation of physical aspects—the conditions of the roads, or of the crops in fields alongside the road. Sometimes it may be possible to record a discussion as it is taking place (similar to the way enumerators operate in a normal sample survey). However, obvious record taking is often undesirable in direct observational situation; it interferes with the development of informal relationships between investigator and respondent, which is one of the chief assets of this method.

The results of discussions must be recorded as soon after as possible, at least on the same day. There are three main reasons for this. The first is the obvious one of simple memory failure; compounded by the more than usual mass of information presented to the enquiring mind in the free-ranging observational situation. The second is the selective and structuring role of memory; items that do not fit in with an evolving mental perception of a situation are more likely to be forgotten, ignored, or distorted. If they are recorded at the time, they cannot be so conveni-

ently disposed of. The third reason is the need to get into regular habits; if unrecorded observations accumulate excessively, recording becomes so burdensome that it does not get done.

6.2 Rapid Assessment: Observation and Enquiry

The role of rapid assessment as a source of data for monitoring a project was introduced in Part 5. Even though this is the most informal of the approaches to data collection, a certain amount of planning will be well rewarded in ensuring that the data, although obtained quickly, are of reasonable accuracy.

An observer's efficiency is determined by natural characteristics (sharp eyes, a good ear), experience, and prior knowledge of the relevant topics. Natural capabilities can be improved by practice in recording the results of observation. Classroom-type exercises may improve performance to some extent, but experience in the field is the best way (particularly if it is under guidance) and can only be obtained by 'doing' the job, not just reading about it. The rest of this section is, therefore, devoted to a discussion of the required knowledge of the topics concerned.

Investigators must start out with a clear idea of the topics they are supposed to be covering. A check list must be prepared beforehand of the physical features they want to identify and the questions they wish to discuss. Any such list should be regarded as open-ended, because not every eventuality can be foreseen. Preparing such a list, however, concentrates the mind; a study of the first draft may identify other related matters which did not come to mind at first.

The ground to be covered can often be best organized by using a simple framework of the following eight questions:

- . Who?
- . Where?
- . When?
- . What?
- . How?
- . For how long?
- . How much?
- . Why?

The questions may be simple: for example, "When was the last delivery of fertilizer to the distribution point?"; "What kind was it?"; "How much of it?"; They may be more wide ranging: "What factors

prevent farmers from planting early, as recommended?"

Clearly, knowledge of the local language is an advantage. At least some knowledge of agriculture and livestock (an ability to recognize individual crops and a knowledge of cropping practices and the crop calendar) is required. Investigators lacking this, and making their first trips, should visit a nearby experimental station; or obtain help from the local representatives of the relevant departments before going out. Display of total ignorance will not encourage farmers to take enquiries seriously, and will not lead to any useful records of the state of crops in the ground. Similarly, it should be possible to obtain beforehand order of magnitude figures for the production of major items (e.g., milk yield per cow).

Knowledge of the average rainfall pattern (a main determining factor of the crop calendar), and of recent levels of rainfall is required. Recent maps of the area should be studied and taken on the trip; or a self-drawn map prepared. Any previous delimitation of statistical strata or of ecological zones should be entered on this map. Information about local units of measure must be obtained, and a standard basket or locally used container carried. Information about local marketing channels is required, and the places and times of the main regular markets identified and marked on the map.

The timing of visits needs consideration. The time of day will affect who will be found in a village and who on the farm: the day of week will determine whether marketing operations can be observed; and the month will determine the farming activities in progress. Often, respondents can only be approached effectively very early or late in the day. Traders often arrive at markets very early, around sunrise. Farmers may only talk in a relaxed fashion late in the day, when their labors are completed.

Follow-up visits require less preparation, but background information must be corrected and amplified, and the checklist revised in the light of experience and expanded as new topics come under review.

Everyone develops an individual system of effective record-keeping, but some rules are basis to the exercise.

- a. Record times and places of observation and discussion, and certain identifying features, for example, status or occupation of infor-

ments. If possible, maintain observation made on a journey on a separate travel log. Times, distances, and names of places can be recorded sequentially with the appropriate record of observations and events alongside. If standard numerical information at a number of sites is to be collected (for example, prices of selected goods at all markets visited), a previously prepared pro-forma will save time and provide a first structuring of results.

- b. Journal entries should follow a standard pattern designed to cover the checklist topics with a final, open-ended section. A regular pattern eases the burden of the work, and helps to ensure that nothing is overlooked.
- c. Develop a system of abbreviations for frequently used words. Records of actual words spoken are indicated by inverted commas ' . . . '. Separate out the observer's own comments and queries requiring further investigations—for example, by enclosing them in square brackets [. . .].
- d. Photograph key features, as long as this does not give offense. Annotate prints with dates, places and circumstances. A series of photographs over time are particularly useful. If promises to supply copy prints to respondents are made, ensure the promises are kept.
- e. A pocket calculator is generally useful.
- f. It *may* be possible to record discussions; but this may not be desirable since—as with writing notes during a discussion—free expression of opinion may be hindered. A tape recorder can, however, be used for keeping the daily journal entries when under pressure.

NOTE: Cameras, calculators and tape recorders must not be so much in evidence that they distract respondents and create the impression of the observer as a 'tourist'.

Field trips depend a great deal on logistic support. It is, however, notoriously difficult to obtain. Very few trips actually start at the time planned; a delay of a few hours at the start can result in a seriously curtailed programme, or result in several extra days in the field.

Interview procedures are discussed in Part 8. One aspect is emphasized here; namely, the need to adopt an informal approach, free from

traces of arrogance or of 'knowing best'. The presumption should be that if the farmers are following certain practices, there are good grounds for them. Local failure to follow project recommendations may be due to constraints which have not been appreciated by the project designers, such as lack of requisite resources, or failure to deliver support of the quality and quantity promised, at the time agreed. Thus, individual farmers may well not plant early if the date is in the period when village livestock are allowed to roam freely: if fertilizer was delivered late one year, there will be doubt that it will turn up at the right time in the succeeding year.

Poor farmers also attach a high notional cost to new arrangements, since the risk element always appears to be, and often actually is, high. There may be elements in current practice which are no longer required or justified, but 'traditional' is not synonymous with 'outmoded', and although a procedure is described in this way there may well be good underlying reasons for its continuance. Indeed, recently adopted practices, if successful and widespread, are often quickly labelled traditional: for example, contour cultivation in a hilly area in Africa was freely described as 'traditional' within a few years of its introduction. Food preferences are deeply embedded and are unlikely to change rapidly, particularly if pressure for change appears to be imposed from outside.

Experience shows that valuable information can be obtained if the investigator shows an evident willingness to listen to the farmer's opinion and tries to understand his position (see Section 8.4).

Locally resident government officers can be of great assistance, particularly those in agriculture and community development. It is always desirable, and usually necessary, to give them advance information of trips to be made in their area. One reservation about information obtained from them should be mentioned. These departments will usually have a departmental 'point of view' to which their officials may subscribe, or which they think they have to be seen to support. They may tailor the expression of their views accordingly. Departments will, of course, also have specific activities under way, such as encouragement of new techniques; local officers, whose career success depends upon the adoption of these techniques (perhaps specified in target terms), are not necessarily unbiased reporters of what is actually happening. This issue is, of course, merely one aspect of a general difficulty that confronts all monitoring and evaluation work.

- b. wide variations in responses or achievements in different areas or sectors; and
- c. general, widespread underperformance or other evidence suggesting possible failure to structure project actions to beneficiary needs.

One common feature is the need to postulate and explore causal relationships. Regular project monitoring may identify the problem and will often provide the background for generating relevant hypotheses, but these need to be tested with more in-depth, accurately observed data sets.

Moreover, as already discussed in Parts 3 and 5, case studies will be relied on in many projects to supply the underpinning rational structure for judging the *plausibility* of competing causal arguments even if rigorous testing of their validity is not possible. Properly conducted case studies can bring into focus a whole range of project and related non-project activities within a single behavioral framework and take account of system interactions.

The PIDER review referred to earlier states, "Such a study (which is multisectoral, but restricted to a rather limited area) should attempt to capture the synergistic effect of several project components on the life, economy, structure, institutions and organization of individual communities."⁵

It can proceed in a flexible—often speculative—fashion, and still produce final results within an acceptable time span. As emphasized before, it will be most effective when it is supplemented by other techniques.

As the success of a case study depends almost entirely on the main investigator (s), the person(s) selected must be allowed considerable freedom to carry out the enquiry in the way they think best. Appropriate persons may be found from the project staff in the central evaluation unit (if there is one), from local academic or research institutions, or from consultants. It may be necessary to appoint two joint investigators since often the resources of both natural and social sciences (for example, an agronomist and an agricultural economist) have to be drawn upon. In some cultures it may be necessary to have investigators of both sexes. "... the need for an interdisciplinary approach is better recog-

5. Ibid., p. 49.

nized; an approach in which the sociologist/anthropologist works jointly with the economist and the agricultural researcher . . . appears . . . the most effective approach to understanding and affecting the . . . farming system . . . "6

The production of timely reports must be stressed from the beginning. Frequently, those most experienced and able in this type of study, once embarked upon it, find themselves drawn into unexpected avenues of enquiry, and pursue further refinements at the expense of meeting deadlines. Extending the period of fieldwork delays analysis directly (by inducing more complicated procedures). The final report may be a better document in the academic or research sense, but it is of little practical value since the time for making use of the study's findings is long past. Although the investigator must be allowed the freedom already mentioned, the progress of any case study in relation to other deadlines must be closely monitored.

In the past, one of the features of the case study type of enquiry has been its open-ended timing: admittedly, some interesting results would not have been obtained otherwise. It will, therefore, be a matter of fine judgement how far—if at all—any requested extension of the study period can be allowed. On balance, extensions should only be made in very special cases: it is too easy to suggest potentially interesting further relationships to pursue; and investigators may, as a result of their training, have an unconscious bias towards wishing to relate everything to everything!

When commissioning a case study, a brief is needed for the investigator. Such a brief must specify the topic, timing, scale and subjects of the enquiry. Required precision in some spheres must be combined with flexibility in others, since one of the reasons for using the case study technique is its exploratory function.

The specification of the topic will be relatively straightforward when the requirement is primarily descriptive, e.g. the provision of information about particular market channels, or an investigation into farmers' attitudes to some proposed or newly introduced facility. When the project is experiencing dislocations or wide response variations, the brief (even if focusing on the particular dislocation or variation) will need to be more open-ended, more of an outline of problems than a

statement of specific information requirements. Project monitoring may have provided provisional hypotheses or explanations which will provide the starting point. In the final stages of evaluation, especially the detection of unintended effects, the brief must indicate particular areas of concern, and the general type of results expected.

In an irrigation project, for example, yields, which rose with the initial use of the water, levelled off at unexpectedly low figures. To explain the reasons for this failure to fully exploit the resources made available, a case study was initiated specifying as the topic the constraints experienced by the farmers as a result of the new circumstances brought about by the project.

The *period* allowed for the study must, as already stressed, conform to project needs. Generally, the more complex the issues, the more time will be necessary to investigate them. A search for interactions in the system, often in great detail, may be required. For example, planting dates for maize may be limited by planting dates for beans which may, in turn, be determined by the incidence of disease. There may be unappreciated interrelations between crop varieties and livestock. For example, in a maize to feed animals, became a key factor in the assessment of returns to farmers. The whole system has, therefore, to pass under review. In instances of this kind, the actual *timing* of the enquiry as well as the period needs careful arrangement within the project framework.

Features of behavior representing risk reduction strategies are difficult to elucidate. Further, project failures may be due to inefficiency or illegality. It takes time to understand farmers' decisions and to uncover concealment or subterfuge.

The case study will need to delve into past events, and also observe behavior at the time it occurs. Labor inputs into the various stages of crop cultivation provides a good example: the frequency, extent, and time required for such tasks as land preparation, crop planting, weeding, treatment with fertilizer and pesticides, harvesting and post-harvest activities may need to be observed (or at least recalled over a very short time-span) throughout the agricultural season. This ability to observe behavior over time—one of the strengths of the case study—must be used with discretion. Such extended observation by skilled observers is an expensive operation and must be justified by the primary users' demand for detailed analysis. Too often the impetus for such studies comes from

researchers who are not primarily concerned with the problems of the specific project. Evaluation case studies are not financed for research purposes.

The *scale or geographical dispersion* of the case study will also affect the length of time required (unless parallel independent enquiries are being mounted simultaneously). Scale may not be an issue in projects with a limited impact area, but in more extensive projects it is necessary to identify those factors which categorize project beneficiaries into suitable separate study groups. The case study units are then chosen from the groups. This selection should not be confused with stratified or clustered sampling (see Part 7). The aim is not to produce valid estimates for the population at large but rather to ensure that the case study includes examples that exhibit the main phenomena of interest. It is a typical or nonmodal groups that are likely to require particular attention. Some groups may not need to be studied. Randomness may not enter the selection process at all.

One essential is to identify and group in a meaningful fashion the *subjects*, so that what they do and how they arrive at the decision to do it can be studied and compared. The subjects for most agriculture and rural development purposes will be the farmers. Two qualifications should be made, however. First, although the farmer may make decisions at one level, other members of the family may decide operations at a lower level: for example, many cultivation practices are determined by women working on the family plot. The fundamental unit may be the household; "the family household is at one and the same time a unit of production and a unit of consumption . . . The sociology of this type of unit is intricately interwoven into its economy."⁷ Secondly, when the household is split temporarily by migration of some of its members, the unit of decision making begins to break down. The investigation then becomes, perforce, more complicated. Where these aspects are important, the recommendations made here about methods for grouping farmers will need to be modified appropriately.

Factors affecting farmers' decisions may be grouped as follows:

- a. *General: outside immediate individual control or variation*
 - i. climatic level/variability
 - ii. pest/disease susceptibility
 - iii. community social/cultural

7. Ibid, p. 53.

- iv. marketing/credit facilities
- v. government policy

b. *Specific: individual variation or under farmer control*

- i. resources: family and labor/land livestock capital
- ii. individual attitudinal goals and response to change.

Clearly, classification by the general characteristics is the more straightforward. Much will be achieved by geographical divisions, although even an area with a homogenous climatic regime may still need substantial sub-division. For example, closeness to towns affects markets and opportunities for migration. Pastoral groups will generally need categories of their own. Often a classification based on general characteristics will be all that can be specified in briefs prepared for case studies in the early stages of the project, since no information about individual variations or characteristics will be available. Later, project records should provide a means of specific groupings; for example, adopters and nonadopters, those showing satisfactory gains and those with disappointing results.

Occasionally, community, social, or cultural factors may be very important, especially when the whole or most of the community must adopt the change for it to work. The maintenance of an irrigation system, dependent on community agreement over the disposal of water and the provision of local labor to keep it working, is an illustration. In instances such as this the community itself will be the focus of the enquiry.

The specific factors may be examined more fully by the characteristics in the following checklists:

a. *Resources*

- i. *Family and Labor:* size/age/responsiveness to farmers' directions/availability through year/other employment/labor hired
- ii. *Land:* size/fertility/position (slope)/access to water/access to market/cropping pattern and timetable
- iii. *Livestock:* type/size/meat/milk/capital
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- i. Age, education, and past experience
- ii. Position in community
- iii. Sensitivity to risk
- iv. Influenced by educated or migrant sons or daughters.

Many of these variables listed will not be known before the study is undertaken, but will be included in the study as potential explanatory causes of response variation. Such individual information as is available, however, may be used, even at the planning stage, to provide further subgrouping.

The more groups that are formed, the greater the homogeneity within each group. But the complexity of organization of the study increases for which there has to be some tradeoff. The crucial point is that the variability *between* groups in relation to the topic under investigation should be substantially greater than the variation *within* the groups.

It should be noted that once the specific factors are brought into account, group boundaries will seldom be geographical; farmers in the same local community may be in different groups. However, in order to get the depth of insight promised by case study methods, the investigations must be limited to a few sites, and to a small number of farmers.

The case study should not be an isolated enquiry; the topic and the selection of relevant groups are guided by the place of individual studies within the total monitoring and evaluation effort. Its planning takes place against the background of the monitoring series, and its detailed setting-out is sharpened by special, preliminary, rapid observation surveys. Its findings are interpreted alongside any sample surveys planned jointly with the case studies. With sample surveys running in parallel the point made earlier is strengthened; namely, that the case study will not necessarily be looking at the 'average'. Greater insights may sometimes be expected from a study of the extremes—for example, those for whom the project has worked well and those who have rejected it entirely.

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Before going to the Unit—13 make sure that you can answer the following questions:

1. What is meant by monitoring of a project?
2. How does monitoring help arrange a project?
3. What are the conceptual issues and basic objectives of evaluation?
4. What is the scope of monitoring in management of development projects?
5. What is the role of experimentation in project evaluation?
6. What criteria would you suggest for monitoring and evaluation of education projects?
7. What are the nature and sources of data required for project monitoring and evaluation?

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After studying this unit you will be able to:

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2. collect and use appropriate data for project monitoring and evaluation,
3. explain monitoring and evaluation of projects,
4. develop useful guidelines for monitoring and evaluation of projects.

OBJECTIVES

PART — 7: SAMPLING AND SAMPLE SURVEY DESIGN FOR MONITORING AND EVALUATION

- 7.1 The Basic Logic of Sampling
- 7.2 The Choice of Unit and the Sampling Frame
- 7.3 Choice of Sampling Procedure
- 7.4 Required Sample Size and Survey Precision
- 7.5 Components of Survey Error
- 7.6 Useful Sample Design Features
- 7.7 Conclusions

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- 8.1 Constraints in Interview and Measurement
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- 8.3 Interviewing: The Recall and Reference Periods
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- 9.9 Cautionary Comments About Correlation and Regression Analysis

PART -- 10: DATA PRESENTATION

- 10.1 From Data to Information
- 10.2 Presentation of Information
- 10.3 Reporting

SELF-ASSESSMENT QUESTIONS

PART 7:
SAMPLING AND SAMPLE
SURVEY DESIGN FOR
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7.1 The Basic Logic of Sampling

If data are collected from every member of a population—a census—no inference is required to relate the results to this population; the only sources of error are those involved in the enumeration and the analysis, such as faulty recording, refusal to respond, errors in responses, omissions (or duplications), and erroneous coding and processing. These are nonsampling errors.

Censuses are usually impractical, except for simple counts of the population by national agencies, so recourse is made to sampling—the collection of data from a few members of the population; but with the intent to make inferences about the population at large. Another error is then introduced, namely, the sampling error, which arises because the sample chosen does not perfectly represent the population; the result obtained from drawing another sample from the same population would be different. But this extra error may be more than offset by a reduction in the nonsampling errors indicated above, due to the higher quality of enumeration that can be achieved by reducing the scale of the enquiry. The sampling error can be estimated from the sample data itself if each member of the population has a known probability of being included in the sample.

The logic of sampling may be expressed by considering a series of samples of certain size drawn from a population, with the intent of calculating the mean of a certain attribute of the population. Some of the samples will result in a mean below the mean of the total population, others will result in a mean that is higher and some will produce a result very close to the population mean. The important theorem is that the distribution of these sample means, if the samples are of reasonable size, will be close to that of a normal curve, which itself has a mean equal to that of the population mean. Because of this, the likely margin by which a given sample mean differs from the population mean can be calculated and is (with some reservations to be mentioned later) inversely proportional to the square root of the sample size.

For these results to apply, the principle of randomization must be introduced into the selection process. The population to be sampled may be grouped into various categories with different selection probabilities for each group; but, when this and other refinements of the design have been applied, the selection of one or more units from a group must be made at random. It is this essential element of randomization that distinguishes probability sampling, which allows inferences to be made with precise levels of confidence, from other forms of sampling, which, although useful in certain contexts, cannot provide proper estimates of sample error.

It follows, therefore, that in order to assign each member of the population a known probability of selection in a sampling process, the population must be fully defined—a frame i.e., a complete listing of its constituent units is required.

7.2 The Choice of Unit and the Sampling Frame

The selection of the ultimate sample unit is an important early design decision. Possible units include

- a. an individual person;
- b. a household;
- c. a cooperative or operational group;
- d. a village or social group;
- e. a plot;
- f. a holding (farm);
- g. a mapped area;
- h. a place where a specific activity occurs; and
- i. an area administered as a single entity.

Individuals as sample units are appropriate in demographic and certain attitudinal surveys; they are less appropriate in surveys dealing with economic and quality of life measures, where the economic or social unit is more relevant. Moreover, individuals are difficult units to list and keep track of, compared to households or farms. Surveys aimed at studying a specific activity may use as the sample unit the locations where this activity takes place, e.g., a market or clinic.

The selected unit must be precisely defined, otherwise, at the frame preparation, listing, and sample unit identification stages, ambiguities will arise, with different interpretations being made by different members of the survey force. As stated in Part 4, there are nearly as many

definitions of a household as there are household surveys. A review of the concepts and definitions in local use should be made with a view to adopting the standard definition—if it exists. The paramount requirements are that the definition must be unambiguous and also acceptable as rational by both enumerator and respondent. It is little use having a clear definition if it is seen as contradicting actual local custom.

Area sampling is particularly appropriate in rural areas where a map of the overall area may be the only frame available; this can be regarded as a set of small areas which can be sampled. However, the small areas must also be carefully defined and accurately mapped; unidentifiable boundaries on maps have been, and continue to be, one of the most serious sources of bias in sample selection.

If the population to be surveyed is a particular subset of the general population, such as project beneficiaries, administrative records listing this sub-set may exist. Such a frame should, however, be checked for:

- a. errors of recording;
- b. omissions; and
- c. duplications.

Usually a complete list of the units in the population does not exist; a sampling frame has then to be constructed in stages, giving rise to multi-stage sampling (see Section 7.6 below). Lists of administrative areas (too large to be considered as ultimate sample units), can be used to draw a primary sample of these areas. A further listing exercise is then undertaken to construct a frame of the required second-stage sample units *within the selected primary units*. If necessary, a third or fourth stage can be introduced with the frame being constructed at each stage only within the units selected at the previous stage.

These decisions on the choice of sample unit and the frame to be used for selection of the units are often hastily made, in order to commence the survey quickly. Biases are introduced, in consequence, that wreck the chance of achieving the objectives of the survey, no matter what the sample size and the care taken in data collection. In countries without cadastral mapping, samples of small areas using census enumeration maps have commonly been found (later) to produce estimates that are subject to biases in the 15–25% range.

The resources to be spent in constructing a frame from which to draw the sample depends, to some extent, on whether it is to be used for

an ad hoc survey covering a single topic, or for a series of surveys over time, covering many topics. In the latter case, considerable effort is justified, whereas for the former there is a limit beyond which further resources to effect minor improvements in the frame are not justified.

7.3 Choice of Sampling Procedure

Some of the information required for monitoring and evaluation (particularly monitoring) may not require the use of sampling procedures. Records of inputs supplied, the beneficiaries of these inputs, construction work, and the like may be complete and readily summarized. Even when such complete records exist, if they are large in number and stored other than on computer fields, sampling may be useful as a means of facilitating the regular (perhaps weekly), reporting of progress to project management:

To collect data on many of the indicators listed in Part 4, sampling will be necessary. A case study may be regarded as a type of sample; but as described in earlier Parts, the detailed microlevel investigation of a particular phenomenon may dictate that the cases are deliberately selected to reflect the phenomenon of interest. Any attempt to introduce a random selection in order to achieve sampling respectability may weaken what should be the strength of the case study—the detailed examination of carefully selected representative units. There are other sampling procedures, which, although failing to meet the strict randomization requirements, may nevertheless produce insights about the population at much less cost in time and resource than that required for random sampling. The following definitions identify the range of procedures:

A random (or probability) sample is the selection of a number of elements from a statistical population in such a way that every member of the population has a known probability of selection.

A simple random sample is one where every element of the population has an equal probability of selection. Other designs that preserve the principle of randomization are discussed in Section 7.6 below. The precision of these other sampling designs is judged against a simple random as the standard, but this does not mean it is the most efficient sample to adopt.

A purposive sample is the selection of a number of elements of the population by a person exercising deliberate choice in an attempt to achieve a sample that represents the population.

The intent to make numeric inferences about the population at large is still there (unlike the case study), but the selection is made on subjective grounds in order to minimize the costs of sample element identification or to maximize the convenience of the enumerator. It is hoped that the sample is representative enough for the purpose in hand, but this will not be known with any measurable degree of precision: the probability of bias is there, but its size is unknown.

A quota sample is the selection of a number of elements of the population in such a way that a given number of them fall within each of a defined set of subgroups of the population, but where the choice of the actual elements included in the sample for each subgroup is left to the discretion of the enumerator.

The sample designer using purposive or quota procedures claims to be aware of the range of elements that make up the population and is attempting to cover them. This is a major improvement on the cruder rapid assessment techniques where observation is limited to the observer simply going along a road on his official rounds of visits to predetermined areas. Although these observations are indeed 'purposive' in one sense of the word, elements encountered using such a procedure are unlikely to include all types of interest within the population.

Depending on the circumstances in which monitoring and evaluation units are placed, purposive or quota sampling may be appropriate and acceptable. Consider the following examples:

- a. In an appraisal of an extension to the project area, it is required to assess quickly the range of farming patterns in the area, but no information exists regarding the size of the population and no frame of villages is available.
- b. A hypothesis that, within an existing project area, the reluctance to adopt the project package is associated with the land tenure status of the farmer has to be checked, but no records exist of the numbers by type of tenure.
- c. Yield differentials by size of farm need to be reviewed urgently, the proportions of farms within certain size groups are known from an earlier census, but no list of individual farms by size exists.

Suppose further that the survey has to be launched immediately with no time to establish a sample frame, and that resources are insufficient for

- b. wide variations in responses or achievements in different areas or sectors; and
- c. general, widespread underperformance or other evidence suggesting possible failure to structure project actions to beneficiary needs.

One common feature is the need to postulate and explore causal relationships. Regular project monitoring may identify the problem and will often provide the background for generating relevant hypotheses, but these need to be tested with more in-depth, accurately observed data sets.

Moreover, as already discussed in Parts 3 and 5, case studies will be relied on in many projects to supply the underpinning rational structure for judging the *plausibility* of competing causal arguments even if rigorous testing of their validity is not possible. Properly conducted case studies can bring into focus a whole range of project and related non-project activities within a single behavioral framework and take account of system interactions.

The PIDER review referred to earlier states, "Such a study (which is multisectoral, but restricted to a rather limited area) should attempt to capture the synergistic effect of several project components on the life, economy, structure, institutions and organization of individual communities."⁵

It can proceed in a flexible—often speculative—fashion, and still produce final results within an acceptable time span. As emphasized before, it will be most effective when it is supplemented by other techniques.

As the success of a case study depends almost entirely on the main investigator (s), the person(s) selected must be allowed considerable freedom to carry out the enquiry in the way they think best. Appropriate persons may be found from the project staff in the central evaluation unit (if there is one), from local academic or research institutions, or from consultants. It may be necessary to appoint two joint investigators since often the resources of both natural and social sciences (for example, an agronomist and an agricultural economist) have to be drawn upon. In some cultures it may be necessary to have investigators of both sexes. "... the need for an interdisciplinary approach is better recog-

5. Ibid., p. 49.

nized; an approach in which the sociologist/anthropologist works jointly with the economist and the agricultural researcher . . . appears . . . the most effective approach to understanding and affecting the . . . farming system . . . "6

The production of timely reports must be stressed from the beginning. Frequently, those most experienced and able in this type of study, once embarked upon it, find themselves drawn into unexpected avenues of enquiry, and pursue further refinements at the expense of meeting deadlines. Extending the period of fieldwork delays analysis directly (by inducing more complicated procedures). The final report may be a better document in the academic or research sense, but it is of little practical value since the time for making use of the study's findings is long past. Although the investigator must be allowed the freedom already mentioned, the progress of any case study in relation to other deadlines must be closely monitored.

In the past, one of the features of the case study type of enquiry has been its open-ended timing: admittedly, some interesting results would not have been obtained otherwise. It will, therefore, be a matter of fine judgement how far—if at all—any requested extension of the study period can be allowed. On balance, extensions should only be made in very special cases: it is too easy to suggest potentially interesting further relationships to pursue; and investigators may, as a result of their training, have an unconscious bias towards wishing to relate 'everything to everything!'

When commissioning a case study, a brief is needed for the investigator. Such a brief must specify the *topic*, *timing*, *scale* and *subjects* of the enquiry. Required precision in some spheres must be combined with flexibility in others, since one of the reasons for using the case study technique is its exploratory function.

The specification of the *topic* will be relatively straightforward when the requirement is primarily descriptive, e.g. the provision of information about particular market channels, or an investigation into farmers' attitudes to some proposed or newly introduced facility. When the project is experiencing dislocations or wide response variations, the brief (even if focusing on the particular dislocation or variation) will need to be more open-ended, more of an outline of problems than a

6. Ibid., p. 33.

statement of specific information requirements. Project monitoring may have provided provisional hypotheses or explanations which will provide the starting point. In the final stages of evaluation, especially the detection of unintended effects, the brief must indicate particular areas of concern, and the general type of results expected.

In an irrigation project, for example, yields, which rose with the initial use of the water, levelled off at unexpectedly low figures. To explain the reasons for this failure to fully exploit the resources made available, a case study was initiated specifying as the topic the constraints experienced by the farmers as a result of the new circumstances brought about by the project.

The *period* allowed for the study must, as already stressed, conform to project needs. Generally, the more complex the issues, the more time will be necessary to investigate them. A search for interactions in the system, often in great detail, may be required. For example, planting dates for maize may be limited by planting dates for beans which may, in turn, be determined by the incidence of disease. There may be unappreciated interrelations between crop varieties and livestock. For example, in a maize to feed animals, became a key factor in the assessment of returns to farmers. The whole system has, therefore, to pass under review. In instances of this kind, the actual *timing* of the enquiry as well as the period needs careful arrangement within the project framework.

Features of behavior representing risk reduction strategies are difficult to elucidate. Further, project failures may be due to inefficiency or illegality. It takes time to understand farmers' decisions and to uncover concealment or subterfuge.

The case study will need to delve into past events, and also observe behavior at the time it occurs. Labor inputs into the various stages of crop cultivation provides a good example: the frequency, extent, and time required for such tasks as land preparation, crop planting, weeding, treatment with fertilizer and pesticides, harvesting and post-harvest activities may need to be observed (or at least recalled over a very short time-span) throughout the agricultural season. This ability to observe behavior over time—one of the strengths of the case study—must be used with discretion. Such extended observation by skilled observers is an expensive operation and must be justified by the primary users' demand for detailed analysis. Too often the impetus for such studies comes from

researchers who are not primarily concerned with the problems of the specific project. Evaluation case studies are not financed for research purposes.

The *scale or geographical dispersion* of the case study will also affect the length of time required (unless parallel independent enquiries are being mounted simultaneously). Scale may not be an issue in projects with a limited impact area, but in more extensive projects it is necessary to identify those factors which categorize project beneficiaries into suitable separate study groups. The case study units are then chosen from the groups. This selection should not be confused with stratified or clustered sampling (see Part 7). The aim is not to produce valid estimates for the population at large but rather to ensure that the case study includes examples that exhibit the main phenomena of interest. It is a typical or nonmodal groups that are likely to require particular attention. Some groups may not need to be studied. Randomness may not enter the selection process at all.

One essential is to identify and group in a meaningful fashion the *subjects*, so that what they do and how they arrive at the decision to do it can be studied and compared. The subjects for most agriculture and rural development purposes will be the farmers. Two qualifications should be made, however. First, although the farmer may make decisions at one level, other members of the family may decide operations at a lower level: for example, many cultivation practices are determined by women working on the family plot. The fundamental unit may be the household; "the family household is at one and the same time a unit of production and a unit of consumption . . . The sociology of this type of unit is intricately interwoven into its economy."⁷ Secondly, when the household is split temporarily by migration of some of its members, the unit of decision making begins to break down. The investigation then becomes, perforce, more complicated. Where these aspects are important, the recommendations made here about methods for grouping farmers will need to be modified appropriately.

Factors affecting farmers' decisions may be grouped as follows:

- a. *General: outside immediate individual control or variation*
 - i. climatic level/variability
 - ii. pest/disease susceptibility
 - iii. community social/cultural

7. Ibid, p. 53.

- iv. marketing/credit facilities
- v. government policy

b. *Specific: individual variation or under farmer control*

- i. resources: family and labor/land livestock capital
- ii. individual attitudinal goals and response to change.

Clearly, classification by the general characteristics is the more straightforward. Much will be achieved by geographical divisions, although even an area with a homogeneous climatic regime may still need substantial sub-division. For example, closeness to towns affects markets and opportunities for migration. Pastoral groups will generally need categories of their own. Often a classification based on general characteristics will be all that can be specified in briefs prepared for case studies in the early stages of the project, since no information about individual variations or characteristics will be available. Later, project records should provide a means of specific groupings; for example, adopters and nonadopters, those showing satisfactory gains and those with disappointing results.

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- c. duplications.

Usually a complete set of the units in the population does not exist; a sampling frame has then to be constructed in stages, giving rise to multi-stage sampling (see Section 7.6 below). Lists of administrative areas (too large to be considered as ultimate sample units), can be used to draw a primary sample of these areas. A further listing exercise is then undertaken to construct a frame of the required second-stage sample units *within the selected primary units*. If necessary, a third or fourth stage can be introduced with the frame being constructed at each stage only within the units selected at the previous stage.

These decisions on the choice of sample unit and the frame to be used for selection of the units are often hastily made, in order to commence the survey quickly. Biases are introduced, in consequence, that wreck the chance of achieving the objectives of the survey, no matter what the sample size and the care taken in data collection. In countries without cadastral mapping, samples of small areas using census enumeration maps have commonly been found (later) to produce estimates that are subject to biases in the 15–25% range.

The resources to be spent in constructing a frame from which to draw the sample depends, to some extent, on whether it is to be used for

an ad hoc survey covering a single topic, or for a series of surveys over time, covering many topics. In the latter case, considerable effort is justified, whereas for the former there is a limit beyond which further resources to effect minor improvements in the frame are not justified.

7.3 Choice of Sampling Procedure

Some of the information required for monitoring and evaluation (particularly monitoring) may not require the use of sampling procedures. Records of inputs supplied, the beneficiaries of these inputs, construction work, and the like may be complete and readily summarized. Even when such complete records exist, if they are large in number and stored other than on computer fields, sampling may be useful as a means of facilitating the regular (perhaps weekly), reporting of progress to project management:

To collect data on many of the indicators listed in Part 4, sampling will be necessary. A case study may be regarded as a type of sample; but as described in earlier Parts, the detailed microlevel investigation of a particular phenomenon may dictate that the cases are deliberately selected to reflect the phenomenon of interest. Any attempt to introduce a random selection in order to achieve sampling respectability may weaken what should be the strength of the case study—the detailed examination of carefully selected representative units. There are other sampling procedures, which, although failing to meet the strict randomization requirements, may nevertheless produce insights about the population at much less cost in time and resource than that required for random sampling. The following definitions identify the range of procedures:

A random (or probability) sample is the selection of a number of elements from a statistical population in such a way that every member of the population has a known probability of selection.

A simple random sample is one where every element of the population has an equal probability of selection. Other designs that preserve the principle of randomization are discussed in Section 7.6 below. The precision of these other sampling designs is judged against a simple random as the standard, but this does not mean it is the most efficient sample to adopt.

A purposive sample is the selection of a number of elements of the population by a person exercising deliberate choice in an attempt to achieve a sample that represents the population.

The intent to make numeric inferences about the population at large is still there (unlike the case study), but the selection is made on subjective grounds in order to minimize the costs of sample element identification or to maximize the convenience of the enumerator. It is hoped that the sample is representative enough for the purpose in hand, but this will not be known with any measurable degree of precision: the probability of bias is there, but its size is unknown.

A quota sample is the selection of a number of elements of the population in such a way that a given number of them fall within each of a defined set of subgroups of the population, but where the choice of the actual elements included in the sample for each subgroup is left to the discretion of the enumerator.

The sample designer using purposive or quota procedures claims to be aware of the range of elements that make up the population and is attempting to cover them. This is a major improvement on the cruder rapid assessment techniques where observation is limited to the observer simply going along a road on his official rounds of visits to predetermined areas. Although these observations are indeed 'purposive' in one sense of the word, elements encountered using such a procedure are unlikely to include all types of interest within the population.

Depending on the circumstances in which monitoring and evaluation units are placed, purposive or quota sampling may be appropriate and acceptable. Consider the following examples:

- a. In an appraisal of an extension to the project area, it is required to assess quickly the range of farming patterns in the area, but no information exists regarding the size of the population and no frame of villages is available.
- b. A hypothesis that, within an existing project area, the reluctance to adopt the project package is associated with the land tenure status of the farmer has to be checked, but no records exist of the numbers by type of tenure.
- c. Yield differentials by size of farm need to be reviewed urgently, the proportions of farms within certain size groups are known from an earlier census, but no list of individual farms by size exists.

Suppose further that the survey has to be launched immediately with no time to establish a sample frame, and that resources are insufficient for

the location of randomly selected segments.

For example (a), purposive sampling may be the only feasible solution. A few small areas can be selected, each of which has different climatic or soil conditions; the farming pattern for each selected area is ascertained by interviewing prominent local community contacts. These areas have been selected purposively with the intent to reflect the true range of farming patterns of the entire area; although there is no guarantee that this has been achieved, the result will almost certainly be stronger than would be obtained by interviewing centrally located officials whose claim to local knowledge may be questionable, or by using data from another area, or national estimates that are erroneously assumed to reflect conditions in the area of interest.

For example (b), a type of quota sample is possible. The types of land tenure may be known although the relative prevalence of each is not. The enumerators may be instructed to locate within their area of operations predetermined numbers of each type and to conduct an interview with each farmer. A rule must be established to cover the case where an enumerator cannot easily fill his quota for a particular type. After following some trace procedure (asking local authorities, etc.) he must be allowed to indicate that this particular type is rare or non-existent in his area.

Example (c) allows for more precision in the quota sample selection. Because the relative size of each size-group is known, the quota for each size can be varied accordingly. Note, however, that there is no necessity to fix the quota in strict relation to the proportion of the population in the size-group. A size-group with a relatively small number of farms within it (e.g., farms greater than ten hectares in size), may nevertheless be of particular importance, and be given a quota equal to that of a size-group that contains a larger proportion of the farms. Again, the enumerator will be given the discretion of filling his quotas as best he can within a few general safeguard rules.

In each of these cases, the intention is to collect information from a sample, the results of which are to be taken to represent the population. Means, ranges, ratios, and proportions will be calculated and will be treated as representative of the value for the relevant group. For example (c), even estimates of population totals may be made as the sampling fractions are known. What cannot be done is to calculate the sampling errors of these estimates and thereby to calculate statistical confidence limits for them. With quota sampling, sampling errors are sometimes

calculated on the assumption that the respondents were selected at random without selection bias, but this assumption is not usually justified.

This loss of power in the treatment of the results may not worry the user unduly. The vaguer caveats attached to the results, stressing the unknown size of the biases may be entirely acceptable—indeed, the recipient may be delighted to have at least this level of quantification of the problem. It may be noted that many reports of surveys involving probability samples are silent on the errors of any estimate, aggregated or disaggregated, contained in them. Numbers in individual cells of tables of cross-classified variables are treated as if they were as reliable as the marginal totals. Although such a practice is undesirable, it reflects the lack of demand by many users for such statements of precision, often resulting from unfamiliarity with this way of thinking.

The questions to be answered in choosing a sampling procedure may therefore be listed as follows:

- a. Has the existence of a frame or the possibility of constructing one been examined?
- b. Is other, more aggregate, information about the population and its distribution available and can it be used?
- c. If formal randomization is not possible, what rules and procedures can be adopted for the selection of the final sample units that will at least minimize the dangers of bias?
- d. Which design will serve to spread the sample as widely as possible, given the resources and time available?
- e. If nonrandom methods are indicated, have the users been made aware of the limitations and dangers involved in the inference processes?

The value of reported information concerning a population depends first on the accuracy with which the data are collected in the skills, diligence, and care taken in the survey operations, and secondly, the accuracy with which inferences can be drawn from the data. Both depend on the sample design. One of these requirements should not be neglected at the design stage due to concentration on the other. The skill of the survey design is to achieve the optimum balance using the given limited resources. This is particularly true of surveys in rural areas where the inadequacy of prior knowledge and the difficulties in measuring key variables are not the exception, but the norm.

7.4 Required Sample Size and Survey Precision

The incorrect supposition that the required or desirable sample size is a percentage of the size of the population is still a surprisingly widely-held myth. Often, sample sizes are reported to be one percent, or five percent, of the population, as if this were a necessary statement to give the sample credibility. Or, a sample larger in one project area relative to that in another is justified merely because one area contains a larger population than the other.

It is worth stating at the outset that:

If the total population of the survey area is very large, compared to the sample to be selected, the variance of, and hence the precision of, estimates calculated from the sample data is a function of the absolute number of sample units, not the sampling fraction.

The sample size required is a function of the variability of the characteristic measured, and of the degree of precision required. The variability component can be most conveniently expressed in this calculation in the form of the coefficient of variation (V) equal to the standard deviation of the estimate divided by the estimate (or x/X).

The precision component requires two factors, D and K . D represents the largest acceptable difference between the value estimated from the sample and the true population value. It is also expressed in relative form. K is the measure of the confidence with which it can be stated that the result does lie within the range represented by $\pm D$. The higher the value for K , the greater the degree of confidence. A value of $K = 2$ is often chosen, since it provides a degree of confidence equal to odds of 19 to 1 (that is, a 95% confidence interval, as technical terminology puts it). A value of $K = 1$ gives odds of 2:1.

Suppose that the standard deviation of a yield cut of a certain crop is equal to half the average yield of a cut. Then $V = 0.5$. Suppose also that the user of the information will be satisfied if the sample estimate is within 10 percent of the true population value, that is, $D = 0.1$. Then the required size of sample, n , is calculated as follows.

$$n = \frac{2^2 (.5)^2}{(.1)^2} = \frac{4 \times 25}{.01} = 100$$

What this calculation ensures is that when the average of the sample of 100 yield cuts, $\bar{x}$, and its sampling error (S.E.) are calculated, the result can be expressed in the following way:

odd of 19:1 can justifiably be taken that the true value in the population lies within the range, $\bar{x} \pm 2 \text{ S.E.}$

Further, the range component, 2S.E. , divided by $\bar{x}$ will be approximately equal to the acceptable difference, D , provided the prior estimate of V was reasonably accurate.

The calculation of n therefore requires three inputs about which the project management has to be consulted.

- The variability of the characteristic in the population. The user may have some idea of this from a previous study or 'general' knowledge.
- An indication of the acceptable error margin, D . For some enquiries, this can be relatively large; for others, it may be very small.
- The degree of confidence (odds ratio), with which he desires to be in this range.

The general formula then is:

$$n = \frac{K^2 V^2}{D^2}$$

Note that as K and/or V increase, n increases according to K^2 and/or V^2 . Thus, if one characteristic has a coefficient of variation twice as large as another, n will have to be 4 times as large for the same level of precision. D^2 appears in the denominator. In the above example, D was equal to 0.1, D^2 to 0.01, and dividing by D^2 was equivalent to multiplying by 100. If D is halved to 0.05; D^2 becomes 0.0025, and dividing by D^2 is equivalent to multiplying by 400, that is 4 times the previous hundred. Thus, if D is halved, the sample size has to be 4 times as large. Reducing D by a factor of g requires that the sample size be increased by a factor of g^2 .

As a further example, consider a project that covers a large state containing six zones or districts. Suppose it is desired to measure crop yields on the basis of yield cuts so that the estimate for each zone lies within 8% of the true value with 95% confidence, and the estimate for the state is required to be within 5% of the true value with 95% confidence. It may be assumed that the coefficient of variation of yield within a zone is 0.5, but at the state level it is rather higher, say 0.7.

The the required sample at a zone level is given by:

$$n_z = \frac{2^2 (.5)^2}{(.08)^2} = \frac{1}{.0064} = 160 \text{ approx.}$$

whereas, at the state level:

$$n_s = \frac{2^2 (.7)^2}{(.05)^2} = \frac{4 \times .49}{.0025} = 780 \text{ approx.}$$

If the sample size within each of the 6 zones is 160, the required state level accuracy will be more than achieved.

Yet another example is provided by the need to estimate a proportion, p , of the population displaying a certain characteristic, e.g., the proportion adopting a project input. The sample error of the estimate of p

is approximately equal to $\sqrt{\frac{p(1-p)}{n}}$, p lying in the range 0 to 1. Thus, given a required sampling true error and an assumed value for p , the required sample size can be calculated.

If p is expected to be of the order of 0.5 and the sampling error acceptable is 0.05 then

$$n = \frac{0.5 \times 0.5}{(0.05)^2} = 100$$

Since the numerator of the estimate of the sampling error is $p(1-p)$, the absolute error for $p = 0.95$ is the same as the error estimated for

$p = 0.05$ for the same sample size. The maximum value of the absolute error occurs when $p = 0.5$ and it does not vary much over a range of 0.25 - 0.75 for p . The relative error (or coefficient of variation) is, of course, much higher for the $p = 0.05$ compared to $p = 0.95$ even though the absolute error is the same. It is this relative error that is often of most practical importance.

Several points need to be made about the above sample size examples.

- a. Simple random sampling has been assumed. Further gains in efficiency can be achieved by sample design techniques such as stratification, but loss of efficiency may be involved in other design features such as clustering (see below).
- b. The sample size may be modest for a given estimate, for a given geographical area. But if estimates are required for individual cells of a cross-classification of two or more variables, or are required for subareas within the primary area, the total sample sizes to maintain a given level of precision at these disaggregated levels are greater than those for the primary area. In general, when detailed cross-classifications of any kind are involved, the number of cells in the tables rapidly becomes large, and the entries in them smaller. A rough guide to the sample size required can be calculated as follows, when the entries in the tables are counts.

An approximate estimate of the sampling error of the count appearing in a cell in a table is equal to its square root. Suppose for all groups forming five or more percent of the population, it is desired that their estimate should have a maximum relative sampling error (V , as previously described) of 0.2. Then, if the count of units in the sample in the cell is labelled Y , the requirement is that

$$\frac{\sqrt{Y}}{Y} < 0.2$$

Or, Y must be at least 25. If this group forms 5 percent of the population, it will also form about 5 percent of the sample. The sample size must therefore be:

$$\frac{100}{5} \times 25 = 500.$$

- c. The user specifies a certain required precision in the estimate. In the size calculation set out above, so far the assumption is that the only error involved is the sampling error. This assumption will not hold in practice, and the implications are examined in more detail below (7.5).

Much of the monitoring and evaluation analysis will involve the significance of differences observed at two or more time intervals. Measuring a variable at different time-points raises a number of issues.

- a. How frequently should the measurements be made?
- b. Should the same sample units be retained over time?
- c. Can the past data be used to improve the current estimate?

A full discussion of these issues requires a detailed exposition outside the scope of this Handbook, and only a few general pointers can be offered.

It is probably overambitious to attempt to measure proportionately small changes from one season or one year to the next. Exogeneous factors, such as climate, cause considerable short-term fluctuations that will disguise for some time a project-influenced trend. A time-series comprising a pre-project baseline, a repeat measurement during project implementation, a project completion measurement, and a post-project completion measurement, is the best basis that is likely to be available.

The decision regarding the retention of identical sample units over time depends partly on the practical difficulties of maintaining a constant sample. It also depends on whether the desire is to maximize the accuracy of the later estimate or the accuracy of the estimates of change over time. The optimal procedures for these two objectives differ; but, in most project information systems, the emphasis will be on the second.

If two sets of observations are uncorrelated, the variance of their differences is equal to the sum of the two variances. The same rule applies to a comparison of sample means. If the sets of observations are positively correlated, the sampling error of an estimate of difference is reduced by a factor involving $(1-r)$, where r is the correlation coefficient. The larger the r , the greater the reduction. When measuring change, therefore, it is desirable to choose a procedure which maximises this reduction. This usually results in recommending that the same units be retained, since measurements of the same variable in the same units at various points of time are usually highly correlated.

It may be possible to maintain a high proportion of farmers in a sample over the project period to measure change. But if the survey involves a high frequency of visits to the respondents, the constant interaction between the enumerator and the respondent may change the behaviour of the respondent so that he no longer remains typical of the population that, as a sample unit, he is supposed to represent. Moreover, the question of imposing excessively on the goodwill of an individual over a long and continuous time period must be taken into account. (See Part 3 for further discussion of these points.) For a combination of these reasons, there will normally be a need to rotate or replace the membership of the original sample, although the primary *area* sample units of a multistage sample design should be retained for as long as feasible. This rotation of the sample enables a chain linkage to be established, as the sample for any two consecutive periods will contain a proportion of common units. The impact of new units is, as it were, spread out over the extended time period, reducing the disturbance in the time-related trend line that is the main paratter of importance. As a general rule, a replacement or rotation of about one-quarter to one-third of the sample at each round seems to work reasonably well.

In addition to such a planned rotation there will be an inevitable attrition rate due to death, migration, or a change in household composition leading to the splitting or aggregation of units.

7.5 Components of Survey Error

The statements about the precision of estimates assume that the observed values are accurate—the only error to be considered is the sampling error. Because of this, there is a tendency in reporting survey results to quote error margins (if indeed they are quoted at all) in these terms. However, the measurement of variables such as production or income of semi-subsistence agriculturalists creates serious interviewing and measurement problems as discussed in Part 4.

Even objective measurements such as yield cutting may be subject to substantial errors unless the techniques used are well designed and rigidly controlled. Response errors to questions arise from reluctance to reveal the true answer, in comprehension of the question, ignorance of the answer in quantitative terms, wish to please by giving an answer that is assumed to be favorable, inaccuracies due to faulty memory, and many other factors. Unlike the sampling error, these errors are not random in nature. They usually tend to bias the estimate in one direction and it is singularly fortunate if two components of these errors act in different directions and cancel each other out.

The only prudent course is to expect substantial biases that may well exceed sampling errors.

The effect is summarized by the following equation ⁸

$$\text{Mean Square Error} = \text{Sampling Variance} + \text{Square of the Bias.}$$

When a user sets an error margin for the estimates from a sample, it is the root mean square error (RMSE) that is being thought of. Consideration of the possible relationship between sampling variance, related to the size of the sample, and the size of the bias helps in checking how RMSE may be minimized. Experience in measuring rural indicators has demonstrated that the biases can be controlled if great care is taken in training and supervising the enumerator force. This tight control over quality usually only occurs when the field force is of modest size. A small field force, however, limits the size of the sample that can be enumerated. Increasing the sample size beyond a critical level may mean that control over quality suffers, thus increasing the non-sampling errors. This increase may more than counterbalance the reduction in the sampling error due to the larger sample size. Unfortunately, the biases involved for different sizes of survey organizations cannot easily be foreseen; the optimal balance between sample size and data quality cannot be precisely determined. However, experience suggests some general guidance.

An example in Part 7.4 gave a result that a sample of 780 would give a maximum difference of 5%, implying a sampling error of approximately 2.5%. If each enumerator can interview 20 respondents, an enumerator force of 39, supplemented by approximately 8 supervisors, is required. If this sample was doubled to 1560, the sampling error would be reduced from 2.5% to about 1.8%, but the field force required would rise to 78 and the supervisory force to 16. But if, as is possible, a skilled supervisory force of this number is not available, the resulting loss of control over quality could lead to increases in the biases which could result in an overall increase in the RMSE. Doubling the sample size may,

8. The proof of which can be found in advanced statistical texts, but is not given here.

therefore, result in a less accurate estimate. It should be noted that doubling the sample size does not always require a doubling of the field force. It may be possible to extend the duration of the survey.

Results of crop-cutting in India show that if they are carefully carried out by skilled enumerators, using an adequate size of crop cut, the bias in the resulting estimate can be reduced below 5%. However, badly conducted yield cuts give overestimates of yield in the 10–15% range—sometimes, higher. Suppose that the monitoring and evaluation unit can only field a skilled force sufficient to deal with 200 yield cuts, and that the standard error of this sample is 10% with a bias of 4%, then the RMSE is given by:

$$\begin{aligned}\text{RMSE} &= \sqrt{10^2 + 4^2} \\ &= 10.8\% \text{ approx.}\end{aligned}$$

If the standard error was to be reduced to 5%, the sample size would need to be increased to 800. But, at this level quality control is lost, and the biases rise to, say, 10%. Then,

$$\begin{aligned}\text{RMSE} &= \sqrt{5^2 + 10^2} \\ &= 11.2\% \text{ approx.}\end{aligned}$$

Quadrupling the sample has reduced the accuracy of the estimate.

It is proposed, therefore, that when dealing with variables subject to large response or observational biases, which can only be reduced by in-depth interviews or carefully supervised measurements, the following slogan with regard to sample sizes is appropriate:

Small may be better.

The effect of bias on estimating changes over time is rather different. If the bias is constant over time, the RMSE of the *difference* in two observations at different time periods will be relatively unaffected by it. In such a case, a biased estimate from a large sample, repeated over time, might be more effective in detecting change than an unbiased estimate from a small sample with a larger standard error. However, as discussed in Part 4, the bias may not be constant over time.

7.6 Useful Sample Design Features

So far, the discussion of sampling error has been presented in the context of simple, random sampling. There are other options open to the sample designer, given a frame from which to sample, which adapt the principles. Some of these options improve the precision of estimates for a given sample size; others make the survey operation more practicable, at the cost of increasing the sampling error. Refining the sample design can be taken too far. In the rural development context the frame is likely to be inadequate, the cartographic experience limited, and the enumerators inexperienced. The more complex the design, the more likely it is that large biases will be introduced due to errors in sample identification. Nevertheless, within limits, the following features should be considered:

- a. stratification;
- b. systematic sampling;
- c. multistage and cluster sampling;
- d. self-weighting samples; and
- e. interpenetrating samples.

a. Stratification

Information available for each unit in a frame can be used to allocate the units into groups according to that characteristic, so that each group of units is more homogeneous than the population. If a separate sample is then drawn from each group, the result is a stratified sample, each group forming one stratum. Thus, in the example given in Part 7.4 of six zones within a state, the zones might be treated as strata, from each of which a sample is drawn.

Estimates of averages, total, etc., from the sample are derived from the individual stratum estimates. The variance of the overall estimate is the sum of the individual stratum variances; the variance *between* strata does not contribute to the sampling error. If, therefore, different strata of relatively homogenous units can be formed, the precision of the overall estimate for a given sample size may be substantially improved. Or, alternatively, the same level of precision as that of a simple random sample can be obtained using a smaller sample.

This arises in the following way:

Let x_{ij} be the j^{th} observation in the i^{th} stratum.

$\bar{x}_{ij} =$ the mean of the x_{ij} in the i^{th} stratum.

$\bar{x}_{ij} =$ the mean of x_{ij} over all strata.

The unstratified variance may be seen as a multiple of $\sum \sum (x_{ij} - \bar{x}_{ij})^2$

The stratified variance may be seen as a multiple of $\sum \sum (x_{ij} - \bar{x}_{ij})^2$

Now $\sum \sum (x_{ij} - \bar{x}_{ij})^2 = \sum \sum [(x_{ij} - \bar{x}_{ij}) + (\bar{x}_{ij} - \bar{x}_{ij})]^2$

It can be seen that the expansion shown contains the stratified variance as but one component. The between-strata variance indicated by $(\bar{x}_{ij} - \bar{x}_{ij})^2$ is contained in the unstratified variance but is not included in the stratified variance,

Points to note include

- all strata must be sampled otherwise no overall population estimate can be obtained;
- to calculate a variance there must be at least 2 units within each stratum; and
- little is gained if most strata are reasonably homogeneous, but at least one exhibits very wide variations; the contribution to the variance from the single 'weak link' may be as large as the sum of the others. This is why the open-ended catch-all stratum (see example below) usually requires a much higher sampling fraction.

Effective stratification is the most powerful tool for improving precision. There is very little risk attached to its adoption. Even if the stratification is not as successful in achieving homogeneous strata as was hoped, some benefit will almost certainly accrue. In any case, most stratifications in agriculture and rural development projects are likely to group the population in classes that are useful for study, quite apart from the increase in precision.

Information for stratifying the population should be related to the variables that are to be measured. If the survey is a multisubject one, stratification according to one characteristic may be very desirable for the estimation of certain variables, but may contribute little to improving the estimation of others. The criteria for stratification in such a case will be to improve the estimation of the most important variables.

The commonest stratification is by geographical subdivisions of the project area. It may be expected that, as a matter of course, units in the same geographical area will exhibit some degree of homogeneity.

Administrative records may indicate the recipients of, say, credit, by the amount received. A sample survey into the use of credit would clearly benefit by stratification using this information. Surveys of farms would gain much from stratification by type or size of farm, if,—and unfortunately it is a big if—the frame contains this information. Stratification by soil type is also an attractive possibility, but if this involves grouping subareas across existing administrative boundaries, complications may ensue in controlling the field operations.

It is not necessary to maintain a constant sampling fraction for each stratum. Calculating the optimum sample allocation to strata requires knowledge of the variances within each stratum: these are often not known exactly, but a pattern of relative variances can be assumed according to general information.

Consider the following example of strata formed by farm size:

Table 2: Number of Farms by Farm Size

STRATUM	AREA (Hectares)					
	-1	1 — 3	3 — 5	5 — 10	10 — 50	5 +
No of Farms	5,000	7,000	2,000	700	200	100

Of the 15,000 farms, suppose it is desired to select 600. A fixed 4 percent sample across all strata will give only 8 and 4 selected farms in the two strata containing the largest-size farms. But these strata, particularly the open-ended last one, will exhibit large variations in farm size, production, etc. A more efficient sample may be obtained by selecting 100 from each stratum. This means that the sampling fraction varies from 1/70 in the second stratum, to 1 in the last stratum, i.e., all large farms are included.

This may be an efficient sample design in one way, but the benefits of reduction in error have to be traded off against the greater complication of the calculation of estimates and their variances. The sample

is not self-weighting across strata; i.e., the probabilities of selection are not equal for all units in the population. (See the section on self-weighting samples below.) The optimum allocation of sampling fractions for each stratum depends, of course, on the relative variance within each stratum. Even a pragmatic allocation, such as the example given, may be very beneficial.

The proportions of the population within a number of possible strata may be known, but a frame of individual units with the required information to allocate them to the correct stratum may not be available. Post-stratification, whereby the sample units are allocated to strata after the data have been collected, may be useful. Note that the weights to be given to each stratum need to be known. As long as the sample number in each stratum is a reasonable size (more than 30 is an approximate guide), this procedure will achieve some of the benefits of ordinary stratification.

b. Systematic Sampling

If the population units are contained within a limited area, e.g., farmers below a small dam, all of which is easily accessible at minimal cost, a sample of respondents may be selected directly with no intervening stage. Sampling of administrative records is a particular case of single-stage sampling. If the records are contained in files and any individual record can be easily located, the sample can be selected *systematically* from the fields.

Consider, as an example, the card index of a credit bank containing the names of credit recipients and the amount of credit issued. The review of a sample of recipient records will often be sufficient to monitor the distribution of credit by recipient. Systematic selection adopts the following procedure. If 500 records are to be sampled out of 5,000, a random number between 1 and 10 is chosen to determine the first sample unit. The remaining units are selected by adding 10 to the initial random number.

In the general case.

Calculate $\frac{N}{n}$ where N = total number of records.
 n = number required in sample.

Select a random number r between 1 and n

The sample units are then $r, r + \frac{N}{n}, r + \frac{2N}{n}, \dots, r + \frac{(n-1)N}{n}$.

A systematic sample can be regarded as equivalent to a simple random sample if the records are stored in a sequence that is unrelated to the variable to be measured; e.g., filing in alphabetical order by beneficiary (it is unlikely that the amount of credit is determined by the starting letter of a beneficiary's name). If, however, the file is maintained in a sequence related to the size of credit, systematic sampling will be better than simple random sampling and approach a form of stratified sampling. The main danger of systematic sampling is that the file of records contains a periodicity that is in some way correlated with the sampling interval; in such a case, a systematic sample will be biased. The danger is small in most practical applications, but must be checked.

c. Multistage and Cluster Sampling

Often the only frame available for selecting households or individual beneficiaries is a record of the *number* of these units in each of the project subareas. A two-stage sample will then be appropriate. The first-stage sample unit (primary unit) is the project subarea. Having selected a number of these, a list of the relevant individual units is compiled locally within each of the selected primary units. A second-stage sample of the final sample units is selected from each of these lists.

More stages may be introduced. The primary unit may be a sub-district, the secondary unit an area block within selected subdistricts, the third stage fields within the selected blocks, and the final stage small segments within the selected fields for yield-cutting purposes. However, each extra stage, with local intervention required to identify and list the units in order to proceed to the next stage, increases the risk that something will go away.

The use of geographical areas as primary units is termed cluster sampling. This, together with stratification, is the most common feature of a sample design.

A clustered sample bestows certain benefits — final units have to be listed only in selected clusters and a sample of secondary sample units (e.g., households) within a cluster will be grouped closer together in

terms of physical location than a simple random sample of units from the population. This reduces the cost of identification of the sample units and the travelling of the enumerator moving from one respondent to the next. However, units within a cluster may be similar with regard to characteristics of interest, so that the contribution, in terms of improving the precision of the estimate, of including an extra sample unit within the cluster is much less than that which would be made by an extra unit outside the cluster. Thus a sample of n units made up of a series of m_i units in i clusters is less efficient than a simple sample of n units dispersed randomly in the population. One could, in theory, construct clusters that contain heterogeneous units, but these would not necessarily be single compact geographical areas, thus negating the main reason for adopting this approach.

To consider the cost of cluster sampling in terms of loss of efficiency for a given sample size it is necessary to introduce the concept of intraclass correlation. This measures the extent to which units within a cluster are more alike than units in different clusters. It is defined as:

$$\sigma = \frac{\sigma_b^2 - (\sigma^2 / M)}{(M - 1) (\sigma^2 / M)}$$

where σ_b^2 = variance between clusters

σ^2 = total variance

M = number of units within a cluster.

If M is large an approximation to δ is given by, σ_b^2 / σ^2 that is, the ratio of the between-cluster variance to the total variance.

The relative efficiency of a simple random sample compared to a cluster sample is given by:

$$z = 1 + \delta (\bar{m} - 1)$$

where $\bar{m}$ = the average number of units selected within a cluster.

It is clear from this expression that $\bar{m}$ will need to be kept small if δ is positive and large; otherwise the loss of efficiency becomes serious. For example, if $\delta = 0.1$ and $\bar{m} = 20$

$$z = 2.9$$

i.e., a cluster sample would need to be nearly three times as large as a

simple random sample in order to give the same precision.

The difference between stratification and clustering now becomes clear. With a stratified sample the between-strata variance is excluded from the sampling error calculation,⁹ whereas with clustered samples the between-cluster variance can be a major contributor to the overall variance. Thus with stratification the aim is to maximize the homogeneity within-strata, but with cluster sampling homogeneity within clusters reduces the efficiency of the sample. When a stratified and clustered sample design is chosen, the gains in precision achieved by stratification are, as it were, dissipated by the loss in precision caused by clustering. A reasonable compromise may be to aim for a net result roughly equivalent to that of a simple random sample of the same size.

Section 7.4 demonstrates that the required sample sizes for moderate precision levels need not be very large, however large the project area. The damaging effect of clustering is that, depending on the variable measured, a sample several times larger than those shown in Section 7.4 may be required for the same level of precision.

In advance of the survey, it is unlikely that δ is known. With the safe assumption that for many agricultural variables it will be positive, a rule of thumb is that m should be kept within single figures.

A clustered sample design requires a listing of all units within selected clusters in order to select the second-stage sample units. In the case of an urgent demand for one or two estimates of simple attributes of a target population, e.g., the adoption rate of a given technical innovation for the current season, it may be cost-effective to skip the separate listing stage, and briefly interview all the units in the cluster.

The number of units selected within a cluster is also higher than that indicated above, when an enumerator is stationed inside a cluster and it is wished to provide a full work-load.

In the case of a survey of access to essential amenities, the intraclass correlation may be so high that little is gained from extra interviews above a minimum of 3–6 per cluster. At one extreme there are certain questions that can be asked of a single community leader and the replies will describe the entire cluster, e.g., number of clinics, schools, water-holes, etc. It would be nonsensical to ask these questions of a number of individuals — but this has been known to happen.

9. The proof of this can be found in advanced statistical texts, but is not given here.

A common form of stratified cluster sample in agricultural enquiries is as follows. The region is stratified into rational administrative and agricultural areas. For example, a project area could be divided into major administrative areas, with further subdivisions as necessary according to farming systems. This could give rise to 10–20 strata. For each of these strata a list of delimited clusters must be obtained — these could be census enumerator areas or villages. The lists for each stratum must be complete, and individual clusters must be identifiable.

A sample of these clusters is chosen within each stratum. As already mentioned, the sampling scheme for each stratum can be a simple random scheme with the same sampling fraction across strata, or it can be more complicated. A sample of clusters must, however, be selected from each and every stratum.

Only the selected clusters are included in the sample. They are identified in the field, and the final sampling units selected by one of the methods indicated earlier.

d. Self-Weighting Samples

If every unit in the population has an equal chance of selection in the sample, the sample estimate is rated up to the total population figure by multiplying it by the reciprocal of the sampling fraction. If primary sample units, with unequal numbers of population units within them are selected at the first-stage, this self-weighting constant sampling fraction can be achieved if the probabilities of selection at each stage are chosen with this in mind.

One popular method is to select the primary units with probability proportional to their size (as defined in terms of population units), and then to select the second-stage units from each selected primary unit at a rate proportional to the reciprocal of the size of the primary unit. In this way the probability of selection of each unit is the same, no matter which primary unit it lies in — self-weighting has been achieved.

Thus, simplicity in the processing of the sample data in terms of weighting is retained. If electronic data processing facilities are available, assigning individual weights to groups of sample units will not significantly affect the processing speed; but simplicity should not be forsaken lightly. Self-weighting is particularly useful when detailed further analysis is proposed.

However, there may be practical problems. The allocation of probabilities of selection may turn out to have been based on very inaccurate prior information. Data may not be obtained from all selected sample units, and so 'missing data' techniques have to be introduced at the processing stage. Moreover, there may be other good reasons for varying the sampling fraction (particularly between strata, as discussed earlier).

e. Interpenetrating Samples

If the selected sample units are viewed as two or more independent sub samples and the enumerators individually assigned particular sub-samples, the analysis of error is both simpler and more powerful, allowing for estimates of the component of variability due to inter-enumerator differences. However, the practical implementation of these arrangements creates logistic difficulties. The numbers involved may result in half the sample units in one cluster being in one subsample, and the other half in the other, with different enumerators operating in each half. The administrative convenience and reduced logistic costs that are achieved by a clustered sample with one enumerator assigned to each cluster is sacrificed in order to achieve an appropriate analysis of variance. In the project evaluation context, and in the light of recommendations in this Handbook for trading off the demands of practicality against statistical rigor, such an elegant technique may be queried. If serious enumerator/respondent biases are suspected, however, the possibility of estimating inter-enumerator variability should be considered.

7.7 Conclusions

Sample survey costs are a function of the number of primary and final sample units and the volume of data collected per sample unit. A doubling of a simple random sample will improve the precision by approximately 40 percent; but because the field enumeration and logistics probably account for one-half or more of total survey costs, and because increased volumes of data incur extra processing costs and time, the extra cost may be greater than the value of their gain in precision. Moreover, greater precision due to a larger sample size may be more than offset by an accompanying increase in bias. Thus larger samples costing more money and taking longer to analyze may produce little or no improvement in the overall precision of the estimates.

PART 8:

DATA COLLECTION BY INTERVIEW AND MEASUREMENT

8.1 Constraints in Interview and Measurement

In the preceding parts, various methods of data collection have been introduced, ranging from rapid subjective assessment to large-scale sample surveys. With the exception of the use of administrative records, all these methods involve the taking of counts and measures and/or the interviewing of selected respondents. Choice of the appropriate level of technique is important; measurements can be taken at different levels of accuracy, interviews can be conducted in a variety of ways, ranging from a free-flowing conversation to a more inquisitorial question/answer session. The general principles that should guide the choice are as follows.

- a. The information gathering process should be tailored to the respondents, so that it is acceptable to them and keep demands on them as low as possible, given the scope of the enquiry;
- b. If junior enumerators are to be used, their task must be within their capabilities and designed to minimize the difficulties they may encounter; and
- c. The data should be collected and recorded in such a manner that the subsequent analysis is facilitated.

Reports of sample surveys in developing countries reveal that the response rate to enquiries is very satisfactory; or, to put it another way, refusal to cooperate is rare, particularly in rural areas. This may seem to indicate that point (a) above has been well catered for; this is not necessarily the case. The small farmer in general, and project beneficiaries in particular, do not feel free to send an official packing even if the enquiry is offensive or arouses concern regarding the uses to which the replies will be put. Abuse of this passivity is not only wrong in terms of statistical ethics but also gives a false picture of the accuracy of the resulting, compliantly supplied data. Many of the enquiries in the project monitoring and evaluation context require the wholehearted cooperation of the respondent if the true situation is to be assessed; polite, indiffe-

rent or anxiety-motivated cooperation will not do. Prior notification of the purpose of the enquiry, minimizing the extent of 'sensitive' information covered, and limiting the demands on the respondents' time are major ways of gaining the respondents' full participation.

It is essential, particularly in sample surveys, that the respondents' time, or the access they provide to their property, should be used efficiently: the enumeration must be competently conducted. Too often, enumerators are burdened with a technique or a questionnaire that they cannot use efficiently. In this context, the survey designer must remember that a technique or question that seemed perfectly satisfactory in specially-controlled practice trials, may be more difficult to apply in an uncontrolled 'real-life' situation. The enumerator may not be able to obtain 'privacy' for the interview; the plots to be measured may be scattered over a very wide area; it may not be possible to interrupt wholesalers as they arrive at the market in order to question them on volumes and prices. Attempts to word questions so that they are unambiguous may lead to the use of technical expressions that are unknown to the respondents. The enumerator then has to 'explain' the question, which in practice often means that the respondent is led to an 'expected' answer.

Protecting the sensitivities of the respondent and facilitating the task of the enumerator are paramount considerations, but there is also the need to record the data in a manner that will lead to efficient and cost-effective analysis. Fortunately, the means of meeting this objective are usually compatible with the others. A clear, simple set of 'closed' questions are likely to be more acceptable to the respondent, more efficiently applied by the enumerator, and easier to code and process. A closed question is one where the range of possible answers can be listed, and then usually precoded.

The decision to use direct measurement/observation techniques or interviews depends on the background situation (see part 4). Interviews are of little value when the respondent never knew the required information in quantitative terms, or, having known it once, cannot recall the figure at the time of their interview with sufficient accuracy.

A decision that such measurements are unavoidable has major implications for the scale and content of the resulting survey. They are demanding in skill and time and complicate the phasing of the enquiry. In small-scale enquiries, a whole package of observations and measurements can be included, as the enumerator will be spending considerable

time with each unit of enquiry. The farm management study, with close observation of farming patterns and measurements of crop areas and yields, provides an excellent example.

Where appropriate information at an acceptable level of accuracy is to be collected by interview, the scope is constrained by the attitude of the respondent. If the interview is a long one, or the enquiry involves an excessive number of repeat visits, respondent fatigue and irritation become probable, interviewer efficiency is likely to decline, and there is a consequent loss of data quality.

8.2 Observation and Measurement

Common types of observation and measurement include

- a. instrument recording or readings, e.g., water flow or meteorological data;
- b. land and yield measurement, e.g., farm and plot areas and yield cuts;
- c. physical measurement or examination of individuals, e.g., health or nutritional status indicators,
- d. counts, e.g., of livestock numbers;
- e. direct observation, e.g., time to complete a certain task (period), or house structure/materials (instantaneous), and
- f. direct action, e.g., the actual purchase of market items in order to obtain prices.

Instrument recording where required is usually well-identified and understood.

Farm measurements are demanding in time, but since junior staff can be expected to master the necessary techniques (given adequate training and intensive supervision), they can be used in relatively large-scale investigations. Area measurements have been satisfactorily made using a prismatic compass and one of various means of measuring distances, such as range finders, chains, measuring wheels, etc. The important point to note is that the person taking the measurements should also have the ability and means to calculate the area on-site. A significant error rate on individual measurements is to be expected, and a single error, e.g., in a compass reading, can make nonsense of the result for the particular field. If these errors are only detected later, when the

data is processed at some central location, considerable logistic difficulties ensue in arranging for the work to be redone, in some cases, it cannot be redone at all, as the situation has changed in the interim, e.g., the plot has been harvested. Thus, an on-site plotting of the bearings and the distances on squared paper in order to check that the diagram 'closes' appears imperative. Cheap pocket calculators which can be programmed to screen the data and calculate the resulting areas offers a quicker and more efficient method; the expense of such calculators will usually be more than justified in terms of man-hours saved.

Crop-cutting techniques use a small randomly located portion of the plot harvested by the enumerator. The size of the crop-cut may range from a few square meters to 100 square meters and the shapes commonly adopted are squares, circles, or triangles. Several points reflected in the literature should be noted.

- a. Even if measured accurately, the yields obtained represent biological yields rather than the actual yield obtained by the farmer. When harvesting entire plots, there will be losses that will not be incurred when dealing with small areas carefully harvested by an enumerator.
- b. The bias in crop-cutting, even after allowance is made for (a) above, tends to be towards overestimation of true yields; the size of the bias is approximately inversely proportional to the size of the crop-cut.
- c. Strict adherence to random location of the crop-cut is essential. Even well-trained enumerators tend to avoid bare or sparsely populated parts of the plot, even though the random coordinates result in the choice of such a portion. Such enumerator intervention will result in a serious bias in the overall estimate.
- d. Edge effects and border biases must be controlled. These reflect the tendency to include plants inside the crop-cut that are fractionally outside, and the tendency for the selection of crop-cut locations to under-represent the fringes of the plot (where yields tend to be lower). Once again, the net effect is usually towards over-estimation of true yields. This, in fact, may be the cause of the positive bias reflected in (b) above.
- e. Sampling only one crop-cut per plot or even per farm may be an efficient method of estimating an average yield for a zone or stratum. But the result of a single crop-cut says little about the average yield for that particular plot or farm. If plot or farm level estimates are required for individual farm budget studies, several crop-cuts per plot will be required. Due to the labor intensity of this method,

several cuts per crop per farm make it difficult to operate a large sample of farms.

- f. Crop-cutting works best on evenly and densely planted plots of a single crop (irrigated rice being a prime example). Haphazardly sown plots containing two or more crops do not lend themselves easily to this technique.

The alternative of weighing the entire production should not be overlooked. Such a method may be feasible, especially for cash crops, which are not disposed of immediately or piecemeal. Supporting information for these types of crops may also be obtainable from the marketing agencies.

Physical examination of individuals is clearly a task for suitably qualified professionals or trained paramedical personnel. Data may be available from the records kept by such personnel at clinics, or as a result of case study investigations. An exception, where junior staff can be used, is the recording of anthropometric data (basically age, height, and weight), particularly of children as discussed in Part 4. Once again, the relationship between the level of measurement and the possible scale of the enquiry is clear.

Direct counts, whether of livestock, humans, tools, or sacks of produce, present only one major difficulty, namely, the bringing together of the items to be counted. This difficulty is very substantial, particularly for enquiries involving pastoral communities. The total cooperation of the persons involved is required; what is not revealed cannot be counted, and what cannot be counted at a few sites is unmanageable.

Direct observation of certain practices, particularly labor inputs, makes heavy demands on the time of enumerators. Great care is also needed to prevent the presence of the enumerator causing a change in the practice being observed. The respondent may work harder, spend more, or prepare a better meal (in a dietary survey), because the activity is under observation. A lead-in-time, whereby the observations in the first visits are later discarded, may allow the respondent to settle down to more typical behaviour. This approach to data collection can be recommended only in microlevel studies.

In price collection, the value of direct purchases, as opposed to reported prices, is well documented. The decision, once again, depends on the required accuracy set against the size of possible distortions

present in more casual responses. Price collection in rural markets is relatively simpler than the intractable problems of measuring crop production. But it requires careful definition of variety and quality; regular timing of observations; and due account taken of 'real', as opposed to, 'asking' prices.

One last word may be said on observation. Whatever the mode of enquiry, a keen eye can gather in casual observations impressions that provide an extra dimension to the results, even though these impressions are not quantifiable or suitable for inclusion in a survey questionnaire. One experienced practitioner, visiting beneficiary homes, noticed a high incidence of plastic tablecloths, where formerly there were few. This was a significant indicator of economic progress even though it had not been foreseen as an item to record. In short, subjective assessment by a trained observer may tell a story as important as that revealed by recorded data. In this context, the *absence* of an expected sign may be as revealing as its presence.

8.3 Interviewing. The Recall and Reference Periods

In any interview that has the objective of recording information relating to a specific time point or time period, the issues of recall and reference periods are important.

The recall period is the interval of time that has elapsed between the events that the respondent is asked to report and the moment of the interview. The reference period is the interval of time to which the question relates. Illustrations serve to clarify the distinctions between these two aspects:

- a. Interview in September, 1980 requesting details of planting at the beginning of the current season, say, March — May;

recall period is 4—6 months;

reference period is 3 months;

- b. Interview in December 1980 requesting details of crop sales in the agricultural year, April 1979 — March 1980;

recall period is 9—21 months;

reference period is 12 months;

Often the two periods coincide. For example, a question regarding births in 12 months preceding the interview has a recall and reference period of 12 months.

Detailed, rigid specifications may not be necessary in informal enquiries where the investigators are able to manipulate the framework of the discussion in a flexible fashion. However, a sample survey will require precise rules which must be applied consistently by all enumerators. A detailed discussion of recall and reference period issues is contained in many survey textbooks. A few general pointers are given here.

The reference period should be 'closed', i.e. the start and finish points should be clear, identifiable moments in the respondent's memory.

The difficulty is that what may appear to be a formally closed period may not be so in practice. This is particularly true of the use of calendar dates. A question may be phrased in terms of events in a particular year or month and this has precise starting and ending dates. But the respondent will not necessarily remember the required events that occurred in such calendar data terms. Events may be reported as occurring within the period which, in fact, took place outside it and vice versa. In contrast, a question such as "How many times did you weed between planting and harvesting of the season's crop?" may be 'closed' to the respondent as the weeding is bounded by two identifiable time periods that are linked to the activity itself: weeding cannot occur before planting or after harvesting. Of course, if planting was staggered over an extended time period the reference period becomes 'open'. If the local market operates on a single day in the week, a question concerning activities on the last market day is 'closed', unless there is ambiguity about the market under reference.

Memory 'fade' of most events is proportional to the time that has elapsed since they occurred. The more routine or insignificant the event, the shorter will be the period in which precise identification of it is possible. Major events will be remembered longer, although precise dates may be forgotten. The optimum recall period will, therefore, vary according to the topic under discussion. Expenditure surveys provide a good example. Major but uncommon expenditures (e.g., household equipment purchases) require a long recall period—perhaps one year. Expenditures on routine daily items such as food purchases will require a very short recall period of no more than a few days. Unfortunately,

the shorter the recall period the higher will be the variance of the data (akin to the high variation in the results of crop yields estimated from small subplots). Moreover, the frequency of visits required, if very short recall periods are used, makes the survey expensive to execute. Improvement in the accuracy with which the data are collected by shortening the recall period must be balanced against the cost of doing so. Nevertheless, if the respondent is expected to recall events in detail, the recommendation must be to:

Choose a recall period that experience, or a pilot test, shows to be the maximum that provides a reasonable assurance that the events will be remembered.

A corollary of this may be formulated as:

Do not ask the respondent to recall something that was never known in the terms required.

8.4 The type of Interview

The criteria for selecting enquiry procedures introduced in Part 5 included the type of interview. The following are the key issues:

- a. Should the interview be unstructured and free-ranging or should it be structured and limited?
- b. Should the questions be 'closed' or 'open-ended'. (note that 'closed' here refers to type of question, not to reference periods)?
- c. To what extent and in what circumstances can attitudinal perception and questions be included?

The interview that is conducted in the form of a flexible, but focused, dialogue, without formal questioning or concurrent detailed recording of answers, is a powerful survey tool when it is used by a skilled and professional interviewer closely involved in the enquiry as a whole. The possibilities of this type of interview can best be illustrated by an example; what follows draws on the experience of CIMMYT in planning technologies appropriate to farmers.¹⁰

10. D. Byerlee, M. Collinson et al., *Planning Technologies Appropriate to Farmers — Concepts and Procedures* (Mexico: CIMMYT, 1980).

The use is described of an 'exploratory survey' to gather information through informal interviews in order to understand farming practices and to ascertain farmers' problems. This survey is seen as an aid to designing a follow-up formal survey using a questionnaire to quantify the variables of importance as identified in the exploratory survey. It is also used to collect information that may be too sensitive or complicated to include in a formal survey.

"the interviews should be carried out in the farmer's field in order to relate questions to observations in the field. Interviews should be conducted in a relaxed manner. Use of pencil and paper should be avoided . . . however, the researchers should immediately note down all relevant information after leaving the farmer . . . It is possible to cover only a part of the information listed in our checklist in one interview with a farmer. What information is included will depend on what practices a farmer is following, what problems he is experiencing, and the degree of cooperation encountered. For example, a farmer who is experiencing difficulty in completing the . . . weeding desired (observed in the field visit) might be asked detailed questions about the hired labour market, competing labour demands . . . timing of operations, etc . . . It is useful to ask some general questions about the crop and the farming system and then use the responses to decide what specific areas will be emphasized. It is not necessary to focus the questions on the practices of a specific farmer. In fact, much can be gained — particularly in interviews with traditional leaders — by discussing practices and variations commonly followed by farmers in the area. For these types of questions, interviews with groups of farmers can be particularly valuable in gaining rough estimates of the frequency of use of various practices . . . After each day's work, it is useful for the researchers to evaluate what they have learned, formulate new hypotheses and determine . . . the key gaps and conflicts in their understanding which should be explored in further interviews."

The checklist referred to in the above extract is illustrated in Figure 3 below.

Figure 3: A checklist of Information on Crop Management Practices

Land Preparation

- Sequence of operations
- Timing of each operation in relations to rains
- Equipment used in each operation
- Variation in method with seasonal conditions

Planting

- Variety(ies) used
- Density and spacing
- Density and spacing of interplanted crops
- Time of planting in relation to rains, frosts, etc.
- Spread of planting dates
- Sequence of interplanting crops
- Method of planting (hills, broadcast, etc.)
- Method of covering seed
- Practices of replanting part or whole fields

Thinning

- Timing
- Target density
- Use of thinnings

Weeding

- Number of weedings
- Timing of each in relation to planting
- Equipment used in weeding
- Use of herbicides (type, rate, timing and method of application)
- Use of weeds

Fertilization

- Type of fertilizer(s) including organic
- Rate(s) of application
- Number and timing of application
- Method of application (e.g., broadcast, furrows, etc.)

Pest Control

- Method of control (type, rate, equipment)
- Timing of control

Irrigation

- method of irrigation
- Frequency and timing of irrigation

Harvest

- Timing of harvest in relation to maturity
- Method of harvesting
- Use of leaves and tops for animals
- Timing and method of picking leaves and tops
- Use of stalks

Post-Harvest

- Method of threshing/shelling
- Timing of threshing/shelling
- Method and quantity stored
- Disposal of produce
- Use of crop in local foods

Seed selection

- Time of selection
- Criteria for selection
- Special seed production or storage methods
- Seed treatment

The general approach is well illustrated by this example and the skills required of the interviewers are clearly highlighted. Investigators with these skills can probe attitudes and perceptions, and even explore potential reactions to hypothetical situations. However, great care must be exercised when using such questions for the following reasons:

- a. It is very easy to *lead* the respondent unconsciously to answers perceived as reasonable by the interviewer;
- b. Even if not led in this way, the respondent may assume that certain answers are expected and politeness results in meeting these perceived expectations;
- c. The use of technical or obscure words or phrases may be misunderstood, creating a situation where, either further explanation brings about (a) above, or the respondent is answering a different question to the one asked;
- d. If, to avoid (c), the question is put into what is believed to be simple, local parlance, it may then seem patronizing or, due to misunderstanding of the exact significance of local terms, misleading; and
- e. Questions requiring the respondent to place himself in a hypothetical situation are difficult to answer sensibly even by sophisticated respondents — the response may bear little relation to what will in fact be done, should the hypothetical situation become real.

The 'closed' attitudinal question, giving a list of optional answers of the 'tick one of the following' type, is considered under questionnaire design in Section 8.5 below.

Structured interviews using a questionnaire will, of necessity, cover a more limited range of topics, and is the required option when junior enumerators are employed. Within such a questionnaire, open-ended questions may be included in an attempt to obtain some of the advantages of a free-flowing interview. There are however advantages in using only 'closed' questions since:

- a. A neat questionnaire is easier to achieve (open-ended questions introduce uncertainties regarding the necessary size of the space that should be allowed for the answer).
- b. Precoding ensures that enumerators collect the information relating to the coding; and
- c. If the number of respondents is large, some form of coded data processing will be involved; open-ended answers will, therefore,

need to be 'closed' at the coding stage, so why not earlier by the enumerator?

It is recommended that in a sample survey using junior enumerators, open-ended questions are used only to provide respondents with an opportunity to express their general reactions to the enquiry.

8.5 Questionnaire Design

Sample surveys demand a standardized format for recording the data; and case studies often benefit from this approach, at least for part of the work. The design of the questionnaire is, therefore, a matter of importance; failure to produce an appropriate set of questions, suitably sequenced in a practical layout, may jeopardize the success of the data collection before it is started.

In the monitoring and evaluation of agriculture and rural development projects, questionnaires are commonly needed to record data on following topics:

- a. household, demographic and economic characteristics,
- b. farming patterns and farm economics,
- c. beneficiary attitudes and perceptions; and
- d. social information on beneficiaries and their communities.

The types of questionnaire applicable for these various topics vary widely and, as already indicated, the layout will depend on the level of knowledge of the respondent, the experience of the of enumerator, and the means of processing to be used.

The *content* of the questionnaire should be determined on the principle of including the minimum number of questions (or column headings) needed to meet the clearly specified objectives. The almost inevitable tendency is to ask more questions than is necessary. As discussed in Part 4, certain background information will be required to assist in the interpretation of the values of the main variables of interest, but the designer should have in mind a hypothesis of this explanatory role before including an item that is not of direct concern. The interview should be focused on the items of direct and major interest, not on secondary issues.

The *time* for the complete interview must be kept within bounds. Except in special circumstances involving an in-depth interview with an enthusiastically cooperative respondent, the length of the interview should not exceed one hour. This clearly limits the number of questions to be included; and the more detailed and thought-provoking the question, the more limited must the number be.

The questionnaire must be easy to *use* both as an enumerator guide and as an instrument for recording answers. The enumerator is faced with an often difficult and delicate interview situation, the tools provided should at least facilitate the task. Careful thought must be given to the quality of paper, the size of the sheet used, the clarity of printing and presentation, and the spaces provided for recording the answers.

The questionnaire must be *self-contained* in that the identification of the respondent, the enumerator, the date of interview, etc., are included.

In many instances, it is necessary to check back with the enumerator or respondent when inconsistencies, errors, or unusual information are detected.

The questionnaire should, to the extent possible, be precoded, so that a manual office coding is avoided. Digital and coded responses should also be aligned, where appropriate, to ease the task of the computer data entry operator.

Three basic types of questionnaire can be identified, namely:

- a. the tabular 'row and column' form, on which responses are recorded, but which does not specify the wording of the question;
- b. listing of questions in the general order in which they are put, but without specifying the precise wording and without precise instructions regarding branching or alternative channels of progress; and
- c. the verbatim listing of questions with precise instructions on alternatives for progression, depending on the answers to preceding questions.

The Row and Column Tabular Format

This type of questionnaire is particularly popular for two of the main topics covered in monitoring and evaluation surveys: namely, the listing of household members and the recording of farm data, either field by field, or crop by crop.

Normally, the 'questions' are implied in the column headings and the replies for a given person, field, or crop are contained in one row. (Instead of fields or crops, the row entries may also, of course, cover items such as livestock type or farming practices.)

Two examples of such layouts are shown as Figures 4 and 5, illustrating a household composition form and a farm data form. The advantages and disadvantages of this type of layout are indicated in these examples.

The advantages are

- a. one sheet or form contains the results of what may have been quite a lengthy sequence of questions;
- b. the impossibility of specifying in advance the number of cases to be covered is allowed for by providing a large number of rows, one for each 'case'; and
- c. the enumerator is allowed flexibility in the manner and sequence of the implicit questions (but this may be a disadvantage also).

The disadvantages are

- a. questions cannot be fully specified, they are only implicit in the column headings;
- b. the lack of sequence and structure may result in omissions, the enumerator misdirecting the respondent, or the enumerator misrecording (e.g., placing the answer for one cell of the table in another).
- c. the abbreviated column heading may disguise the failure of the designer to realize that the implicit question is in fact a set of questions, some of which may be impossible to answer.

Sometimes an attempt is made to combine the tabular format with verbatim questions and coding instructions incorporated in the column headings. Figure 6 provides an example. There are differences of opinion on the usefulness of this approach. It has been criticized on the grounds that the space taken up by the headings reduces excessively the space available for recording the answers, and that the printing of questions in full results in column widths varying according to the length of question, rather than according to the demands of the answer.

FIGURE 4

First all household members, present or absent:

Today's Date

at Sunray's door.

**SUPERVISOR'S
CHECK**

Supervisor's
Signature
Date

 Enumerator's
 Signature

Form checked in office ☐
Interview watched ☐
Reinterviewed ☐

FIGURE 6

**ASK OF HEAD OF HOUSEHOLD OR OTHER ELIGIBLE RESPONDENT
ASK QUESTIONS COLUMN BY COLUMN**

NO	NAME	SEX	DATE OF BIRTH		AGE	MARITAL STATUS	RELATIONSHIP TO HEAD OF HOUSEHOLD	STATUS OF
A1	A2	A3	A4	A5	A6	A7	A8	A9
	What are the names of the members of this household?	Are you Male - 1 Female - 2	In what month and year were you born?	Are you Single - 1 Married - 2 Widowed - 3 Divorced - 4 Separated - 5	What is the name of the head of this household?	Do you live in this household or is the property dead?	FILL IN THE CODE SHOWING THE RELATIONSHIP TO THE HEAD OF HOUSEHOLD	FILL IN THE CODE
	WRITE IN THE NAMES OF HOUSEHOLD MEMBERS						Head - 1 Wife of head - 2 Own child of head - 3 Non own child of head - 4 Grand child - 5 Parent of head - 6 Parent of wife of head - 7 Sons/daughters in law - 8 Other family members such as servants, etc - 9	1 - Live in this household 2 - Live outside this household 3 - Already dead 4 - Don't know
	AFTER WRITING ALL THE NAMES GIVEN BY A1, READ THE NAMES AGAIN TO SEE YOU HAVE WRITTEN AND ASK:						WRITE IN THE RELATIONSHIP WITH THE HEAD OF HOUSEHOLD	
	Are there any other household members who have not yet been mentioned, such as:							
	1. Young children or new-born babies?							
	2. Household members who are temporarily away from home?							
	3. Other household members such as other relatives or servants who live with you?							
	IF YES, ENTER THEIR NAMES							

Whether it is wise to allow the considerable flexibility to the enumerator that the tabular layout demands depends on the topic of the survey, the quality of the enumerator, and the type of respondent. Certainly, careful training and intensive supervision is particularly important if this format is adopted. Specifically, the enumerator must be totally familiar with the definitions and implicit questions as summarized in the column headings. Reference to a manual during an interview is not practical, so the necessary instructions must be in the enumerator's 'on-line memory', to borrow computer storage phraseology.

Making the column heading simple does not simplify the question. Thus, a column heading 'Income' on a form intended for small semisub-sistence farmer respondents does not solve the problem of determining income. Nothing betrays an inadequate questionnaire designer more clearly than such an abrogation of responsibility whereby the load is placed where it does not belong — on the enumerator.

The Nonverbatim Questionnaire

A common type of questionnaire presents the questions by topic and follows a sequence that is intended to reflect a logical progression of the interview through the topics being investigated. However, the questions are not printed in full verbatim form and may not include the branching and alternative channels of progress through the interview. This format does not usually require the questionnaire to be printed in the language of the interview. Nevertheless, the question is phrased in approximately the form in which it is to be put, perhaps in a shorter form than that to be used during the actual interview. It is, therefore, an intermediate type between the tabular and the verbatim questionnaires, in which a measure of flexibility for the enumerator is retained. How the question will be phrased in translation, the follow-up that may be required in clarification, and the recognition that a later question has been rendered unnecessary by a previous reply, these are at the enumerator's discretion.

As with the tabular format, this can be either a strength or a weakness. The essential requirement is that the topics and questions are simple in concept and will be well understood by the respondent. The enumerator should not be forced into difficult translations of technical terms¹¹ or made to clarify the question in such a way as to 'lead' the res-

11. It is not only technical terms that give difficulty. Words such as "since" and "ever" are often mistranslated or misinterpreted.

pendent to the answer. How much discretion can be allowed needs careful consideration and the training requirements are as demanding as those for the tabular questionnaire as outlined above.

Given that the precise wording of the question is not a requirement, the designer has an easier task in producing a layout that meets the general principles laid out earlier, particularly the ease of use and ease of coding and analysis requirements. An example is shown as Figure 7.

This type of questionnaire is well-suited when using printed lists of optional answers with the instruction to the enumerator to indicate which answer is closest to the respondent's opinion. However, the preparation of the list of options requires detailed knowledge of the issue in question; it is very easy to impose a set of answers that have no real bearing on the true reaction of the respondents. Indeed, the very order in which the options are listed and the range of options offered are likely to affect the response. Moreover, a range of optional answers from very negative to very positive may reduce a complex reaction to a superficial response. There is also a tendency to 'heap' on the middle point of the scale.

The designer must guard against the disguised multiple question and the excessively hypothetical question. Examples of these are:

"Do you normally work on your farm, but also seek employment on other farms?"

"Do you consider that your sons will be able to make a living from farming when they are older?"

The first example, in effect, asks two questions. Suppose the answer is 'no'; what interpretation can be put on the answer?

The second involves the respondent visualizing a situation in which various possibilities of change or lack of change will be adopted in the visualization process, and as these are not revealed in the recorded response, the answer may be meaningless. Both these questions and similar variants have been used in recent years.

The best attitudinal enquiries lead the respondent from a statement of fact regarding his behavior, to his reasons for acting as he did, to the circumstances that he thinks will lead him to change his behavior.

The Verbatim Questionnaire

This type removes all enumerator discretion. The questions are printed in the precise wording to be used during the interview; the options and branching processes that may occur during the interview are identified and specific instructions included in the questionnaire, in extreme cases, even the courtesy opening and closing of the interview are indicated.

FIGURE 7

AN EXAMPLE OF A PRE-CODED FORM

NATALIDADE

Se nos dois ultimos anos alguma mulher desta casa ficou grávida, tome os seguintes dados:

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Idade da mulher ao engravidar pela ultima vez nesse periodo. | ☐ | ☐ | ☐ | ☐ |
| | 1 | 2 | 3 | 4 |
| 2. Idad da mulher ao engravidar pela primeira vez. | ☐ | ☐ | ☐ | ☐ |
| | 5 | 6 | 7 | 8 |
| 3. Numero de gestacoes anteriores. | ☐ | ☐ | ☐ | ☐ |
| | 9 | 10 | 11 | 12 |
| 4. Numero de abortos. | | | ☐ | ☐ |
| | | | 13 | 14 |
| 5. Numero de natimortos. | | | ☐ | ☐ |
| | | | 15 | 16 |
| 6. Numero de criancas falecidas antes de 1 anos. | | | ☐ | ☐ |
| | | | 17 | 18 |
| 7. Numero de criancas falecidas de 1 a 5 anos. | | | ☐ | ☐ |
| | | | 19 | 20 |
| 8. Numero de criancas falecidas com mais de 5 anos. | | | ☐ | ☐ |
| | | | 21 | 22 |
| 9. Problemas na ultima gestacao (78 ou 79)
(1. hemorragia; 2. infeccao; 3. edampsia;
4. aborto; 5 outro: especifique). | ☐ | ☐ | ☐ | ☐ |
| | 23 | 24 | 25 | 26 |
| 10. Fase da gestacao em que ocorreu o problema (1. atc
o 3.º mes; 2. no curso do 4. mes; 3. no curso do 5.
mes; 4. no curso do 6.º mes; 5. no curso do 7.º mes; 6. no curso do 8.º mes; 7. no curso do 9.º mes) | ☐ | ☐ | ☐ | ☐ |
| | 27 | 28 | 29 | 30 |
| 11. Em que fase da gestacao inciciou o pre-natal,
na ultima gestacao (78 ou 79) (1. Antes do
3.º mes; 2. no curso do 4.º mes; 3. no
curso do 5.º mes; 4. no curso do 6.º mes; 5.
no curso do 7.º mes; 6. no curso do 8.º mes;
7. no curso do 9.º mes). | | | ☐ | ☐ |
| | | | 31 | 32 |
| 12. Numero de filhos no ultimo parto, dentro
dos ultimos 2 anos. | | | ☐ | ☐ |
| | | | 33 | 34 |
| 13. Nascidos (1. vivos; 2, mortos; 3. 1
vivo e 1 morto). | | | ☐ | ☐ |
| | | | 35 | 36 |
| 14. Local do parto (1. residencia, 2. maternidade
localizada no municipio; 3. maternidade
localizada no municipio vizinho; 4. maternidade
localizada em municipio nao vizinho. 3. a
caminho da maternidade; 6. fora da residencial). | | | ☐ | ☐ |
| | | | 37 | 38 |
| 15. Parto assistido por; (1. medico; 2 pessoal para-
medico; 3 agentes leigos de saude. 4 outras pessoas). | | | ☐ | ☐ |
| | | | 39 | 40 |

This type of questionnaire is best suited for a detailed interview into a specific topic where the range of behavior is both limited and identifiable in advance. Its widest use has been in surveys of demographic characteristics, particularly fertility, for which it seems well-suited. It is not usually appropriate in a general farm survey, where enumerator reaction to the widely varying farm characteristics and farm patterns is almost essential, if the interview is to appear to be an intelligent one, as viewed by the respondent.

The decision to adopt this type of questionnaire carries the following implications:

- a. The questionnaire must be printed in the language of interviews;
- b. The possible courses of the interview must be fully foreseeable; and
- c. The length of the questionnaire (if not the actual interview) is a major design problem.

The need for the questionnaire to be printed in the language of the interview is obvious; the perceived need for removing enumerator discretion cannot otherwise be achieved. Unfortunately, in certain countries, this may entail a translation of the questionnaire from the language used for drafting into, not one, but several languages. This is a tedious business and must be carefully done and tested. Indifferent translation produces the same result as enumerators exercising their discretion in phrasing the questions. Moreover, if technical words are used and not understood by the respondent, the enumerator is forced to clarify the meaning: this again defeats the purpose of structuring the interview to avoid enumerator bias. A common safeguard is to translate the questions into the required language and then to have this version independently translated back into the original in order to reveal the deficiencies and ambiguities.

All possible courses that the question and answer process may take must be covered by written instructions and alternative questions. In so doing, the questionnaire is likely to become formidably long, even if, in any one interview, the number of questions put are limited. Figure 8 shows an example of an acceptable extract from a structured questionnaire. Bad examples are, however, more common than good.

Enumerator Training Manual

A training manual must be prepared to accompany each questionnaire. This will be the basic reference document during the enumerator training course. It should contain the following:

- a. explanatory details about the survey,
- b. instructions for identifying the respondents,
- c. general guidelines on conducting an interview;
- d. precise definitions of each term used in the questionnaire, e.g., household, farm, field, income.
- e. explanation of each question with examples of how answers are to be recorded;
- f. coding instructions (if these do not appear on the questionnaire); and
- g. other operational and time-scheduling instructions.

It is important to stress that by the time the training course is completed, items (b)–(e) must be so familiar to the enumerator that reference to the manual during an interview is avoided. The manual will, however, continue to be a valuable reference document for the enumerator, particularly with regard to items (f) and (g), and also when a difficulty arises regarding interpretation of the definitions in an unexpected situation.

FIGURE 8

AN EXAMPLE OF A STRUCTURED QUESTIONNAIRE

1. Did you do any work in the last 7 days? Yes...1 No...2 **SKIP TO 6**

2. What was that work?

3. How many hours altogether did you work over the last 7 days? _____ **HOURS**

4. Did you want more hours of work during those 7 days? Yes...1 No...2 **SKIP TO 9**

5. Why did you not want more hours of work? **CIRCLE ONE ONLY**

Worked fully	1	ALL SKIP TO 9
At school	2	
Housekeeping	3	
Too young/old	4	
Physical defect	5	
Other (SPECIFY)	6	

6. Do you have a business for which you did anything during the last 7 days? Yes...1 No...2 **SKIP TO 9**

7. Did you look for work during the last 7 days? Yes...1 No...2 **SKIP TO 9**

8. Why were you not working during the last 7 days? **CIRCLE ONE ONLY**

Vacation	1	ALL
Illness	2	
Strike	3	
Lay-off	4	
Off-season	5	
Other (SPECIFY)	6	

DATA HANDLING AND ANALYSIS

9.1 Introduction

As stated at the beginning, this Handbook is designed to serve different types of users, and therefore contains material at different levels. That is particularly true of this Part. Early sections discuss simple first stage steps, treated at a very elementary level, and may be useful for the essential early stage of exploratory analysis before deciding on the details of more formal analysis, whether computerized or otherwise. Later sections touch on problems that are often apparent only to those with an advanced statistical background. The material has been selected with two ends in view:

- a. to provide examples of simple data handling techniques, relevant to the major theme of this Handbook of turning data into information for management; and
- b. to indicate some of the major sources of difficulty in analysis, thus providing a set of warning lights so that false conclusions will not be drawn and professional statistical advice will be sought when it is needed.

Much can, in fact, be achieved by simple techniques of analysis—the preparation of graphs, the calculation of simple rates and averages, the ranking of items, and the construction of simple tables. These are particularly relevant to quick, timely reporting for monitoring. Exploratory analysis of this kind is also a required first step before more complex techniques are employed. These more complex procedures, primarily multivariate analysis, are almost certain to be required when casual analysis is involved, especially in the later stages of evaluation. Professional statistical advice will be required to decide what should be done and—often just as important—what should not be done. The availability of package programmes is now so general that data are frequently subjected to inappropriate manipulations, results being read off computer printouts without adequate consideration of whether the methods of analysis are appropriate, given the character of the data and the methods by which they have been collected.

Simple techniques are important for first assessments of the quality of the data, and for establishing orders of magnitude of the main features

under observation. These can also be used to give a first idea of the sensitivity of the results to variations from the norm.

Different types and scales for enquiry generate different requirements for data editing and coding; the following sections should be interpreted with that in mind. Experience shows that the data handling and presentation stages in the generation of information are difficult to complete in practice. There are numerous surveys and enquiries where the data collected have never been properly analysed and used. Some of the reasons for this are

- a. Insufficient attention is given to these later stages when the enquiry is being planned and the questionnaire designed; the main lines of analysis and presentation must be thought through before the data are collected;
- b. Failures of the kind described in (a) lead to the collection of much unnecessary data, which complicate the data processing and delays work on the data of primary concern;
- c. Expectations of speedy analysis arising from developments in electronic data processing are usually overoptimistic;
- d. The tedious nature of the work of editing and coding data dampens commitment and enthusiasm, leading to a tendency to do more field work before bringing the current study to a conclusion;
- e. The task of constructing and then validating large data files, particularly those relating to longitudinal surveys, is usually grossly underestimated.

9.2 Data Preparation

An editing stage is necessary for all but the smallest investigations. Data are edited for completeness and consistency; omissions and inconsistencies discovered are re-enumerated in the field or corrected by using an agreed imputation process.

If the proposals made in Part 8 have been followed, office coding will have been reduced to a minimum through the use of precoded questions. The resulting coded data are either transcribed directly on to summary tables, or transferred to cards, discs or tapes for further analysis.

Unless office management is strict, this work can degenerate into chaos. The questionnaires must be booked in, grouped into appropriate enumerator, area, or strata bundles, and their movement between diffe-

rent stages and clerks recorded. Detailed records must be kept of any questionnaires returned to the field or temporarily abstracted for other purposes. Any dislocation of the normal process by which batches of questionnaires pass through manual edit, correction, and punching should be avoided.

Frequent inspection of daily output figures are helpful in monitoring staff performance. Manually maintained running totals of some of the key variables can be used to provide averages, rates, orders of magnitude, and first estimates of the main characteristics under enquiry. If there are previous or preliminary figures with which these first estimates can be compared, discrepancies may provide an early warning that something has gone wrong.

It is important that the person in charge of the enquiry should examine and edit a sample of the field documents as they arrive. This provides a check on earlier assessments of the quality of the field work, and ensures that the editorial instructions to detect inconsistencies are sound. In fact, unless a pretest is conducted, it is often not possible to complete the instructions for editing and coding until some field documents have been scrutinized.

Not all errors require the return of questionnaires to the field for comment, revisit, and amendment. Some are obviously slips and can be corrected in the office. Others, such as incorrect area measurements cannot be corrected without further field enquiry, which must be undertaken promptly. Field checks are also required for some information which appears dubious but is not necessarily wrong.

'Faked' data is not uncommon, for most survey teams contain a few dishonest enumerators who manage to survive the training course and its selection filter. This is one reason why it is desirable to batch questionnaires by enumerator since a skilled editor can often detect patterns in the responses, e.g., a suspicious regularity in family structures, or the absence of occasional zeroes, which indicate that faking may have occurred.

Editing, particularly in the early stages, should also show whether there has been a misunderstanding of procedure that has escaped the supervision in the field. For example, suppose it was decided that in the case of an absentee husband, the wife was to be shown as the head of the household: an absence of questionnaires showing wives as heads of households in any area may suggest that this rule has not been followed there.

Editing and coding stages are sometimes combined. The advantages and disadvantages in this arrangement; on balance, un- questions are almost all precoded, it is desirable to separate the Quality control—a regular check of a sample of forms after editing—coding—is needed to ensure that the work is being done properly. A check needs to be maintained throughout the process, and may be stepped up in the later stages as earlier enthusiasm and commitment ebb away.

9.3 Data Processing

The equipment and their associated programmes for data processing are rapidly changing. In particular, development of microcomputers seems likely to alter the situation considerably. This development may prevent the 'distancing' of the surveyor from the data that occurs in main-frame installations. With a microcomputer the surveyor is in control of the processing; in control of access to, as well as data analysis. The design itself can be more flexible. The surveyor can easily control the structure and validation of the data files, and some of the numerous validation runs that are characteristic of electronic data processing. On the other hand microcomputers are limited in their ability to handle large files, and software development lags behind that of the hardware.

In the current situation of rapid change, detailed recommendations would be out of place. Two comments should, however, be made. First, the computer is not the *only*, or necessarily, the best way in which data can be processed. Much can be done with data summarized in appropriate groups and analyzed with the aid of cheap, programmable hand-held calculators. When timeliness is essential—and this is often the case in monitoring—some simple tabulations from the data, or a summary of it, will often meet the requirements effectively.

If the regular data for monitoring purposes can be processed through available computer facilities, it will be well worth the investment to get the system working; this is one aspect of the use of the computer in management. However, operations at remote sites with difficult climates may face problems. Further, the temptation must be resisted to expand reports excessively simply because the facilities are there. Experience varies from project to project, and even projects in the same country show considerable variations in performance which are difficult to account for.

Secondly, the time allowed for processing survey type data is usually too short, particularly when computer processing is involved. In a recent survey of data processing of the World Fertility Survey, Rattenbury writes that,

Realistic estimates, to allow for shortfalls in performance and for unpredictable problems, are obtained by multiplying the normal estimates by a realism or R-factor. From experience in many environments this factor should often be three or more for data processing projects. Actual durations of WFS country data processing have been on average about three times greater than planned.¹²

The World Fertility Survey was usually given some priority in the country concerned, and substantial use was made of the additional data processing skills of the international survey staff.

9.4 The Appropriate Scale of Analysis

In many cases analysis will not be a problem, since the basic data are limited and simple, and the techniques required straightforward. For many aspects of monitoring, the data processing requirements will be laid down in a reporting sequence repeated regularly throughout the year. The analysis of larger and more complicated sets of data resulting from case studies and sample surveys, however, require decisions involving the crucial trade-off between speed and depth.

Reports of past experience emphasize that timeliness has generally been given insufficient weight: this Handbook has accordingly tried to redress this by emphasizing the value of quick simple summaries. More sophisticated analyses will, however, be required when causal links are being investigated.

Statisticians have debated the relationship of levels of data accuracy and levels of analytical detail and sophistication. Some have argued that sophisticated methods should not be applied to bad data; others have argued that these are especially required when the data are bad. A 'middle of the road' position is

12. J. Rattenbury. "Survey Data Processing—Expectations and Reality, *World Fertility Survey Conference* (London: July 1980).

- a. No general rule can be given: each case must be considered on its own merits—at all costs, avoid the “tabulate everything against everything” attitude;
- b. It is sometimes worth trying sophisticated methods to see what can be ‘squeezed’ out of the data. The result must, however, be interpreted with great care. For example, the signs and magnitudes of the estimates of the coefficients for some of the variables in a multiple regression relationship may be different from expectation. If these are ignored and attention concentrated on those which confirm expectation, the analysis is being used merely to support preconceived ideas and does not provide an independent validation;
- c. The extent to which the results are sensitive to the likely size of inaccuracies should be investigated by simulating alternative sets of data;
- d. The necessity for effecting data transformations should be examined;
- e. Data dredging is dangerous, and will almost certainly generate spuriously statistically significant results. On average, one in twenty tests of nonsignificant relations (using 95 per cent confidence limits) will appear significant; and
- f. Statistical significance does not necessarily imply substantive significance.

Some effects of inaccuracies in the data are set out in Section 9.9.

9.5 Presentation and Display

The manner in which data is presented depends upon the aspects that need highlighting. A common fault is the failure to simplify: usually, far too many digits are given. Partly, this is because, say, a figure of 71654 under a heading of ‘Tons’ gives a reassurance of accuracy not provided by an entry of 72 under a heading of ‘Thousand Tons’: it is also due partly to an inheritance from bookkeeping, where an exact balance must be shown.

Detailed figures must, of course, be available and supplied to those who need to make further computations. But management first wants to

see the main outlines of the situation; tables and graphs must be designed for this purpose. Some of the possibilities are illustrated using the data in Tables 3 and 4, taken from the detailed report of a survey.

Table 3. Maize and Groundnut Yields and Gross Production for the 1971 Harvest Periods

Area	Maize		Groundnuts	
	Average Yield Per Acre	Gross Production	Average Yield Per Acre	Gross Production
	(lbs.)	(tons)	(lbs.)	(tons)
1.	1,331	12,772	476	2,215
2.	1,230	9,284	360	2,227
3.	1,110	14,135	520	4,816
4.	1,290	13,041	580	5,864
5.	1,090	8,073	480	3,555
ALL AREAS	1,209	57,305	494	18,676

Table 4: Maize and Groundnut Yields and Gross Production for the 1972 Harvest Periods

Area	Maize		Groundnuts	
	Average Yield Per Acre	Gross Production	Average Yield Per Acre	Gross Production
	(lbs.)	(tons)	(lbs.)	(tons)
1.	1,631	13,989	297	1,640
2.	1,628	12,288	363	1,887
3.	1,845	21,005	514	4,958
4.	2,038	19,027	452	3,515
5.	1,020	7,414	367	2,823
ALL AREAS	1,626	73,723	413	14,824

The presentation could be varied to highlight different aspects. For example, if a comparison for maize is required, an obvious first stage would be to reduce the number of digits and produce Table 5.

*Table 5. Maize: Average Yields per acre and
Gross Production 1971-72.*

Area	Yield (hundred lbs.)		Production (thousand tons)	
	1971	1972	1971	1972
1.	13	16	13	14
2.	12	16	9	12
3.	11	18	14	21
4.	13	20	13	19
5.	11	10	8	7
ALL AREAS	12	16	57	74

The changes can now be seen at a glance, e.g., that the variations between areas increased markedly from 1971 to 1972.

Table 5 could be extended to include a measure of change. Change can be measured in absolute or relative terms, e.g., the absolute change in maize yield in Area 1 is 300 lbs. (1631 — 1331), and the relative change is 23% ($100 \times 300/1331$). Both measures are useful, but the relative change is often the more relevant for comparative purposes. Table 6 presents results of this kind.

Table 6. Maize and Groundnuts: Percentage Changes in Average Yield per Acre and in Gross Production. 1971-72

	PERCENTAGE CHANGE			
	Maize		Groundnuts	
	Yield	Production	Yield	Production
	23	10	-38	-26
	32	32	0	-15
	66	49	-1	+3
	58	46	-22	-40
	-6	-8	-24	-21
AS	35	29	-16	-21

ession of tables in a major report often need to present areas in a order to avoid confusion. However, the relative performances of ber of areas may be brought out by ordering them according to tent to which they deviate from the average level of performance. 10 area project might produce the following results:

	7	4	10	1	8	9	5	2	3	6
(%)	50	55	55	60	65	70	75	80	95	105
ion										
ver-										
1 %)	-21	-16	-16	-11	-6	-1	+4	+9	+24	+34

common characteristics of areas close together in the ranking may t management action. For example, if areas 3 and 6 are following practice not adopted elsewhere, perhaps it should be introduced in areas.

t should be noted that overperformance—getting results higher targets—requires reaction, just as much as underperformance. If operations in one area exceed those planned for, extra supplies of ers, seeds, etc., will be needed there.

Absolute figures of area targets and performances can be plotted using the two axes to represent target and performance respectively. The data in Table 7 are shown in this graphical form in Figure 9:

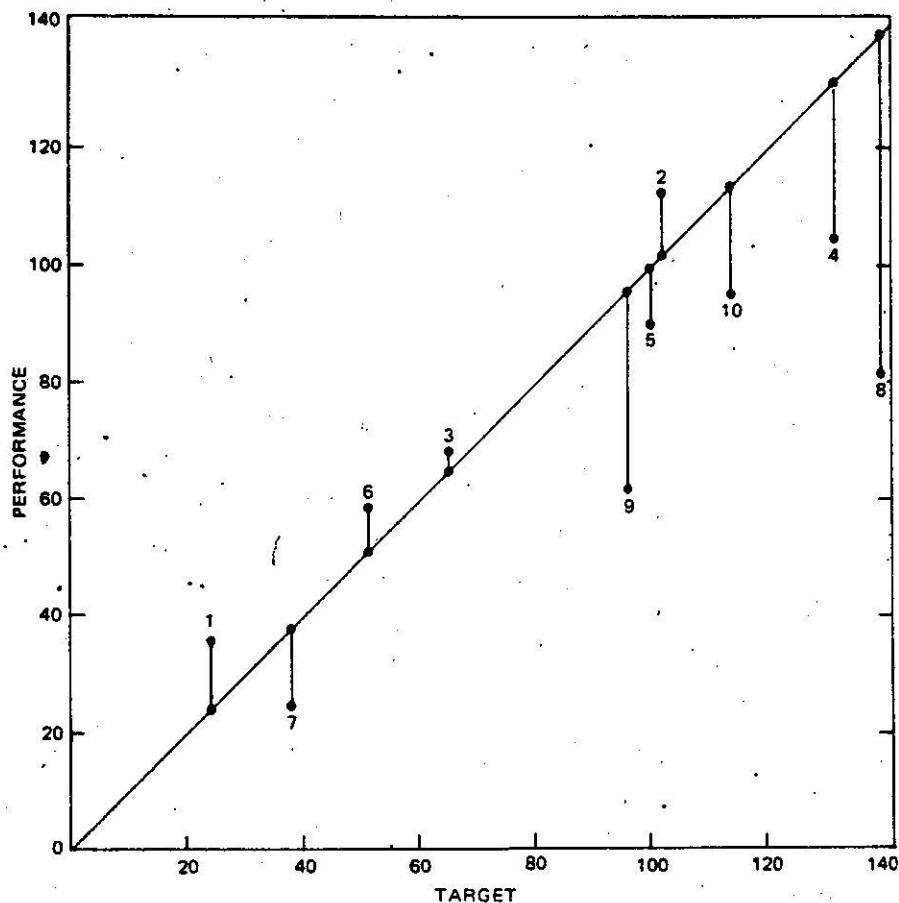
Table 7: Target and Performance by Area

<i>Area</i>	<i>Target</i>	<i>Performance</i>	<i>Area</i>	<i>Target</i>	<i>Performance</i>
1.	24	35	6	51	59
2.	102	112	7	38	25
3.	65	68	8	140	82
4.	132	105	9	96	62
5.	100	90	10	114	95

Any area where performance equalled target would be on the diagonal: points below the diagonal show areas which have not reached their targets, whilst those above show those where more has been done than expected. The length of the vertical deviation of the point from the diagonal represents the extent of the shortfall (or of overperformance). In this example the areas with the larger targets are underperforming, and their shortfalls are substantial.

It is not always necessary to react to short-term fluctuations within individual reporting units. For these cases cumulative performance graphs bring out the situation in a useful form. Three profiles are shown in Figure 10. They are especially simple in the sense that they assume targets increasing linearly over time (that is, increasing by the same absolute amount for equal time periods). Profile (i) shows an operation that started off reasonably well, but then deteriorated. It also shows how warning lines may be inserted, and action initiated when operations fall below some control level. More complicated "cusum" (cumulative sum) techniques are available as part of statistical quality control. Profile (ii) indicates an operation that started badly, but then got "on course." As the opportunities lost at the beginning could not be retrieved, a new set of targets was fixed. Profile (iii) shows an oscillating performance. It may be noted that the slope of the between-period line indicates whether the operation is falling further behind (slope of performance line less than that of the target line), holding its own (equal slopes — or parallel lines), or catching up (slope performance line greater than that of the target line).

FIGURE 9
TARGET AND PERFORMANCE BY AREA



The three examples start with the same target. Graphs of this kind can be produced in percentage form (target at end of final period = 100%) and will then be comparable between reporting units even if their targets differ in absolute size.

In many cases, interest is focused on the rate of change, not on the absolute amount. If a time series is graphed using a logarithmic scale on the vertical axis, then a straight line represents equal relative increases per unit of time—a constant rate of change. Such a graph is called a semi-logarithmic graph (in casual reference the 'semi' is often omitted). If semi-logarithmic graph paper is not available ordinary graph paper can be used by first converting the data into logarithms and plotting the log values rather than the absolutes. Negative numbers cannot be accommodated using this approach as logarithms of these do not exist.

Semilogarithmic graphs are also useful when the scale for the variable plotted up the vertical axis covers a very wide range, e.g., from 100 to 100,000. This situation often occurs when comparisons are being made between regions of very different sizes.

When examining the relationship between two variables, one representing a cause and the other an effect, a scatter diagram can be used as a visual aid. Thus if yields are plotted against amounts of fertiliser used, the resulting diagram may enable any relationship or lack of it to be easily seen. This is an useful first step before proceeding to a more formal relationship analysis using regression techniques (discussed below). In particular, a visual examination of a scatter diagram may prevent an inappropriate regression analysis being performed.

Description and Measurement of Inequality

Inequality and the extent to which it is changing are often of concern in agriculture and rural development projects.

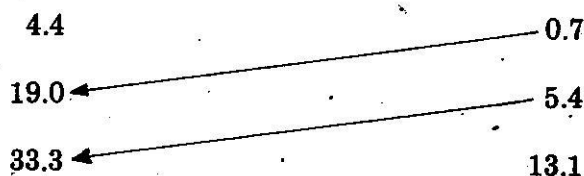
The simplest measure is the proportion of the benefit being distributed in the possession of the poorer part of the population. Thus, it may be said, that 60% of the farmers own 20% of the cultivable area. This is obviously a crude measure, since changes of the distribution towards either greater or lesser equality can take place without the figure at the cut-off point chosen being affected appreciably.

For comparative purposes, inequality may be summed up by the Lorenz diagram, and the Gini coefficient associated with it. These, in effect, combine a series of percentage relationships of the kind mentioned above. The data are put into cumulative percentage form as in the following example, using data of the distribution of farms by area (Table 8). A Lorenz diagram is obtained by plotting these cumulative numbers, as shown in Figure 11. The extent of the inequality is indicated by the shaded area between the diagonal and the curve: the greater this area the greater the inequality.

<i>Size Class (areal units)</i>	<i>Cumulative Percentage of Farms</i>	<i>Cumulative Percentage of Area</i>
0 - 1.0	4.4	0.7
1.1 - 2.0	19.0	5.4
2.1 - 3.0	33.3	13.1
3.1 - 4.0	45.5	21.6
4.1 - 5.0	61.5	36.0
5.1 - 6.0	70.1	46.1
6.1 - 7.0	78.8	56.0
7.1 - 8.0	84.9	65.0
8.1 - 9.0	87.8	69.7
9.1 - 10.0	92.3	78.1
10.1 and above	100.0	100.0



(b) Take the sum of (T2) of cross multiplications in the opposite direction:



and so on to



(c) The Gini coefficient = $\frac{T1 - T2}{10,000}$

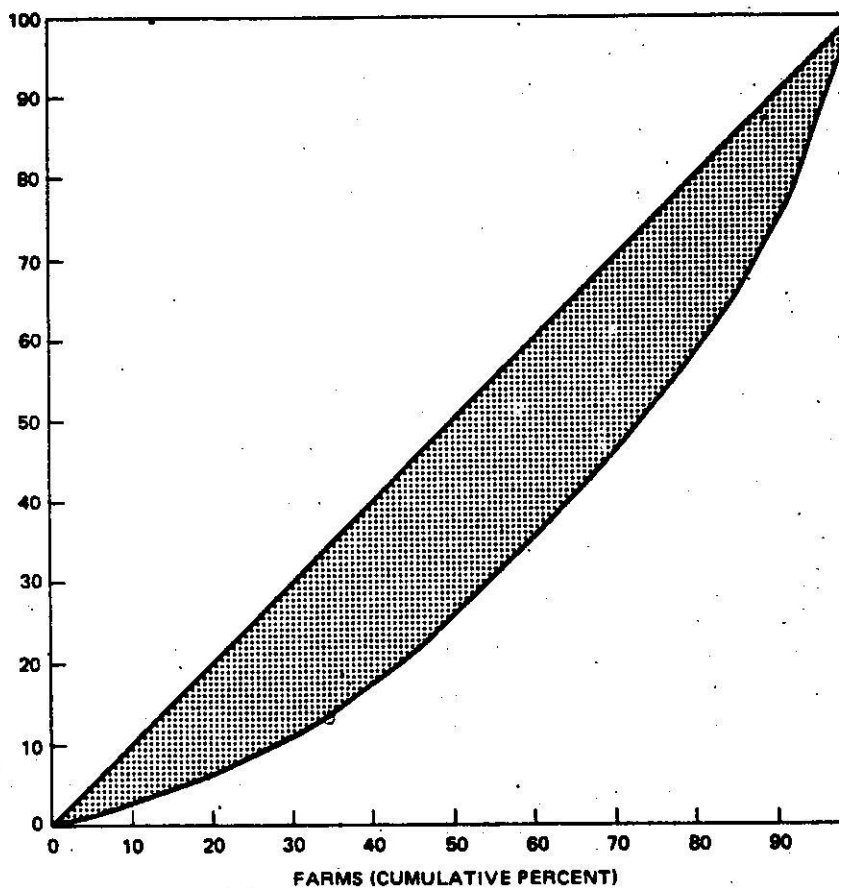
It must lie between 0 and 1, and in this case is 0.354.

It should be noted that the first column of cumulative percentages relates to the units (farms, persons, etc.) between which the 'benefit' (area, income) is distributed. The second column is the percentage of the 'benefit' owned by the related units in the first column. Entries in the first column are plotted along the horizontal ("x") axis in the Lorenz diagram; those in the second column along the 'y' axis. The same scale is used for both axes.

If two distributions are being compared, then the distribution with the larger Gini coefficient is the more unequal. But this rule has to be interpreted with care because two types of situations can arise.

- The Lorenz curve for distribution A lies entirely within that for distribution B. Then the conclusion that distribution B is more unequal than distribution A is unequivocal.
- The Gini coefficient of distribution B is greater than that of distribution A, but the Lorenz curves of the two distributions cross each other when plotted on the same diagram. This indicates that distri-

FIGURE II
LORENZ CURVE FOR DATA IN TABLE 8



bution B is more unequal than A over part of the range, but less unequal over another part. Conclusions about relative inequality will depend upon whether the whole distribution, or only part of it, is the focus of interest.

Gini coefficients provide a convenient first ranking of inequalities, but too much should not be made of small differences between them. They will be affected by response errors in the data, which are often likely to be large for variables used to investigate inequality; the way the data have been grouped will influence the values; and if sample data have been used, sampling fluctuations will be present. Thus, whilst Gini coefficients are useful indicators, conclusions about significant changes in relative inequalities must rest upon detailed examination of the original distributions.

9.7 2 X 2 Tables

One of the commonest ways of showing differences in performance is by a 2 x 2 table. A typical example is given in Table 9 (a). The letters in Table 9 (b) will be used for generalizing results.

Table 9. (a) Adoption of Practice by Project and Nonproject Farmers

	<i>Adopt</i>	<i>Do not Adopt</i>	<i>Total</i>
Project farmers	180	70	250
Non-project farmers	60	90	150
Total	240	160	400

(b) Table (a) in general form

	Yes (1)	No (0)	Total
In (1)	a	b	(a + b)
Out (0)	c	d	(c + d)
Total	(a+c)	(b+ d)	n=(a+b+c+d)

The difference in the proportions 'adopting' for project and non-project farmers gives an idea of project performance. The difference in proportions is:

From Table 9(a)

$$\begin{aligned}P_1 - P_2 &= \frac{180}{250} - \frac{60}{150} \\&= 0.32\end{aligned}$$

From Table 9 (b)

$$P_1 = a/(a + b); \quad P_2 = c/(c+d)$$

$$P_1 - P_2 = \frac{a}{a + b} - \frac{c}{c + d} = \frac{ad - bc}{(a + b)(c + d)}$$

If several tables are being compared, comparisons of P_1 's and P_2 's can be made. Simple single figure measures have however been devised.

One single figure method is the relative odds or the Odds Ratio (OR) — the ratio between the odds that a project farmer has adopted to the similar odds for a nonproject farmer. For Table 9 the results are:

From Table 9 (a)

$$\begin{aligned}\text{OR} &= \frac{180}{70} \div \frac{60}{90} = \frac{180 \times 90}{60 \times 70} \\ &= 3.9\end{aligned}$$

From Table 9 (b)

$$\text{OR} = \frac{a}{b} \div \frac{c}{d} = \frac{ad}{bc}$$

The bigger the OR, the greater the odds for the first group, relative to the second.

The values that the Odds Ratio can take range from 0 to infinity. Values 0 to 1 indicate a negative relationship — nonproject farmers are adopting more than project farmers. Values greater than 1 indicate a positive relationship.

For making comparisons across a number of tables a measure that ranges from -1 to $+1$ may be more convenient. One such is Yule's Q , which is calculated as follows:

From Table 9 (a)

$$\begin{aligned}Q &= \frac{180 \times 90 - 60 \times 70}{180 \times 90 + 60 \times 70} \\ &= 0.59\end{aligned}$$

From Table 9 (b)

$$Q = \frac{ad - bc}{ad + bc}$$

Q was originally devised as a measure of association, and is appropriate here since a difference in the odds on adoption for project and nonproject farmers is equivalent to an association between "being in the project" and "adopting the practice."

Q takes values ranging from 0 (no association) to + 1 in one direction (complete positive association) and -1 in the other (complete negative association). The larger the figure, the greater the strength of the association it summarizes. Q and OR are related in the following way:

$$Q = \frac{OR - 1}{OR + 1}$$

An OR of 3 is equivalent to a Q of 0.5.

Another measure sometimes used is the correlation coefficient r (which also takes values lying in the range - 1 to + 1). The usual formula for r can be put as follows (using the assignment of the numeric codes 0 and 1 in Table 9(b)):

From Table 9 (a)

$$\begin{aligned} r &= \frac{12000}{\sqrt{(250 \times 150 \times 240 \times 160)}} \\ &= 0.316 \end{aligned}$$

From Table 9(b)

$$r = \frac{ad - bc}{\sqrt{[(a + b)(c + d)(a + c)(b + d)]}}$$

The result for r will be of the same sign as Q (since the numerator is the same, and the positive root is always taken in the denominator of r) and r will always be closer to 0 than Q . It is often recommended (see 9.9), that the value of r^2 be considered, rather than that of r , since r^2 equals the proportion of the variation explained. The value of r^2 in this case is equal to only 0.1.

The correlation coefficient is, however, better suited to quantitative than to qualitative variables. Any pair of quantitative variables might be turned into two zero-one variables by splitting each at a point. For example, distributions of expenditures of farmers and of the areas they farm can provide the basis for a 2 x 2 table by forming groups labelled:

Expenditure	Farm
High	Large
Low	Small

Values of Q could then be calculated, but they are sensitive to the choice of the splitting points.

The quantity $(ad - bc)$ occurs again in another often used measure. Suppose there is in reality no association between the two variables. In this case it would then be expected that the $(a + b)$ farmers and the $(c + d)$ farmers, and the total of farmers would all divide in the same proportion. In the cell in which a is found, the number would be expected to satisfy.

$$\frac{a}{a + b} = \frac{a + c}{n}$$

giving:

$$\text{Expected value in the first cell under assumption of no association} = \frac{(a + b)(a + c)}{n}$$

The number actually observed is a , and so the difference (D_{11}) between the observed and 'expected' values is:

From Table 9 (a)

$$\begin{aligned} D_{11} &= \frac{(180 \times 90) - (60 \times 70)}{400} \\ &= 30. \end{aligned}$$

From Table 9 (b)

$$D_{11} = a - \frac{(a + b)(a + c)}{n}$$

$$= \frac{ad - bc}{n}$$

Keeping the marginal totals constant, it will be seen that $D_{11} = D_{22} = -D_{12} = -D_{21}$.

Clearly, the larger $(ad - bc)/n$, the bigger the difference between the observed value and that expected on the assumption of no association, the stronger is the evidence for the alternative view that there is a relationship between the variables.

Using this feature, a commonly used test for assessing sampling fluctuations, called 'chi-squared', is calculated as follows:

From Table. 9 (a)

$$X^2 = \frac{400 (12000)^2}{250 \times 150 \times 240 \times 160}$$

$$= 400 (.316)^2$$

From Table 9 (b)

$$X^2 = \frac{n(ad - bc)^2}{(a + b)(a + c)(b + d)(c + d)}$$

or substituting r from above.

$$= nr^2$$

If there were no association between the variables, samples giving a value of X^2 greater than 1 would occur, on average, approximately once in three samples, and values greater than 3.8 would occur only once in twenty times. One reason for calculating this particular quantity is that

it is a convenient basis for combining results from a number of similar sample tables. If the association in all, say k , tables is in the same direction (that is if $(ad - bc)$ is the same sign in all k tables) then the sum of X^2 's from the tables can be added together and tested at the desired level against the value of X^2 with k degrees of freedom (details in most sets of statistical tables).

Single figure measures provided only a first stage of analysis, and the reduction of the data into 2×2 tables may be an oversimplification. It should also be noted that the description of these measures are introductory only. The effects of sampling design features, e.g., clustering, have not been dealt with. But an initial analysis of this kind can be done quickly by hand and be valuable in indicating whether there is a possible relationship that will warrant a more detailed analysis under professional guidance.

9.8 Standardization

Standardization is a procedure which compensates for differences in structure between groups or areas being compared. Suppose that the readiness and ability of farmers to take up credit is related to the size of their farms, those farming larger areas being on average more likely to take up credit. Differences in the overall percentage absorption of credit in project areas could be due to differences in administrative effectiveness or to differences in the distributions of farms by size (or, of course, to other factors which are ignored here). Table 10 gives a numerical example:

*Table 10. Differences in Area Performance
due to Structural Differences*

Size of farm	Area A			Area B		
	Proportion (1)	% take-up (2)	Product (1)x(2)	Proportion (3)	% take-up (4)	Product (3)x(4)
Small	0.50	18	9	0.33	18	6
Medium	0.25	36	9	0.33	36	12
Large	0.25	72	18	0.33	72	24
Overall % Take-up			36			42

Area B's overall rate of 42% looks better than Area A's rate of 36%, but the difference is due to the higher proportion of smaller farms in Area A.

Standardization deals with this problem by comparing the overall results with that which would have been obtained if the detailed rates were matched with a standard structure, which is usually the structure for the whole region under study. Thus, supposing the proportions of farms by size in the total project region were 0.5, 0.3, and 0.2, standardized figures would be calculated as follows (first three areas only shown):

Table 11: Calculation of Standardized Rates

Size of farm	Standard Proportion	Area A		Area B		Area C	
		% take-up	Product	% take-up	Product	% take-up	Product
Small	0.5	18	9.0	18	9.0	20	20.0
Medium	0.3	36	10.8	36	10.8	35	10.5
Large	0.2	72	14.4	72	14.4	75	15.0
Overall % take-up (Standardized)		34.2		34.2		35.5	

The overall standardized rates for Areas A and B are equal, as they should be. These standardized rates can also be used to provide measures of relative performance by comparing them with overall project area percentage take-up rate. Suppose this is 30%. Then a suitable index of performance is:

$$\text{Area A} \quad 34.2/30 \times 100 = 114$$

$$\text{Area B} \quad 34.2/30 \times 100 = 114$$

$$\text{Area C} \quad 35.5/30 \times 100 = 118$$

Standardization can be extended to cover more than one structural feature, if desired. The procedure was developed for the comparison of mortality rates and is formally similar to that used in the construction of index numbers.

9.9 Cautionary Comments About Correlation and Regression Analysis

Attempts to trace causal relationships in a project will often use correlation and regression methods. Some of the dangers they involve are briefly outlined in this Section, so that due caution will be exercised in drawing conclusions from them.

There is a time-honoured methodological maxim: "correlation does not prove causation." Correlation of an effect with an identified treatment is only useful evidence if the results of other possible causes have been partialled out. Thus, for example, although production may have increased, the increase may be due to better market prices, rather than to the additional fertilizer. Conversely, a project failure may be due to an unforeseen change in general price structure, not to any internal fault.

The correlation of time-series often leads to mistaken inferences. A high figure may be due merely to the separate effects of time on the two series, not to any causal relationship between them. It is therefore usually worthwhile to see if the relationship is maintained when the two sets of first differences (that is, the period-to-period changes) derived from the original data are also correlated. If the value of this second r is also high, confidence that there is a real relationship between the two series is increased.

A study of the residuals (the differences between the original observations and their estimates obtained from the model being considered) is necessary to decide if the model is applicable. Patterns shown by them may indicate how the model can be improved. For example, if the original observations are spread over time and the residuals show a trend over time, then adding a time term to the model may improve it. Further correlation coefficients measure *linear* correlation. A close nonlinear correlation may be hidden in a misleadingly low value of the coefficient. The data and residuals must always be examined to see that any assumption of linearity is appropriate.

A second reason for looking at the residuals is to see that any assumptions about the error structure of the model are met. For example, the classical linear regression model requires that the variability

of the dependent variable is constant across the range of values of the independent variables. If the residuals indicate this is not so, then some transformation of the independent variables may be necessary. Tests of significance and confidence intervals usually require that the residuals in the model are distributed normally — at least approximately. So a study of the residuals can prevent improper inferences.

Another common error is referred to as the 'ecological fallacy', and arises when correlations between variables measured over aggregates of persons do not appear when the correlation is calculated over individuals. Thus, there may be correlation at an aggregated level (say, by district) between educational attainment and business activity; but when the data is looked at on the individual level there may be little correlation between education, and commercial or industrial initiative, and ability. Indeed, a general problem with correlation coefficients is that their size can be increased by aggregating upwards the data used to calculate them.

In any case, the value of r is often not the most relevant figure. A value of 0.5 for the correlation between treatment and impact indicators may seem high; but it should be regarded as showing that the treatment explains 25 percent, $(0.5)^2$, of the variation in the impact indicator. If $r = 0.2$, still some way from zero, the treatment is explaining only 4% of the variation. Too much attention may also be given to a finding of 'statistical significance'. This is often merely a flag indicating that the effect under investigation is not likely to have arisen just by chance. This flag does not necessarily give any guide to the substantive or policy significance of the relationship: it may just prevent the waste of time that would occur in further examination of a chance relationship. Many correlation and chi-squared results found to be statistically significant are of little interest or importance for policy purposes.

Perhaps the most serious problem in using regression models in the context of this Handbook is the effect of measurement errors. Note that these errors are not sampling errors and that they can affect the *independent* variables. They are the difference between the true value for any respondent and the figure that is actually recorded and used in the analysis. The relationship involved is that the value included in the analysis for the i 'th individual, x_i , does not necessarily equal the true value of X_i , the error being equal to e_i . Thus:

$$x_i = X_i + e_i$$

The e_i 's can be positive or negative, and can of course be equal to zero. Errors can be introduced during editing or coding, but they arise more commonly in the collection of data in the field. Much of the discussion in other parts of this Handbook is directed at minimizing these errors.

In a simple one-independent variable regression model, the 'true' value of its parameter b , is related to the calculated value $\hat{b}$, by the equations:

$$b = \frac{\hat{b}}{R} = \hat{b} \frac{1}{R}$$

where R is the 'reliability' of the measurement of the independent variable. This result is sometimes referred to as the 'attenuation' effect.

$$R = \frac{\text{variance of } X}{\text{variance of } X + \text{variance of } e}$$

The variance of e may be expressed as a proportion of the variance of X :

$$\text{Var } e = k \cdot \text{var } X.$$

Then $R = 1/(1 + k)$, and $1/R = 1 + k$. Thus if $k = 0.1$, the calculated value, $\hat{b}$, should be multiplied by 1.1 to correct for the attenuation effect. The value of k may be as high as 0.2 or 0.3, particularly when attitudinal and perception questions or long recall periods are involved.

The situation is more complicated with multiple regression. As an example, Cochran calculated the following table:¹³

13. W.G. Cochran, "Errors of Measurement in Statistics," *Technometrics* 10(4), 1968, p. 657.

Table 12:

Values of $\hat{b}_1, \hat{b}_2$ When $b_1 = 2, b_2 = 1$ (R₁ and R₂ are the reliabilities of the two independent variables and r is their correlation).

R ₂		r = + .3			r = - .3		
		R ₁ = 0.6	0.8	1.0	R ₁ = 0.6	0.8	1.0
0.6	$\hat{b}_1$	1.25	1.68	2.13	1.10	1.48	1.87
	$\hat{b}_2$	0.74	0.66	0.58	0.44	0.51	0.58
0.8	$\hat{b}_1$	1.20	1.63	2.06	1.13	1.52	1.94
	$\hat{b}_2$	0.99	0.89	0.78	0.59	0.69	0.78
1.0	$\hat{b}_1$	1.15	1.57	2.00	1.15	1.57	2.00
	$\hat{b}_2$	1.25	1.13	1.00	0.75	0.87	1.00

Even if the second variable is measured *without* error, it will be seen from the bottom row that $\hat{b}_2$ can still over or under estimate b_2 .

Measurement errors add considerably to the problems of using ratio variables in regression models.¹⁴ A recent review of this issue produced the following results:¹⁵

14. A ratio variable arises, for example, if the ratio of food expenditure (labelled Y, say) to total expenditure (Z) is regressed on total expenditure (Z)—that is, Y/Z is regressed on Z.
15. S.B. Long, "The Continuing Debate over the Use of Ratio Variables: Facts and Fiction", *Sociological Methodology*, 1980, p. 55.

Table 13: Effect of Random Measurement Error on the Correlation Between a Ratio (Y/Z) and Its Common Component (Z) Where the two are Linearly Related

Error Variance in Z as % of Total Variance	Error Variance in Y			
	None		Same Proportion as in Z	
	Correlation <i>r</i>	Slope <i>b</i>	Correlation <i>r</i>	Slope <i>b</i>
0.00	1.000	1.000	1.000	1.000
0.05	0.899	0.901	0.812	0.901
0.10	0.797	0.798	0.660	0.798
0.20	0.586	0.588	0.420	0.588
0.30	0.368	0.372	0.232	0.372
0.40	0.139	0.143	0.075	0.143
0.50	-0.101	-0.109	-0.065	-0.109
0.60	-0.346	-0.433	-0.203	-0.433
0.70	-0.351	-2.315	-0.316	-2.315

When the measurement error is substantial it will be seen that both *b* and *r* (the estimate of *r*) have the wrong sign.

Unfortunately, it is difficult to estimate response errors in individual surveys without complicated schemes involving interpenetrating samples (see Part 7), a special section in the pilot survey, or a post-enumeration survey. For enumerators dealing with similar groups of respondents, the variability within enumerators' results for a variable may be compared with the variability between enumerators' average results. Details are complex and a discussion will not be attempted here.

In conclusion, it should be emphasized that correlation and regression methods remain essential. However, the accessibility of computers has led to a proliferation of superficial analyses — improperly screened data fed into package programmes followed by mechanical interpretations of the results. The way in which even experts can disagree about the appropriate methods and the interpretations of results shows the scale of the problems; and the warnings in this section may help to prevent some mistakes.

DATA PRESENTATION

10.1 From Data to Information

The data collection and processor sometimes forget that the users require information, briefly and clearly presented, rather than large volumes of indigestible figures. Project management and planners reviewing project performance need decision-oriented information from monitoring and evaluation systems; it is the task of those responsible for these systems to turn data into such information.

Failure to effect this metamorphosis can range from complete break down to just missing the final step, as illustrated by the following examples.

- a. data remains on the questionnaires, unanalyzed and valueless;
- b. magnetic tapes containing large data files are prepared but they remain unusable due to lack of proper validation procedures or documentation;
- c. tabular printouts, large in volume, long in detail, lie in files gathering dust in the data library;
- d. reports contain adequately presented summary tables derived from a baseline survey, but are available to the user only at the end of the project; and
- e. reports are full of tests of significance, analyses of variance, correlation matrices, etc., but do not set out any conclusions or suggest a range of options for action.

Converting data into information for presentation to the user is facilitated if the following guidelines are observed:

- a. The appropriate levels of detail and disaggregation will vary according to the different levels of user;
- b. The definitions of variables and tabular headings must be clear to the user who will not always have either a numeric background or technical knowledge of the topics discussed;
- c. The depth of statistical analysis must be geared to the level of user;
- d. The tabular layout, including the use of averages, dispersion indices, ratios, etc., should be simple and clear — a set of simple two-way tables may be better than a complicated four-way cross-classi-

fication with each cell containing entries for absolute numbers, percentages, means, etc.;

- e. Text accompanying tables should summarize the main highlights revealed by the tables, indicating the conclusions that may be drawn; and
- f. Graphical and other diagrams will be particularly useful in focusing the user's interest and aiding his understanding.

10.2 Presentation of Information

The following essential questions must be borne in mind:

- a. to whom is the material addressed?
- b. at what time and with what frequency is it required? and
- c. in what form should it be given?

The recipients of monitoring and evaluation information include

- a. the field-level official of an agency contributing to the implementation of a component of the project;
- b. the project manager;
- c. the interagency coordinating committee;
- d. the sectoral planner;
- e. senior officials at the national ministerial level; and
- f. donor agencies.

In general, as one moves along this scale, the information presented needs to be briefer, less demanding in the technical knowledge required by the recipient, and more oriented to presenting conclusions and options for decisions. This is not to say that the sectoral planner, for example, may not then call for the original data files in order to carry out further detailed analyses. But, the further the user is removed from a specific project, the more likely it is that many similar reports of a variety of projects pass across his desk; the initial perusal to identify the ones requiring further study is assisted if they are succinct.

Timeliness at an agreed frequency is the key to successful information transmittal. The most informative report is useless if the decision to which it should have contributed has, of necessity, already been made. The frequently encountered lack of reliance by the project implementers

on their monitoring or evaluation units is usually due to a lack of confidence, based on experience, that the information required will be available when it is needed. If the emphasis in this Handbook on simple data collection procedures using appropriate sources and methods is followed, timeliness will be more likely.

The availability of information, at the right time is also facilitated if the information needs and their timing are identified at an early stage. If a longitudinal study is launched using large samples, it is clearly impossible to report much in the way of results for a considerable time. Perhaps a different type of survey was required. The results of an objective measurement of crop yields cannot, by definition, be made available in advance of harvesting. If crucial decisions must be made before the harvest, and these require estimates of likely production, it is a crop forecast survey that is required as a supplement to, or substitute for, the later, more accurate effort.

Frequency of information transmittal is a matter for agreement between user and analyst, although their agreement will be worth little if the data collection and analysis mechanism cannot be designed or adjusted accordingly. Simple information on routine implementation progress may be required weekly or monthly. Moving averages of input data may be reported monthly or quarterly. Seasonal or cyclical data surveys should be organized to facilitate reporting within a fixed period of the events being recorded, as agreed in advance to meet user needs. Case studies and ad hoc problem-oriented surveys will not fit into a regular reporting schedule, but must be operated against deadlines for completion.

Quarterly, half-yearly, or annual reporting will occasionally match the frequency required to meet main user needs. More often, such fixed reporting cycles are inappropriate for this purpose. Flexibility must be the keynote. Approximate estimates, handwritten, if necessary, may be invaluable if available on schedule.

Above all, the detection of an unexpected phenomenon, whether as a by-product of routine data analysis, or as the result of a field visit, must be reported immediately, whatever the normal schedule. To wait until the full survey report is ready is erroneous and to bury significant findings among routine material is unforgivable.

The approach to information transmittal should therefore, be one

of willingness to communicate provisional and approximate findings if they are significant. Unfortunately, those fearful of making a mistake tend to err on the side of caution. Careful checking of surprising facts, deliberate appraisal, and avoidance of jumping to conclusions are all valuable attributes. But some willingness to make the best judgement possible on the basis of whatever evidence is currently available is also necessary.

Evaluation, which is a more deliberate process, can work to a less demanding time schedule. Greater depth of analysis and a more thorough presentation will be required. Nevertheless, events may occur that require the evaluation effort to be advanced or accelerated in order to appraise likely consequences including the need for modified implementation procedures.

Project information can be transmitted in a number of ways:

- a. verbal, informal communication;
- b. regular updating of charts or graphs on the office wall;
- c. formal presentation at project meetings;
- d. memoranda detailing important and urgent findings;
- e. regular reports of a briefing or summary nature;
- f. formal reports of survey results;
- g. analytical reviews of the project data base; and
- h. specific problem analysis with recommendations.

The more formal reporting will be considered in the next section. What, however, is often neglected are the verbal and graphical modes of communication.

Regular updating of a graph on the manager's office wall, showing deliveries of inputs against targets, may be seen by the manager as a significant contribution of the monitoring system. Passing computer printouts through the internal mail is no substitute for a half-hour opportunity to meet with the manager and guide him through the printouts, drawing attention to the highlights. Not only is this useful in itself, it also serves to familiarize the manager with unaccustomed data configurations so that, in time, easy reference is made, even without a personal presentation. The possibility of developing this kind of relationship depends on the integration of the monitoring team into the management structure.

10.3 Reporting

Monitoring and evaluation reports of various types will be needed. The required format of a report depends not only on the type of user for whom it is written, but also the source of the information to be conveyed.

Reports of field trips need to be prepared immediately on return, covering such items as the itinerary, meetings held, observations made, and general impressions gained, together with recommendations for appropriate action.

Results from studies or surveys need to be embodied in the report, even though faster methods may have been used to communicate pressing, significant findings. Such reports must describe the issues investigated, the methodology of the study, the tabulated results, and the findings.

Collection of time-series data for evaluation purposes may have no formal end-of-survey timepoint. Analyses of these series will, however, need to be conducted periodically and the emerging trends reported in the form of updating previous analyses. Comparisons over time will be the focus of such reports and the analyses need to be conducted in some depth and with statistical rigor.

Finally, there are the regular periodic "state of the project" reports, bringing together all relevant materials from the various sources described in Part 5, ranging from administrative records to the major beneficiary surveys. These reports concentrate on presenting an overall view of project progress and provide the means for decisions on adjustments or alterations in project targets and implementation procedures. The periodicity of these reports, e.g., semi-annual or annual, is a matter for decision at the beginning of the project. It should not be so frequent as to absorb an excessive amount of the senior staff's time, thus endangering the maintenance of the quick, regular communication of items of current importance, as described in the previous section.

In view of this wide range of reporting needs, it is not possible to set out a recommended report layout. However, certain guidelines can be offered that are of general validity.

a. Presentation of Data

Different users require different degrees of detail in the data included in a report. Summary tables and graphs will meet the requirements of many, but others will need to refer to the less aggregated and unrounded data in order to carry out further analyses. Within a project this is not a major problem, the report should provide a summary, with a reference to the source data files or computer printouts to which the project staff have access. For higher authorities, the summary will almost certainly be sufficient; although, here too, the potential for access to the files remains. It should be noted that access to the master files by users other than those immediately responsible should be according to an agreed clearance and approval system. Issues of confidentiality of the data may arise, and if the files are maintained on computer discs or tapes, the security of these needs to be allowed.

As well as providing summary tables, the report will contain summary measures of the distributions of the data in the tables. Introductory comments on certain of these measures have been given in Part 9. The writer of the report must bear in mind that many users of the data will not be aware that misleading conclusions can be drawn from even simple parameters. A simple arithmetic mean of a highly skewed distribution may lead to erroneous deductions by the user if his attention is not drawn to the skewness, or if an alternative distribution-free measure, such as the median, is not used in conjunction with it.

Consider, for example, the following incomes as measured before and after an intervention (only ten results are shown for convenience but the point made is valid for any size of data file):

Table 14: Income per Beneficiary

		Income	
		Before	After
Beneficiary	1	20	5
	2	50	75
	3	30	25
	4	40	40
	5	35	30
	6	25	30
	7	80	140
	8	30	25
	9	60	100
	10	30	40
Total:		400	530
Mean:		40	53
Median.		30	30

The mean has increased sharply due to the large increase achieved by those beneficiaries (Nos. 2, 7, and 9) who were already the richest; the median is unchanged.

The use of percentages may also confuse, unless carefully used. It is common practice to show individual cell percentages in a two-way table so that the summation to 100 is only achieved by adding both across rows and columns. Most users are unable to glean much from this as there is an automatic tendency to expect percentages to sum to 100 in one direction only, i.e., either vertically or horizontally. If this option is chosen, the choice of direction may be important. Take a simplistic example of a sample of 400 farms in three areas, classified by the number of parcels of land making up the holding.

Table 15: Number of Farms by Number of Land Parcels

No. Parcels	location			Total
	A	B	C	
1	100	20	16	136
2	60	60	24	144
3	40	40	40	120
Total	200	120	80	400

Little may be detected from a casual examination of this, except that there are more farmers in Area A. Consider, however, Table 16, expressing the same data in percentage form for each area.

Table 16: Percentage Distribution of Parcels by Area

No. Parcels	Location		
	A	B	C
1	50	17	20
2	30	50	30
3	20	33	50
Total	100	100	100

This clearly reveals that farmers in the three areas have very different distributions, in terms of fragmentation of holdings, with the modal number being 1, 2 and 3, respectively. On the other hand, to run the percentages across the rows would reveal nothing, except possibly the larger size of Area A.

Simplistic though these examples are, there have been many real cases where a wrong choice of the direction for calculating percentages masked the story that the figures had to tell.

If grouped frequency tables are used, it is advisable to keep the width of each class interval the same, with the exception of an open-ended highest value class. Varying class intervals may lead the user to draw wrong conclusions about modality or the skewness in the distribution.

b. Attribution of Accuracy and Significance

Whether the data presented originate from records, case studies, or sample surveys, the presenter should discuss the likely accuracy of the data and indicate which findings are significant in view of the margins of error involved.

The analysis of administrative records may present little difficulty if based on an examination of the total file which supposedly includes all relevant cases. The quality of the record-keeping may, however, be variable and such variations should be noted.

Case studies, as discussed in Part 6, present the reporter with a difficult decision regarding the general validity of the findings based on a very few cases. As discussed, it will not usually be possible to make inferences from a limited number of cases (perhaps purposively selected), to the population at large. This is certainly true for numeric estimates of totals, ratios, etc. However, a case study will have the objective of studying the internal relationships of the variables that cause a particular phenomenon to occur. If a consistent pattern emerges, a plausible inference may be made as to the causality of the phenomenon, which, it may be suggested, is likely to be repeated in other cases where the circumstances are similar. That is to say, inference of causality and relationships may be made in a general way on the basis of plausibility, as long as a suitable cautionary note is struck. For example, a case study may examine in depth a few farmers who adopted a certain project recommendation and a few who did not. Assume it is found that the reluctance to adopt the new pattern of farming was due quite logically to the perception of a labor constraint at a particular period when the new practice makes heavy demands. Assume also that the adopters have more family labor available than the nonadopters and did not perceive the same constraint. The conclusion that adoption/nonadoption is affected by the availability of family labor may be a plausible inference for the general population in the area, even though the numbers affected by limited labor availability cannot be calculated from the study.

The communication of such findings requires skill in interpretation and presentation. The temptation to claim too much must be resisted, particularly, when the pattern is inconsistent and blurred by a range of extraneous factors. It may be a worthwhile conclusion that no discernible pattern exists — at least one set of hypotheses can be rejected, avoiding concentration by management on the removal of an irrelevant constraint.

Results from sample surveys, properly designed and executed, enable numerical inferences to be made to the population at large with calculable margins of sampling error attached. The procedures for doing so were introduced in Part 7, although from the different perspective of calculating the required sample size for a given sampling error. The formulae for calculating the error margin for any sample design are to be found in standard texts on sample surveys.

Having calculated the sampling error, the question arises of determining which estimates are significantly different, either from one another, or from a standard of comparison, so that conclusions may be drawn with reasonable confidence. Again, the techniques are to be found in the standard texts. What is emphasized here, as in Part 7, is the danger that the reporter may set too demanding a standard before describing a result as significant. The use of the "classic" 95% confidence level implies that any statement of a significant change or difference has a very high chance (19:1) of being correct. Without a recommendation emerging from the survey, an existing procedure may be maintained when there is, let us say, a 3:1 chance that a change would be beneficial. Or, if decision must be made, the manager may be forced to reply on subjective judgements unaware that the data showed a strong, but less than certain support, for one particular course.

The relative costs of making a change when it should not have been made, as compared to leaving unchanged a procedure that required changing, are the determinants in deciding the level of confidence to be attached to significance testing. In one case, the cost of making a change may be very high. Considerable confidence in the evidence for making such a change will reasonably be demanded. In another, little may be lost in making a procedural change, whereas, to let matters "drift" may amount to bad management. The decision to change in this case does not require full confidence in the significance of the evidence for it.

Often the implications of the survey data are not perceived in such a major decision-making role. In simpler terms, the user may look at a table of figures wanting an answer to the question: "Am I on the right track; are yields rising?" An answer: "probably, yes", implying a better than even chance that it is so, may serve a more useful purpose than a conservative, "not known", based on the use of rigorous confidence standards. Such an answer must, of course, be based, not only on the actual increase, but also after consideration of past variability.

Sampling errors can be calculated; nonsampling errors often cannot. Yet, as discussed in Part 7, these may be crucial in any consideration of the accuracy of the estimates presented. The author of the tables should have an intimate knowledge of the source, methods used in collection, problems in analysis, etc. It is a responsibility, therefore, to provide an assessment of the likely biases and observational errors that may affect the results; even though such an assessment lacks the mathematical support that the sampling error calculation commands. To state that the estimate of output is X with a standard error of, say, 4 percent, leaving unstated the suspicion that the measurements were seriously biased, is to portray a totally spurious impression of accuracy. A description of the survey procedures, design, methodology, nonresponse rate, practical problems, results of field checks, etc. may serve the purpose. But, as most readers may skip such introductory sections, the reporter needs to comment on the implications of these in the text accompanying the tables.

c. The Use of Advanced Statistical Techniques

Some of the tools available to the analyst have been introduced briefly in Part 9. Many of the techniques available are powerful, but the results are easily misunderstood by the nonprofessional statistician, into which category most readers will fall. What is necessary is to communicate the significant findings in an intelligible manner, helping the reader through the technical details. This brings the discussion to the question of the style of the text in survey reports.

d. The Text

The text accompanying the numerical data presented in a report is intended to supplement the tables and thus assist in the process of converting the data into information. The method of presentation of the essential supplement and the style in which it is written will vary according to the writer; there is no harm in, and much in favor of, such individuality, as long as the ultimate objective of conveying the information clearly to the intended user is achieved.

A report should contain the following information:

- a. the topics under discussion;
- b. the source and reference period of the material presented;
- c. the design and execution of the survey (if a survey was involved);
- d. a summary of the data;

- e. the necessary comments regarding the accuracy of the data;
- f. a review of the highlights and implications of the data; and
- g. where appropriate, the drawing up of options for decision-making.

The order in which these sections are arranged needs careful consideration. Section (f) and (g) may be given as a summary at the very beginning of the report — taking maximum advantage of the reader's limited timespan of concentration on the particular report. If the findings are important enough, the further attention of the reader to the body of the report may be secured. The background description contained in (b) and (c) may be relegated to appendices or retained as the necessary introduction at the beginning of the main body of the report. Within the report itself (d) may be a very succinct presentation with the more detailed tables also appearing as appendices.

It is, however, important to accompany each summary table with a paragraph or two of text, drawing attention to the facts of significance, providing indications of their likely reliability, and setting them in their correct perspective in the context of the information contained in other tables. The alternative is to consolidate the text in one section and the tables in another. This is usually the less desirable alternative, for two reasons. First, the general reader may not refer to the tables when reading the text, so that the impressions gained are divorced from the underpinning provided by the actual figures. Second, many users of the report may turn directly to the tables in order to obtain a figure or set of figures. The text, with its insights and caveats will not be referred to, leading to a danger that the data will be misinterpreted. If the text and tables are integrated, these dangers are, at least, minimized.

The text in reports of this kind should be short and spare in style. The arguments which the report sets out should have a focus and a sharpness in their presentation. Side issues should be treated separately and not allowed to confuse the development of the main thesis. Brevity, however, does not release the writer from the need to indicate his assessment of the evidence; rather, the briefer and more aggregated the presentation, the more important becomes the role of the writer in guiding the reader to the correct interpretation. Highly aggregated summary tables cannot be further examined or investigated by the reader; it is important, therefore, that the writer provides the necessary explanatory comments.

The user of a report, whether it is short or long, is asked to take certain things on trust, namely, that the reporter has been objective and

frank in the way the facts are marshaled. It may be assumed that deliberate falsification has not been introduced, but selective omission of contradictory evidence, removal of data from their limited context in order to generalize, and failure to report the possibility of biases may produce, indeed, a false picture.

The monitoring and evaluation officer may judge his success in communicating useful information by the extent to which he is accepted as a vital and integral part of the management team.

INDEX

A

- Administrative records, 18, 36, 51, 55, 71, 82-84, 89, 138.
- Adoption rates, 5, 10, 16, 36-39, 53, 55, 139
- Amenities, access to, 43-45
- Anthropometric indicators, 35, 43-45, 55, 92

B

- Baseline survey, 2, 8-10, 27-29, 47
- Beneficiaries, 2, 3, 5-10, 14, 18, 36-39, 46, 51, 89, 93
- Bias, 31-34, 41, 71, 79-81, 84, 87, 88, 91, 92

C

- Case studies, 10, 28, 29, 40, 41, 43, 51-58, 62-68, 72, 92, 138, 139, or sample surveys, 53-56
- Casualty, 3, 7, 20-23, 27-29, 52, 58, 63, 109, 127, 128, 138, 139
- Chi-squared, 125, 126
- Computers
 - use of, 15, 87, 109-112, 131, 132
- Confidence limits, 28, 75, 76, 113, 128, 139, 140
- Correlation, 78, 119, 123-125, 127-131
 - intra-class, 85, 86
- Credit, 36-39
- Crop
 - production, 3, 33-35, 39-41, 79, 92, 93
 - yields, 32-35, 40, 41, 76, 79, 80, 91, 92
 - prices, 33, 42, 56, 91-93
 - area, 33-35, 40, 41, 50-65, 91
 - marketing, 33-35, 41, 42, 91-93

D

- Data analysis, 4-8, 10, 14, 18, 26-29, 35, 39, 47, 50, 78, 89, 90 109-131, 135
- Data collection, 4-9, 25-30, 34-36, 47-49, 57-59, 74, 89-111
- Data presentation, 113-142
- Data processing, 36, 109-131
- Data sources, 47-56
- Demographic & vital statistics, 43-46
- Direct observation methods, 57-68, 90-93

E

- Effects, 3-5, 7, 32-58
- Enumerators, training of, 45 102-107
- Evaluation, 1-10, 20-29, 134
 - and research, 65
 - indicator for see Indicators
- Experimental model, 20-29, 52

F

- Farm management studies, 37, 41, 52 54, 55

G

- Gini coefficient see Inequality
- Guidelines for Design of M&E. 1

H

- Health, indicators of, 43-45, 55, 91, 92
- Hierarchical community structure, 57-59
- Holding, 45, 50
- Household, 41-43, 45, 46, 50, 66, 70, 71

- I**
- Impact, 3-7, 24-27
 - Income & expenditure, 3, 7, 31-33, 42, 43, 94
 - Indicators, 9, 10, 16, 26, 29-46, 66, 67, 79, 89-92
 - for monitoring, 35-39
 - for evaluation, 39-45
 - Inequality, 119-122
 - Inputs, 2-6, 32, 36, 58
 - Interviews with survey respondents, 54, 55, 61, 62, 78, 89, 90, 93-98
- Lorenz curve see Inequality
- M**
- Mean square error, 79-81
 - Memory, 34, 40, 41, 59, 93, 94
 - Modus operandi method, 20, 21, 28
 - Monitoring, 3-6, 10-19, 35-39
 - indicators for see Indicators
 - Monitoring & evaluation, 1-5, 8-13, 29, 30, 33, 45-50
- N**
- Non-sampling errors, 69, 79-81, 91-93, 128-131
 - Nutritional status see Anthropometric indicators
- O**
- Odds ratio, 123, 124
 - Outputs, 3-7, 14, 32, 39-41
- P**
- Percentages, 137, 138
 - Project design and implementation, 1-11, 18, 47
 - Project management, information needs, 1-8, 11-19, 50, 132-142
 - Project objectives, 2-4, 6, 7, 13, 14, 17-20, 30, 31, 36
- Q**
- Quality of life, 3, 6, 43-45, 70
 - Quasi-experimental designs, 20, 25-29, 52
 - Questionnaires, 8, 9, 53, 54, 90, 94-111
- R**
- Rapid assessment, 34, 51, 52, 55, 59-62, 72
 - Recall period, 9, 40, 43, 59, 93-95
 - Regression analysis, 124-131
 - Reporting, 12, 18, 36, 64, 132-142
 - Response, 2, 6, 7, 89, 90
 - errors see Non-sampling errors
- S**
- Sampling
 - general, 69-88
 - probability, 8, 52, 70-74
 - purposive, 8, 9, 52, 72-74
 - quota, 9, 72-74
 - simple random, 77, 81, 86
 - cluster & multi-stage, 71, 78, 81, 84-86
 - stratification, 81-86
 - systematic, 81, 83, 84
 - self-weighting, 81, 87
 - interpenetrating, 81, 87
 - rotation of, 78, 79
 - size of, 26, 75-88
 - unit for, 70, 71, 74, 78, 79, 81-88
 - frame, 70, 71, 74, 81-88
 - Shelter, 43-45
 - Socio-economic indicators, 7-10, 22, 31, 35-37, 42-46
 - Standardization, 126-127
 - Surveys, 7-11, 14, 16, 26-29, 34, 35, 39, 43, 51-56, 69-88, 90, 94-97, 138-140
- T**
- Two-by-two tables, 122-126
- U**
- Users of information, 4, 77, 79, 132-142
- V**
- Variable see indicators
- Y**
- Yule's Q, 123, 124

SELF ASSESSMENT QUESTIONS

1. What are the types of data which you would require to monitor and and evaluate an education project?
2. What sampling procedures would you recommend for collecting data about a project for its evaluation?
3. What is the difference between monitoring and evaluation of a project?
4. What are the methods and techniques which you would like to use for collection of data?
5. What problems do you foresee in monitoring and evaluation of projects?
6. What measures would you suggest to facilitate monitoring and evaluation of education projects?

SUMMATIVE EVALUATION OF PROJECTS

**By
Dr. M. Athar Khan**

ACKNOWLEDGEMENT

The specimens of the executive summaries given at the end of this unit have been reproduced from "Executive Summaries of Evaluations and Special Studies Conducted for A.I.D. in Asia in Fiscal Year 1985" published by the Bureau for Asia and the Near East Office of Development Planning, Agency for International Development, Washington D.C.

M. Athar Khan

CONTENTS OF THE COURSE

Preface

Introduction

BLOCK 1:

Unit No.1: The Project Manager's World

Unit No.2: Fundamentals of an Education Project

Unit No.3: The Project Planning Process in Pakistan

BLOCK 2:

Unit No.4: The Logical Framework : an aid to the Design and Review of Projects

Unit No.5: Case Studies Illustrating the Use of Logical Framework

Unit No.6: Implementability of Projects; Project Environment

BLOCK 3:

Unit No.7: Work Plan for Implementing a Project

Unit No.8: Scheduling of Resources

Unit No.9: Project Personnel Organization and Management

Unit Nos.

10-11 Strategic Management of Development programmes

BLOCK 4:

Unit No.12: Monitoring and Evaluation of Projects-I

Unit No.13: Monitoring and Evaluation of Projects-II

BLOCK 5.

Unit No.14: Summative Evaluation - Evaluating the Impact of the Projects

Unit No.15: Case Studies Illustrating Summative Evaluation of Selected Education Projects

OBJECTIVES

After studying this unit, you, the student, should be able to:

1. explain the meaning and purpose of summative evaluation of projects,
2. appreciate the need and value of project evaluation,
3. Discuss the types of project evaluation and their uses for different education projects,
4. know and use the methods and techniques of project evaluation,
5. visualize the problems of project evaluation and conceive appropriate measures to overcome them.

ACKNOWLEDGEMENT

OBJECTIVES

INTRODUCTION

1. What is Summative Evaluation

- Example 1 “Integrated Functional Education Project”
- Example 2 “The Improvement of Existing High Schools in Sind”
- Example 3 “Allama Iqbal Open University”

2. Objective of Summative Evaluation

3. Types of Summative Evaluation

3.1 Informal Evaluation

3.2 Merits of Informal Evaluation

3.3 Some Useful Hints

3.4 Limitations of Informal Evaluation

3.5 Formal Evaluation

4. Evaluation and Research

4.1 Defining the Objectives or Formulating Key Questions

4.2 Preparing a Plan for Evaluation

5. Problems of Project Evaluation

6. Some Useful Hints about Summative Evaluation of Projects

7. Writing an Evaluation Report

23

8. SELF-ASSESSMENT QUESTIONS

25

Books Suggested for Further Study

Annexure

INTRODUCTION

This study unit on "Summative Evaluation of Education Projects" has been designed to acquaint the students of the course "Project Implementation, Monitoring and Evaluation" with the meaning, purpose, uses, methods and problems of project evaluation. Therefore, in this unit, it is intended to develop in the student an appreciation for project evaluation and enable him to independently design and conduct project evaluation and also to enable him to supervise a project evaluation exercise if his or her job so demands.

In order to make the contents of this unit practicable, the author has based them mostly on real experiences of evaluation of several education projects in Pakistan which were to be carried for the Ministry of Education, Departments of Education and international agencies. While studying this unit, the student, therefore, will come across references to familiar education projects. Wherever essential, theoretical information has been given to explain certain phenomenon of project evaluation. But in cases where such a theoretical discussion has been inevitable, attempt has been made to link it with what is practical, thereby bridging the gap which usually exists between theory and practice.

Nevertheless, it is to be remembered that a course unit of this size is not sufficient to equip the students with the very basic information and skill about project evaluation. In order to develop greater competence in project evaluation, therefore, the student is advised to study standard books on the subjects of educational research and statistics. The EPM-507 "Educational Research and Statistics" course which is being reproduced under the title "Research for Planning and Management" contains useful material on methods and statistics. At the end of this unit a list of some good books on research and statistics has been given for the guidance of the students.

1. WHAT IS SUMMATIVE EVALUATION

The term "Summative Evaluation" denotes the worth or value of a project on its completion. In the context of education projects the summative evaluation would refer to the project inputs in relation to the impact of the project on the education sector development in general or particularly on the beneficiaries of the project such as students, teachers, community, educational institutions or organisations. Following are the examples which illustrate the summative evaluation in education sector projects:

EXAMPLE 1:

The Project: Integrated Functional Education (IFE) Project:

Project Description: The project focussed on developmental efforts which integrate education with aspects of the rural life such as agriculture, household, social relations, health and hygiene etc. The project units were set up in various parts of the country to experiment on the methods and materials developed and used to achieve the objectives of the project. Each project had to be completed in a given period of time which was termed as a project cycle.

Evaluation: On completion of the project cycle, evaluation reports, based on the relevant data about the project were prepared to assess the merits or value of the methods and materials developed and used in the project in the developmental effort of rural masses. The impact of the project was to be assessed in terms of the benefits which the beneficiaries of the project (i.e. the local people) received.

EXAMPLE 2.

The Project: The Improvement of Existing High Schools in Sind

Project Description: The project was designed to improve in the selected High Schools of Sind the facilities such as buildings, furniture and equipment with the purpose in view to improving the intake capacity and quality of education in these institutions. The project was expected to be completed in 36 months at a total cost of Rs. 10.39 millions.

Evaluation: The summative evaluation of the project if carried out, should have focussed on the achievements of the project targets in terms of improvements of the provisions of buildings, furniture and equipments and also in terms of their impact on the student enrolments and quality of education in those institutions. Other information in this regard could have been obtained about the accuracy of cost and time estimates, external environmental factors and management system and procedures which influence the implementation of the project etc.

EXAMPLE 3:

The Project Allama Iqbal Open University

Project Description: The University was set up to provide educational facilities to the masses through correspondence course; tutorials, seminars, workshops, laboratories, TV and Radio broadcasts and other media of mass communication. The project was conceived initially for a period of five years with limited objectives to be achieved.

Evaluation: On completion of the period of the first five years, the summative evaluation of the project would have been conducted to assess the effectiveness of the system of education of the Allama Iqbal Open University in achieving the objectives for which it was established, its effectiveness as an institution of mass education and its internal and external efficiency.

It is to be noted that in projects like Allama Iqbal Open University the project usually doesn't end after a certain period but it continues indefinitely. In such cases the summative evaluation is carried out at suitable intervals of time.

2. OBJECTIVES OF SUMMATIVE EVALUATION

The summative evaluation is based on sum-total of information about a project on its completion or on completion of its phases. It is aimed at judging the overall merits of a project to make decisions about it. While facilitation of decisions about a project is the main purpose of summative evaluation, the following are its specific objectives:

- i. Assessment of extent to which project objective have been achieved.
- ii. Determining cost effectiveness of a project.
- iii. Diagnosis
- iv. Determining relevance between the plan goals, programme targets and outcomes.
- v. Feedback
- vi. Policy review

(1) Assessment of Extent to which Project Objectives have been Achieved

Any development project in education or other development sector has certain well defined objectives or targets which are intended to be achieved through it. The project organisation, its management system, resources are all meant for achievement of these objectives. Whether or not these objectives have been achieved in full can be determined only on the completion of the project during its operation.

(2) Determining Cost Effectiveness of a Project

All projects consume resources which cost money in one or the other form. The cost of a project is in fact, an investment for development. On completion of the project it is the outcome of a project or the project impact which provides a criterion for judging whether or not the outcomes of the project justify the investment.

(3) Diagnosis

The summative evaluation serves as a means to diagnose the problems which would have been encountered during the implementation of the project and which could only be realised after the project has been completed. This aspect of the summative evaluation focusses on:

- a. efficiency of the project implementation work-plan;

- b. efficiency of the system within which the project management organization operates;
- c. factors influencing the implementation of the project;
- d. project management organization and system;
- e. problems of project management.

(4) Determining Relevance Between the Plan Goals, Programme Targets and Project Outcomes

The summative evaluation of a project yields information which helps ascertain the relevance between the goals of national development plans and the project outcomes on the one hand and on the other hand it helps determining the contribution of the project in the overall achievement of the targets of development programmes of education and other sectors. Since education is a means to national development in general the relevance of the project outcomes has to be viewed in the larger context of national development. However, if essential this could also be restricted to education sector development only.

(5) Feedback

The information obtained through the summative evaluation of a project provides a feedback on project implementation, its operation and outcome to the project management organization and helps decision making for future projects and for improvement of project implementation and operation.

(6) Policy Review

The findings of a summative evaluation of projects help policy reviews in education at higher level of the management of education system.

3. TYPES OF SUMMATIVE EVALUATION

The summative evaluation of education projects may be classified under several types according to the method and data used for evaluation. Following are the common types of summative evaluation:

- i. Informal Evaluation
- ii. Formal Evaluation

It is, however, to be remembered that these classifications according to the types of summative evaluation are not mutually exclusive. In practice these classifications often overlap and in most cases a comprehensive evaluation of a project includes the elements of all the four types. In certain cases it may even be difficult to separate one from the other. However, for the purpose of explanation and to specifically describe their place and importance in project evaluation. They are described in detail as follows:

3.1 Informal Evaluation

The informal evaluation refers to the evaluation of project impacts or outcomes on the basis of evidences commonly observable in a given situation, or in cases it may be based on personal experiences of individuals which are often related in unconventional situations. The informal evaluation is, therefore, unplanned, superficial and incidental. It usually reflects personal experiences, observations or hearsays and it's usually characterised by a sort of vagueness or bias. For example Mr. 'A' was associated as a consultant with an education project 'X' in the early formative days of the project. On completion of the project, as he met some of the project management staff members he expressed to them his inquisitiveness about what the achievements of the project had been. The information which he received about the project was as follows

Mr. 'B': "It has been very successful."

Mr. 'C': "There have been many improvements in the Primary Schools in the project area. Students retention rate has increased; there is a greater participation of female children in primary education.

Mr. 'D': "I see remarkable improvement in teacher efficiency. The experiment has proved to be a success."

Mr. 'E': "In my opinion the project has not achieved its objectives because of frequent changes in the high level management of the project and non-cooperation of other organizations."

Mr. 'F': "It has been a white-elephant project which consumed a lot of benefits to the education system."

Mr. 'G': "As most education projects of the country, it has been a victim of faulty planning and mismanagement."

Mr. 'H': "There should have been some better use of resources wasted in this project. Greater benefits of this project went to the persons who did not contribute anything to the project to achieve its objectives."

On the basis of such remarks and observations about the project and his own limited knowledge about the project Mr. 'A' concluded that the project had achieved little which was not worth the money spent. The following points about the summative evaluation of a project emerge from the observations of Mr. 'A' and his friends.

- a. The questions asked by Mr 'A' would not have been carefully worded and specified which resulted in different responses from his friends;
- b. Mr. 'A' had no definite objective before him while enquiring about the project outcome;
- c. The persons responding to his queries knew that his enquiry meant nothing except his personal interest in the project with which he had been once associated;
- d. If it helped Mr 'A' to evaluate the outcome of the project it was certainly never intended to be used for making decisions about this or other projects or for any other purpose;
- e. The answers of different people to Mr 'A's queries reflected their personal views and experiences;
- f. The responses were neither recorded nor were they given any statistical term to determine their value and worth;
- g. The persons contacted by Mr 'A' constituted a symbol of convenience and didn't necessarily represent the common opinion;
- h. The findings were not to be written down for reporting;

- i. The responses were lacking in accuracy, details and specificity.

3.2 Merits of Informal Evaluation

Although this kind of informal evaluation of project outcomes doesn't tell much about the specific outcomes, impacts or efficiency of the operation of a project, it provides a situation where people, particularly men in the project management organizations really open up and they are often apt to tell the inner stories which cannot be known otherwise and which have a lot to reveal about the project and help evaluate the project.

3.3 Some Useful Hints

As pointed out above, the informal evaluation of projects has merits of its own. But in order to make it really worthwhile the evaluator should keep in view the following points:

- a. Clarity of Purpose. The evaluator should have a purpose in the informal evaluation of a project and should be very clear in his mind about what aspect of the project he wants to evaluate and what the possible use of that evaluation would be. For example, the evaluator might be interested in assessing the personnel management efficiency. For this purpose he may discuss the inter-personal relationship between the project management and other organizations such as contractors, suppliers, persons in the department of which the project management organization is a part, and attitudes and performances of members of this project organization.

- b. Rapport. The term 'Rapport' refers to the inter-personal relationship between two or more persons in which the persons concerned communicate openly with a sense of security and confidence in each other. It is a precondition for obtaining reliable information from others. For an evaluator, therefore, it is essential that before he or she talks about a project with the person concerned or requires some information from him or her it is essential to make sure that a good rapport has been built up and that a relationship has been established between the persons in which the other person shares his true feelings, experiences and knowledge with the evaluator.

c. *Listening Interest.* People usually want to talk about their experiences etc. with others. This desire is particularly spurred when the person finds that he is being listened to and that his or her experiences and views are valued by the listener.

d. *Note Taking.* Taking notes or recording conversation of a person makes him cautious and alerts him against possible consequences of expressing or disclosing anything that might relate to others in the organization or a group to which he belongs. It is, therefore, advisable that the evaluator, if he finds it essential, takes notes of important things immediately after he has had his meetings with a person but not in his presence.

3.4 Limitations of Informal Evaluation

It is a fact that if properly used the informal evaluation of project can serve the purpose of evaluating a project and tells the evaluator things about the projects, which, perhaps, could not be possible otherwise. However, informal evaluation has its own limitations and, therefore, it cannot always substitute formal evaluation of projects. Following are its major limitations:

a. *Sample of Convenience.* Since in carrying out informal evaluation the evaluator utilises the human and other resources for evaluating project to which he has easy access, the sample of persons or record used for informal evaluation might not be representative. The information, so obtained, therefore, may not be representative of the project management organization.

b. *Personal Biases.* Since the informal evaluation is based mostly on personal communications it is fraught with the element of subjectivity. There are, therefore, chances that informal evaluation may reflect personal biases and perceptions more than the facts about the project.

c. *Exaggerations and Reservations.* While relating their experiences most people tend to exaggerate certain things and have reservations about others. This is true for both the evaluator as well as the persons being involved in the informal evaluation. This human factor reduces the objectivity of evaluation in informal situations.

d. *Ministerpretations of the Facts.* Although it may not be the

case in all informal evaluations, in the light of the limitations described above, the facts and the situations are liable to be misinterpreted by the evaluator or persons participating in informal evaluation of projects:

e. Faulty Observations. Since under the conditions of informal evaluations the observation of situations are incidental, it is possible that the facts about a project are not revealed in their totality which might render the observation of a project situation as faulty and unreliable.

3.5 Formal Evaluation

As opposed to the informal evaluation, the formal evaluation is based on the data gathered about a project from representative and reliable sources. These sources may include persons, situations or events and documentary evidences and records about a project. A formal evaluation is carefully planned, structured and employs scientific method of research or inquiry into the facts. It has a clearly defined objective or objectives. It utilises the relevant data about a project obtained from reliable sources, and employs statistical methods and techniques to interpret them and report the findings usually in quantitative terms.

Methods of Formal Evaluation

Since education sector projects are of different kinds such as buildings, construction, text books' development and printing, staff training, evaluation and experimental or pilot projects etc., evaluation of education projects necessitates the use of different methods to suit the nature of project and the purpose of evaluation. Following research methods are commonly used and suggested in this course for evaluation of projects:

- (1) Surveys
- (2) Follow-up Studies
- (3) Descriptive Research
- (4) Observations
- (5) Experimental Methods

Surveys

Surveys usually refer to an investigation of a field to study a given situation. The survey, according to the Encyclopaedia of

Educational Research (1982) "is probably the most widely used method for obtaining descriptive and evaluative information." In education, survey has a wider use and is used as an effective tool in almost every area of education, which includes education projects as well. Surveys in education are designed for the purpose of obtaining descriptive information about specific questions or variables of interests. In education projects, the surveys could be designed and conducted to answer a wide range of questions about a project. For example,

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- i. What has been the impact of the project on attitude of parents towards sending their daughters to schools?
- ii. What improvements have occurred in the quality of education as a result of certain input in education (example: supply of Teaching Kit to Primary Schools)?
- iii. What impact does the project (construction of a college building in a rural area) has on the participation rate of youths in post-secondary education in the area?
- iv. What are the benefits and problems of introduction of the new curricula (e.g. Agro-tech. scheme of education)?

The surveys could be in one or more of the following forms

a. **Social Surveys.** The social surveys may consist in the analysis of the impact of a project on the social, political and economic life of the people of a community.

b. **Public Opinion Surveys.** Public opinion surveys are an effective means to evaluating the outcomes of a project by using the opinions of a representative group of individuals who is directly or indirectly concerned with the outcomes or operation of an education project. The public opinion survey takes the evaluator away from the project to the beneficiaries of the project or the ones who are in any way interested in the project. Since it is not possible to contact each and every person in the project area it is based on a representative sample of the persons.

c. **National Assessment.** There are education projects which are assessed at national levels and reports about which are published or

brought to the notice of public through newspapers, proceedings of the Legislative Assemblies or Parliaments, publications of Ministries and Departments of Education etc. These assessments provide a basis for evaluation of some education projects. For example, introduction of the *Set Theory* of mathematics in the Primary Schools had been a concern of highest levels of educational leadership and public opinion leaders in the country. The opinions expressed in the Press, in the meetings of the Ministry of Education and Departments of Education provide useful information for such surveys.

d. Activity Analysis. Activity analysis as it refers to the evaluation of projects focusses on the process of operation of a project after its completion. The project establishment of a comprehensive high school for boys in a certain District, for example, could be considered as 'complete' after the construction, equipping, furnishing, staffing and enrolment of students. But, how well the school is functioning to serve the purpose for which it was established remains to be assessed from the process of its operation, as it could be done by studying the roles and performance of personnel, activity and utilization of school spaces and equipments, and school management system and functions etc.

2. Follow-up

Follow-up is the process by which information as to the present status in an area of concern is obtained from a student or former students. In case of projects it could refer to the beneficiaries of the project which could be individuals, communities or organisations. Education projects which are designed to train manpower, for certain jobs, are particularly, the ones which could be a subject of follow-up for assessing the effectiveness of the project.

Projects such as Polytechnic institutions, technical schools, are examples where a follow-up method can yield good data for project evaluation.

3. Descriptive Research

Descriptive research implies a kind of survey. The purpose of descriptive research is to describe a phenomenon or a situation as it appears at a given time, place and environment. It is not concerned

with what caused them or what their value and significance are. A description survey, can therefore, be used where the purpose is to evaluate a project to determine what it is like on its completion or at the stage of its operation. The evaluation of the Agro-technical scheme of education, which began its operation in 1974-75 and was evaluated in 1979-80 to assess its present status and achievements provides a good example of a descriptive research.

4. Observations

According to the Dictionary of Education (Good, 1973) 'observation' denotes the act or process of observing (usually complex) conditions or activities as a means of gathering descriptive or quantitative data. It is also known as the process-project research. Under the formal conditions observation of a project operation or project impact is made by a trained observer who records the significant events or situations. Observations could be made by individuals or groups.

d. Experimental Methods

Experimental method of evaluation of a project, is, in fact, the application of techniques of research which specifies a definite set of researchable hypothesis and has an established and a systematic programme of collecting data under standard conditions with the purpose in view to test a hypothesis. The hypotheses are statements describing the presumed impact of one variable upon another. For example, in the Pakistan Primary Education Project-IV it was assumed that construction of boundary walls around girls' schools in villages would result in increased enrolment of girls in the schools or an improved supervision of primary teachers would reduce teacher absenteeism in the schools.

4. EVALUATION AND RESEARCH

As pointed out earlier, summative evaluation of a project, in order to be objective, valid and reliable, follows the methods of research, i.e. application of scientific methods and techniques of inquiry to evaluate outcomes or impacts of a project or efficiency of its operation. The project evaluation accordingly follows the following steps:

- (1) Defining the objectives of formulating key questions.

- (2) Preparing a plan for evaluation.
- (3) Reporting

4.1 Defining the Objectives or Formulating Key Questions

In order to make evaluation of a project worth-while, it is essential that its objectives are clearly laid down and the evaluator has already decided or he has been told what is intended to be achieved through the evaluation. In some cases, the evaluator may have certain broad questions before him about a project which he might be seeking to answer by applying scientific methods and techniques of research. Formulation of objectives or questions is basic to any project evaluation activity because they determine the nature and sources of data, method of analysis and interpretation of data and preparing the report of evaluation.

4.2 Preparing a Plan for Evaluation

In order to achieve its objectives, it is necessary that a project evaluation is carefully planned and includes the following information:

- (1) Purpose of evaluation
- (2) The data and their sources
- (3) Methods and Techniques used for collection of data.

1. Purpose of Evaluation. The plan of evaluation of a project should clearly state the purpose for which the evaluation is to be carried out. The project evaluation plan may include a brief introduction of the project; its targets or objectives; the use of evaluation and the users of the project evaluation study. For this purpose, a paragraph or two would suffice:

EXAMPLE:

Project: Improvement of Existing High Schools in Sind

In view of the situation relating to poor educational facilities in the high schools of Sind, the project was undertaken to construct 80 classrooms in 19 high schools and to provide furniture and science equipments to the schools. The estimated cost of the project was Rs. 10.930 million and it was to be completed in 36 months. On completion of the project an evaluation of the project will be undertaken

with a purpose in view to finding answers to the following questions.

- i. Was the project completed within the stipulated time and cost?
- ii. Were the facilities provided according to the needs and requirements of the schools?
- iii. What were the problems faced by the project management and administration of the project?
- iv. What are the quantitative and qualitative impacts of the improved facilities on the high schools included in the project?

Answers to these questions will be used by the sponsoring and executing organizations for determining the efficiency of project implementation and achievements of the objectives of the project. Also the findings of the evaluation study will help in making decisions about similar project in future.

2. *The Data and their Sources.* The data of an evaluation study comprises the facts which an evaluator gathers from various sources. These sources may include published books and documents, opinions of significant persons, responses to questionnaires, records and correspondence relating to project and observations etc. The data to be collected for evaluation of a project is determined by the objectives of the evaluation or by the questions which the evaluator seeks to answer about the project which he formulates while planning for the evaluation study.

EXAMPLE:

While deciding about the type of data to be collected for an evaluation study, the evaluator must ask himself the following questions.

- a. Are the sources of data reliable?
- b. Are the data pertinent to the problem(s) of the research?
- c. Will it be possible for one to collect all the data required for the study?

- d. Do I have sufficient time and resources for collecting the data?
- e. Is the method of collecting data—mailings, other persons, individual and/or group interviews etc. reliable?
- f. Can the data be analysed objectively or statistically to yield dependable results?

3. Methods and Techniques Used for Collection of Data. Once the evaluator has decided about what type of data he requires to evaluate a certain education project, it is important to know and use the best methods and techniques for collecting appropriate and reliable data for the evaluation study. Following are the methods commonly used for collection of data:

- i. Study of documents and official records relating to a project;
- ii. Observations of the project situation to determine the achievements of the targets planned and the targets achieved;
- iii. Interviews with significant persons directly or indirectly associated with the project. The persons in this connection, may be the project management staff members, the beneficiaries of the project, members of the project sponsoring organisations and experts. These interviews could be open or structured. In the later case the evaluator uses pre-formulated questions or a structured questionnaire for eliciting and recording the responses of the persons to be interviewed.

The techniques commonly used for collecting data for evaluation of a project are:

- a. Questionnaires
- b. Proformas
- c. Field study
- d. Experiments

a. Questionnaires. A questionnaire is usually known as a self-administered instrument used to obtain data for a research study. It comprises a set of pre-structured questions and sometimes a pre-conceived set of possible answers from which the respondent

chooses the most appropriate answer and marks it. In some cases, a questionnaire contains open-end questions which means the respondent has to give answer to a question. The questionnaires are used to elicit peoples' opinions, observations and their knowledge of facts etc. The next Unit-15 contains several examples of questionnaires used for project evaluation. It is to be always remembered that a questionnaire should be constructed or developed only after the project evaluator has ascertained what data he requires for evaluation of a project.

The following points should be kept in view while designing a questionnaire and framing questions.

- i. The questions should be pertinent to the purpose of evaluation;
- ii. They should be short, simple and clear to avoid any ambiguity about responses;
- iii. The items should be placed in logical order;
- iv. The questions, as far as possible, should be neutral;
- v. While formulating questions, care should be taken to avoid any information which may involve emotional reactions or personal feelings of the respondent;
- vi. The questions should be so framed that respondent should not feel threatened or insecure while answering the questions;
- vii. Questionnaires should not be too lengthy so that they take little time to answer;
- viii. The questions, in order to obtain true responses of the people, should not be suggestive of answers;
- ix. The questions should not be too demanding for the respondents.

b. Proformas: Proformas are a sort of questionnaires with the only difference that in proformas information is already available in

some form (documents, office records etc.). The proformas are used to compile an organized information to be used for evaluation of a project. The case study-1 given in the following unit-15 includes several examples of proformas used for project evaluation.

c. Field Study. A field study denotes a study of the current status and condition of a project. It may involve evaluator. In some cases it may involve a study of documentary and recorded facts about the project. In some cases the field study may also involve use of other techniques of evaluation such as a questionnaire and/or a proforma. As about other techniques, the field study is aimed at collection of facts about a project which helps answer several questions about the implementation, operation and impact of project.

d. Experiments. Some of the education projects are experimental or pilot projects, the purposes of which are to test the feasibility of introducing innovations in education, or determining the effects of certain inputs in education or testing certain hypothesis relating to educational or institutional developments. But as these experimental projects are implemented outside a laboratory and under the conditions which don't fully control the influences of other variables on the project these projects are well-known as quasai experiments. It means that although they imply experiments in certain way they are not experiments in the real sense of the term. The observations in the quasai experimental situations, therefore, have their own style of arriving at the conclusions. In most education projects, such experiments may simply consist in comparing the situations before and after launching of a project in a given situation. Pakistan Primary Education Project-IV provides a very good example of an experimental project. Some of the hypotheses which were meant to be tested under the project were to be derived from the following:

A. Main Objectives of the Project

- i. to improve the quality of teaching and so attain a higher level of pupil achievement;
- ii. to increase access, especially for girls;
- iii. to reduce wastage in the school system;

- iv. to reduce or retard growth of the unit costs.

B. Project Inputs for Achievement of the Project Objectives:

- i. the strengthening of the teaching service through improved and recurrent in-service training and the training of a new category of 'assistant teacher';
- ii. improved supervision through the creation and training of two new categories of sub-district level staff; supervisors and advisory teachers;
- iii. the provision of teaching and learning materials;
- iv. the provision of essential physical facilities.

The hypothesis which could be formulated for the purpose of evaluation of the project could be many. Following are examples of the hypotheses:

- a. Provision of training in-service teachers and adding a new category of assistant teacher will improve the quality of teaching and help attain a high level pupil achievement.
- b. The provision of essential physical facilities (boundary walls) in the girls schools will increase enrolment in the schools.
- c. Improved supervision will reduce wastage in the school system.

A large number of such hypotheses could be developed from the objectives of the project and the project inputs. The results of the experiments could be worked out simply by comparing the situations before and on completion of the project such as.

- i. difference between the achievement of pupils before and after the project;
- ii. participation rate of girls in Primary Schools before and after the project;

- iii. difference between the wastage in the school system before and after the project and so on.

5. PROBLEMS OF PROJECT EVALUATION

While evaluation of projects is essential for determining the efficiency of implementation of a project, effectiveness of its operation and the impact of project, it is not surprising to see that very few evaluation studies have been carried out about education projects in the country. There could be many reasons for it. But, the most fundamental ones relate to the problems of project evaluation. Following are the most important problems:

1. Who to evaluate a project,
2. Allocation of resources for project evaluation,
3. Administrative and organizational considerations,
4. Lack of expertise in project evaluation.

1. Who to Evaluate a Project

In evaluating a project, the question of paramount importance is, "who to evaluate a project?" Several questions arise in this connection. Should the project management staff evaluate the project? Should a person outside the project organisation or an agency be asked to evaluate the project? Or, would it be advisable for the project sponsoring organisation to evaluate it? Answers to these questions, depending upon the situation and nature of project and its evaluation, could be both in negative and in affirmative because each of the systems of evaluation identified above has its merits and limitations.

The merit of evaluation of a project by the project management organisation or a person associated with the project lies in the fact that such a person or organization knows so much about the project—i.e. project plan, project targets, project resources, problems faced during the implementation of the project, operation and outcomes of the project. This category of evaluators has easy access to recorded information about the project. Also they have opportunities of having observed the process of project implementation, sharing of experiences with men in and outside the project, and have a deeper insight into the project

management and operation system. The merit of evaluation of or project management staff becomes very high in cases where it is carried out with a view to learning lessons from the project experiences and in cases where project management has a sense of security and appreciation in evaluating the project. However, evaluation of a project by project management is not without its own limitations because of the following factors:

- i. The project management or staff may hold a very subjective opinion about the project;
- ii. His/their opinions might have been biased or influenced by certain incident involving persons during the implementation of the project;
- iii. The project management staff might become defensive about certain shortcomings in the implementation or operation of the project;
- iv. They may overemphasise certain aspects of the project;
- v. They may tend to exaggerate the achievements of the project;
- vi. The evaluation carried out by project management staff may not be valued as objective and reliable by the decision makers.
- vii. They may have certain interests in appreciating or depreciating the project outcomes.

2. Allocation of Resources for Project Evaluation

Like any other project activity its evaluation also consumes resources which must be allocated either at the time of the conception of the project or at certain stage after the project has been completed. Unfortunately, allocation of resources for evaluation of a project is not considered worthwhile at any stage with the result that evaluation of project is not carried out and it goes unaccounted for what happens and what happened to a project.

3. Administrative and Organizational Considerations

Administrative and organisational considerations particularly influence evaluation of projects in cases where the projects are sponsored

by some international organisations or national organisations. They play a very vital role in determining the nature and need of evaluation of projects. In cases where further financing of a project or supply of resources for the same project or for other related projects depends on the success of the project under evaluation, the chances of an objective and true evaluation of a project become less. It happens mostly in foreign sponsored projects such as projects sponsored by the ODA, USAID, UNICEF and World Bank etc., but local government sponsored projects are no exception in such cases.

4. Lack of Expertise in Project Evaluation

Notwithstanding the fact that the factors causing the problems of project evaluation, as discussed above, one major problem of project evaluation is posed by lack of expertise in the field of project evaluation. It is due to these factors that:

- a. evaluation of project is not carried out with professional competence. Hence they don't conform to the standards of scientific evaluation;
- b. ethnical considerations are not taken into account while evaluating projects;
- c. the evaluation reports are characterised by a sort of shallowness and amateurism;
- d. Such reports are not accepted by executives for decision making.

6. SOME USEFUL HINTS ABOUT SUMMATIVE EVALUATION OF PROJECTS

The problems of project evaluation identified earlier are such as their influences on project evaluation cannot be completely eliminated. However, as one has to deal with these problems, there are ways which can be used to overcome most of the problems and use evaluation of project as a means to improving project implementation and planning in the country. Following are some useful hints for project evaluation:

- a. Projects should be evaluated with a view to learning from the lessons of experience of a project. In any way, should the findings of project evaluation be taken for decision which may have adverse effects on evaluators, persons responsible for project planning, implementation and monitoring and on the scientific operation and investment of a project. The evaluation of a project should aim, under all conditions, at improving the situation.
- b. Projects should be evaluated by a team under the leadership of a person who has professional training and experience in project evaluation.
- c. Depending upon the needs and requirements of the project evaluation, the project evaluation team should have a thorough reorientation to, or a refresher training course in project evaluation methods and techniques.
- d. If possible, the project evaluation should be replicated. The project evaluation team for this purpose should be advised to prepare a detailed plan project evaluation and in reporting it give the details so that they could be replicated for verification of evaluation results, if necessary.
- e. While preparing a project plan (PC-I), separate funds or resources should be allocated for evaluation of the project on its completion.

7. WRITING AN EVALUATION REPORT

The report of a project evaluation should include a brief statement about the project and its objectives, purpose of evaluation, method of study, type of data and its treatment, major findings and conclusions, drawn from the findings of the evaluation study. The language of the report should be simple unambiguous and must avoid unnecessary statements and details. In cases where data has been statistically analysed, the statistical methods and formulas and their sources should be given in the report.

Although depending upon the purpose and type of evaluation, the evaluator may present the report in any way he considers it appropriate, it is advisable that a standard style for writing and typing evaluation

reports as suggested in several manuals of styles of writing and typing research reports ought to be followed by the writer of evaluation report.

1. Uses and Users of Evaluation Report

According to their use the evaluation reports could be of two types i.e. detailed evaluation reports and executive summaries.

The detailed evaluation reports include the information as specified earlier. The purpose of this report is to provide the project management organisation or administration a detailed information about the project evaluation. This report could be used for replication, and verification.

The executive summaries are based on the detailed evaluation report and may be written into 3—5 pages. They are meant for use by the project managers and other executives for making decisions about the project. They should contain very basic information about the project and the findings of the evaluation study. It is also customary to add recommendations to these summaries and identify the names of project evaluators. Specimens of executive summaries of education and human resources projects are given in the Annex. A, B & C.

8. SELF-ASSESSMENT QUESTIONS

1. What purposes does summative evaluation serve in improving implementation of project?
 2. What are the major objectives of project evaluation?
 3. What are various types of summative evaluation? Write their merits and problems.
 4. What are the methods and techniques used in formal evaluation?
 5. What is the relationship between evaluation and research?
 6. What steps do you suggest to ensure an objective evaluation of a project?
 7. What are the nature, types and uses of evaluation report?
 8. What are the problems faced by a project evaluator? Suggest measures to overcome them.
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ANNEXURES

INDIA: DEVELOPMENT AND MANAGEMENT TRAINING PROJECT: MID-PROJECT EVALUATION

Problem and Overview. The Development Management Training. Project (386-0487) was designed to respond to several apparent opportunities in the U.S.-G.O.I. (government of India) assistance dialogue. AID/Washington was promoting training as an especially effective method of contributing to institution-building, technology transfer, and the overall policy dialogue. Other donors were not financing major training programmes. G.O.I. officials, after a period of coolness toward large-scale U.S. training, were favorable to a project that would provide in-service technical and managerial training primarily to mid-and junior-level bureaucrats, and were not adverse to A.I.D.'s suggestion that a modest number of training slots be set aside for private-sector and female participants. Furthermore, USAID/India lacked a generic training project that would permit it to make use of the training opportunities being presented by AID/Washington.

U.S. Assistance. The project was launched therefore with high expectations for rapid success. The project agreement was signed in 1982 with a project completion date of June 30, 1987. The total project cost was to be \$8.2 million (a \$6.1-million from grant from A.I.D. and a \$2.1-million in-kind contribution from the Indian government). *The project purpose* is to strengthen the managerial and technical capabilities of public and private sector personnel in India in areas of G.O.I. and A.I.D. collaboration. The overall *project goal* is to help increase the institutional capacity of G.O.I. development agencies to plan and implement development activities in sectors of high priority to both the G.O.I. and A.I.D.

The Project Design had four Components, two of them were major as under:—

1. development of about 25-30 joint U.S.-Indian training teams, and establishment, by these teams, of training programmes within ministries for their line staff; and
2. U.S. or third country short-term, academic training.

Minor components were as under:

3. U.S. long-term academic training; and
4. short-term non-academic training at Indian institutions.

Training slots were to be reserved for female participants (15 percent) and private-sector participants.

Purpose of the Evaluation. The purpose of the evaluation was to: (1) measure progress to date, and (2) recommend changes to speed up implementation. The evaluation was part of a broader analysis of all USAID-supported training in India (and, in fact, the chief reason for the overall analysis).

Major Findings

1. *This is Clearly a "Troubled" project.* It has fallen far short of expected progress and is only now at the point of development that it should have been two years earlier when it was approved. The first major component has not yet begun and the third component has had to be eliminated. Only two training sessions have been completed in India and only 26 Indians have gone abroad for training. Only 10 percent of planned expenditures for the first two years have been spent.

2. *Reasons for the Slow Implementation Derive,* to a large extent, from faulty assumptions during project design. Reasons include the following.

a. *USAID Misperception of G.O.I. views on Training.* Having finally reached agreement with the GOI that the U.S. could do large-scale training once again, USAID falsely assumed that the hard part was over and implementation would commence rapidly. The GOI has subsequently directed, for example, that no long-term training will take place under the project.

b. *Misperception of Ministerial Relationships.* Project design assumed USAID/India would work *directly* with ministries most closely related to A.I.D.'s own programme in India (e.g., agriculture, irrigation). In fact, USAID has been required to deal with these sectoral ministries indirectly, through the Ministry of Finance. This has slowed the process, although perhaps less than USAID personnel believe.

c. *Inadequacy of Ministry Training Plans.* Another assumption that proved faulty was that the GOI ministries already had, or could readily develop, training plans that would prioritize training needs to be met by the project. In fact, ministries that claimed they had plans presented unacceptable materials; those without plans found

it difficult to develop them. (Finally, 15 months after project approval, a contract was let with the Indian Institute of Public Administration to help develop the training plans that were supposed to have existed at the outset.)

d. Misidentification of Indian Training Counterparts. The project envisaged that the joint U.S./Indian teams conducting the training in India would relate directly to ministry training "cells." In fact, those ministry units do little training themselves but rely heavily on outside training institutes. (These institutes now appear to offer much more likely counterparts for the joint training teams than the ministries.)

e. Misjudgment of USAID Capacity for Selecting U.S. participants.

Project design assumed that USAID could easily develop training arrangements with institutions in the U.S., India, and other countries. In fact, selecting U.S. institutions was a lengthy process that resulted in fewer Indians being sent to the U.S. for short-term training than expected.

f. Misjudgment of USAID Capacity for Involvement in Project Implementation. The project paper specifies an active role for USAID/India in programming the training. In fact, USAID/India clearly does not have enough staff to give major time to the project and thus has taken a basically passive role while waiting for the GOI to work out its plans and procedures. (For example, the Project Paper did not specify the method for contracting with the U.S. training institutions; during the ensuing two years little has been done to identify potential mechanisms.) The project design suggests one person, probably an American, would be required virtually full-time over the next one or two years to permit the project to come into active operation.

3. The Project is at a Critical Point. Problems that have characterized this and other USAID-funded training projects in India are not subject to easy remedy and will likely continue. Without vigorous USAID action to move it forward, further delays and problems are inevitable.

4. This project is perhaps the best illustration available of the problems of doing participant training in India.

Project Design and Policy Implications. The process of designing this project appears to have involved too little institutional analysis and too much wishful thinking. The assumptions underlying the project were sound, *in principle*, but they did not correspond to the realities of the Indian ministerial bureaucracy, or even USAID/India's own capacities. This should have been discovered during project design through careful institutional analysis and alternative strategies adopted instead. It cannot be assumed that things will happen just because they are logical and desirable.

Major Recommendations

1. *The Project Should be Continued, Although Perhaps Redesigned,* and work should begin soon on a follow-on project based on lessons learned. Laggard as the project has been, it is nevertheless a breakthrough in USAID/India's efforts to provide American-originated training to Indian participants.
2. *USAID/India should Accelerate the Positive Aspects of the Project* and learn to accept the negative aspects it cannot change. Efforts to find ways around the cumbersome GOI regulations and procedures are not likely to succeed so long as training abroad, especially in the U.S., is invested with the same political significance in India as it is today.

Evaluation Conducted by Development Associations, Inc. Report titled "USAID-Supported Training in India: An Analysis" (see pp. 19-32). Dated December 21, 1984. Submitted with USAID/India Project Evaluation Summary dated September 24, 1985.

SOUTH PACIFIC: *PVO CO-FINANCING PROJECT -- Summer*
Institute of Linguistics, Non-Formal Education and Leadership Training
ANNUAL EVALUATION

The Problem. Throughout Papua New Guinea and much of the South Pacific, illiteracy remains widespread. Many people are unable to read and write in their own vernacular (local language) or to use basic numbers. Attempts to improve literacy are difficult, in part because of the large number of local languages involved.

U.S. Assistance. The South Pacific PVO Co-Financing Project (879-0251) is also known as the Summer Institute of Linguistics Non-Formal Education and Leadership Training Project. Its purpose is to develop leadership and organizational capability for continuing village-level non-formal education by: (1) increasing functional literacy and community development activities in 50 ethnic groups; and (2) training adults in professions and trades for direct employment and income-producing opportunities. The project was funded through a \$1.496-million operational programme grant to the Summer Institute of Linguistics (OPG II, 879-0251-G-00-1008-00), dated January 5, 1981. This sum includes a subgrant of \$218,540 to Pacific Ministries Development, Inc. of Palo Alto California.

In April, 1984, the grant was amended to reduce funding to \$999,100—a reduction of almost 50 percent in the amount going to the Summer Institute of Linguistics—and to extend the project one year (to December 31, 1985). The change was Summer Institute of Linguistics internal management shortcomings, notably financial management and the inadequacy of personnel administering the grant) These problems have subsequently been remedied and the Summer Institute of Linguistics is now in a much better position to implement both the remainder of the current grant and future projects.

Purpose and Methodology of the Evaluation. The purpose of this evaluation, specified in the grant, is to determine if the project is achieving its planned targets. Findings are based on two and a half weeks of field visits to 12 tribal locations so dispersed as to require travel by helicopter, small airplanes, a four-wheel drive vehicle, boat, and foot. Methodology consisted of examination of baseline data, project goals and assumptions, post-project expectations, project financing, accomplishments to date, and beneficiary impacts. The evaluation also covered the subgrant to Pacific Ministries Development.

Major Findings

1. Goals are Being Met in Most of the Sub-projects, although many had to eliminate or curtail activities because of the nearly 50-percent reduction in funding to the Superior Institute of Linguistics. After a slow start, most of the subprojects were just well under way when they had to be cut back because projected funds were no longer available.
2. Most of the grant funds have been spent, with about a months remaining in the project.
3. The Main Beneficiaries are young children who are learning to do basic numbers and to read and write in their own mother languages. Children who have completed the project's preschool vernacular classes have been so far ahead of other children beginning the government community schools that the government is studying the schools sponsored by the Summer Institute of Linguistics in order to replicate or adapt the model elsewhere.
4. The Goal of Increasing Functional Literacy and Community Development Activities in 50 Ethnic Groups is being met. In nearly each community (subproject), children, adults, or both are being taught to read and write in their own local language and some community development activity has been undertaken to generate funds for supporting this literacy training. The development activities include sawmills and a bakery to provide jobs for school dropouts and to help pay salaries of the literacy teachers, construction of a literacy building with a water supply system, and provision of solar lighting for community activities. Some of the development activities have not been successful because they were premised on Western commercial models rather than the local kinship system. Others have been successful but may need continuing external assistance.
5. The Goal of Training Adults in Professions and Trades for Direct Employment and Income-Producing Opportunities. An apprenticeship programme has been established and, although small, is considered highly successful. The Summer Institute of Linguistics Center at Ukarumpa, recognized by the government of Papua New Guinea as an official training center, currently provides training to 14 interns in such areas as accounting, construction management, printing facilities, management, radio and communication engineering, and automotive maintenance. It also provides much appreciated training in appropriate technology and

teachers training for mother-language translators and national literacy teachers from many language groups.

6. The Subgrant to Pacific Ministries Development appears quite successful. People of the Upper Sepik Basin rely on the Sepik River for drinking water, but this is contaminated. The goal of this subgrant was to install 25 rain-water catchment systems in villages serving several thousand people along the Sepik River. To date, 19 systems have been installed benefitting about 3,000 people. Much of the labour has been contributed by the villagers themselves and two men in each village have been chosen by the villagers to be responsible for maintenance and have received some training in maintenance.

Project Design and Policy Implications. A project that sets out, as this did, to assist people belonging to many different and quite dispersed cultural and linguistic groups, must design its activities in terms of the local cultural patterns as well as local needs. The subprojects that have been least successful appear to be those that were premised on Western models inappropriate for the local culture—for example, establishment of a small bakery (to generate funds for helping pay teachers' salaries) when, in fact, people usually get bread through the kinship system without paying for it, or establishing a sawmill (again to help pay teachers' salaries) on the assumption workers would work according to Western employer/employee relationships, when in fact, other kinship patterns prevail.

Recommendations are not provided.

Evaluation Team: Leon Schanley (Grants Officer) Morris Carney (Associate Director), and Harriett Carney (Executive Secretary); Summer Institute of Linguistics, Pacific Area Office. Report dated April 16, 1985.

PAKISTAN: POPULATION WELFARE PLANNING PROJECT MID-PROJECT EVALUATION

Problem and Overview. Pakistan has one of the highest population growth rates (2.9 percent) in the world. The government of Pakistan (GOP) has long recognized the problems this presents, but has not had much success in promoting family planning. (Contraceptive prevalence rates are still only 7 to 10 percent of married couples of reproductive age.) Following suspension of GOP-sponsored family planning field activities in the late 1970s, the GOP in 1982 created a new Population Welfare Division within the Ministry of Planning and Development (the purpose being to coordinate more effectively with other ministries and to integrate population activities with other ministries and to integrate population activities with other development programmes). The new national "population welfare programme" seeks to reach a large part of the population through a network of Family Welfare Centers, Reproductive Health Units (for surgical contraception), authorized contraceptives distribution agents, and a social marketing project.

U.S. Assistance. A.I.D.'s Population Welfare Planning Project (391-0469) was authorized in March, 1982, to assist this new GOP programme. The project provides \$25.6 million in grant (ESF) funds plus 21 million rupees in local currency. About 80 percent of the grant funds were planned for purchasing contraceptives; minor portions were designated for technical assistance, training, research, provision of warehouse earmarked for constructing a warehouse and research institute. The completion date (PACD) is September 30, 1987.

Purpose and Methodology of the Evaluation. Purposes of this evaluation were: (1) to assess GOP progress in implementing its Population Welfare Plan, particularly the A.I.D.-financed activities; (2) to recommend changes for improvement, including possible redesign of the A.I.D. project; and (3) to provide an analytic base for a possible increase in A.I.D. funding in FY 1985. Methodology consisted of one month of interviewing, document review, and field visits.

Major Findings. Funds for contraceptive procurement will be expended ahead of schedule; all other project components are far behind schedule. The status of each of the four project components is as follows.

1. Commodities (contraceptive supplies) and Logistics: Initial contraceptive purchase plans misjudged local demand, but the logistics system has compensated fairly well. There has been a chronic shortage of condoms, which account for about 60 percent of all contraceptives used. Nevertheless, and despite very poor facilities, the logistics system has functioned well and the central warehouse, through careful rationing, has avoided extreme shortages at local distribution points. An additional \$14.4 million is needed to meet commodity demands of the current project. There is also demand for a broader range of oral contraceptives and for the Copper-T IUD.

2. Management Information, Research, and Evaluation. The goal of carrying out the much-needed research and evaluation has been overshadowed by preoccupation with establishing a high-level research institute. The project was to provide \$2.88 million for surveys, seminars and workshops, evaluation studies, training, publications, technical assistance, service statistics, and data processing but has been unable to do so. The reason is bureaucratic (GOP) turf battles over the power and influence (size, autonomy, scope of work, and rank of the executive director) of the institution being created to receive the A.I.D. assistance and carry out the work. Tentative approval was given in 1981 for a semi-autonomous research institute (the Population Development Center), which was ambitiously re-conceptualized in 1984 as the National Institute of Population Studies (NIPS), but has not yet become operational.

3. Biomedical and Sociomedical Research. Due to bureaucratic debate over the relative status of two organizations both engaging in biomedical and sociomedical research, no progress was made until 1984. The deadlock has finally been resolved, but neither construction of the research institute (NRIFC) nor training and technical assistance has yet begun.

4. Professional and Personal Awareness and Motivation. Complex social, religious, political, and economic factors present severe obstacles to promoting family planning. To help overcome them, the project was to send up to 50 Pakistani community, provincial, and national leaders on short educational visits to other developing countries or the U.S. and 15 U.S. experts to Pakistan. Only 5 visits have been made because of the delays in other parts of the project and failure to develop annual training and technical assistance plans.

5. Lack of Public Information, Education, and Communication about Family Planning and Population. There is no clear communications

(IE&C) strategy. Debates have persisted at the central level for over three years about population communications. Meanwhile, local officials responsible for service delivery are eager for educational materials but have neither the materials nor money to produce them.

38

Project Design and Policy Implications. The project has succeeded in providing contraceptive supplies to meet much of the existing demand, but it appears to have accomplished little in the way of progress. The obstacles to increasing contraceptive practice in Pakistan are well-documented: inadequate political commitment, real or potential religious opposition, the low status of women, non-involvement of the Ministry of Health, frequent changes in programme strategy, and bureaucratic difficulties. The components in which the project has made little headway are precisely those which depend on resolution of bureaucratic difficulties. The project planners appear to have grossly underestimated the deadlocks that would arise because of competition for influence among the parts of the bureaucracy with which the project planned to work.

Major Recommendations. The completion date (PACD) should be extended to September 30, 1989, so that the project's training, technical assistance, and research and evaluation activities can be undertaken. To provide commodities through this period will require an additional \$18.5 million.

1. *Commodities and logistics.* Figures from the field regarding monthly condom offtake should be used as a basis for projecting need, and the "USAID [Boni] Estimate" of condom needs should be used for re-ordering. The central warehouse in Karachi should be strengthened and provincial warehouses strongly discouraged.

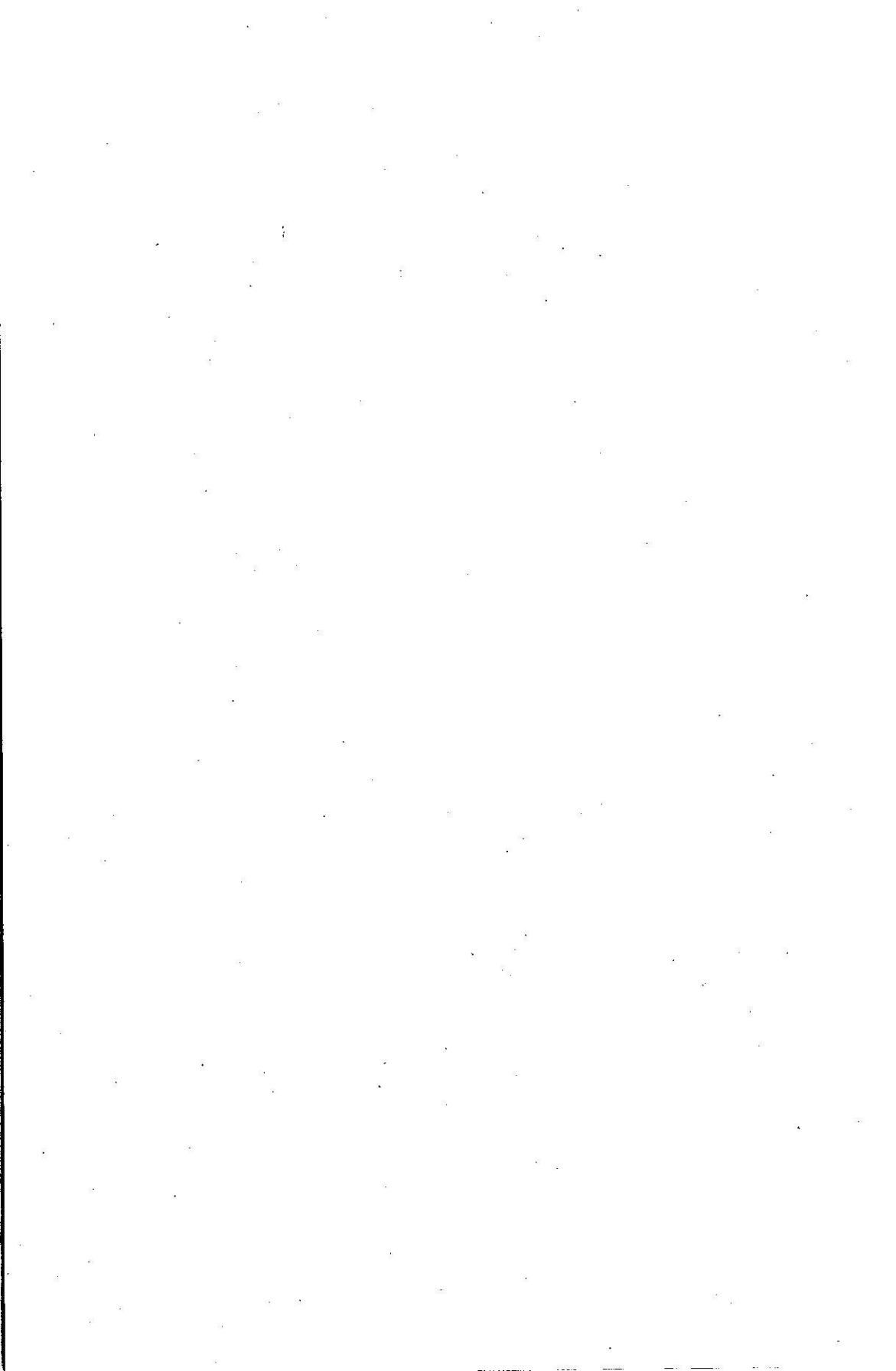
2. *Management Information, Research, and Evaluation.* Funds allocated for NIPS should be reprogrammed so that some training and research can be started now. Resources should be made available to the Monitoring and Statistics Wing of the Population Welfare Division to initiate monitoring, evaluation and operations research projects. NIPS should be approved in a scaled-down version and a realistic implementation plan promptly developed. The third contraceptive prevalence survey should be delayed until at least late 1988 — or there is no evidence that prevalence is increasing sufficiently to warrant two more large-scale surveys.

3. Biomedical and Sociomedical Research. At the soonest possible, candidates for training should be processed, equipment and long-term technical assistance provided, and a clear delineation of responsibilities must be established between the two research institutes (the NRIFC and the NRIRP).

4. Professional and Personal Awareness and Motivation. This component, requiring a large number of brief visits, should be abandoned. Instead, the Population Welfare Division and the research institutes should concentrate on the institutional technical assistance components of the project.

5. Public Communications (IE&C). Decide on a communications strategy immediately. Decentralize part of the IE&C activities, with funding, to the provinces and districts.

Evaluation Team: John Crowley, Ph. D., AID/Washington; Anthony Hudgins, M.A.S., Center for Disease Control; Charles N. Johnson, M.A., M.P.H., AID/Washington; and Noel McIntosh, M.D., John Snow Inc. Report dated November 14, 1984.



**CASE STUDIES ILLUSTRATING SUMMATIVE
EVALUATION OF SELECTED EDUCATION PROJECTS**

**Written by
Dr. M. Athar Khan**

INTRODUCTION

It was only in the recent decades that both the Ministry of Education and certain Departments of Education showed their interest in evaluating the outcomes or efficiency of the operation of some education projects. In some cases international organisations such as UNICEF also sponsored, through Govt organisations, evaluation studies to assess the impacts of their assistance on the development of education in the country.

The case studies included in this unit are abridgement of the following evaluation studies:

- i. an initial evaluation study sponsored by Ministry of Education;
- ii. a study sponsored by an international agency.

The case studies presented in this unit are intended not only to acquaint the student with the matured types of evaluation studies conducted in this country but also to provide them models which they could use for conducting and reporting project evaluation studies. It is with this purpose in view that the case studies selected for this unit are representative of many education projects. These studies include summaries of the plan of evaluation study, procedures and major findings of the studies and the questionnaires and proformas used for the collection of data.

OBJECTIVES

After studying this unit you, the student, will be able to:

1. explain the types of evaluation studies conducted in the country;
2. define the models of project evaluation studies;
3. discuss models of project evaluation proformas/questionnaires.

1. Case Study I: Evaluation of the Agro-Tech-Vocational Scheme of Education	47
1.1 Background of the Study	
1.2 Purpose of Study	
1.3 The Scope of the Evaluation Study	
1.4 The data of Study	
1.5 Findings	
1.6 Conclusions & Recommendations	
1.7 Proforma "A"	
1.8. Proforma "B"	
1.9 Proforma "C"	
1.10 Questionnaire for Student in Agro-Technical Studies	
2. Case Study II: Assessment of Application of UNICEF Policies in Education in Pakistan	78
2.1 Background of the Study	
2.2 Purpose	
2.3 The Data	
Appendix 1: Questionnaire-A (For Teachers)	82
Appendix 2: Questionnaire-B (For Supervisor)	87
Appendix 3: Questionnaire-C (For SDOs)	92
Appendix 4: Questionnaire-D (For District Education Officers)	98
Activity	106

CASE STUDY 1

1—EVALUATION OF THE AGRO-TECHNICAL/ VOCATIONAL SCHEME OF EDUCATION

1.1 Background of the Study

The Agrotechnical/Vocational Education Scheme was introduced in the country's schools in 1975. Three years after the launching of the scheme in the schools, the Ministry of Education decided to ascertain the value and success of the scheme in the national education system. The studies were conducted both at Federal and Provincial levels by the Boards of Technical Education and the Allama Iqbal Open University. (The study included in this unit is the one carried out by the AIU.).

1.2 Purpose of Study

The purpose of the study as specified by the Ministry of Education was to evaluate the implementation of agro-technical education scheme and effectiveness of its curriculum with a view to review the strategies for future improvements.

1.3 The Scope of the Evaluation Study

The study was planned to evaluate the following aspects of the scheme:

- i. physical and instructional facilities in the schools offering agro-tech/vocational courses;
- ii. administration of the scheme;
- iii. effectiveness of the curriculum of the agro-technical/vocational education;
- iv. identification of the limiting factors.

1.4 The Data of Study

- The data for the study consisted of information from:
- i. the school records;

- ii. responses of students and teachers;
- iii. information received from the agro-technical education sectors/cells in:
 - a. Ministry of Education
 - b. Departments of Education
 - c. Directorates of Education
 - d. District Education Officers

1. Sampling

Wherever necessary, random sampling technique was used to draw the sample for the study.

2. Collection of Data

The following proformas and questionnaires were used for collection of data:

- a. *Proforma "A"*: Used for collecting relevant data on educational institutions offering agrotechnical/vocational education courses and for assessment of physical and instructional facilities in these institutions;
- b. *Proforma "B"*: Used for collecting data on the implementation of the agrotechnical education scheme at national, provincial, Divisional/Regional and District levels of educational administration;
- c. *Proforma "C"*: Used for collecting data about the effectiveness of the agrotechnical education scheme in terms of students achievements as determined by:

student enrolments, attendance, examination results and dropouts in agrotechnical subjects,

students projects,

application of skills acquired,

general observations

- d. Proforma "D" (for students): Used for assessment of the effectiveness of agrotechnical education scheme with reference to the achievement of the objectives as indicated by students' responses.

Team of evaluators consisting of the principal researchers, officers of the Ministry of Education and Education Department of Azad Jammu and Kashmir collected the data for the study through personal interviews and visits to the concerned persons and institutions.

3. Analysis of Data

The data so collected was analysed in four parts, as follows: Part I related to the implementation of the agro-technical/vocational scheme education at higher levels of Provincial Educational Administration. Part II dealt with the implementation of the agro-technical/vocational scheme of education at the institutional level in schools for boys. Part III consisted of the analysis of data related to the schools for girls. Part IV dealt with the analysis of data pertaining to the effectiveness of the curricula in agro-technical/vocational education.

1.5 Findings

Part I

As a result of the analysis of the data in Part I, it was seen that the agro-technical/vocational scheme of education was not uniformly conceived by different Heads of Educational Administration in the provinces. Almost everyone had developed his own idea about the scheme. One thing on which there was agreement, however, among all the officers was that the scheme was very useful and must receive the support of Government and Foreign Agencies to continue and expand its scope in the country.

The analysis of the data also revealed that there was no uniform plan for the implementation of the scheme in the various provinces and at various levels. It was further revealed that there was no uniform organization in Provincial Education Departments or at Regional/Divisional levels.

Part II

The analysis of data in Part II showed that in Federal Government schools in the Federal Capital Area the scheme had been introduced very slowly into the schools which had been selected for teaching agro-technical/vocational courses in 1975. The scheme had not been implemented in all the selected schools by 1980. By 1980, agro-technical courses in Industrial Arts and Agriculture (in classes VI to VIII) and Vocational courses in Electrical Wiring and Fitting, Furniture and Cabinet-making, and Book-keeping and Accountancy had been introduced in classes IX and X of these schools. These courses were found to have little relevance to the common occupations of the people residing in the school areas. The enrolment of students increased in the agro-technical/vocational courses in these schools over the years 1975-1978. Also the attendance of students and their pass percentages in the agro-technical/vocational subjects showed that the courses had been popular among the students. The facilities for teaching Industrial Arts were better in the schools which were established as Comprehensive, Technical, or Pilot schools. Facilities in the other schools clearly needed improvement. It was also found out that Comprehensive, Technical, or Pilot school, did not offer a course in Agriculture; schools which offered this course were lacking in the facilities required for teaching of the course.

One of the Federal Government schools was found to have introduced a course in Local Community Crafts. The facilities for teaching the course were generally satisfactory. Similarly, only one school had introduced a course in Commerce and had adequate facilities except that text-books or manuals for teaching typing were not available.

Evaluation of student projects in agro-technical/vocational classes in the Federal Government schools were indicative of students' and teachers' interest in these courses as the quality of student projects was rated highly.

In case of Federal Government and nationalized Cantonment Board schools for boys, located all over the country, the Ministry of Education had selected 12 schools for the introduction of the agro-technical/vocational scheme of education. All these

schools had an urban location. Some of them taught courses in agro-technical/vocational education even before the introduction of the scheme. In these schools, the programme had been gradually introduced. The courses introduced in these schools had more relevance to the occupations of the local community than was the case for the Federal Government schools for boys in the Federal Capital Area. In classes IX and X of these schools all students took a course in Vocational Education. In classes VI to VIII, however, only 56 to 67 per cent of the students were enrolled in the agro-technical courses. In these schools the pass percentage of the students was higher than that of other students. Facilities for teaching Industrial Arts courses, Agriculture and Commerce were not adequate. Workshop equipment especially was lacking. Facilities for teaching Commerce were found to be very limited as regards the number of machines and furniture.

The quality of student projects in the course of Industrial Arts was found to be poor, especially in the schools which were known as Comprehensive, Technical, or Pilot schools. Student projects in Agriculture were generally rated highly.

In Azad Jammu and Kashmir, 26 schools were selected for the implementation of the agro-technical/vocational scheme of education. They were all Government schools and as the study of a sample of 7 boys' schools shows, nearly 40 per cent schools offered agro-technical courses in 1978 and 1979. In other schools, the course was introduced between 1975 and 1977. The study revealed that Applied Electricity was taught in classes VI to VIII in all the schools, while Agriculture was introduced in 2 schools only. In classes IX and X only 1 school had a course in Agriculture. The agro-technical/vocational courses introduced in these schools were found to be not relevant to the occupations of the surrounding communities.

Student attendance in these classes and their pass percentage in the annual examinations showed that the students were taking an interest in the agro-technical/vocational education programme. The facilities for teaching Industrial Arts courses in these schools were found to be better in the Comprehensive, Technical or Pilot schools of the province. However, even in these schools, certain essential facilities which were fundamental to the teaching of the courses

were lacking. Facilities in other schools were not adequate for undertaking the teaching of a course in Industrial Arts. Although Azad Jammu and Kashmir is predominantly an agricultural area, only two of the schools offered a course in Agriculture. Moreover, it was found that the facilities for teaching Agriculture were not adequate. Also, the facilities for teaching a course in Commerce especially typing, were poor, especially as regards furniture and the number of typing machines and their maintenance and the availability of textbooks.

Although the quality of student projects in Industrial Arts and Agriculture classes of the schools of Azad Jammu and Kashmir were better than one would have anticipated despite the inadequacy of the facilities for teaching these courses, they were rated lower than those of schools in Federal Government and Cantonment Boards.

Part III

Under the scheme of agro-technical/vocational education, a course in Home Economics was introduced in 4 of the Federal Government schools for girls. Three of these schools were included in the study. It was found that in classes VI to VIII, almost all the girls who were enrolled took a course in Home Economics. In classes IX and X, however, not more than 36 per cent of students registered for the course. In the schools included in the study, most of instructional facilities for teaching Home Economics were found to be satisfactory. However, the supply of good raw material, the nursing section facilities and built-in almirahs in the workshop need to be improved. The quality of student projects was rated very high.

In the case of Federal Government and Cantonment Boards schools for girls, 2 of the 8 schools offering Home Economics course were selected for the study. All the students who enrolled at these schools from classes VI to X took the course in Home Economics. The schools were found to be very inadequately equipped for teaching of the course. Trained Home Economics teachers, for teaching of the course. Trained Home Economics teachers, nursing section facilities, a kitchen garden and stoves in the kitchens were non-existent. The quality of the student projects, however, was rated highly and indicated students' and teachers' interest in the subject.

In Azad Jammu and Kashmir out of the 12 girls' high schools selected for the implementation of the scheme, 3 were selected for the study. In classes VI to VIII of these schools, all students took a course in Home Economics. In classes IX and X about 70 per cent of students were enrolled in the course in Home Economics. The ratings of the teaching facilities for Home Economics were found to be low. Cooking and nursing section facilities in particular were very poor. The quality of student projects in these schools were also rated comparatively low.

A comparative study of the instructional facilities for teaching Home Economics in the girls' high schools of the Federal Government (Federal Capital Area), and Cantonment Board (outside Federal Capital Area) and Azad Jammu and Kashmir showed that better facilities were provided in the Federal Government schools for girls in the Federal Capital Area.

Part IV

The study had also attempted to ascertain the effectiveness of curricula of agro-technical/vocational education by administering a 10 item questionnaire to the students. The items in the questionnaire were based on the objectives of the scheme. It was found out that there was no significant difference between the responses of the students of the boys' schools of Federal Government, Federal Government and Cantonment Boards and Azad Jammu and Kashmir. The curricula of agro-technical/vocational education seemed to have been effective only in the theoretical aspects of the scheme. The objectives of the scheme which emphasised practical outcomes in terms of the development of work habits, use of tools and practical work fell short of the targets. From the findings of the study, it was also evident that the students' attitudes towards the agro-technical/vocational courses in general were independent of any educational or training variable.

1.6 Conclusions and Recommendations

1. Findings

- i. As a result of interviews with the officers of the Education Departments at Provincial/Regional/Divisional levels in all the provinces it was revealed that:

- a. The schme of agro-technical/vocational education was conceived differently by the Administrative Heads of the Provincial, Regional/Divisional Education Departments. There was, however, a common consensus on the point that the scheme of agro-technical/vocational and education was useful and must receive the support of Government and Foreign Agencies to continue and expand its scope in the country.
 - b. There was no uniform plan for the implementation of the scheme for various Provinces and at various levels. The only one available at some offices was in the form of target numbers of the schools and staff to be achieved over a period of time.
 - c. The organization of the agro-technical/vocational education programme varied from province to province and office to office. In some provinces, separate cells were found to have been created for implementing the scheme; in others there was no organized body or system responsible for this purpose.
 - d. The administration of the scheme was found to be centred at the provincial level and each of the implementing agencies appeared to be functioning independently of the Centre. The situation resulted in lack of coordination at the various levels of implementation of the scheme.
 - e. In the early years of the introduction of agro-technical/vocational education, Federal grants were allocated to the provinces for implementation of the scheme. As the situation exists, the budget for the agro-technical/vocational education is allocated by the Provincial Governments as part of the general education budget. This has resulted in making the agro-technical/vocational education scheme part of general school education.
- ii. In most schools, the facilities for teaching agro-technical/vocational courses were inadequate. In some institutions, the basic facilities for teaching the courses were non-existent.

However, the projects and the work of the students in the agro-technical/vocational courses were of the quality which showed that both students and teachers were taking an interest in the courses and that they had found them both interesting and meaningful.

- iii. In many cases, it was found that the courses introduced in a school were not relevant to the occupational interests of the people of the area.
- iv. In the school, where a course in Local Community Crafts had been introduced, it was observed that this course could be taught successfully with minimum instructional facilities.
- v. A comparative study of the facilities for teaching agro-technical/vocational courses in Federal Government schools (Federal Capital Area), Federal Government and Cantonment Board schools, and schools in Azad Jammu Kashmir showed that in general the facilities were lacking most in the schools of Azad Jammu and Kashmir and that in the schools in the Federal Capital Area the provision of the facilities was best. In other cases, the schools which had already been established as Comprehensive, Technical or Pilot schools, were better equipped for teaching agro-technical/vocational courses.
- vi. The scheme had yet to be implemented in all the schools which were selected by the Government in 1975.
- vii. In the case of schools for girls in all the three areas of study, it was found that, in most schools, a very large number of girls took courses or were required to take a course in Home Economics. Despite this, the facilities in many institutions were very inadequate. In some cases, they were even non-existent. However, the quality of the student projects was indicative of the fact that the subject could be taught by a well-trained teacher with the minimum of the facilities.
- viii. The curriculum of the agro-technical/vocational education was found to have been effective in so far as it pertained to the theoretical aspects of the scheme.

2. Conclusions

From the findings of the study it was concluded that:

- i. All levels of implementation of the agro-technical/vocational scheme of education realise the importance and need for the scheme in our educational system.
- ii. In view of the importance of the scheme, it is commonly desired that it should continue and that the programme of agro-technical/vocational education be reorganized under a well-planned system.
- iii. The facilities for teaching agro-technical/vocational education ought to be improved wherever this is needed.
- iv. Courses on agro-technical/vocational education need to be based on the local needs and occupational interests of the people of the school area.
- v. Courses in the Local Community Crafts can be introduced with the minimum of the facilities and community participation.
- vi. Basic facilities for teaching Home Economics courses need to be provided in the schools where the course is being taught.
- vii. The curriculum of agro-technical/vocational education was found to have been effective, only in the cognitive areas of the scheme. Lack of instructional facilities and opportunities for practical work have resulted in the failure of the students to develop practical skills through the courses.

3. Recommendations

On the basis of the findings of the study, the Evaluation Study Team makes the following recommendations for improving the situation relating to the implementation of the scheme of agro-technical/vocational education in the country's schools.

- i. A permanent Cell should be established in the Central Ministry of Education to coordinate the activities of the Provincial

Departments of Education in the implementation of the scheme.

- ii. Literature should be produced and circulated among all levels of the administration responsible for the implementation of the scheme. This literature should clearly define the scheme and outline an implementation strategy for the whole country.
- iii. Permanent Cells should be created or, wherever they exist, strengthened, to administer the implementation of the scheme in each province or administrative area.
- iv. A Need Assessment Survey should be conducted to determine the needs, social trends, cultural heritage and common interests of the people of the area before introducing agro-technical/vocational courses in the schools in that community.
- v. Facilities should be pooled in selected schools for teaching the courses where it is most needed.
- vi. Teaching of Local Community Crafts should be organized in such a way that instead of becoming a competitor to the local craftsman, the student should learn to appreciate the place and importance of local community craft and craftsmen in his community; and students should contribute to its propagation for the economic development of the people of the area.
- vii. In the light of the findings of various Evaluation Studies in agro-technical/vocational education conducted all over the country, a comprehensive plan of implementation of the scheme should be designed to allow the maximum flexibility to adapt it to the local needs and resources of an institution.

1.7 Proforma "A".

(to be filled in by the heads of middle and high schools)

Instructions: Please read all the items carefully and provide the requisite information by filling in the blank spaces () or by a (/) mark in the box ☐ or boxes indicating your response.

The information supplied on this proforma is meant for evaluating the implementation and effectiveness of the agrotechnical education scheme. Any information on this proforma will not be used against the respondent or any other person associated with the school.

(1) Name and address of the school _____

District

Division

(2) Classification:

(1) a. rural ☐

b. urban ☐

(2) a. Middle school ☐

b. High School ☐

(3) a. Government ☐

b. Nationalized ☐

c. Other ☐

(4) a. Boys ☐

(3) Population of the location town/village (approximate):

(1) a. 1000 or less ☐

b. 1000 to 5000 ☐

c. 5000 to 10000 ☐

d. 10000 to 20000 ☐

e. 20000 to 30000 ☐

f. 50000 and above ☐

(4) Agrotechnical/Vocational education courses offered:

(i) Agro-technical Courses (Classes VI-VIII)

a. Industrial Arts ☐

b. Agriculture ☐

c. Home Economics ☐

(ii) Vocational Courses (classes IX and X)

- a. Industrial Arts ☐
- b. Agriculture ☐
- c. Commerce ☐
- d. Home Economics ☐
- e. Local Community Crafts (General Group) ☐

(5) Year of the introduction of the agrotechnical/vocational studies in the schools:

(i) Classes VI – VIII

- a. 1975 ☐
- b. 1976 ☐
- c. 1977 ☐
- d. 1978 ☐

(6) Approximate area (in square kilo metres) covered by the school.

- a. 5–10 ☐
- b. 10–20 ☐
- c. 20–50 ☐
- d. 50–100 ☐
- e. 100 and more ☐

(7) Common occupations of the people in the school area:

- a. Agriculture ☐
- b. Business and industry ☐
- c. Mixed ☐

Proforma A–1 (For Industrial Arts)

Instructions: Please read all the items carefully. Select your response from the following scale (most satisfactory) _____ (unsatisfactory) and indicate your response by a "X" mark in the appropriate column.

Physical and Instructional facilities for teaching Industrial Arts
Subjects in the school:

(i) General Condition of the Workshop

- a. Size of the workshop
- b. Ventilation
- c. Light
- d. Temperature
- e. Doors and windows
- f. Electrification
- g. Power plugs
- h. Water facilities (basin and faucets)
- i. Built-in Almirah (racks and counters).
- j. Storage facilities
- k. Exhaust

(ii) Workshop equipment (Furniture)

- Work benches
- Tool racks
- Cupboards
- Blackboard
- Showcases

(iii) Workshop equipment (power machines)

- a. General condition
- b. Adequacy

(iv) Workshop equipment (Hand operated machines)

- a. General condition
- b. Adequacy

[illegible]

Proforma A-2 (For Agriculture)

Instructions: Please read all the items carefully. Select your response from the following scale (most satisfactory _____ unsatisfactory) and indicate your response by a "X" mark in the appropriate column.

(9) Physical and instructional facilities for teaching agriculture subjects in the school:

	Most Satisfactory	Satisfactory	Less Satisfactory	Least Satisfactory	Unsatisfactory
	4	3	2	1	0
(i) <u>Agricultural plots/pots available for students use</u>					
a. Area of agricultural plots					
b. Number of Agr. plots					
c. General condition of Agr. plots					
d. General condition of Agr. plots					
e. Location of Agr. plots/pots					
f. Irrigation system and facilities					
(ii) <u>Agricultural implements and tools</u>					
a. Quality					
b. Adequacy					
c. Supply					
d. Storage facilities					
e. Maintenance facilities					
f. General condition					

	4	3	2	1	0
(x) Student-teacher ratio in agriculture classes					
(xi) Availability of Workbooks					
(xii) Qualifications of Agr. Teachers					
(xiii) Quality of Agr. Teachers					
(xiv) Weekly allocation of class-room periods for teaching agriculture					
(xv) Safety measures and first aid box					
(xvi) <u>Common Facilities for Teaching</u>					
a. General Agriculture					
b. Farm Economics					
c. Crop Production					
d. Livestock Farming					
e. Animal Production					
f. Insects and Fish Culture					
g. Horticulture					
h. Birds and Poultry					
i. Honey Production					

Proforma "A-3" (Home Economics)

Instructions: Please read all the items carefully. Select your response from the following scale (most satisfactory _____ unsatisfactory) and indicate your response by a "X" mark in the appropriate column.

(10) Physical and Instructional facilities for teaching Home Economics subjects in the schools.

(i) *General Conditions of Workshop*

- a. Size of workshop
- b. Ventilation
- c. Light
- d. Temperature
- e. Doors and windows
- f. Electrification
- g. Power plugs
- h. Colour scheme
- i. Water facilities (Basin and faucets)
- j. Built-in almirah
- k. Racks and counters
- l. Storage facilities
- m. Exhaust

(ii) *Cooking Section Facilities:*

- a. Cooking range (Chulah, Stove etc.)
- b. Adequacy of cooking range
- c. General condition of cooking range
- d. Storage facilities for supplies
- e. Racks for equipments
- f. Working counters
- g. Adequacy of food preservatives
- h. Kitchen garden

(iii) **Nursing Section Facilities:**

(iv) Facilities for teaching family living

[illegible]

11. Physical and instructional facilities for teaching *Local Community Crafts* (general) in the school:

	Most Satisfactory	Satisfactory	Less Satisfactory	Least Satisfactory	Unsatisfactory
	4	3	2	1	0
(i) Availability of space for teaching Local Community Craft in the school					
(ii) Availability of Local Community Craftsmen for imparting instructions					
(iii) Quality of Community Craft instructors					
(iv) Student's interest in learning Local Community Crafts					
(v) Availability of raw material					
(vi) Budget allocation and provisions of Funds for teaching local community crafts in the school					
(vii) Patronage of Local Community Craft in the school area					

1.8 Proforma "B"

(to be completed from the office records and personal interviews with the officers concerned)

Evaluation of the implementation of agrotechnical/vocational education scheme at the following levels of educational administration.

_____ Federal Ministry of Education, Islamabad.

Provincial Departments of Education

Regional Divisional Directorates of Education

District Education Offices

- (1) Formulation (concept) of the agrotechnical/vocational education (separate sheets of paper may be used for recording the findings).
- (2) Planning (Plan of the implementation of the agrotechnical/vocational education as provided/prepared and followed)
- (3) Organization (Organization of personnel and Functions for the implementation of agrotechnical/vocational education scheme with reference to the assignment of each personnel)
- (4) Administration (system and process of communication, supervision and control of the implementation strategy)

Proforma "C"

(to be filled in by the survey committee in collaboration with the head of the school)

Instruction: Please read all the items carefully. All requisite information must be obtained and be verifiable from the school records, personal interviews with students and observations of facts.

The information recorded on this proforma is meant for evaluating the effectiveness of agrotechnical education. Any information on this proforma will not be used against the persons associated with the school.

(1) Name and address of the school

(2) Classwise student enrolment, attendance, examination results and dropout data for classes VI — VIII for last three years.

Agrotech Courses	Enrolment & Attendance	1977-78			1976-77		1975-76		
		VI	VII	VIII	VII	VIII	VI	VII	VIII
Industrial Arts	Enrolment Average Attendance Passed Dropouts								
Agriculture	Enrolment Average Attendance Passed Dropouts								
Home Economies	Enrolment Average Attendance Passed Dropouts								
Total	Enrolment Passed Dropouts								

- (4) Student Projects (please rate student projects by assigning from 5 points for the best to 1 point for the poorest for the following):

- (i) Usefulness
- (ii) Creativity (design)
- (iii) Productivity
- (iv) Workmanship
- (v) Utilization of raw material
- (vi) Use of tools

5	4	3	2	1

- (5) Students' attitude toward agrotechnical/vocational studies and application of skills acquired.

(select a maximum of 5% of the students studying agrotechnical vocational courses randomly. Administer the attached questionnaire to them in group)

1.10 Questionnaire for Student in Agro-Technical Studies

- Directions: — Check against relevant responses
— Fill with words where provided blanks.

- (1) Name of respondent: _____
- (2) Sex: Male ☐
Female ☐
- (3) (a) School Name & Address: _____
- (4) Rural ☐ Urban ☐
- (5) Class: _____ (6) Age: _____
- (7) Father's occupation _____
- (8) Mother's occupation _____
- (9) Mother language _____
- (10) Please indicate your position in the Class?
(Students own rating)

Good

☐

Average

☐

Poor

☐

(11) Which group of subjects you are studying?

Arts Science Social Studies Agro-Technical

(12) Which subjects do you prefer in your curriculum?
Mention three subjects in order of priority:

(1) (2) (3)

(13) Which Agrotech Component you are studying?

Component:	Industrial Arts	Agriculture	Home Economics
Commerce			

(14) (a) Are you happy with Agrotechnical Subjects?

Yes _____ No _____

(b) Please elaborate your response

(15) Do you have some tools in your house?

Yes	No	Few

(16) Have you worked with tools before?

Yes	No	Rarely
	<u> </u>	<u> </u>

(17) How long have you been studying Agrotechnical Subjects?

One Year Two Years Three Years Four Years Five Years

(18) From which class you have started taking up Agro-Tech Studies

Class VI

Class IX

(19) List new techniques you have learnt while studying Agro-Tech Courses?

- 1.
- 2.
- 3.
- 4.
- 5.

(20) Can you make some repair jobs in your house? Yes No

(21) Do you spend sometime in gardening at home? Yes No

(22) (a) Can you cook for you? Yes No

(b) Name three dishes: 1. _____

2. _____

3. _____

(23) (a) Can you tailor your dress? Yes No

1. _____

2. _____

3. _____

(24) Can you make a tray for yourself? Yes No

(25) If you have done so, which raw materials have you used?

Wood Metal Cloth Paper Cardboard Fibre

Wire Cotton Plastic Seeds Others

Specify:

(26) What else would you like to learn in Agro-Technical Studies?

(27) What do you plan to do when you leave school?

(33) Do you bring your own raw materials in school?

Yes

No

(34) Do you bring your own raw materials in school?

Yes

No

(35) Do you bring your own tools in school?

Yes

No

(36) Do you ever discuss about Agro-Technical studies with your parents and show them the product of your work?

Yes

No

(37) If yes, what is their opinion?

i.) Encouraging

ii) Favourable

iii) Lack of interest

iv) Not favourable

(38) What are your main problems in agro-technical studies?

— Understanding technical information

— Doing the different operation

— Lack of demonstration from the teacher

— Fear of working with hand

— Lack of interest

— Lack of encouragment from community

— Lack of encouragment from parents

(39) What is your opinion about the discipline in workshop or laboratory?

Excellent

Good

Bad

(40) Does your teacher help you to learn without book?

Yes

No

(41) Do you have the feeling of making much progress in Agro-Technical studies?

Yes

No

(42) If no, what are the reason for that?

- Lack of raw materials
- Lack of tools and equipment
- Lack of a good teacher
- Lack of discipline
- Lack of a good shop organisation

(43) What do you do when the teacher is absent or does not give you any assignment?

- Working on Agro-Technical jobs
- Studying other subjects
- Playing with other students
- Making your own project
- Doing nothing

(44) What do you think of Agro-Technical subjects? (You may tick any number)

- Good subject
- Bad subject
- Useful subject
- Helpful for problem solving
- Helps in bringing changes in your habits.

(45) Yours suggestion to improve the Agro-Tech/Vocational subjects education?

2 —ASSESSMENT OF APPLICATION OF UNICEF POLICIES IN EDUCATION IN PAKISTAN

2.1 Background of the Study

UNICEF is one of the international organisations which have been associated with education development programmes of the country particularly in the field of Primary education. Over the years, UNICEF extend cooperation for funding a number of projects relating to Primary education. In 1979–80 a study was sponsored by UNICEF through the Ministry of Education to determine the effectiveness of UNICEF cooperation in primary education in Pakistan with particular reference to use and effectiveness of Teaching Kit in primary schools and teacher training programmes.

2.2 Purpose of the Study

The purpose of the study was to assess the degree to which the UNICEF input has been effective in the use of of Teaching Kits and in serving of teachers for its use.

2.3 The Data

The data for the study consisted of the views and opinions of school teachers, supervisors and officers of primary education all over the country. A set of questionnaires was prepared and administered to the respondents of various categories randomly selected. Study teams visited selected Districts of the country and collected relevant data through personal group and individual interviews. The questionnaires, annexed to this study, were prepared and used for collecting data.

(1) Analysis of Data

The data collected through the questionnaires and interviews were tabulated under separate respondents group headings separating the responses of male and female respondents.

(2) Findings

The analysis of the data collected through structured questionnaires and interviews yielded the following findings and areas of future concern for UNICEF:

- i. The assistance of UNICEF facilitated the formulation and promotion of primary education, with particular reference to the qualitative improvement.
- ii. The contribution of UNICEF in planning, programming, funding and monitoring the programme was considered reasonably adequate. On occasions, direct contacts with the executing agencies delayed the approval of the programme. For future programming, it was proposed that the tripartite agencies i.e. UNICEF, Executing Agency and Government may currently plan comprehensive projects.
- iii. UNICEF's inputs in the areas of training and orientation of teachers in revised curriculum, use and maintenance of Kit, as perceived by teachers, supervisory personnel, and administrators were adequate and equally acknowledged. This accelerated the process of curriculum implementation and assisted in qualitative change in classroom situation.
- iv. In the areas of training, priority was given to impart training to working teachers and in a limited number to supervisors. Analysis of the data indicated that if DEOs, SDEOs, and Supervisors were concurrently trained, the process of implementation and performance could have been relatively higher. However, the feedback from the teachers and supervisors considerably indicated sufficient growth in teaching-learning processes.
- v. The working teachers have attached high value to the use of teaching Kit. It was considered an effective instrument in the workshop of a teacher in classroom situation. They felt that arrangements for the replacement of consumable items and enhancement of storage capacity would have further facilitated more use of the Kit. Fear of accountability affected its more use. The data further suggested that training to supervisors in the use and maintenance of Kit was limited and as such the traditional role of supervision continued and had less

effect on improving certain learning conditions.

- vi. Both of the experimental and control groups of supervisors were satisfied with the quality of teaching Kit and training. They showed keen interest in similar programmes at frequent intervals and of extended periods.
- vii. Some additional areas were identified. These included production of low-cost materials from indigenous resources, provision of transport facilities to school children particularly in rural areas in AJK, Northern Territories and interior of the country.
- viii. With increased inputs from various sources, comprehensive plans of training programmes need to be formulated and carried out to attain quantitative targets and qualitative improvements. To assess the impact of such programmes, in-built follow-up studies of empirical nature may be carried out.
- ix. Under the given constraints, the data in respect of training programmes and use and maintenance of Teaching Kit were collected from limited sample drawn from major districts and suburban areas. The problems of distant places are varied. There are considerable areas and situations where teachers with limited professional training or having inadequate facilities are imparting education. To reach such major population, surveys need to be undertaken, training programmes formulated, and assistance provided.
- x. The findings of this study are based on the experiences of teachers and supervisors who received training in revised curricular programmes and use and maintenance of teaching Kit. They are the direct reference groups to assess the effectiveness in classroom situations. The data yields favourable responses. These programmes need to be integrated and continuous feedback collected. Specialised studies need to be undertaken in the areas of learning abilities and conceptual growth of children, effectiveness of training of teachers on the performance of students, validity of Teaching Kit and related areas. The process of curriculum development has received very limited assistance of UNICEF. Development of alternative curricular programmes and their feasibility may be specific area for collaboration. The studies carried out through UNICEF Assis-

tance Programme, over a period of time, need to be coordinated. This will facilitate finding out viable solutions of most of the problems that may be generated from the work already done. This will provide systematic data determining the future areas of Pak-UNICEF collaboration in quantitative expansion and qualitative improvement of general and technical education in general and primary sector in particular.

**GOVERNMENT OF PAKISTAN
MINISTRY OF EDUCATION**

A Study to Determine the Effectiveness of UNICEF Cooperation in
Primary Education in Pakistan.

***QUESTIONNAIRE 'A'** (for teachers)

Information obtained on this questionnaire is meant for assessing the value and effectiveness of the UNICEF cooperation in primary education in Pakistan. Information furnished on this questionnaire will under no circumstances be used against the respondent or any other person associated with him or his school in any capacity.

PART - I

(Information about the respondent)

Instructions: Please read all the items carefully, select and indicate your response by putting a '✓' mark in the appropriate box ☐. Furnish the information in writing where ever a blank space '_____' is provided.

1. Name and address of _____
your school.
2. Your name (optional) _____
3. Sex: Male ☐ Female ☐
4. Age: 25 or less ☐ 26 to 35 ☐ 36 to 45 ☐
46 or over ☐
5. Location of school: Rural ☐ Urban ☐
District _____
6. Qualifications:
 - (a) Academic: Matric ☐ Inter ☐ B.A. ☐
M.A. ☐
 - (b) Professional: JV ☐ SV ☐ PTC ☐
CT ☐ B.Ed. ☐ M.Ed. ☐

Urdu and Provincial language version of the questionnaire was prepared for administration to the teachers of primary schools in Pakistan.

7. Particulars of inservice trainings attended in last two years.

Name of Training	Duration	Place	Month & Year.

PART - II

Please read all the items carefully and indicate your responses as in Part. I.

1. Has your school received a Teaching Kit?

Yes ☐

No ☐

Don't know ☐

2. If your school has received a Teaching Kit, where is it being used (skip the question if your school did not receive the kit?)

Class	Subjects			
	Language	Mathematics	Social Studies	Science
I				
II				
III				
IV				
V				

3. Does the use of Teaching Kit help in making teaching more effective?

Yes ☐

No ☐

Don't know ☐

(i) Please provide reasons for your answer _____

(ii) Suggestions for improvement _____

4. If you have attended an Inservice Training Course for the Teaching Kit, do you consider such a course useful?

Yes ☐

No ☐

Undecided ☐

(i) Please provide reasons for your answer _____

(ii) Suggestions for improvement _____

PART - II - a

Please read the following questions carefully and indicate your responses by putting a ' / ' mark in the box ☐ which represents your best response.

Yes ☐

No ☐

If you marked 'Yes' / please rate each of the items listed under 'A': and if you marked 'No' rate items listed under ('5') represents highest rating, and '1' the lowest).

	5	4	3	2	1
(1) Organisation of the training					
(2) Quality of the training					
(3) Methods of the training					
(4) Teaching Material used in the training					
(5) Work of resource persons					
(6) Attitude of Organisers					
(7) Cooperation of Organisers					
(8) Use of training period					
(9) Outcome of the training					
(10) Improvement of your work as a result of this/these trainings					
(11) Improvement in achievement of your students after you received training					
(12) Facilities provided during training					
(13) Duration of Training					

	5	4	3	2	1
(1) Observations of your colleagues who received in-service trainings about the trainings.					
(2) Improvement in the teaching of those who received in-service training					
(3) Improvement in the achievement of students of the teachers who received the training.					
(4) All primary teachers should receive such training					

PART – II – (b)

Please read the following questions and indicate your response by putting a '✓' mark in the box ☐ representing your best answer:

- Have you observed any improvement in the attitude of Primary School Supervisors after they received an in-service training?

To great extent ☐ To some extent ☐

Very little ☐ Not at all ☐

Don't know ☐

- To what extent the supervisors after receiving inservice training have been effective to your teaching programmes.

To great extent ☐ To some extent ☐

Very little ☐ Not at all ☐

Don't know ☐

**GOVERNMENT OF PAKISTAN
MINISTRY OF EDUCATION**

A Study to Determine the Effectiveness of UNICEF Cooperation in Primary Education in Pakistan.

QUESTIONNAIRE 'B' (for supervisors)

Information obtained on this questionnaire is meant for assessing the value and effectiveness of the UNICEF cooperation in primary education in Pakistan. Information furnished on this questionnaire will under no circumstances be used against the respondent or any other person associated with him or his office in any capacity.

PART - I

(information about the respondent)

Instructions: Please read all the items carefully, Select and indicate your response for each item by putting a '✓' mark in the appropriate box ☐. Furnish the information in writing wherever a blank space '_____' is provided.

1. Name and address of your office _____
2. Your name (optional) _____
3. Sex: Male ☐ Female ☐
4. Age: 25 or less ☐ 26 to 35 ☐ 35 to 45 ☐
46 or over ☐
5. Location of your area of supervision:
Rural ☐ Urban ☐ District _____

6. Qualifications.

- (a) Academic: Matric Inter B.A./B.Sc.
M.A./M.Sc. Others
- (b) Professional. JV SV PTC
CT B.Ed. M.Ed.
Others

7. Particulars of Inservice Trainings attended the in last two years:

Name of Training	Duration	Month & Year	Place

PART - II (a)

Please read all the items carefully and
indicate your responses as in Part-I

1. What percentage of primary schools in your area of supervision have received Teaching Kits?

Less than 25% 25% to 50% 50% to 75%
75% to 90% over 90%

2. In which of the following classes and subjects is the Teaching Kit, mostly used?

Class	Subjects			
	Language	Mathematics	Social Studies	Science
I				
II				
III				

IV				
V				

3. Does the use of Teaching Kit help in making teaching more effective?

Yes ☐

No ☐

Don't know ☐

(i) Please provide reasons for your answer _____

(ii) Suggestions for improvement _____

4. If you have attended inservice training course for the Teaching Kit, do you consider such a course worthwhile?

Yes ☐

No ☐

Undecided ☐

(i) Please provide reasons for your answer _____

(ii) Suggestions for improvement _____

PART - II (b)

Please read each of the following questions carefully and indicate your response by putting a '✓' mark in the box ☐ which represents your best response.

1. Have you received inservice Teacher Training in the past two years?

Yes ☐

No ☐

If you marked 'Yes' ✓ please rate each of the items listed under 'A' and if you marked 'No' rate items listed under 'B' by assigning them 5 to 1 points ('5' represents the highest rating and '1' the lowest).

'A'

	5	4	3	2	1
(1) Organisation of the training					
(2) Quality of the training					
(3) Methods of the training					
(4) Teaching material used in the training					
(5) Work of resource persons					
(6) Attitude of organisers					
(7) Cooperation of Organisers					
(8) Use of training period					
(9) Outcome of the training					
(10) Improvement in your work as a result of this/these training(s)					
(11) Improvement in the performance of your teachers after you received the in-service training					
(12) Facilities provided during training					
(13) Duration of Training					

	5	4	3	2	1
(1) Observations of your colleagues who received the training					
(2) Improvement in the work of the supervisors since they received in-service training.					
(3) Improvement in the schools in the area of supervision of those supervisors who received training.					
(4) All supervisors should receive in-service training					

**GOVERNMENT OF PAKISTAN
MINISTRY OF EDUCATION**

A study to determine the effectiveness of UNICEF cooperation in Primary Education in Pakistan.

QUESTIONNAIRE 'C' (For SDEO's)

Information obtained on this questionnaire is meant for assessing the value and effectiveness of the UNICEF cooperation in primary education in Pakistan. Information furnished on this questionnaire will under no circumstances be used against the respondent or any other person associated with him or his office in any capacity.

PART - I

(Information about the respondent)

Instructions. Please read all the items carefully. Select and indicate your response by putting a '✓' mark in the appropriate box ☐. Furnish the information in writing wherever a blank space '_____' is provided.

1. Name and address of your Sub-Division/Administrative Area

2. Your name (optional) _____

3. Sex: Male ☐ Female ☐

4. Age: 25 or less ☐ 26 to 35 ☐ 36 to 45 ☐
46 or over ☐

5. Location of your Sub-Division/Administrative Area

Rural ☐ Urban ☐ District _____

6. Qualification:

(a) Academic: B.A. M.A. Other
 B.Sc. M.Sc.

(b) Professional: B.Ed. M.Ed. Other

7. Particulars of Inservice Trainings attended in last two years.

Name of Training	Duration	Month & Year	Place

PART - II

Please read all the items carefully and indicate your responses as in Part - I.

1. What percentage of primary schools in your sub-division/jurisdiction have received Training Kits?

Less than 25% 25% to 50% 50% to 75%

75% to 90% over 90%

2. In which of the following classes is the Teaching Kit mostly used?

Class	Subjects			
	Language	Mathematics	Social Studies	Science
I				
II				
III				
IV				
V				

3. Does the use of Teaching Kit help in making teaching more effective?

Yes ☐ No ☐ Don't know ☐

(i) Please provide reasons for your answer _____

(ii) Suggestions for improvement _____

4. If you have attended In-service Training Course/Workshop for the Teaching Kit, do you consider such a course/workshop worthwhile?

Yes ☐ No ☐ Undecided ☐

(i) Please provide reasons for your answer _____

(ii) Suggestions for improvement _____

PART - II (a)

Please read the following questions carefully and indicate your responses by putting a '✓' mark in the box ☐ which represents your best responses.

1. Have you received any in-service Teacher Training in the past two years?

Yes ☐

No ☐

If you marked 'Yes' please rate each of the items under 'A' and if you marked 'No' rate items listed under 'B' by assigning them 5 to 1 points (5 represents the highest rating and '1' the lowest).

'A'

	5	4	3	2	1
(1) Organization of the training					
(2) Quality of training					
(3) Methods of Training					
(4) Teaching materials used in the training					
(5) Work of resource persons					
(6) Attitude of organisers					
(7) Cooperation of organisers					
(8) Use of training period					
(9) Outcome of the training					
(10) Improvement in your work as a result of this/these training(s)					
(11) Facilities provided during training					
(12) Duration of Training					

	5	4	3	2	1
(1) Observations of your colleagues about the trainings/workshops who attended such trainings or workshops					
(2) Improvement in the work of the SDEOs, since they received the training or attended workshop					
(3) Improvement in the schools in the administrative areas of those supervisors who attended training or workshops.					
(4) All SDEOs should attend such training/workshops.					

PART - II (b)

Please read the following items and indicate your responses by putting a '✓' mark in the column representing your best observation.

Give your overall assessment of the performance of the following two groups of Primary Teachers in your Sub-Division/Administrative Area and rate them for the following items by assigning 5 points to 1, to each (5 represents the highest rating and 1, the lowest).

	Teacher who received Inservice Training in the last two years.					Teachers who did not receive any In-service Training				
	5	4	3	2	1	5	4	3	2	1
(1) Relationship with pupils										
(2) Teaching Method										
(3) Knowledge of subject material in teaching										
(4) Use of instructional material in teaching										
(5) Preparation of teaching aids from locally available inexpensive materials										

**GOVERNMENT OF PAKISTAN
MINISTRY OF EDUCATION**

A Study to Determine the Effectiveness of UNICEF Cooperation
in Primary Education in Pakistan.

QUESTIONNAIRE 'D' (For District Education Officer)

Information obtained on this questionnaire is meant for assessing the value and effectiveness of the UNICEF cooperation in Primary Education in Pakistan. Information furnished on this questionnaire will, under no circumstances be used against the respondent or any other person associated with him or his office in any capacity.

PART - I

(Information about the respondent)

Instructions: Please read all the items carefully: Select and indicate your response by putting a '✓' mark in the appropriate box. Furnish the information in writing where-ever a blank space '_____' is provided.

1. Name of your District/Administrative area _____
2. Your name (optional) _____
3. Sex: Male ☐ Female ☐
4. Age: 25 or less ☐ 26 to 35 ☐ 36 to 45 ☐
46 or over ☐
5. Location of your District: Rural ☐ Urban ☐
6. Qualifications:
(a) Academic: B.A. ☐ M.A. ☐ Other _____
B.Sc. ☐ M.Sc. ☐ (Specify)

(b) Professional: B.Ed. ☐ M.Ed. ☐ Other ☐ (Specify)

7. Particulars of Inservice Training Workshops attended in last two years:

Name of Training/ Workshop	Duration	Month & Year	Place

PART - II

Please read all the items carefully and indicate your responses as in Part - I.

1. What percentage of primary schools in your District Administrative Area have received Teaching Kits?

Less than 25% ☐ 25% to 50% ☐ 50% to 75% ☐
75% to 90% ☐ Over 90% ☐

2. In which of the following classes is the Teaching Kit mostly used?

Class	Subjects			
	Language	Maths	Social Studies	Science
I				
II				
III				
IV				
V				

3. Does the use of Teaching Kit help in making Teaching more effective?

Yes ☐

No ☐

Don't know ☐

(i) Please provide reasons for your answer _____

(ii) Suggestions for improvement _____

4. If you have attended Inservice Training Course/Workshop for the Teaching Kit, answer the following questions (otherwise skip them).

(a) Do you consider such a course/workshop worthwhile?

Yes ☐

No ☐

Undecided ☐

(b) Please provide reasons for your answer.

(c) Suggestion for improvement _____

PART - II

Please read the following questions carefully and indicate your responses by putting a '✓' mark the box ☐ which represents your best response.

1. Have you received any in-service Teacher Training in the past two years?

Yes ☐

No ☐

If you marked 'Yes', please rate each of the items under 'A' and if you marked 'No' rate items listed under 'B' by assigning them 5 to

1 points (5 represents the highest rating and '1' the lowest).

'A'

	5	4	3	2	1
(1) Organization of the training					
(2) Quality of training					
(3) Methods of Training					
(4) Teaching Material used in the training					
(5) Work of resource persons					
(6) Attitude of organisers					
(7) Cooperation of organisers					
(8) Use of training period					
(9) . Out-come of the training					
(10) Improvement in your work as a result of this/these training(s)					

(11) Facilities provided during training					
(12) Duration of training					

'B'

	5	4	3	2	1
(1) Observations of your colleagues who received training or attended workshops in last two years about the training/ workshop					
(2) Improvement in the work of the D.E.Os, who received training or attend workshop					
(3) Improvement in the schools in the administrative areas of those D.E.Os, who received training or attended Educational Workshop.					
(4) All D.E.Os, should receive such trainings/or attend Educational Workshops.					

QUESTIONNAIRE 'D'

PART II - C

Please read the following items and indicate your responses by putting a '✓' mark in the column representing your best observations.

Please give your overall assessment of the performance of following two groups of Primary Teachers in your District/Administrative Area: and rate them for the following items by assigning 5 points to 1 to each (5 representing the highest rating and 1 the lowest).

	Primary Teacher who received Inservice Training					Teachers who did not receive Inservice Training				
	5	4	3	2	1	5	4	3	2	1
(1) Relationship with Pupils										
(2) Teaching Methods										
(3) Knowledge of subject matter										
(4) Use of instructional material (for teaching)										
(5) Preparation of teaching-aids from locally available inexpensive materials										

INTERVIEW SCHEDULE FOR SENIOR ADMINISTRATORS

1. Assistance of UNICEF is normally secured for improving Primary Education in Pakistan. Based on your experience has this cooperation been:
 - (a) Particularly worthwhile?
 - (b) Not so worthwhile?
 - (c) Failure?
 2. What special features made it worthwhile?
(Ask this question if response to Q.No. 1 is (a))
 3. What particular features detracted from success?
(Ask this question if response to Q.N. 1 is (b))
 4. What features contributed to the failure?
(Ask this question if response to Q.No. 1 is (c))
 5. How was this cooperation with UNICEF initiated in:
 - (a) Curriculum Development.
 - (b) Teachers Orientation.
 - (c) Production of Instructional Material, Teaching kit.
 6. How was the cooperation developed?
 - (a) Between Government and UNICEF.
 - (b) Between UNICEF and Executing Agency.
 7. What difficulties were encountered during the implementation of the project in:
 - (a) Curriculum Development.
 - (b) Teachers Orientation.
 - (c) Teaching kit.
 8. Did UNICEF contribute to the planning and design of the Project?
- IF YES: (a) How was this contribution made?
(b) How could it have been made more effective?

- IF NOT: (a) Had UNICEF contribution been useful at the preliminary stage? (Planning and Design) Please elaborate
- (b) What, in your view, was the factor hindering UNICEF contribution at that stage? Please elaborate.
9. Were the methods of administering the cooperation between UNICEF and Government successful?
- (a) If no, were there any unusual reasons? Please name a few.
- (b) If they could be improved, what would you suggest?
10. What methods were adopted to implement the projects?
- (a) Between Government and UNICEF.
- (b) Between UNICEF and Executing Agency.
11. Has non-implementation or delays in implementation of UNICEF Assistance affected any of the programmes in your jurisdiction.
- (a) Identify the problems.
- (b) Could you suggest remedies please?
12. Did the Government and UNICEF foresee mechanism within the project, in case of a change in the situation later?
13. UNICEF is giving considerable inputs in Primary Education. Suppose we want to develop self-sufficient structure in Primary Education. With the present National Resources how would you achieve the objectives and targets of current National Education Policy.

ACTIVITY

After studying this unit you are expected to be able to plan, summative evaluation studies and develop questionnaires and proformas for collection of data which is appropriate for summative evaluation of an education project. At the end of this unit you are required to take any of the education projects and prepare a plan for its evaluation alongwith the identification of sources and the data required for evaluation. Prepare usable proformas and questionnaires for collection of data.

Please note that you may be required to present it at the group training workshop.

THRESHOLD ANALYSIS OF PROJECTS

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Islamabad

LIST OF CONTENT

1. Introduction
2. Project appraisal
3. Projects and their environment
4. Classification of Thresholds
 - 4.1 Environmental thresholds
 - 4.2 Physiographical thresholds
 - 4.3 Ecological thresholds
 - 4.4 Techno-economic thresholds
 - 4.4.1 Infrastructure thresholds
 - 4.4.2 Input thresholds
 - 4.4.3 Market thresholds
 - 4.5 Socio Political thresholds
 - 4.5.1 Social thresholds
 - 4.5.2 Political thresholds
 - 4.5.3 Administrative thresholds
 - 4.6 System thresholds
 - 4.6.1 Organizational thresholds
 - 4.6.2 Technology thresholds
 - 4.6.3 Resource thresholds
5. Methodology of threshold appraisal
 - 5.1 Impact analysis
 - 5.2 Consistency analysis
 - 5.3 Compatibility analysis

OBJECTIVES

After having gone through this unit, the students will be able to;

- i. Under the history of thresholds
- ii. Understand the thresholds that constrain projects
- iii. Identify the environment of the projects
- iv. Classify thresholds into different categories
- v. Highlight the impact of thresholds on the projects
- vi. Apply the appraisal techniques to the impact of different types of thresholds.
- vii. Know how the thresholds consideration is necessary while planning projects.



1. Introduction

Thresholds are the constraints and the limitations of the project and the attributes of the project environment impose on the scope, magnitude and complexity of a project. Threshold appraisal is concerned with the identification of these constraints and with the evaluation of the chances of success.

Threshold theory owes its origin to the work of Professor Malisz of Poland. Malisz enunciated his theory round about 1963 in the context of the urban physical planning process. The evaluation of the threshold theory was triggered off by the failure of the physical planning system in Poland to make a more significant contribution to the determination of policies for development during the period of post-war reconstruction. Need was felt for evolving an objective oriented and quantifiable planning methodology which was capable of evaluating alternative schemes on explicitly identifiable criterion. The importance of economic implications of physical planning was the other important stimulus for the evolution of the technique. A common language and platform for inter disciplinary understanding with economists has to be found out. Threshold analysis provided the framework for such a forum.

In 1967 Kozlowski and J.T. Hughes introduced this method in U.K. It was put to use in the preparation of the regional survey. They developed the subject further and wrote a number of papers about the theory and the manner in which threshold analysis could contribute towards the improvement of the urban planning process. Their work entitled '*Threshold Analysis*' was eventually published in 1972. Similarly 'Rosalind Brown' contributed a

chapter entitled 'Towards the use of computers in threshold analysis' in the book.

According to Malisz, thresholds are not irremediable disabilities but disabilities, which can be overcome by incurring additional costs, called the threshold costs. He describes threshold analysis as a "step by step process aiming towards the definition of thresholds and evaluation of costs necessary for their overstepping". In this sense it is an aid to decision-making, an aid particularly useful in the field of long term planning. It involves a comparison and evaluation of the costs associated with variants of the spatial growth of a settlement system.

The steps involved in the analysis are delineation of the area to be surveyed, the analysis of factors affecting town planning, the tracing of threshold lines, the sub-division of land for main functions within the successive physical threshold areas, the calculation of the capacity of residential areas with successive thresholds, calculation of the industrial areas and the rough calculation of the capital investment costs necessary to overstep each threshold.

Threshold analysis provides a practical framework for the integration of partial results for three groups of analysis viz. natural features, public utility networks and communication systems and land use patterns. Its aim is not to "discuss how to limit the development process" but to identify the additional costs which will have to be incurred in overcoming the limitations on growth and to assess the alternative approaches possible in this behalf.

Internal consistency and external compatibility are the two basic attributes of a viable project. If the project objectives are not consistent with the objectives of the project sponsoring system or if the demands which the project will make on the resources are beyond the capacity of the sponsors a

situation of impasse is bound to arise. Every commercially or socio-economically viable project cannot be implemented by a sponsoring system of any description. Sponsoring systems have certain limitations in term of their goals, structural capabilities and resources. Even when a new organization is proposed to be established to implement a project, the limitation of those who promote the organisation and the attributes of the other systems with which the project will have to co-exist get super imposed on the individuality of the project implementing system. A tally has therefore to be made of the objectives of the project and their consistency with the limitations of the project sponsoring system has to be established. Similarly a tally has to be made of the support which the project will abstract from its universe and the capabilities of the universe to yield the requisite support have to be determined.

A project does not merely exist in a universe. It derives its sustenance from the universe. If the universe cannot sustain the project it will languish.

2. Project Appraisal

Visualized as systems, projects partake of all those characteristics of open systems. Projects are undertaken to make available resources which in their absence would not have been available in the project universe. They abstract resources from resources from the universe in which they subsist. The resources so abstracted are initially utilized for building up the sub systems of the project and eventually as raw materials and other process inputs and processing the throughputs in a cyclic operation of events.

Projects are continually dependent on the import of energy and other resources from the universe in which they subsist. Interruptions in the smooth flow of resources can cause entropy, a collapse into an irredeemable state of

disaster. The outputs generated by projects provide the mechanism for ensuring uninterrupted availability of inputs for the project. These outputs are utilized as inputs by other sister systems which taken together with the project constitute the project universe. The sister systems in their own turn generate and make available resources needed by the project for its sustenance and survival. A project has a dynamic relationship with its environment and its sister systems.

The changes in the attributes of the sister systems do not necessarily mean a collapse of the project. How relationship can grow. In fact equifinality is one of the basic attributes of open systems. There are several ways of reaching the same final state. There, however, is a limit upto which projects can modify their basic characteristics. Corrections to counteract deviations from the chartered course are feasible but sudden changes in the environment can cause excessive strain and even collapse of the system.

Yet another way of looking at projects is to consider them to be socio-technical-economic systems. Projects utilize technology to execute individual tasks. They are as such technical units. Projects use, limited resources to achieve certain goals. They are as such economic units.

Social processes are inherent characteristics of work organizations. Khandwala lists differentiation and stratification of organizational members of the organization, conflict, opinion formulation, non-formal control of organizational members, deviant behavior and changes in attitudes and norms of organizational members as some of the important aspects of the social process which take place in living organizations. Projects being in the nature of social units partake of the attributes of the social process in ample measure. Projects use scientific and mechanical aids in processing the projects throughout. These aids taken together comprise the project technology.

Workflow defines the way in which the component activities in the project are sequenced.

Technology provides the means of achieving the subgoals of the activities. Technology besides make available the basis for developing human relationships within the organization. It not only helps in the processing of throughput but also defines the nature and the characteristics of the operations within the project. The type of technology used in a project has a direct bearing on the quality of life and work environment, which a project will offer to the project personnel.

Considered as an economic unit, the main concern of a project is with the optimization of resource effectiveness. A project procures inputs from the market. Its relationship at the input end with the market is that of a buyer. Similarly the project eventually disposes of its output in the market. The relationship with the market here is that of a seller. The structure of the market imposes certain constraints upon the latitude that the project has in the matter of choices of resource mix and in the selection of the optimal combination of project inputs

3. Projects and their environment

Projects are functional, purposive and mechanical system. Each project has specific objectives which it seeks to achieve with the help of an interconnected, interrelated array of subsystems. There is a dynamic purpose in the relationship between the sub systems, which is neither rigid, nor fixed in time. The parts of the sub systems of a project act in unison to help in the fulfilment of the desired role which the project is expected to perform. The system cannot function effectively in the absence of any part or when any

part becomes dysfunctional projects are a part and parcel of a wider world, in which they subsist. The expanse of this world is indeed very large bordering on almost the infinite. The perception of the limits of the project universe differs from person to person. It is influenced to a great extent by what is of interest to the person concerned at the relevant time. The impact which a project generates permeates through the entire universe. The ripples caused at the periphery are, however, much milder than those caused in the immediate vicinity of the project. The relationship between a project and other subsisting systems in the project universe depends on the nature of the project, its scope and its magnitude on the one hand and on the attributes of the outside systems on the other hand.

Project environment is the sum total of the attributes of the myriad's of systems with which the project has to co-exist during its effective life span. It defines the characteristics of the actual situation in which the project will have to subsist. The project and the other co-existent systems taken together form the project universe. the members of the universe are in a state of dynamic equilibrium each other at any juncture of time. A new project disturbs this state of equilibrium and sends down ripples through the entire universe. The outer parameters of the universe are unbounded. The interrelationships within the universe are therefore extremely complex. For a worth while appreciation of the project situation rational bounds have to be placed on the zones of effective influence and the project judged in the light of the effect it will have on the sister systems falling within the effective zone of consideration.

Hall defines environment as the set of all objects outside the system, a change in whose attributes affects the system and whose attributes are changed by the behavior of the system. This is a dynamic concept of the environment. A project, however, small or large has inevitably an impact on

its surrounding co-existing systems. It modifies their attributes. But the degree of modification varies from system to system and attribute to attribute. Environment is that set of attributes, which the project is not in a position to materially change. It defines the parameters of a particular project situation, which a project has to accept as fixed constraints. Environment does not remain constant over eternity, but within the ambit of the foreseeable future, it has the semblance of permanence and immutability. Environment is reality does not consist of objects or things but of their characteristics.

4. Classification of Thresholds

Thresholds in the context of project appraisal have slightly different connotation than they have in the context of town planning. Malisz specifically and categorically states that thresholds are not taboos, but are hurdles which can be negotiated by expenditure of extra resources. Threshold analysis is, according to Malisz, aimed at evaluating different ways of overcoming the thresholds and selecting the optimal parameters for the development of a project. In contradistinction thresholds from the point of view of project appraisal are constraints which the attributes of the project environment and the limitations of the project sponsoring system impose on the scope, magnitude and complexity of a project. These constraints have to be accepted as given at any juncture of time and the project specifications have to be modified to conform to the dictates of these constraints.

Threshold appraisal identifies the project thresholds and judges the feasibility of undertaking the project in the face of these thresholds. The objective is to confirm the chances of success of a venture after taking into consideration myriads of difficulties which the project will encounter during its effective life span.

Project universe is in a constant state of flux. New systems are added to the universe day in and day out. Old systems also fade out of the universe in an unending stream. The addition of new systems and the elimination of existing systems disturb the existing state of equilibrium in the universe. This disturbance is eventually reflected in the quantitative and qualitative dimension of project thresholds. Project thresholds change with time. Their propensity to change is however not uniform. It varies from threshold to threshold. Some of the thresholds are almost fixed in time, while as others undergo changes even over short durations, of time. The rate of change and the nature of change follow a predictable course in the case of some of the thresholds while as the change is unpredictable and sometimes even cataclysmic in the case of others. Not only the magnitude but also the degree of transience of project thresholds has a bearing on the chances of success of a project. It constitutes what Galbraith would call the "tyranny of circumstance":

Kozłowski and Hughes suggest a four-fold classification of thresholds in the context of urban development.

1. Classification based on cost consequences of other Overstepping.
2. Classification based on cause i.e., by the character of physical factors imposing threshold limitations.
3. Classification based on the planning level at which thresholds have to be dealt with.
4. Classification based on specific significance.

They categorize thresholds, which offer unusual difficulties in overstepping them, as critical threshold. These thresholds are in the nature of development constraints, which are crucial to the success of a project. The

overstepping of critical threshold raises particular difficulties for authorities difficulties mainly but not only resulting from excessive high cost of threshold overstepping. Overstepping of a critical threshold is generally beyond the capability of the level for which an analysis is carried out.

In the context of project appraisal non-critical thresholds have only a marginal significance. Where costs can be assigned to the overstepping of a threshold, implication of a threshold ceased to be absolute. The impact of the threshold can be visualised, quantified and eventually, integrated in to the cost calculus of the project. Where, however, a threshold is critical, the quantification of cost of overstepping has only an academic significance. A critical threshold imposes an absolute constraint and sets definite limits on the feasibility prospects of a project. It is necessary to visualise the nature and purpose of these constraints and to evaluate their impact on the project situation. No threshold is absolute, nor can any threshold be said to be immutable over infinity. What, however, is of significance is the current impact of the threshold on the project situation. Project thresholds are of myriads of types. Broadly however, thresholds can be divided into two categories:

1. Environmental thresholds and
2. System thresholds

4.1 Environmental thresholds

Environment of a system is what lies outside the system about which the system can do relatively little. According to Churchman it consists of things or people that are fixed or given from the systems point of view. The moment these things or people come within the purview of the project and the project is in a position to materially influence their attributes, they cease to be part of the environment and become parts of the project itself. The line

of demarcation between what falls within the system is very thin. The environment determines in part how the project will eventually perform.

Environmental thresholds are the sum total of the attributes of other systems with which projects will have to co-exist in the project universe. Broadly speaking they can be categorized as under:

- (a) Physical thresholds
- (b) Techno-economic thresholds and
- (c) Socio-political thresholds.

Environment is the medium in which a project is embedded and in which it operates. It consists of the attributes of things, people and situations outside the project entity, which have a direct bearing on the project scope and viability. Projects have to derive sustenance from the universe in which they subsist alongwith a large number of other systems. In their turn projects contribute additional resources to the stock of goods and services in the universe. Projects have to perform within the constraints imposed on the project situation the properties of the systems surroundings which impinge on their performance. If the project universe does not have the capacity to provide the inputs needed for the project or to absorb its outputs the project will fail. The characteristics of the project universe place a positive limitation on the scope, magnitude and complexity of projects, which can be undertaken at any particular juncture of time.

4.2 Physiographical thresholds

Physiographical thresholds include topographical features of the area where a project is to be located, the climatic conditions of the area, the availability of portable water, the proximity of the location to the sea and international boundaries, and other features arising out of the natural characteristics of the area of operation of the project. These characteristics

can generally be expressed in qualitative rather quantitative terms. The relevance and criticality of various physical thresholds as of other types of thresholds varies from project to project. Some of the thresholds are highly critical for certain types of projects i.e. climatic conditions for agricultural sector projects while some other are critical for other types of projects. Criticality ranking apart correct appreciation of physiographical thresholds is absolutely essential for project clearance.

4.3 Ecological thresholds

Ecological thresholds have assumed importance in the recent years.

Projects in general and industrial projects in particular are accompanied by a wholesale disturbance of the ecological conditions of their areas of impact. Trees are cut, animal habitats are destroyed and water sources are polluted. The delicate balance which nature maintains between life supportive and life effective forces is disturbed generally in favor of the forces of destruction. The ecological characteristics of the area of impact of a project have to be carefully catalogued and the effect, which the project will have on, the natural features evaluated. Projects are undertaken ultimately with a view to improve the quality of life of man. In case the disturbance of the existing equilibrium of natural conditions ultimately leads to a deterioration of the quality of life, the project is not worth being taken up.

4.4 Techno-economic thresholds

Techno-economic thresholds are of three types:

1. Infrastructure thresholds
2. Input thresholds
3. Market thresholds

4.4.1 Infrastructure thresholds

The success or the failure of a project depends to a considerable extent on the availability of appropriate infrastructure support. The capabilities and idiosyncrasies of the infrastructure systems impose serious constraints on the scope, size and complexity of projects, which can be undertaken in a given situation. The limits upto which the resources of available infrastructure systems can be stretched and appropriated by a project for its own use constitute the infrastructure thresholds. Power supply systems, are some of the important systems which provide infrastructure support for a project. The quantity of power that can be drawn from the existing power supply system depends on the availability of spare generation capacity in the systems. It also depends on the feasibility of placing a constraint upon the current users of power. Development plans of power supply system have also a relevance to the determination of the threshold limit. In case there is going to be a large-scale expansion of installed capacity, there will certainly be more power available, though some time in the future.

What is true of the power sector is also true of other infrastructure support systems. In a developing economy a number of development activities are aimed at improving the levels of availability of infrastructure support for new and existing ventures. The pattern of growth of available facilities, however, is not uniform. It keeps on changing, most of the time for the better. While identifying the physical or quantitative dimensions of infrastructure thresholds, the dynamic nature of the availability has to be taken into account. While there may be improvement in the quality and quantity of infrastructure support available for the future. If any such trends are discernible these have also to be brought into the field of reckoning for threshold appraisal.

4.4.2 Input thresholds

Input thresholds define the trigger levels of availability of critical inputs of a project in quantitative as well as qualitative terms. Resources are consumed at the activity level in a project. The resources requirements of a project are therefore the sum total of the source requirement of the constituent activities of the project. Activity time-resource profiles can be compiled at the point of commencement of the activity. The activity time-resource profiles so developed can form the basis of computation of calendar oriented resource requirements of a project. Matching of the aggregate demand of a resource and the availability thereof in the project universe is a prerequisite for project clearance. A project can be sustained only if the rate of input abstraction generated by the project is matched by the rate at which the resource can be made available for the project.

4.4.3 Market thresholds

The input-output cycle of a project can be sustained only if the project is able to secure a sustained supply of inputs on the one hand and is assured of a sustained demand for its outputs on the other hand. The mere presence of inputs or the existence of a felt need for the output of the project is not enough. Availabilities have to be converted into assured supplies and felt needs into effect demand. Market structures determine the constraints, which will guide the supply of inputs to project and the off take of outputs of the project. Markets provide a structured link between the project, its potential suppliers of inputs and its potential customers.

Projects have a two way economic relationship with the project universe. One as a purchaser of goods and services and the other as the supplier of goods and services. The quality and quantity of goods and services purchased are not generally the same as those of goods and services supplied by the project. As a result the business environment which the project meets

at the input end is not necessarily the same as the one it meets at the output end.

Market thresholds are the operational constraints placed on the project situation by the structure of the market in which a project has to operate. Market structures are of several types and shades. Each of the market types necessitates the adoption of a specific operational strategy. Inability of a project to adapt its operations to the constraints of the relevant market situation can only lead to failures. The mere presence of any input or felt need is no guarantee that the requirements of the project will be met. Market structure plays an effective if not a decisive role in assuring continuity of supply of inputs and off take of outputs of a project. Market thresholds identify the operational constraints that the project will have to face and provide an important criterion against which the viability of the project can be tested.

4.5 Socio-political thresholds

Socio-political thresholds fall into three main categories:

1. social thresholds
2. Political thresholds and
3. Administrative thresholds

4.5.1 Social thresholds

Social thresholds have their moorings in the value system of the society, which eventually hosts a project. The valuations held by people living in different countries differ widely from each other. Myrdal enumerates three main reasons, which make it very difficult to identify these valuations in the developing countries. These are:

1. Ignorance of how people in different occupations, social and economic strata and locations, really feel and the intensity and tenacity of their feelings,
2. The fluid, uncertain and biased character of the process by which public policies are decided and
3. The immense heterogeneity of the actual valuations of the people.

Social thresholds do not include the political and economic goals of the country. They are either in the nature of inhibitions or in the nature of obstacles. Inhibitions are the valuations held by members of government and by those participating in shaping and carrying out government policies, which obstacles are the valuation held by the general public. Inhibitions account for hesitancy and half-heartedness on the part of outside agencies while dealing with projects. Obstacles have amore direct purpose and have the same end effect on project situations as physical thresholds.

Social thresholds are a part of the inherited culture of a society. They are relatively static in nature. Traditional thresholds are ordinarily not subordinate to rational ideals. They may have links with the national history, religion, culture, language, tradition and so on. In developing countries the linkage of social thresholds with historical past is very strong. People of these countries find a sense of national pride in identifying themselves with their inherited culture. Religious beliefs also form the basis of a number of social thresholds. Attitudinal thresholds are yet another category of social thresholds. These thresholds are based on "the totality of beliefs and valuations which cause behaviour to be what it is."

4.5.2 Political thresholds

In developing countries political thresholds are primarily linked with what Myrdal calls the "modernization ideal." Modernization ideal defines the socio-political goals of a nation. Each country has its own ideals which differs in details from the other countries. There are, however certain common traits of development ideals.

Besides the wide spectrum threshold base or the modernization ideal, specific thresholds linked with the policies of state are also a part of the project scene. These policies may define the over-all socio-economic or socio-political situation of the state or lay down the broad parameters of sectoral development guidelines. Industrial policy statements, import-export-policy statements, foreign exchange policy statements, forest policy statements are examples of sectoral state policy guidelines. These statements prescribe certain bounds, which cannot be transgressed in ordinary course of events.

Sectoral policies of the statement have an important bearing on the chances of acceptability of a project in developing countries. A project which transgresses, or which does not conform to the state support is an inescapable ingredient of project inputs. Projects of any reasonable magnitude are dependent on this support day in and day out. Sectoral thresholds have therefore to be carefully identified and the impact, which these thresholds will have on the project, has to be properly evaluated.

4.5.3 Administrative thresholds

Administrative thresholds arise out of the manner in which day to day affairs of the state is conducted. They have their basis in the management style of the civil service system, which is responsible for translating state

policies into action. As a direct consequence of the acceptance of planning and planned development as a national policy in most developing countries, the scope of administrative action has widened to a considerable extent. As the role of the state has widened, the area of operation of bureaucracy has also widened.

Administration acts through a series of agencies. Each agency has its own set of rules, regulations and procedures. These rules and regulations impose certain constraints on the type of activities which can be undertaken and lay down the procedures for approving certain types of activities. The constraints these rules and procedures impose have to be clearly visualized while evaluating the chances of success of a venture.

As important as the formal rules and regulations is the administrative style of the bureaucracy. There is no uniformity in the style of functioning of the administrative machinery's of the developing countries. The areas in which the project entity will come into contact with public administration have, therefore, to be identified in the case of each project and constraints, which will have to be faced in the course of securing necessary administrative support, have to be visualized. Administrative support is now accepted to be one of the important inputs for the success of the development effort. The role and style of functioning of the administration have therefore started receiving close attention. But while this process of streamlining administrative styles is afoot the constraints of the impact the current practices will have on project situations cannot be ignored.

4.6 System thresholds

Systems thresholds are the limitation, which the capabilities of the project sponsoring system place on the project situation. These are internal constraints, which are peculiar to a particular sponsoring system. System

thresholds are determined by the resource availabilities, the goals and objectives and the personnel of the sponsoring system. Each organization has its own structure, its own framework, its own absorption potential for new technologies and its own fund of physical, financial and manpower resources. System thresholds define the qualitative and quantitative constraints which the organizational pattern, R&D capabilities and the resource availability's in an existing system place on the scope of new projects which can be undertaken without seriously damaging the performance of the mother system.

System thresholds fall in to three broad categories:

4.6.1 Organizational thresholds

Organizational thresholds are linked with the goals and objectives of the project sponsoring system, its framework and its structure. Project sponsoring systems do not always undertake the implementation of project ideas themselves. They help in and sponsor the establishment of new organizations or management systems for the undertaking of new tasks. These sponsored organizations have a somewhat greater latitude in the matter of framework and structure than the existing sponsoring systems, but in the ultimate analysis the objectives and goals of the parent organization, its legal structure and its hierarchical set up do clamp some restrictions on the new organization.

There has to be a consistency between the goals and objectives of the project and those of the sponsoring system. In case there is a conflict obviously the sponsoring system will find it difficult to sustain its interest in the project. The legal framework of the sponsoring system imposes certain restriction on the type and extent of functions or activities, which it can undertake. These restrictions have to be accepted as thresholds for new undertakings, which the systems may sponsor. The organizational structure

assumes importance where the sponsoring system purposes to undertake the project by itself. Certain projects are amenable to hierarchical structural patterns while as certain other have of necessity to have a line and staff pattern. There has to be a proper match between what will optimize effectiveness of the project and what the sponsoring system can provide.

Structure defines the levels of authority and responsibility in a system. It has a direct bearing on the manner in which operations decisions will eventually be taken. If the structure available is not suited to the type of decision making that is required in a particular project situation the effectiveness of the project will be seriously affected.

4.6.2 Technology thresholds

Technology has a direct bearing on the workflow or the way programme and activities are sequenced. It also shapes human relationships within an organization. Its primary function is to help in the transformation of inputs into outputs. Its secondary function is to automate the process of conversion of inputs into outputs and substitution of machinery for human labour. Yet another purpose is to standardize the output of an organization. As the level of sophistication of technology increases more and more investment in capital equipment is needed.

Absorption potential and R&D capabilities are the two basic technological thresholds. Absorption potential defines the scale type of technology which can be assimilated and sustained by an organization, its resources and its personnel taken together make it possible for an organization to undertake certain types of activities. Existing organizations can improve upon their current capabilities only upto a certain extent. Even where organizations are newly established current availabilities of personnel, material

resources and capital stock of the mother system which new organization can appropriate to itself place a limitation on the type of work that the organization undertake. For ensuring success it is necessary to know the scope of the work which can, in the ordinary course of events, be undertaken by an organization and to assess the adequacy of available capabilities for meeting the demands of the new project.

R&D capabilities are part and parcel of a modern organization. Every new venture requires modification of the current practices, usages, tasks and technologies. The extent of modification needed however, differs from project to project. The nature of R&D support, which a project will require, has to be matched with the R&D capabilities, which the project sponsoring system will be able to make available for the project.

4.6.3 Resource thresholds

Resource thresholds define the strength and capabilities of resource personnel, the capital stock, the materials stock and the financial resources, which the project sponsoring system can make available for a project. Organizational resources have to be distinguished from the resources of the economy. The availability of a particular resource in the project universe is no guarantee of the availability of the resources for a particular project. There are number of competing demands on the total resources and only a fraction of the total availability can be expected to be mustered by the project sponsoring system, which can in its own turn make a part of its own resources available to the new project, excessive demands placed on the resources of the sponsoring system are bound to affect the performance of the mother system as also the project.

The technological capabilities of the project sponsoring system determine the absorption of the system. A project involving utilization of

technology which the sponsoring system can not assimilate either by itself or through a sponsored project management system fall obviously beyond the pale of activities which the system should sponsor. There has to be a consistency between the type of technology which the project proposes to use and the capability of the sponsoring system to sustain the technological effort to successfully run the project.

Resources, which a project sponsoring system can make available at any juncture of time for a new project, are limited. There has to be a consistency between resource requirements over time of a project and the capability of the sponsoring system to yield the needed resource in quantitative as well as qualitative terms at the time the need arises. Implementation of a new project places severe demands on the available resources of a project sponsoring system. Inability of the system to provide resource support to the new project even for short periods can have serious consequences for the success of the new venture. It is necessary to carefully identify the resources constraints that the capabilities of the project sponsoring system will impose on the project situation and to evaluate the chances of success of the project in the light of these constraints.

5. Methodology of threshold appraisal

The primary objective of threshold appraisal is to assess the feasibility prospects of a project in the light of the constraints imposed on the project situation by the environment and system thresholds. The sequential steps to be taken during the course of the exercise are:

- 1- impact analysis
- 2- consistency analysis
- 3- compatibilities analysis

5.1 Impact analysis

The impact of a project can be defined in terms of the scope and magnitude of its operations. The scope of the project embraces all activities which will take place at the project site, the auxiliary operations related to the processing of the throughput, of site activities both on the input as well as on the output end and ancillary activities like housing schemes, educational, training and recreational activities. The impact of a project forms the basis of its relationship with the environment as also with the project sponsoring system. The effectiveness of the threshold analysis depends on the manner and thoroughness with which the scope and magnitude of project operations are visualized at the commencement of the appraisal exercise. A project generates a multiplicity of effects both along the input as also along the output ends. All these effects are important in their own place, some of them, however, are more important than others. It is necessary to isolate the critical effects of projects and to design the threshold analysis in such a manner as to include all such effects in the zone of consideration.

5.2 Consistency analysis

The framework, the structure, the technological and the resources availabilities of the project sponsoring systems place certain constraints on the scope, magnitude and complexity of project, which may be undertaken or sponsored by the system. Sponsoring systems are not free to take up all and sundry types of projects. Most of the time their charters of incorporation place restrictions on the type of activities which the systems may engage in. there has to be a consistency between the broad objectives of the project management system and those of the candidate project:

The technological capabilities of the project sponsoring system determine the absorption potential of the system. A project involving utilization of technology which the sponsoring system can not assimilate either by itself or through a sponsored project management system fall obviously beyond the pale of activities which the system should sponsor. There has to be a consistency between the types of technology, which the project proposes to use and the capability of the sponsoring system to sustain the technological effort needed to successfully run the project.

Resources, which a project sponsoring system can make available at any juncture of time for a new project, are limited. There has to be a consistency between resource requirements over time of a project and the capability of the sponsoring system to yield the needed resource in quantitative as well as new project places severe demands on the available resources of a project sponsoring system. Inability of the system to provide resource support to the new project even short periods can have serious consequences for the success of the new venture. The capabilities of the project sponsoring system will impose on the project situation and to evaluate the chances of success of the project in the light of these constraints.

5.3. Compatibility analysis

Environmental thresholds define the limits upto which the existing availability's of physical, techno-economic and socio-political resources and valuations of the project universe can be stretched in the interests of a new venture. They represent the maximum price which society is prepared to pay in order to be in position to eventually partake of the bounty, which the project will generate. Every new project is in the nature of an implant. It gives rise to eddy throughout the universe. It deprives some of the existing systems of their sources of inputs and burdens other systems with additional responsibilities. It has an impact on income distributions, on social value

systems, political policies and even on administrative methods and procedures.

Every project has its own spectrum of impacts. Thresholds, which are critical for one project, need not be critical for another project and vice versa. Critical thresholds have therefore to be identified separately for each project. Environmental thresholds prescribe the standards of conformity for a project based upon the capabilities, ethos and value system of the project universe.

Projects in order to survive in a universe have to measure upto these standards. Non-conforming projects give rise to hostile reaction and as such do not have any chance of being sustained over long periods of time. Efforts made to set up such projects invariably lead to frustration. It is better not to invest time, energy and resources in such projects right from the start rather than to face disillusionment and substantial and sustained loss at a later stage.

SELF ASSESSMENT QUESTIONS

1. What is threshold.? How are these different from the general constraints
2. Describe how environments of the projects can enhance or retard effectiveness of projects.
3. Explain in your own words what are the socio political thresholds.
4. State different types of techno economic thresholds.
5. Describe different methodologies of thresholds appraisal.
6. Do you think that avoiding thresholds in planning process will result in unsuccessful projects.
7. Describe a project that suffered from socio-political thresholds. Could it have been avoided.

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