A System for Monitoring and Evaluating Agricultural Extension Projects

SWP272

World Bank Staff Working Paper No. 272

December 1977

The views and interpretations in this document are those of the authors and not necessarily those of the World Bank.

Prepared by: Michael M. CERNEA and Benjamin J. TEPPING

Rural Operation Support and Review Unit
Agriculture and Rural Development Department

World Bank Staff Working Paper No. 272

December 1977

A SYSTEM FOR MONITORING AND EVALUATING AGRICULTURAL EXTENSION PROJECTS

This paper presents the design of a System of Monitoring and Evaluation for Agricultural Extension and Research Projects.

The proposed system is designed as a management tool to ensure that the extension organization is operating efficiently, to enable management to take corrective action when necessary and to provide policy makers with appropriate information. The recommended system consists of a conceptual framework, a set of indicators for monitoring project implementation, a set of indicators for estimating impact on farmers, and the design of a data generation system consisting of a set of sample surveys and ad hoc studies which would produce information concerning the accepted indicators. Recommendations for the organization, structure and staffing of a Monitoring and Evaluation Unit are included and an implementation time table is suggested. Detailed specifications were prepared describing sample allocations, recommended sampling procedures, draft questionnaires and appropriate data collection and processing techniques.

Prepared by: Michael M. CERNEA and Benjamin J. TEPPING

Rural Operation Support and Review Unit
Agriculture and Rural Development Department

The authors are grateful to M. Ahmad, D. Benor, J. Burrows, J.C. Collins, T. Davis, A. Egbert, Y. Elkana , J. Fransen, J. Harrison, C. Hellman, A. Israel, N. Krafft, F. Lethem, P. Nottidge, T. Rice, A. Sfeir-Younis, and D. Turnham for reviewing and commenting on an earlier draft.

Very useful discussions of the paper's content were provided by a group of Indian statisticians, sociologists and extension specialists, in particular A.P. Barnabas, S. K. Ghosh, C. Misra, B.T. Pal, R. Raghunadhan, R.V. Ramakrishna, J. Roy, Prodipto Roy, J.S. Sarma, Ram Saran, Lalit K. Sen, Daroga Singh, and R.C. Sood.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

SUMMARY

This paper presents the design of a System of Monitoring and Evaluation for Agricultural Extension and Research Projects.

The proposed system is designed as a management tool to ensure that the extension organization is operating efficiently, to enable management to take corrective action when necessary and to provide policy makers with appropriate information. It can be applied in each project, with adjustment to local circumstances, thus ensuring uniformity in monitoring and evaluation procedures among similar projects. The starting point of this proposal is the extension organization itself and its needs.

The recommended Monitoring and Evaluation System consists of a conceptual framework, a set of indicators for monitoring project implementation, a set of indicators for estimating impact on farmers, and the design of a data generation system consisting of a set of sample surveys and ad hoc studies which would produce information concerning the accepted indicators. Recommendations for the organization, structure and staffing of a Monitoring and Evaluation Unit are included and an implementation time table is suggested. Detailed specifications were prepared describing sample allocations, recommended sampling procedures, draft questionnaires and appropriate data collection and processing techniques. These are intended to promote the use of uniform methods by the various States to produce results which are comparable one with another.

The recommended monitoring and evaluation system is based on the following principles:

- Transition from limited command areas to statewide extension systems entails a set of changes in the structure and scale of the Training and Visit (T & V) extension organization. A consequence is the need to set up a strong statewide monitoring and evaluation system at the start of each project.

- The T & V program has a built in monitoring mechanism. The proposed monitoring and evaluation system is intended to complement the existing mechanism through a specialized entity, essential to provide the feedback required for efficient management.

- Simplicity, which does not imply scarcity of information, should be the key note of the system.

- Timeliness is of the essence. The system would provide monitoring data with sufficient frequency and continuity to assist management in running the project and taking corrective action when necessary.

- No additional data collection or report writing tasks should be given to the operating personnel of the extension organization.

The selected indicators recommended for the monitoring and evaluation system would reflect the essential sociological, agronomic and economic dimensions of the Extension Projects. Through these selected indicators, monitoring data collection would have two foci: (a) the build-up and the performance of the extension service; and (b) farmers' behavior in adopting recommendations and changing their agricultural practices. Evaluation would focus mainly on measuring the impact of extension on crop yields and on other impact indicators.

The data generation system recommended relies on the contention that no single multipurpose study alone should or could produce information about all indicators. The proposed design makes the monitoring and evaluation task more manageable by investigating different aspects of project performance through separate, though mutually reinforcing studies. Repeating the survey rounds at regular intervals will permit accumulation of time series of data and will gradually improve the quality of the information generated.

The following studies are recommended to complement the internal reporting process and generate information consistent with the selected indicators: (a) A series of monitoring sample surveys of contact farmers in the pre-harvest months; (b) An evaluation sample survey of the total farming population, including also a crop cutting survey in each crop season; (c) Special in-depth studies on selected topics (e.g., studies on farm practices; the proper selection of contact farmers; the quality of training sessions; sociological village case studies).

The recommended studies are designed to match the sequence of agricultural seasons and major crops. The workload of the Evaluation Unit will be distributed more or less evenly over the year. The design of the studies would facilitate more rapid data processing methods, in order that findings may be reported in a timely manner and acted upon expeditiously.

Proposals for institutional arrangements for the Evaluation Unit of each project are included. It is estimated that the staff needed would be about 2% of the staff of the entire extension organization, while the cost would amount to about 1% of the total cost of the extension service; most of the proposed staff would be involved in field data collection and stationed in districts and sub-districts.

A SYSTEM FOR MONITORING AND EVALUATING AGRICULTURAL EXTENSION PROJECTS

I. INTRODUCTION

1.01 This paper proposes a model for the Monitoring and Evaluation activities designed to meet the specific requirements of Agricultural Extension and Research Projects. It is based on field assessments of the current operations of such projects in several states in India (Rajasthan, West Bengal, Orissa and Madhya Pradesh) during February - March and October 1977 and on a review of the operations of similar projects in Bangladesh, Indonesia, Sri Lanka and Burma during an extended international workshop held in Manila in March 1977.

1.02 The starting point of this proposal is the extension service itself and its needs. The extension service is known as the Training and Visit (T & V) System of Agricultural Extension and has been developed by Daniel Benor. 1/ It has been or is being introduced with good results in projects assisted by the World Bank in a number of countries: Bangladesh, Burma, India, Indonesia, Nepal, Sri Lanka, Thailand and Turkey.

1.03 Uniformity in the structure of the extension services themselves allows for a standard basic design of the Monitoring and Evaluation System. Standardization would also increase the comparability of findings. Nevertheless, the basic model of the Monitoring and Evaluation System will have to be adjusted to local circumstances, resources and needs in each state extension project.

1.04 The present paper addresses those who are directly managing and monitoring such extension projects and who might wish to use the proposed Monitoring and Evaluation System. It tries to answer three questions: What should be done? Why should it be done? How should it be done?

1.05 The proposal makes, first, an assessment of the institution building and sociological aspects of implementing the extension projects. Then it defines the conceptual framework for monitoring and evaluation with respect to the specific needs of extension work, and discusses the inherent difficulties and limitations in quantifying the impact of extension on yields and income. Specific indicators for monitoring and for evaluation are then proposed as concentration points for data collection. The objectives and design of the

---

1/ See Daniel Benor and James Q. Harrison, Agricultural Extension, The Training and Visit System, with a Foreword by Robert McNamara, World Bank, May 1977.

recommended monitoring and evaluation surveys, case studies, etc., are specified in detail. This is intended to give guidance on the sampling procedures, sample size, questionnaires, logistics of carrying out the surveys, processing and feedback of data.

1.06 An abbreviated version of this proposal, containing the basic design of the monitoring and evaluation system, but without the technical instructions for its application, is available.

PART ONE

II. THE AGRICULTURAL EXTENSION PROJECTS IN INDIA

A. The T & V Extension Model

2.01 The understanding of the monitoring and evaluation strategy proposed in this paper obviously depends on a good knowledge of the T & V extension model itself. A detailed description of the latter was given in the Benor & Harrison book previously mentioned and is also contained in each Appraisal Report of the Bank-assisted agricultural extension projects.

2.02 The general organizational structure of the T & V system is based on the total number of farm families to be assisted in a given state or area and on defining the number of families which one village extension worker (VEW) can reasonably be expected to cover. The VEWs are trained, guided in the field and supervised by the Agricultural Extension Officers (AEO) who, in turn, are guided and supervised by Subdivisional Extension Officers (SDEO), themselves supported by Subject Matter Specialists (SMSs). The District Extension Officer (DEO) is responsible for the service at district level and, depending on number and type of districts, he is supervised either directly by extension headquarters or by an intermediate superior. The organizational principle involved is to ensure that each level of the service has a span of control narrow enough to afford close personal guidance and supervision of the level immediately below. The organizational chart of Intensive Extension Service, as applied to the typical administrative structure in one of the states in India, is reproduced in Annex 1.

2.03 The method of operation of the T & V system is to concentrate its initial efforts only on the major crops and on those few aspects of farmer's production which offer greatest scope for increasing yields through relatively unsophisticated techniques of better crop husbandry. These techniques often call for little or no increase in cash inputs, for the focus is on the improvement of basic agricultural practices (good seed selection, seedbed preparation, weeding, etc.) which require more work but little cash and bring tangible results. The recommendations are conveyed mainly to selected and imitatable contact farmers who will assist in spreading the new practices to other farmers in the area quickly. The regularity and strict fortnightly periodicity of VEWs' contacts with farmers allows a high divisibility of the message. This helps to ensure that recommendations are area-specific and appropriately timed for a given interval.

2.04 To be really effective, the monitoring and evaluation of this extension organization should be molded according to the shape, structure and operating rules of the T & V system itself. By virtue of its nature and

goals, the T & V extension organization requires both economic and sociological evaluation of its effects. It has to focus on the build up and effectiveness of the extension service in specific sociological environments, on the social, psychological, economic and technical response of farmers and on the overall agricultural impact achieved.

B. Beginnings of the T & V System in India

2.05 In India, the T & V extension system was first introduced in 1974 as a component of three limited command area development projects - two in Rajasthan state (Chambal and Rajasthan Canal) and one in Madhya Pradesh (the latter covering only two blocks). In mid-1975, the system was introduced in six districts in West Bengal. Building upon past accomplishments of extension activities in India, some very significant improvements in the extension service performance were achieved in a relatively short time. Results were so encouraging, that the Government of West Bengal decided in 1975 to expand the reorganization of the extension service from the first six districts to the entire state, thus becoming the first state in India to do so.

2.06 The interest in expanding the T & V system grew stronger and during 1976 a new generation of agricultural extension and research projects in India with statewide coverage was prepared in five states and started to operate during 1977. Other statewide extension projects are presently in the preparation phase. A table summarizing the basic facts about current extension projects in India is presented in Annex 2.

C. Transition from Command Areas to Statewide Systems

2.07 The transition from limited command areas to statewide systems entails a set of organizational developments in the structure of the extension organization. Among these are:

a) The hierarchical pyramid in the extension organization becomes considerably taller. The top management of the statewide system is less close to the base level, where extension is delivered, than in the case of a command area service;

b) The internal vertical communication channels are stretched out much longer. The flow of management information takes more time and is exposed to higher risk of loss or distortion.

c) The basic area unit of a Village Extension Worker increases (double or triple), while in general the ratio of VEW/farmers decreases from 1-320 in general to 1-to-600/1000.

d) The high degree of concentration of means, resources and activities, which is typical for a command area development program, cannot be initially replicated statewide. Therefore, to maintain and improve similar effectiveness, management should be strengthened through better monitoring mech nisms.

e) Whole states are less homogeneous than irrigated command areas and the spectrum of agronomic problems to be addressed through extension becomes significantly larger. Thus, systematic evaluation of the relative effectiveness of the extension recommendations becomes critical.

f) The staff of the extension organization increases dramatically, from a few tens or hundrends to several thousands, thus enhancing the complexity of monitoring its daily performance.

2.08 To sum up, these changes significantly increase the complexity of setting up and operating the extension service. A major consequence of this turnabout in the scale and organization of extension is the urgent need to set up a strong statewide monitoring and evaluation capability at the start of each project. Resources should be assigned to complement the monitoring mechanisms already existing in the T & V system by an adequate and specialized entity. This entity should be viewed as a subsystem of the larger extension organization, matching its building principles and geared toward improving its performance.

D. Sociological Dimensions of Agricultural Extension Projects

2.09 Important sociological dimensions are embedded in the design and content of the Agricultural Extension projects. They rely on certain assumptions about farmers' behavior and attempt to introduce changes in current agricultural work patterns by influencing farmers' awareness and counting on small group communication mechanisms within rural communities. Accordingly, the monitoring and evaluation effort must be fully aware of these sociological variables of extension projects, so that the method of evaluating implementation and impact performance will tend to be both economic and sociological.

2.10 The main sociological variables of the agricultural extension projects against which monitoring and evaluation measurements will have to be made are the following:

a) the institution building content of the projects;

b) the social target group and the project's performance in reaching it;

c) the communication of messages, their circulation and adoption;

d) the socio-economic system of the village communities in which the extension system operates.

We will briefly examine these aspects in turn.

2.11 Institution building. The implementation of these agricultural extension projects is, in fact, a major operation of institution building. Even more, the scale of institution building is probably unprecedented in World Bank assisted development projects. Within each extension project, a large-scale formal organization spread over an entire state is to be built up. The former set up of the Indian extension service is being structurally changed and considerably expanded. The farmers are being given an institutionalized service which - most important - has a precisely defined set of operational rules and a structure of tightly interlocking roles; each individual in this organization has to operate according to a tight pre-programmed timetable. Organizational and management problems are therefore at the core of project implementation. As almost all the Appraisal Reports emphasize, the projects' most "significant risk lies in the fact that the effectiveness of the new extension methodology is highly dependent on an efficient organization and management of extension and research services, as well as on farmers' response." 1/ This is why monitoring this organization-building process, with its social and human implications, is so essential.

2.12 Creating a new organization for the rural environment means much more than just setting up another administrative agency. There are some organizational/cultural intangibles which have a particular significance in the case of an institution built to service rural communities: the attitudes and moral of its personnel, its adaptability to the culture of the working environment, the credibility it can inspire, etc. Each one of the new statewide extension organizations will be staffed by several thousand professional extension agents. For instance, in West Bengal the staff of the new extension organization will comprise more than 5,000 persons. In Bihar it will have about 9,000 village extension agents and more than 1,000 subject matter specialists and other extension officers. The quality of the staff, its sensitivity to village conditions, people and customs, its motivation, energy and abilities are paramount for the success of building this institutional structure. And it is obvious that when the personality characteristics of the staff are so crucial for role performance, the build-up of the organization's culture and sense of commitment should also be of concern to the evaluation effort.

1/ India - Madhya Pradesh Agricultural Extension and Research Project, p. 17, Document of the World Bank, May 1977.

2.13 The main organizational emphasis of the building effort is put at the grass roots, tending to create an organization not only for but of the farmers themselves. In some cases, the grouping of farmers for extension delivery purposes matches their functional group organization for other productive purposes - e.g., for irrigation. The irrigation "chak" in Rajasthan, consisting of about 30-50 farmers, is also taken by the extension system as a unit (group structure) for the diffusion of technological information. In the long run, creating a viable matrix for grouping the farmers in clusters who can be regularly serviced with technical advice and support may have social, institutional and economic consequences far beyond the immediate goals of the extension project.

2.14 The Target Group and Its Social Stratification. The mass of small farmers, tenants and sharecroppers, who in India constitute the vast majority of the farming population, is the target group of the Agricultural Extension Projects. In the past, agricultural development strategy has been often aimed at achieving production increases mainly through investment in irrigation or other costly infrastructure, without particular emphasis on who was going to benefit. The new Agricultural Extension projects put a definite emphasis on reaching quickly the mass of small farmers, tenants and sharecroppers. Their goal is to increase the productivity of large numbers of small and marginal farmers, help them to meet their basic human needs and contribute to an overall increase in food production. Apart from generating economic benefits with low costs, the projects are guided by equity criteria and attempt, thus, to have considerable impact on income distribution.

2.15 The target group of extension, however, is not a socially homogeneous population, but a very stratified one. It consists of various caste groups and often tribal groups, of small landowners, tenants and sharecroppers; each subgroup is subject to general and specific constraints of economic, cultural and technological nature. The extension service has to penetrate across these differences and to adjust its advice and support to farmers with different cultures, possibilities, constraints and needs.

2.16 A specific example could better illustrate the stratification of the target group itself and the social and cultural problems it entails for the extension project: take the rural population of Orissa. The Agricultural Extension Project in this state has to cover over 90% of the state's population, which is living in rural areas. About 74% of it is below the poverty line. 1/ The village population is stratified along caste, class and tribal lines and is caught in a web of socioeconomic relationships and land tenure systems which hamper agricultural development. The proportion of farmers who belong to the scheduled castes and tribes is very large: 23% and 15% of the state population, respectively. A significant number of tribals, the main

---

1/ For definition of the poverty line, see: Rural Development - Sector Policy, World Bank, 1975.

occupants of the hill regions, still practice shifting cultivation. The "small" and "marginal" farmers, with holdings of less than 2 ha, represent roughly 2.6 million out of a total of 3.4 million cultivators' households. Although these farmers operate over 76% of all holdings, they control less than 40% of the total cultivable land, while farms of 5 ha or more (representing less than 7% of holdings) account for about 30% of the land. Adding to the skewed distribution of income in the rural areas are the landless and agricultural laborers, who constitute 1.8 million households. Fragmentation complicates the problems of small holdings, each holding consisting, on an average, of three plots. A large but unquantified area is under sharecropping. The low level of technology is indicated by the fact that Orissa farmers are almost totally dependent on human labor and draft animals as power resources for land cultivation. Among Indian states Orissa is a major producer of nitrogenous fertilizers, yet its own farming population uses only about 50,000 tons. The rice research in Orissa has produced a large number of improved varieties and technologies, yet relatively few farmers use them. Agricultural productivity has been virtually stagnant in Orissa over the past few years. 1/ Structural changes in landholding and tenancy patterns are both socially and politically very difficult to achieve. Hence the importance of helping the poverty group, through extension, in assimilating low and medium cost labor-intensive technology and improving the productivity of their agricultural practices.

2.17 The extension service will assist not only the poverty group, but medium and large farmers as well, within the general effort for increasing food grain production. But wealthier rural families constitute a politically influential and elite group and they frequently attempt to preempt a disproportionate share of scarce public services, including extension. History of past extension schemes indicates that the issue of equity was usually neglected and that the larger farmers tended to become a fixed and exclusive clientele over time. New information was thus channeled to the same better off farmers, further strengthening their economic and technological advantages. 2/ The T & V system and the extension projects have a different policy orientation, deliberately aiming at reaching the disadvantaged farmers (without, however, avoiding the better off farmers). Therefore, the organization will often have to operate in a social context of competing interests, to resist attempts of some elite groups to capture exclusively its services or to coopt its agents. The sociological and economic evaluation of the extension impact will have, therefore, the major task of appraising to what extent the extension project will have succeeded in its fundamental objective of reaching effectively the mass of small and marginal farmers.

1/ See: India - Orissa Agricultural Development Project, Document of the World Bank, 1977.

2/ Roling, Niels, J. Ascroft, F.W. Chege, The Diffusion of Innovations and the Issue of Equity in Rural Development, Communication Research, 3, 2, 1976, p. 162.

2.18 Communication Processes and Behavioral Change. Another major sociological variable is the take-up rate of the practices recommended by extension, i.e. farmer's response to outside influence.

2.19 Communication of information under conditions of an unchanging social political structure cannot be expected to change the stratification system. But it can effect certain behavioral changes of important consequences in farmers' ways of practicing agriculture. Under various difficulties and risk situations, the extension projects undertake the monumental task of influencing the production behavior of millions of farmers and triggering certain changes in their work patterns, know how and psychology, so as to help them make a better use of their own economic resources.

2.20 Changes in farmers' agricultural behavior and their preparedness to innovate are a function of several variables, some well known, some presupposed, and some as yet unknown or even unsuspected. The traditional agricultural practices are learned methods of optimizing economic welfare in a high risk, low knowledge, low resource situation. These practices are not just an individual response but part of the wider village farming system. Changes in that system can successfully be determined - and evaluated - only through a gradual identification of the implications for all its social and economic groups.

2.21 Attitudes toward change of practices will depend, in the traditional village system, not only on the technical appropriateness of the recommendations but also, largely, on the mobilization of traditional communication networks in rural communities, on enlisting the factors which can accelerate dissemination and increase the multiplier effect. To identify and analyze such factors in different areas would be another input expected from the sociological ongoing evaluation of the extension projects.

2.22 The Village Socioeconomic System. Looking beyond the household, the social structure of the community is a very important variable in the success or failure of the extension service. The reaction to extension is not just a matter of the individual farmer's attitude to new practices but also - if not mainly - a matter of adequacy of the delivered service to the socioeconomic and political structure of the village community.

2.23 Agricultural production is not just a singular activity that takes place in isolation, but rather a way of life. It is part of an encompassing social system and a function of such basic characteristics as the land tenure system, the power and authority structure, a system of values and social obligations, a certain code of conduct that governs individual and group behavior, etc. Factors related to the political, economic, kinship or religious institutions of the village may either support or constrain the programs advocated by the extension service.

2.24 This requires the extension projects to be able to address the villages as social systems, not just as simple collections of individuals. And implicitly, the sociological evaluation effort will have to approach the study of extension impact not only as surveys of randomly selected individuals, but also as studies of village communities in their entirety.

III. CONCEPTUAL FRAMEWORK AND METHODOLOGICAL ISSUES

3.01 The statewide extension projects in Orissa, West Bengal, Rajasthan, Madhya Pradesh and Assam contain provisions, funding and staffing for monitoring and evaluation. However, the design of monitoring and evaluation is still tentative and understandings were reached with the State Governments to prepare and incorporate a specific strategy at an early stage.

3.02 A review of the initial tentative provisions revealed widely different approaches to monitoring and evaluation: (a) in some projects, it was basically a data compilation exercise, under which a statistical officer at the district level would only aggregate information available from different district agencies (on weather, amounts of fertilizers distributed in the district, credit, etc.); (b) in other projects, monitoring appeared restricted to routine reporting, which is often overloaded with exaggerated data requirements; the design for evaluation was even more vague, suggesting only that a number of studies (topics unspecified) be contracted out to temporary consultants.

A. The Definitions of Monitoring and Evaluation

3.03 Underlying the present proposal of a monitoring and evaluation system is a conceptual understanding of the functions of monitoring and evaluation (m/e) which can be briefly summarized as follows:

3.04 Monitoring and evaluation are closely related. Monitoring (keeping track of project activities and progress) provides current information for project management and also a basis for ongoing and ex-post evaluation (assessment of project impact and overall results). Monitoring during a project and evaluation during and after the project are all forms of management information and action-oriented analysis.

3.05 Monitoring, more specifically, is the gathering of information on utilization of project inputs, on unfolding of project activities, on timely generation of project outputs, and on circumstances that are critical to the effective implementation of the project. The system set up for uninterruptedly generating and reviewing the information on the project's evolution consists of a set of indicators, the regular reporting channels and some special data generation actions, whose findings are passed on to the users. This system supplies (to management, government or outside donor agencies) timely signals focused selectively on crucial problem areas, offering early warning about implementation problems which require corrective action. This information arising during the course of implementation enables project management to redirect, if necessary, implementation towards a more efficient achievement of project goals and effects.

3.06 Ongoing evaluation is an action-oriented analysis of project effects and impacts, compared to anticipations, to be carried out during implementation. It is designed to suggest solutions to problems of project execution, some of which may have been identified as a result of monitoring. Ongoing evaluation can be comprehensive or focused on specific issues. A major objective is to make an in-depth assessment, before project completion, of whether the project's defined target group is getting the benefits of various components as these are implemented, in line with the assumptions underlying project design. Ongoing evaluation is also necessary for management and policy makers to adapt the project to changing objectives and circumstances or to a better perception of the project's sociological environment. It may result in adjustments in implementation strategies, in resource allocation, in the design of the project or in the supporting policies. Thus, ongoing evaluation would deepen the efforts of monitoring, working towards bringing the project to fully effective operation.

3.07 Ex-post evaluation would resume this effort several years after completion of the investment, to review comprehensively the experience and impact of a project as a basis for future policy formulation and project design.

3.08 In the concrete framework of an agricultural extension program the general concepts of monitoring and evaluation have to be specified accordingly. This means that the content of m/e and the m/e methods to be used have to match the peculiarities of the given delivery program.

3.09 The unique features of these extension projects, as opposed, say, to a conventional agricultural project financing physical facilities, feeder roads, or irrigation schemes, are that (a) it is designed for the delivery of human services, and (b) it is aimed at influencing the work behavior of millions of farmers. This means, in brief, that behavioral and cultural (sometimes elusive) sociological aspects should necessarily be given more weight than in the monitoring of other projects and that qualitative field methods, akin to the participant observation techniques of the social anthropologist, should be used along with the conventional quantitative methods.

3.10 Therefore, monitoring extension projects should consist of the timely data gathering on the buildup of the extension service and the performance of its agents (transmission of messages and feedbacks, training activities, motivation and skills of personnel), as well as on the acceptance or non-acceptance by farmers of the extended advice. The purpose of extending monitoring is to ensure that all components of the T & V system are fulfilling the functions for which they were established and are having a tangible impact on farmers' agricultural practices.

3.11 Conceptually and practically, monitoring extension entails more than simply reporting on extension work. While the state agricultural headquarters will have to rely heavily on the on-the-spot checkup in the field by the supervisory staff to identify problems and develop solutions, as well as on

the regular internal reporting from the lower levels of the extension service and from other agricultural agencies, 1/ additional information on critical extension aspects will also be generated by the special (external) monitoring system. Thus, the monitoring system is intended to complement the built-in supervision procedures with an independent mechanism for checking the regularity, quality and utcome of extension efforts, thus highlighting areas that may require immediate strengthening.

3.12 Extension evaluation is the assessment of the overall effects of the agricultural extension and research program on production levels and on the farmers' welfare, to determine the degree to which the project is reaching its economic, technical and social targets set for a given period of time. It has to assess the degrees of farmers' acceptance and use of the recommended practices, as well as their actual effectiveness in the fields. It should also assess other social, cultural and institutional consequences of the extension programs on village communities. Evaluation of the socio-economic impact of extension should be conducive to improvements of extension and of agricultural adaptive research, as well as of the overall agricultural policy.

3.13 There is an intrinsic continuity between monitoring and evaluating extension and some necessary overlapping, not a rigid and total separation. If the delivery of extension is satisfactory (to be measured by monitoring) and if the extension messages are relevant and acceptable to the farmer, positive effects on yields should be achieved (to be assessed by evaluation). Thus, both monitoring and evaluation are to measure concurrently, at various levels of depth, the degrees to which the extension and research program during each of its various phases is approaching the goals.

3.14 The goals, however, are of various kinds. The ultimate goal may be said to be the improvement of the social and economic welfare of the farmer and economic wealth of the country, but there are many intermediate goals each of which may also be thought as a means to further goals. For example, one goal of the extension program is to bring its fortnightly message to every contact farmer at a specified time. An estimate of the proportion of cases in which this is actually done is one measure of how well the extension program is accomplishing its mission. But the purpose of spreading the fortnightly message is to persuade farmers to adopt certain beneficial practices, so another measure of how well the extension program is doing its task is provided by an estimate of the proportion of all farmers (not only contact farmers) who adopt the recommended practice. Such a chain of goal-means - goal - means - goal continues to the ultimate goal of the program,

---

1/ The content of internal reporting will be discussed later, but it has to inform not only on extension per se, but on crucial circumstances affecting agricultural extension - unusual rainfall patterns, plant diseases, state of input availability, etc. - to enable the headquarters to direct overall agricultural and extension activities.

but the degree to which each goal in the chain is attained at a certain point in time is also a useful measure of the success (or lack of success) of the program.

B. Methodological Difficulties and Fallacies

3.15 One should be clearly aware of the great methodological difficulties and inherent uncertainties of evaluating the impact of extension. While monitoring studies should not encounter particular problems, since they are concerned with measuring definable inputs and activities, evaluation of impact has to be concerned, ultimately, with crop yields and incomes. Evaluation studies are expected to substitute for impressionistic estimates by some quantifications of the incremental increases in yields which are attributable to the extension efforts. However, yields are subject to the influence of many factors at a time, some convergent and some divergent, and it is extremely difficult, if possible at all, to disaggregate crop yield figures by different causal factors and to measure the separate impact of extension.

3.16 As reported in the published scientific literature, the methological experience of evaluation research on extension impact is not very reassurring. While there are many sociological and communication studies on the so-called "diffusion of innovation" processes, most of these studies confine themselves to collecting statements of farmers' about acceptance or rejection of innovations, i.e., collecting only opinions rather than hard facts. These sociological studies have not gone as far as to measure the actual impact of accepted innovative technologies on yields, by performing crop cutting surveys and attempting to disentangle the effects of extension from effects of other factors. Thus, the state of the art does not offer ready-made and tested solutions for evaluating extension impact.

3.17 Facing these difficulties, evaluators, and critics of evaluation efforts, run the gamut from the extremely pessimistic to the extremely optimistic. At one end of the scale are those who feel that evaluation is hopeless unless a controlled experiment can be mounted. At the other end of the scale are those who attribute causality to any anticipated change, blind to other plausible explanations of the change. Neither of these extreme positions is tenable. While it is true that causality cannot be attributed with perfect logic in the absence of a randomized controlled experiment, a prudent interpretation can and will draw inferences about the plausibility or implausibility of alternative explanations in the light of relevant data, and hence about the impact of this particular factor - the extension program.

3.18 Therefore, despite all the difficulties, there is no doubt that since the ultimate goal of extension is to increase agricultural production, the evaluation of the extension program's success or failure should aim at measuring the impact on yields.

3.19 There are certain fallacies to be avoided in evaluating the impact and in interpreting the information which suggests increases in yields and/or incomes. An example may suggest such difficulties and possible fallacies. For instance, since the ultimate objective of the extension program is to improve social and economic well-being, one can think of evaluating well-being as a measure of impact. However, no specific characteristics of well-being are singled out nor are specific levels of any such characteristics defined as the goals of the extension program. Unless strong evidence is obtainable, neither would achievement of specific well-being characteristics be attributable necessarily to extension. Consequently it is necessary, post hoc, to identify some cultural characteristics of the population of Indian farmers, of such a nature that changes in those characteristics might be related to the existence of the extension program. A host of such characteristics might be named: income, crop yields, possession and quality of goods such as houses, clothing, furniture and tools, children's attendance in school, and many others. Evaluation might then direct itself to the question whether, as a result of the extension program, the levels of each of these indicators of well-being have increased. The problem resides in the phrase "as a result of the extension program." It is certainly possible, given sufficient resources, to measure the level of any of these characteristics at the initiation of the extension program and at later points in time and thereby to measure changes during the course of the program. To attribute the changes to the extension program on the basis of this evidence is fallacious. The Indian farmer is exposed to many forces that are acting at the same time, some programmed and some unprogrammed. These highly significant forces include the weather, various types of communication with other farmers, irrigation programs, information programs using various media, programs designed to make such inputs as credit, fertilizers, seed and pesticides more readily available, and others. Moreover, the forces interact in complex ways. For example, the installation of irrigation canals may itself increase crop yields but water management techniques recommended by the extension service may lead to even greater gains in crop production by advocating the start of a nursery sufficiently early in the year to permit two crops rather than only one to be grown on a given field. The complex interaction of the many effective forces makes causal attribution to any one of them extremely hazardous.

3.20 A desirable solution would be to establish a controlled experiment in which randomly selected portions of the target population are exposed to various combinations of the existing forces. From such an experiment, properly designed, one could hope to see to what degree changes are associated with the various experimental factors. However, it is obvious that the solution of a randomized controlled experiment, which would rule out competing explanations of effects, is not feasible. Weather, for example, is clearly not controllable, nor is communication with others. Of similar difficulty would be to isolate in an ongoing program "control" plots to which the percolation of extension messages was precluded.

3.21 How then can we learn about the impact of the extension program? We must first define some characteristics that can be measured reasonably

well and which will be generally acceptable as indicators of well-being. Some indicators or proxies are given in Chapter 4. One such indicator (or proxy) is crop yield. Crop yield is a direct measure of productivity and it is only a measure of well-being when converted to a net income value (or nutritional value) and related to some suitable index of standard of living (e.g., poverty level or nutrition level).

3.22 One may be quite willing to conclude that the extension program has had a positive effect on yields if he observes that farmers who have been exposed to the extension program and who have adopted the recommended practices have increased their yields more than farmers who have not adopted. This is precisely the analysis that was adopted in the evaluation of the extension project in the Chambal Command Area Development. 1/ Again, one may be willing to grant that there was a positive communication effect if he observes that there has been a substantial increase in the number of farmers who have adopted better agricultural practices. In both cases, of course, there are alternative hypotheses to explain the effects, but they could reasonably be considered to be less plausible. Other approaches are available also. Thus, yields might be related by a regression analysis to rainfall and other weather conditions in order to show that an observed increase in yield cannot be explained only by a change in the weather from one year to the next. But even a multiple regression analysis may not be conclusive for separating timeliness of rain as opposed to amount, or pest and disease factors, etc.

3.23 It should also be emphasized that the data collected for evaluation should be limited to those items that are the most crucial for the analysis. There is often an unfortunate tendency to collect data in such volume that most of it is simply stored and never subjected to examination. Moreover, data collection should be limited to items that can be measured reasonably well within financial and human resources that are available.

3.24 We have omitted income from the list of indicators in Chapter 4 for two principal reasons. First, income is extremely difficult to measure well since sources of income are numerous, memory biases are considerable, and there is an understandable tendency to regard income as sensitive and private information. Second, income is affected by changes in price levels and other extraneous factors not related to the extension program, as well as by the way the farmer manages his finances. Yield, on the other hand, can be measured quite objectively and is included as a principal measure of the impact of the extension program. We also recognize, however, that crop yields are not the only measure of the impact of the extension program; cropping intensity and change in cropping patterns are significant as well. For instance, increased crop intensity may, sometimes, slightly decrease yields of individual crops, while cumulated yields would be higher; or some innovative practices may have no impact on yields, but decrease the production costs. To evaluate

---

1/ See Crop Estimation Study under Agriculture Extension Program in Chambal Command Area, 1977, typewritten report, Kota, Rajasthan.

such impacts may require more qualitative analysis than simple yield measurements.

3.25 Another evaluation fallacy is to regard physical agricultural ouputs as the only consequence of extension projects, as though extension were no more than a pure technological input/output phenomenon. Institutional and cultural effects of different kinds might be generated as well and they are of major importance for the development of the affected rural communities. For instance, extension recommendations may be conducive to increased membership in the primary cooperative credit societies by inducing interest in using purchased inputs. This would be an institution building effect of definite significance. Therefore, measurements of application for credits and repayment rates of loans may also serve, under definable circumstances, as indicators of extension impact on farmers' behavior. Over time, the evaluation studies should evolve to assess other measurable social and institutional effects too.

3.26 It should also be noted that not all information relevant to the impact of the extension system is derivable from surveys. Other means are available, which may produce data that are not amenable to strict satistical analysis but which may, nevertheless, provide useful insights into the relationship of the extension activity to the social mechanism. For example, data on family budgets are extremely difficult to collect by survey techniques in any society, and impossible where the level of literacy is low. But a sociologist or other trained observer, resident in a village, can construct such budgets for several families and in the meantime learn a great deal about the relationship of the budget to changing practices that are related to the extension program. Sociological participant-observer studies of this kind are useful and necessary in studying the relationship of the extension program to other aspects of village life.

PART TWO

IV. THE SYSTEM OF INDICATORS

A. The Three Concentration Zones

4.01 A list of selected indicators is proposed in this chapter to guide the collection of information needed for monitoring and evaluation.

4.02 The basic rule followed in the present recommendation is to limit the set of indicators to the absolute minimum information that can be collected and fed back to project management and policymakers easily, at low cost and on a timely basis. Given the large variety of aspects of the Extension Projects, a long series of indicators can be easily listed. The difficulty, however, is not to list many indicators, but the ability to identify priorities and to restrict the list to a small number of truly key points.

4.03 If and only if such vital check points could be accurately defined and systematically watched, can we realistically hope to capture, through a rather simple monitoring device, the heartbeat of such a huge organization covering millions of farm families and immense territories. Therefore, we propose to select only three concentration zones for which these indicators should account. Such a "reduction to the ultimate essence" would make clearer how the suggested monitoring and evaluation system would focus sharply on the ultimate building blocks of the extension process.

4.04 We consider these three points to be:

a) the visits

b) the recommendations (adoption of)

c) the yields

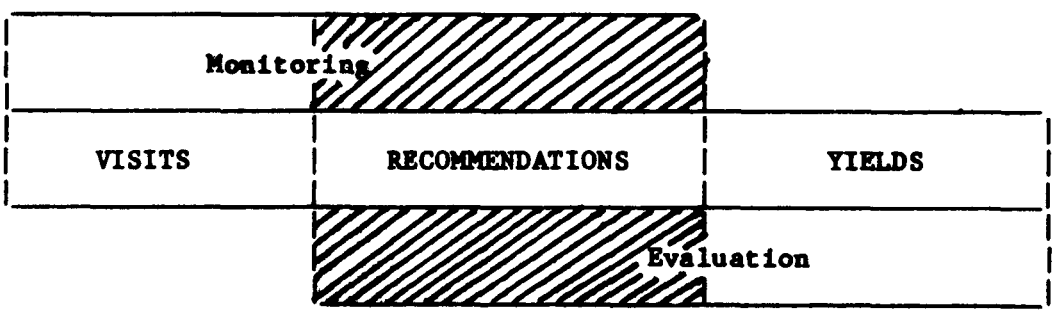
4.05 The visit made by the VEW to the farmer crystallizes and concentrates in a nutshell the whole effort of the entire extension apparatus. Absolutely everything in the work of the extension organization is geared toward delivering a "high quality" and timely visit. The visit is the final output of all the means put in place: agricultural research, systematic training, financial resources, an army of specialists and field staff, backstopping, transportation equipment, etc. The visit is a measurable and simple proxy for the entire endeavor of institution building undertaken by the project. The training of the VEWs, which is of paramount importance, translates itself into the quality of the visit. Thus, the focus on the visit

offers the best chance to explicitly monitor the service provided by the extension establishment and implicitly and retroactively monitor the long process which leads to and materializes in the delivery of the visit. Therefore, the visit should be put in the very center of the monitoring effort.

4.06 The yields (or overall production levels) are the eventual consequence of the developmental effort. Under normal conditions, extension impact should be reflected in yields more tangibly than in other measures, although the full set of social, cultural and institutional effects should be considered as well (see also 4.25).

4.07 The recommended practices are the link between visits and yields. They are the content of the visit and the means toward the end-yields. The visit strives to make the recommendations understood and accepted, it motivates the farmers and provides him technical assistance.

4.08 If it is correct that these three "concentration points" abstract in essence the entire process, then we should cover them properly under a set of indicators for monitoring and evaluation. The proposed coverage is:



4.09 As can be noted from the above design,

- the VISITS will be the main concern of MONITORING
- the YIELDS will be the main concern of EVALUATION
- the RECOMMENDATIONS (adoption of) will be the concern of both MONITORING and EVALUATION.

4.10 The overlapping of monitoring and evaluation on the adoption of recommendations is deliberate and logical. Farmers' acceptance of recommended practices should be both a monitoring measure of extension performance (the increasing uptake rate) and an intermediate measure of impact and agricultural productivity (precisely when direct and distinct impact measurement are so difficult).

B. The Adaptive Research Activities

4.11 Adaptive agricultural research is not explicitly represented in the above drawing, because substantively the conduct of scientific research lends itself to a different type of evaluation (by the "peer review committee") from that appropriate for extension. Implicitly, however, research is constantly in the limelight of project monitoring. In other words, the three concentration points are pertinent proxies for evaluating adaptive research effectiveness.

4.12 It should be remembered that a main objective of all the Extension Projects in India is to develop the state agricultural adaptive research institutions. They provide substantial support for research programs aimed at suplying the technologies to be conveyed through the extension organization. Though, as was indicated, the present proposal does not intend to cover comprehensively the projects' research components, 1/ it should be emphasized that the m/e system for extension is designed so as to provide evaluative information about the technical packages to researchers. By focusing on the three concentration areas, m/e will, in fact, observe (a) the transmittal of the research products through visits, (b) the relevance and acceptability of research output to farmers (adoption of recommendations) and (c) the effectiveness of research products (through yields and economic analysis). In fact, it is the ultimate merit of the T & V system itself which puts the beneficiary farmers in the position of "monitors" of research outputs and conveys their acceptance, partial acceptance, or non-acceptance (read: evaluation of suitability) back to the research lab.

C. Implementation Indicators

4.13 We will note first two clusters of indicators that fulfill a monitoring function; that is, they are indicators that can be estimated at relatively short intervals (say, one month) and can therefore serve to give signals about possible incipient weaknesses, delays, etc. Thus, relevant indicators for monitoring are measures of the resources put in place (personnel, materials), the number of contact farmers reached by the VEW, the number and frequency of visits by the VEW to the farmers, the degree of understanding by the farmers of the messages that were to be spread by the VEW and the degree to which the recomended practices are adopted by the contact farmers and transmitted to other farmers. A good indicator is the attitude of the farmers toward the usefulness of the extension program and its staff.

1/ The traditional procedure for evaluating scientific research - the peer review process - is of course recommendable. In this particular instance it is complemented and reinforced by the testing operations to which the entire T & V system submits the research products.

4.14 Note that each indicator listed below should be specified into a class of operationally quantifiable items, at the desired level of detail. Thus, "staff" might include number of AEOs appointed, number of VEWs or SMSs appointed, number of VEWs at work, and others. The choice of the specific items to be reported within each class should be made on the basis of usefulness for monitoring.

List of Indicators for Monitoring

Objective: Institution Build-Up	Information Sources
(1) Staffing of Extension Organization	- Reporting
(2) Selection of Contact Farmers	- Ad hoc study and reporting.
(3) Training (role learning)	- Reporting
(4) Physical Equipment	- Reporting and Accounting

Objective: Extension Performance	
(1) Degree of Exposure to Extension - Farmers reached directly - Farmers reached indirectly	Monitoring sample survey
(2) Quality of Visits	Monitoring sample survey
(3) Farmers' evaluation of T & V	Monitoring and harvest survey Village studies
(4) Adoption of farm practices	Monitoring sample survey Harvest study Village studies Farm Practices ad hoc study
(5) Role Behavior (VEWs, AEOs)	Ad hoc studies Monitoring survey
(6) Training (quality)	Ad hoc study Study on VEWs

4.15 These synthetic but simple indicators provide a means to monitor, both quantitatively and qualitatively, (a) the construction of the organization, (b) the role performance of its actors (VEWs, AEOs, SMSs, etc.), and (c) the reactions of the beneficiaries. These are mutually complementary. Some overlapping may also exist, but it neither can nor should be totally

eliminated; it allows for double checking of some essential variables of system operation.

4.16 For actual data collection, these indicators, as shown later, would be operationalized and "translated" into specific questionnaires or field observation procedures. If information on these indicators is obtained with sufficient precision, it will surely identify certain project components or certain geographic areas in which the extension program needs more attention from the supervisory staff. For example, if a certain district has a markedly low proportion of contact farmers who are adopting a given recommendation, the management could institute an immediate investigation to determine whether this is because the recommendation is inappropriate in that district, because the information about the recommendation has not been communicated effectively, because the group is more conservative than other groups, or for some other reason. In these cases, different actions would be indicated, such as re-training of the VEWs, replacement of the Subject Matter Specialist, amendment of a recommended technology, or other action depending on the revealed cause.

D. Impact Indicators

4.17 Within the methodological caveats discussed in paras. 3.15-3.26, we believe that the correct strategy in establishing our impact indicators is not to restrict them to yields. Though this paper strives to limit and simplify evaluation measurements, it recognizes that the consequence of a strong extension program are multifaceted (economic, sociological, technological, attitudinal, institutional). Moreover, they will mature over a longer time horizon than the time-frame of ongoing evaluation.

4.18 With that proviso, and for practical and policy reasons, we recommend to focus (but not to limit) ongoing evaluation on capturing the linkages between extension, adopted practices and production level achieved.

List of Indicators for Evaluation

Indicators	Data Sources
(1) Yields of major crops	Harvest survey
(2) Cropping intensity and patterns (changes)	Harvest survey
(3) Area under HYVs	Reporting
(4) Spread of key practices	Monitoring and harvest surveys Village studies
(5) Amount of purchased inputs (fertilizers, pesticides)	Aggregate statistical information from distributing agencies
(6) Credit use/recovery	Cooperative/Bank statistics

4.19 Once again (as we did in Chapter III, section B) we have to point out that the indicators of agricultural production levels are susceptible to competitive explanations; they may result from actions other than extension, e.g., removal of certain constraints in water supply, equipment availability, seed supply, etc., while extension will have most effect on the way a specific crop is grown. It is only the correlation of the impact indicators with previous baseline information and with monitoring indicators on extension delivery which may lead to a meaningful interpretation of the impact indicators.

4.20 The indicators should be treated as inter-related in a system, mutually reinforcing their evaluating power when they are cross correlated. However, it is also important to mention that within this system the relationships between recommendations and impact may sometimes be obscured by other factors. For example, a recommendation for timely sowing may at a given point and time be impossible for a farmer to implement because of, say, lack of rainfall. In such a case the fact that the farmer does not follow the recommendation indicates neither that the recommendation is an inappropriate one in normal circumstances nor that extension is not effective in bringing the message to the farmer. Another example would be if a farmer did adopt timely sowing but in that particular year floods destroyed his crops. In this case an outside influence (weather) can weaken any attempt to establish a link between extension, the adoption of a recommendation and an increase in yields. Such possible relationships should be given due consideration in manipulating the indicators and interpreting the findings.

E. Flexibility of the Indicators' System

4.21 The proposed system of indicators refers to the crucial areas of the T & V system and its anticipated effects, but they should not be construed as appropriate for all times and places. On the contrary, they allow the Evaluation Unit room for flexibility on several counts: level of detail in specifying each indicator's information requirement, differential emphasis on individual indicators depending on stage of project implementation, moderate additions to the list derived from area-specific problems or use of proxies when no ohter ways of generating information can be imagined.

4.22 The concise wording of each indicator does not attempt to suggest, of course, the depth and level of detail at which it would be researched during the actual evaluation exercise. This would appear later in the design and terms of reference for each particular type of study. It is also a matter to be decided upon by the Evaluation Unit, depending on specific needs in different states or at different points in time. For example, the indicator "spread of key practices" would lead to data collection about specific items in the technology recommended by the VEW, about reasons for acceptance or rejection, about methods of presenting these practices to the farmers and farmers' comprehension (message clear or not), about whether the cost entailed is or is not within the means of farmers of different categories and about the related profitability, etc.

4.23 Note also that not all of these indicators have to be used from the first ongoing evaluation survey. Some elements of the projected extension effects and impact will appear earlier, others later. Accordingly, for instance, it would probably be premature to expect in the first year of extension operation, a significant increase in small credit use/recovery or change in cropping patterns, as expressions of impact. This would come gradually, as yields may initially increase without many credits or much purchased inputs. The use of some impact indicators in the first years, when there was not time enough for the impact to appear, should not lead to mistaken interpretations about absence of impact. At initial stages, such indicators should rather be used for measuring the "status quo", i.e., for establishing the baseline situation against which later progress would be measured.

4.24 The list of indicators should be considered open. As the project advances, some indicators which will become relevant would be added, while others would be de-emphasized. For instance, extension targets will change with time and the evaluation of performance should be made against targets set in the annual or seasonal plans of the Department of Agriculture. Or, after the first few years devoted to building up the extension organization, a shift will become necessary from indicators concerned with staff recruitment to those reflecting organizational maintenance.

4.25 Perhaps the best example in this report can be the treatment of yields as impact indicators: yields are only a simplified proxy for what extension aims to achieve over time; just as important are extension

recommendations that increase cropping intensity, reduce costs or increase income in other ways. Moreover, it is worth pointing out that, probably, yields could be used as a significant indicator only for relatively few years. If, after a certain period, the yield of a crop has approached its full potential, then the maintenance of the achieved level would become a challenging goal of the extension service and a more adequate indicator of the T & V system's effectiveness. At that point the extension service has to work very hard just to help farmers maintain their yields, particularly against attacks of pests and diseases. Helping farmers find more profitable cropping patterns then becomes more important. In short, the impact of extension involves more than the yield of a single crop in a single season, and over time the indicators for the evaluation should evolve to assess these efforts as well.

V. THE DATA GENERATION SYSTEM

A. The Flow of Management Information

5.01 Following the definition of indicators, the next step in developing the model of the M & E System is to determine the data generation system capable of yielding information along the lines of the indicators retained.

5.02 The data generation system in an Extension and Research project is composed basically of two main parts: (a) the internal functional reporting from lower to upper levels of the administrative structure, which is often called "internal reporting", and (b) the set of special monitoring and evaluation studies and surveys which generate information supplemental to the normal reporting and which is sometimes called "external" monitoring and evaluation. While the present report is concerned essentially with setting up the "b" part, it fully recognizes the crucial importance of a sound reporting system as an information lifeline for project management about activities going on in all sub-areas of project implementation.

5.03 In fact, Project Management should be put in the best position to integrate the information received through the reporting channels with the information produced by the monitoring studies and surveys and to guide the so-called "external" monitoring towards checking, supplementing and/or deepening the critical information signals received through the reporting system. The reporting system itself should be strengthened and streamlined so as to facilitate a smooth and rapid flow of management information.

B. Internal and Outside Reporting

5.04 There are well established reporting procedures within the state Departments of Agriculture in India, which convey to the state headquarters information about (a) the activities of lower level staff on various agriculture-related matters and (b) the circumstances within which the agricultural processes progress: we refer to the various reports on crop and weather conditions in different parts of the state, on local availability of various inputs, on distribution and recovery of agricultural credits by primary credit societies and by various banks, on flooding, water levels, state of feeder roads, transportation of agricultural products and inputs and other aspects. This information enables the state agricultural headquarters to have an overall picture of the agricultural processes and problems and to act accordingly.

5.05 It is desirable that the introduction of the T & V system gives the occasion, in each state Department of Agriculture, for a thorough review of existing routine reporting patterns on the overall agricultural activities, with a view to relieving district and regional staff from redundant report writing and freeing management from excessive report absorption. This is not

to say that reports are not important. It is essential that the Directorate of Agriculture has prompt reports on the delivery or availability of seeds or fertilizers all over the State, since the best extension efforts might be undermined if recommended treatments are not feasible because of lack of inputs. The same is true of credit bottlenecks. But the Directorate of Agriculture in each State could realistically re-examine its own needs for internal reporting from lower echelons, with respect to the content and periodicity of such reports. As a general principle, in an administrative context presently overloaded with countless reporting requirements, the minimal reporting rule seems to be beneficial. For instance, the Government of West Bengal has embarked recently on an effort to cut down reporting requirements in agriculture. From the some 1,450 reports routinely asked annually from each district in agriculture (including weather conditions) the number is being cut down to about 350. Experiments with the new formats are in process. Any attempt to strengthen internal agricultural reporting in various states should remain as much as possible consistent with the minimal reporting goal and rule.

5.06 Insofar as strictly extension work is concerned, the implementation of the T & V system introduces ipso facto some essential improvements in record keeping and in the reporting and internal built-in monitoring mechanism. In the T & V extension service, keeping paperwork at a minimum is a fundamental principle. At the grass roots level, the main record is the Diary of the Village Extension Worker. The T & V extension organization normally uses oral reporting at the lower levels, and switches to written reporting only at the higher functional levels. These rules should never be altered by requesting written routine reports from the field level staff.

5.07 Built-in monitoring. An outstanding characteristic of the T & V extension organization is its built-in monitoring mechanism. This puts the Agricultural Extension projects in a distinctly better position than other Bank projects, since a monitoring mechanism is put into place automatically by the very process of building up the extension service.

5.08 The built-in monitoring device resides in the very rigid and precise time schedule of field visits and training sessions, which requires the extension agent to be at a definite place on a definite day with no exception. This helps to curb the absenteeism of field workers, which used to be a chronic weakness of the previous extension services. Similar tight time schedules are built in for the ABOs and SDEOs, which enable them to monitor easily the presence of the VEWs at prescribed places and times and, in turn, encourage them to perform both their technical assistance and supervisory monitoring roles along a precise time/space chart (see the space/time chart of a VEW in Annex 3). The principles of a single line of command and extension exclusivity should prevent evasions. Each identified departure from the pre-established timetable becomes a monitoring signal. The time schedule is also made known to the farmers who become aware that on a certain day they should regularly expect their VEW's visit. This efficiently co-opts the beneficiaries into the monitoring mechanism. The supervisory

potential of the periodic training sessions adds another piece to the built-in monitoring mechanism.

5.09 Functional Reporting on Physical Project Inputs. The Agricultural Extension and Research Projects provide the resources for expanding the staff and facilities for field extension work and for developing the network of applied agricultural research centers (research staff, civil works, fellowships, equipment, etc.). The timely and effective use of these project resources should be of essential concern to the internal monitoring process. In particular during the first two or three years of the project, when the reorganized extension service and the research centers are being built up towards the point of full development, timely recruitment of new staff and timely provision of physical inputs (housing, offices, laboratory equipment) is of utmost importance. The same is true for timely payment of salaries or travel allowances to field staff, provision of means of transportation, etc. The unfolding of these project activities should be checked strictly against the time schedules set up in the Appraisal Reports and in the annual planning of the Department of Agriculture.

5.10 We suggest that the monitoring of the physical project inputs should be carried out only through the internal functional reporting system of the Department of Agriculture. There is no need for the Evaluation Unit to get involved in this process. Functional managers at different levels (Subdivisional Extension Officers and District Agricultural Officers) would report on a monthly basis to the Director of Agriculture about these and other items. The Research Centers would report on their activities, as agreed, to the Directorate of Agriculture as well. Normal functional supervision would be exercised. Accounting procedures are established for reporting on consumption of financial resources provided under the project.

5.11 Outside reporting. For the purpose of centralizing at state level district information on staffing and equipment, as well as for semi-annual reporting to the Bank on state of projects, a proforma for semi-annual progress reports is suggested (Annex 4). The proforma would contain quantitative information on progress in territorial coverage by the reorganized extension service, on staff recruitment and training, on building of functional and residential facilities and on provision of transportation by equipment. (For the direct use of project management, the semi-annual report figures should be broken down by districts, to facilitate supervision emphasis on area bottlenecks.) A similar proforma can be used for semi-annual reporting of physical developments in the research components of the extension and research project.

5.12 If in addition to extension and research, the project contains other components the proforma for the semi-annual reports should be supplemented with corresponding reports. This refers, for example, to such components as the small irrigation schemes in the Assam Project.

5.13 As soon as the monitoring and evaluation surveys and ad hoc studies have passed through the testing phase and have started regular production of substantive information on the extension operation, appropriate summarizing columns should be introduced into the profroma for the semi-annual report. These columns should report on achieved intensity of coverage of contact farmers, actual frequency of visits, proportion of accepted practices, etc. A qualitative analysis of the progress achieved should be appended to the statistical proforma, which would thus include the main survey findings which can be tabulated and quantified in the proforma.

C. The Diary of the VEW

5.14 As it was mentioned, the main record at the field level is the Diary of the Village Extension Worker. The Diary is an obvious means for internal monitoring. It contains primary, self-recorded information on the VEW village visits. Its purpose is twofold: (a) to facilitiate the VEW's own follow-up and self-evaluation; and (b) to enable his supervisors to check on his activities. It is expected that the diaries would be scrutinized and signed by the AEOs and other supevisory officers visiting the VEW's area. The AEO is also, in turn, expected to keep a simple diary recording the findings of his supervision visits and the issues on which he believes he should send feedback messages to his superiors or to the agricultural research centers.

5.15 Though the usefulness of the diary as a self-monitoring and internal reporting tool is very significant, there are also two shortcomings: (a) there is no attempt to process and aggregate the primary information contained in the diaries for systematic monitoring or evaluation studies; and (b) the current format of the diary permits redundancy, while omitting some important information.

5.16 The reporting/monitoring function of the diary can be enhanced by improving its format and uses. More space should be provided for recording the issues or requests raised by the farmers. Clear instructions should be given that the VEW records each week only the names of contact farmers he visited and did find in the village or field, and not simply list in his diary all the contact farmers which he is supposed to meet in the village. Since the diaries are printed and given to VEWs by the Department of Agriculture, it would be desirable to have one page with printed instructions as to the keeping of the diary, to ensure uniformity.

5.17 The VEW's diaries accumulate gradually a mass of invaluable information, which is only periodically checked by the AEOs or SDEOs but never synthesized and aggregated systematically. Such aggregations might help detect some trends which otherwise might not be grasped in a cursory review of each diary individually. In fact, such aggregations can be done rather simply and quickly, for instance, during one of the fortnightly training sessions when all VEWs are together. Therefore, it is recommended that, from

time to time, the AEOs be directed to undertake such a compilation, or, in other terms, a more systematic review of the VEWs' diaries. In addition, the State Evaluation Unit should initiate at a certain point during the year (but not as a permanent bureaucratic operation) review of samples of VEWs' and AEOs' diaries producing simple aggregations of the standard information contained in these records and attempting to identify trends and patterns in VEW visits or in the issues raised by farmers and recorded in the diaries. This operation would add significant insight to the internal monitoring effort.

D. Surveys and Special In-Depth Studies

5.18 The information generated through internal reporting/monitoring will be complemented by data generated through the monitoring and evaluation sample surveys and special in depth studies. Despite their effectiveness, the built-in monitoring devices are not sufficient. For a large part, they are based on self-monitoring, which has its known biases as well. Moreover, not all the aspects of the extension operations can be monitored this way. The higher levels of project management should not depend only on what the lower levels of command want, or are able to report, because this may restrain the flow of management information. Therefore, in addition to the field checks carried out directly by the project managers, empirical surveys and studies are the appropriate tool to provide project management with the essential information needed to run the system and evaluate its socio-economic effects.

5.19 Several criteria were taken into account in choosing the studies proposed. To begin with, it is considered that no single study could alone cover all indicators. Moreover, it is not desirable to assign too many data collection objectives to each individual study, since this would make its undertaking cumbersome. Periodicity at short intervals should be the rule for monitoring studies. All these make it preferable to recommend a set of complementary studies, relatively easy to undertake and likely to permit fast data processing and feedback. The proposed set of studies would cover the total communication process - the source, the messages, the channels, the transmission, the receivers, the feedback - as a system in its entirety.

5.20 Furthermore, the set of recommended studies should fit into a timetable that would match the sequence of agricultural seasons and major crops. It should be planned so as to distribute the workload evenly over time and keep the monitoring/evaluation staff busy year round, thus ensuring over the year a continuous information flow to management. The data processing capability should govern the amount of data collection attempted, to avoid accumulation of unused information. Consultants can be mobilized for specialized assignments.

5.21 The set of studies should cover all the organizational segments of the extension service. They should also invite the use of a wide range of data gathering techniques.

5.22 The recommended studies are listed below:

a) Monitoring surveys (pre-harvest months) of samples of contact farmers.

b) Evaluation surveys (at harvest times) of samples of the total farming population, involving crop cutting.

c) Special In-depth monitoring and Evaluation Studies:

1. Study on the Selection of Contact Farmers
2. Sociological Village Case Studies on Extension Impact
3. Study of the Role Performance of VEWs and AEOs
4. Farm Practices Studies
5. The Quality of Training Sessions
6. Farm Budgets (case studies)
7. Review of Research Output

(Note: Studies 1 and 3-5 will use relatively small samples of observed units, while 2 and 6 will be case studies).

5.23 The two sample surveys are the basic monitoring and evaluation tools. For simplicity, these surveys deliberately have similar designs and they can be treated as two distinct phases ("pre-harvest" and "harvest") of a single study. The second survey actually flows from and deepens the first survey in the same way in which evaluation flows from and must deepen the monitoring inquiry.

5.24 The proposed logistics and the similarity of design would facilitate replication of the two surveys periodically over the year. This would have the fundamental advantage of generating data time-series, thus allowing for comparisons over time. The set of special (ad hoc) studies would complement the survey information with a more in-depth analytical exercise. These ad-hoc studies would fulfill either monitoring or ongoing evaluation functions, or, in some cases and in various degrees, both.

5.26 The objectives, focus, nature and design of each one of the studies, together with detailed sampling procedures, options for sample size, illustrations of interview schedules, suggested techniques for case studies, etc., will be described, in turn, in the following sections of this paper.

VI. THE MONITORING SAMPLE SURVEY

6.01 The main instrument for generating monitoring data, as a complement to the reporting procedures built into the T & V system, would be a sample survey of farmers to be carried out during the growing season of a given crop. It is designed in such a way as to identify the districts or other administrative subdistricts of the state in which the extension program is going well and those that require immediate and additional management support.

6.02 We describe here a general standard design for such a survey and also give an example of a specific survey program, including sample size and allocation of the sample among districts. States will differ with respect to the crop seasons that are to be the object of investigation, the level of variability among Farmer Groups (villages or subgroups within villages) and among farmers. Moreover, different project managers may desire different levels of the sampling error for subdistricts, districts or the whole state. These factors should influence the way in which the sample design is determined. We illustrate in the specific design described later the manner in which knowledge about such factors is used to define particulars of the sample design. 1/

6.03 The survey in each crop season would consist of two phases, which we will designate the monitoring (pre-harvest) phase and the evaluation (harvest) phase. The pre-harvest phase will provide primarily monitoring data and will extend over the growing season for the crop. The sample size will be such that two rounds of the survey can be completed within the harvest period, i.e., a period of about two and one-half to three weeks, and is described in Chapter 7. For the pre-harvest phase, the target population, the sample design and the precision of the estimates that will be produced are discussed below.

A. The Target Population

6.04 It is proposed that this survey initially consist of interviews with a sample of contact farmers, upon which the VEWs act directly. Such a survey of contact farmers can reveal the extent to which the VEWs are completing their assigned tasks, and the extent to which the population directly addressed is absorbing and applying the recommended practices. The diffusion

---

1/ It should be noted that initially knowledge of these factors will likely be rather vague. Information will be accumulated in the course of time, and this will permit modifications of the parameters of the sample design in the direction of greater statistical efficiency. It is an important task of the statistician in the monitoring and evaluation unit to assemble and analyze data bearing on these factors, for the improvement of future rounds of surveys.

to other farmers will be measured indirectly in this survey and directly in the harvest phase of the survey system (see Chapter VII). After year two and three of the project, the monitoring sample composition may shift to include a mixture of contact farmers with a certain proportion of non-contact farmers.

6.05 We may note that a sample survey is the only practical way in which objective estimates can be derived for such a population. A state may contain a population of contact farmers of the order of 300,000, distributed over the entire state. In a smaller state (for instance, Assam) they would eventually number about 200,000, but in a more densely populated one (like West Bengal) there will be about 450,000 contact farmers (see figures in Annex 2). With a sample of only 2,000 to 3,000 contact farmers, properly allocated, it is possible not only to make sufficiently precise estimates for the state as a whole but also to compare certain subdivisions of the state, so that informed judgments can be reached by the decision makers at the various levels of the extension organization on the places where remedial action should be taken. Such a sample must be well spread throughout the state to permit comparisons of subregions; to confine the sample to one or two districts would not provide the information that is needed for monitoring.

B. The Design of the Sample

6.06 The sample which we propose here for the monitoring survey should have a simple two stage stratified design. The pyramidal design of the T & V system itself consists, in fact, of a stratified structure (as can be seen in the Organizational Chart, in Annex 1), and its natural layers can be taken as strata for the sampling design. For simplicity and efficiency reasons, we have taken only the three bottom layers of the extension system - namely, the VEW circles, the Farmers' Groups and the contact farmers. The total number of VEW circles should be stratified into sets of neighboring VEW circles. Thus these sets would serve as strata for sampling. For each stratum a list of all its Farmers Groups would be easily available. The first stage sampling unit in the proposed design will be the Farmers' Group visited by the VEW, and the second stage sampling unit will be the contact farmer. The monitoring sample will thus consist of a stratified random sample of Farmers Groups from the

total number of Groups and a random sample of farmers within each sample Group. 1/

6.07 The actual size of the survey sample in a state should depend upon the degree of geographical detail and the level of sampling error that is desired by project management. For instance, one possibility would be to consider the administrative district as the unit of management in the T & V system for which the estimates are desired. True, the administrative districts in many Indian states are unequal in size and often too big for proper management estimates. Therefore, another possibility would be to consider the agricultural district, which is smaller, as the acceptable unit. One can think also of the "subdivision", which is still smaller, as a monitoring unit, but this option would probably be costlier than available monitoring resources permit if the same level of sampling error is desired, or, with identical resources, will have a significantly higher sampling error.

6.08 The preliminary discussion of this monitoring and evaluation model in several Indian states has adjusted the definition of the unit for which monitoring information is desired to the specific conditions of each state. For instance, in Orissa, where the entire state is divided in only 13 large administrative districts, not the administrative but the agricultural districts (of which there are 30) will be the unit, with 2 field investigators per each unit. In Madhya Pradesh, where the extension project covers about one-third of the state, the unit will be the district, of which there are 15; a field investigator will be placed in each subdivision, amounting to approximately 3 data collectors per district. In West Bengal, the 17 districts consisting of 50 subdivisions have been tentatively regrouped by the Monitoring and Evaluation Unit, in consultation with the Project Management, into 27 areas for which estimates of monitoring information are desirable. This

---

1/ A more complex, four stage stratified design was at first contemplated for this purpose. It consisted of a sample of AEO jurisdictions, with subsamples of VEW circles in each AEO jurisdiction, Farmers' Groups in VEW circles and randomly selected contact farmers in the sample Farmer Groups. The appropriate computations for allocating such a sample and deriving the associated sampling errors were laid out. However, careful examination of this four stage design and of the actual conditions under which the surveys will be carried out indicated that the two stage design described in this paper fits the existing circumstances better, is considerably simpler for programming the survey, and would lead to similar levels of sampling error. A description of the four stage stratified sample design is given in Annex 5. It can be used as an alternative to the two stage stratified design if considered more appropriate in certain circumstances.

regrouping was done by taking into account both the managerial and agro-climatic criteria for defining relatively homogeneous areas 1/ (some areas coincide with a district, others are smaller).

6.09 In the illustration given below, we have assumed that there are 15 districts in the project for each of which estimates are desired, and that 2 field investigators are assigned full-time to each district. On the basis of the assumption made regarding the basic variances and the time-costs involved in the collection of data, this results in a sample of approximately 3,000 interviews per month, usefully small sampling errors for individual districts, and very small sampling errors for the state as a whole.

6.10 If a state has fewer than 15 territorial units for which estimates are desired, the same assumptions would lead to a smaller total sample size, the same sampling errors for each unit, and larger sampling errors (although perhaps quite tolerable) for the state as a whole. Thus, Assam has only nine districts; this would imply a total sample of less than 1,800 interviews per round, with sampling errors for the state of Assam as a whole that are about one-third of the standard errors shown for individual districts.

6.11 It should not be inferred that this sample design necessarily implies statewide coverage. Some states (e.g., the Rajasthan or Madhya Pradesh projects) may prefer to phase the introduction of the T & V program, district by district, over a period of several years. In such cases, for the purpose of the monitoring and evaluation surveys, the term "state" comprises the area in which the extension program is operating at the time of the survey.

C. Independent Samples for Each Round

6.12 As was indicated, the monitoring phase would consist of two survey rounds during the pre-harvest season for the crop. Each round of the preharvest survey should use an independent sample of contact farmers. It is true that if the same sample were used in each round the estimates of change over time would have smaller sampling errors and the costs would probably be lower, but there is a substantial risk of non-sampling bias. This bias arises from the fact that a contact farmer's inclusion in the monitoring sample would soon become known to his VEW, and the latter's behavior is certain to be affected

---

1/ It may indeed be desired, at a certain point in time and for agrotechnical reasons, to replace the "district" with a homogeneous agro-economic zone (such as a combination of districts or subdivisions) for which the research stations recommend identical practices and for which estimates of their acceptance and profitability are sought. The administrative unit (e.g., district) may sometimes be appropriate for monitoring managerial performance/failure, which is one function of monitoring, while it may not necessarily be the optimum unit for evaluating technical performance or failure.

by that knowledge. Even the farmer's subsequent behavior is very likely to be affected by his inclusion in the sample. Thus, observed characteristics of the farmers in the sample would no longer be representative of all contact farmers.

6.13 On the other hand, the revolving character of the monitoring survey provides opportunities for imaginative use of follow-up procedures. After a reasonable interval (two or three years) the same sample of contact farmers can be reinterviewed with very useful results and with no serious bias risks, making changes in their work behavior and opinions more visible.

6.14 Also, instead of using completely independent samples of farmers in each round, the M/E Units in some states may wish to retain a subsample of the sample through several rounds of the monitoring survey in the same year and even include this portion of the sample in the following evaluation survey. The purpose of such a procedure would be to gain some insight on how individual farmers change their behavior under the influence of the extension program. Recognizing, however, that farmers interviewed in a monitoring survey round are very likely to be influenced thereafter, such a continuing identical subsample should be, say, no more than 10% of the sample. Moreover, it would be better to base estimates on the independent portion of the sample, rather than including the continuing identical subsamples. Thus, it would be wise to make the continuing identical subsample an addition to, rather than a part of, the evaluation survey sample.

D. The Questionnaire

6.15 As was emphasized, data collection in the sample survey should be limited to a small number of the most essential items for monitoring the extension program. A draft questionnaire is proposed (Annex 6) as an illustration, not as a ready-made tool, to be specified and adjusted in the case of each state and each survey round.

6.16 The principal purpose of the questionnaire is to obtain monitoring information on the farmers' behavior under the influence of the extension service, such as estimates of the frequency and quality of contact with the VEWs, the extent to which the extension messages are received and understood by the contact farmers, the differential rates at which recommended farming practices are perceived as profitable and actually adopted, and the general attitudes of the farmers toward the extension program. Thus, readings on the farmers' activities and the extension program will be available about twice in the growing season and will permit judgments to be made on which districts are doing will and which districts need closer attention by the management of the extension service.

6.17 The questionnaire should help ascertain whether the VEW's visit really gets down to the specifics of farm work and communicates <u>correctly</u>, not superficially, the advice given by the SMSs. Experience has indicated

that sometimes messages are so transformed in actual communication that to evaluate later without finding out through monitoring what actually transpires at the point of delivery may mean evaluating a program (or a technological package) in fact very different from that originally intended. If the survey suggests there has been much distortion, this should be checked further through special studies.

6.18 The survey questionnaire is addressing the contact farmers, but there is no sharp barrier between them and the other farmers. On the contrary, the contact farmer is expected actively to disseminate the message among his neighbors, relatives, friends, and the extension service is interested to know whether he is really doing so or is hoarding the information received. This should be appropriately reflected in the questionnaire.

6.19 We strongly recommend that, whatever the questionnaire and survey procedures, they be thoroughly pretested in the field before commitment to a full-scale survey. Such pre-tests are essential to ensure that the proposed procedures are feasible and that the questionnaire really obtains the information that is desired.

E. Determination of the Sample Allocation for the Monitoring Rounds

6.20 Essentially the same sample design can be used to provide monitoring data in each state (or portion of a state) that has an extension program, with certain modifications to be indicated below. However, the design may differ in detail from state to state depending on local conditions. For example, the field investigator's travel from place to place may be more time-consuming in one state than in another, or even in different areas within the same state. Information may be available that indicates differences in the basic variances and intra-class correlations. These and other relevant factors influence the choice of sample design with respect to total sample size and the allocation of the sample among strata and Farmers' Groups. The sample design to be implemented should be determined through the line of argument displayed in the following discussion, based on the available knowledge of local conditions.

6.21 For the sake of specificity, and as an illustration, we assume for the moment that there are three crop seasons in the state, for each of which attention will be centered on a single major crop. In other states there will be only two crop seasons, and in still others as many as four, but we suggest that the survey be confined to no more than three (which may overlap somewhat). We also assume that the state has 15 districts covered by the T & V program and that estimates are desired for each district. The staff of field investigators would then consist of two data collectors for each district or a total of 30 plus a supervisory staff of appropriate size and some reserve field investigators.

6.22 Assuming there will be two field investigators in each district, working full time, the sample in the district must then be limited by the amount of work that can be accomplished within a period of approximately one month (about five weeks, half the length of the growing season). We shall assume that this is equivalent to 25 working days for each field investigator. The sample design will be a multi-stage stratified random sample comprising, within strata, a sample of Farmers Groups at the first stage and a sample of farmers at the second stage. The allocation of the size of sample at each stage should be such that the data collection can be accomplished within the 25 working days that are available and such that the resulting sampling errors are as small as possible. The determination of the desired allocation of the sample must therefore depend upon two kinds of information, namely (a) the cost per unit at each stage in terms of the field investigator's time, and (b) the degree of variability among the units at each stage. Good data on these parameters are not now available to us. However, we may speculate on appropriate values for the cost and variance parameters, based on previous experience, and it turns out that, within a fairly broad range, the proper allocation of the sample is relatively insensitive to the speculated values.

6.23 To be specific, let us suppose that we wish to estimate the proportion of farmers that have a given characteristic (for example, have talked with the VEW at least twice in the last month, or have adopted some specific recommendation or set of recommendations, or have expressed a particular attitude toward the extension service). The precision of the estimated proportion in each stratum is measured by its standard error 1/ whose square is given approximately by either of the following formulas:

1/ The standard error of an estimate may be interpreted in the following way. If all possible samples of the specified design were selected, each of them were surveyed under essentially the same conditions and the estimate calculated for each sample, then:

i) Approximately two-thirds of the estimates would fall within an interval from one standard error below to one standard error above the average value of all possible samples.

ii) Approximately 19/20 of the estimates would fall within an interval from two standard errors below to two standard errors above the average value of all possible samples.

iii) Almost all estimates (about 99.7%) would fall within three standard errors below to three standard errors above the average value of all possible samples.

$$\sigma_p^2 = \frac{\sigma_G^2}{g} + \frac{\sigma_F^2}{gf}$$

or

$$\sigma_p^2 = \frac{\sigma^2}{gf} \left[1 + \rho(f-1) \right]$$

6.24 In these formulas σ_G^2 is a measure of the variability among the average Farmers' Groups within strata, σ_F^2 is a measure of the variability among farmers within Groups, and σ^2 is a measure of the overall variability of farmers within strata. In the alternative formula, ρ is the intraclass correlation of farmers within Groups, and is a useful measure of the degree to which farmers in the Group are similar with respect to the characteristic being observed. The symbol g denotes the total number of Groups in the sample, and f the number of farmers in the sample in each Group.

6.25 The total cost in terms of the time used by the field investigators assigned to one area for which estimates are desired may be expressed in the form

$$K = K_1 g + K_2 gf$$

Where K_1 is the investigator's time that is required for each Group included in the and K_2 is the additional time required for each farmer included in the sample. It can then be shown that the allocations $\hat{g}, \hat{f}$ that minimize the standard error of the estimated proportions are given approximately by

$$\hat{f} = \sqrt{\frac{K_1}{K_2} \frac{1-\rho}{\rho}}$$

$$\hat{g} = \frac{K}{K_1 + K_2 \hat{f}}$$

6.26 We note that the optimum number of farmers per Group does not depend upon the total time K that is available. We take K_1 = 3 hours and K_2 = 0.5 hours, tentatively. We anticipate that the intraclass correlation within Groups will be fairly high, say, ρ = 0.5. The formula then gives f = 2.4, which we round to f = 2. For a single field investigator, the number of Groups will be

$$g = \frac{200}{3 + 0.5 \times 2} = 50$$

and the square of the standard error of an estimate of a proportion P for the area would be

$$\sigma_p^2 = \frac{P\ (1-P)}{50 \times 2}\ [1 + 0.5 \times 1]$$

$$= 0.015\ P\ (1-P)$$

If two field investigators are used, this would be reduced by a factor of 2; if three data collectors, by a factor of 3; etc. Then, the resulting sampling errors would be

Proportion P being estimated	2 investigators	3 investigators	4 investigators
0.10 or 0.90	0.026	0.021	0.018
0.20 or 0.80	0.035	0.028	0.024
0.30 or 0.70	0.040	0.032	0.028
0.40 or 0.60	0.042	0.035	0.030
0.50	0.043	0.035	0.031

6.27 The standard errors of estimates for the whole state would be about one-fourth of those for a single district, if the state has 15 districts.

6.28 If the assumptions given above are acceptable, we would propose that initially the sample for each field investigator consist of a stratified random sample of 50 Farmers' Groups and a random sample of 2 farmers for each Group. Data accumulated during the course of the continuing survey will provide information on actual costs and correlations and thus provide the basis for modifying the allocation in future rounds of the survey.

6.29 It should be noted that the approximations used above for the sampling errors are conservative, so that the standard errors shown may be larger than the actual values by as much as one-fifth. When the survey is actually in operation, it will provide the data for making valid estimates of the standard errors of the various statistics derived from the survey. Such error estimation should be carried out routinely for the most important statistics of the survey.

6.30 The assignment of Groups and sample contact farmers should be given to the field investigator by his supervisor at the beginning of the round, together with the sequence in which the Groups should be visited. The sample of Groups and the farmers should be selected randomly, from lists of Groups and contact farmers supplied by the extension service. The sequence in which they should be visited should be arranged rationally so as to minimize the travel time of the field investigator.

F. Processing, Analysis and Feedback of Monitoring Survey Data

6.31 Once the questionnaires have been filled in, the preliminary coding and compilation should be done immediately by the individual field investigator. This should accelerate the processing and the flow of information at the local level, even before the survey documents are sent to the State Evaluation Unit. A simple compilation proforma is suggested in Annex 7.

6.32 The limited size of the questionnaire and the proposed compilation proforma should allow the field investigator quickly to code and process the basic information from the completed interview forms and to submit a summary of the data to the DEO immediately at the end of each round of the survey. The data collector would also send a copy of the compilation as well as all the completed questionnaires to the State Evaluation Unit for more detailed processing and analysis. The combined compilation sheet from the two field investigators in one district will give the DEO a picture of what has happened in the last month or so with respect to the items on the questionnaire, and may flag problems that need his attention.

6.33 The tabulations made by the State Evaluation Unit for each district can be more elaborate. For example, the accuracy with which the farmers have described and interviewers have recorded the recommended practices could be examined. Also, cross correlations of the various items on the questionnaire should be made in order to reveal their relationships. The responses to Item 10 (see Annex 6) should be examined, and possibly coded and tabulated if this appears to be useful. (The question should be retained even if not objectively useful, for its psychological effects). These tabulations should be done quickly, studied and summarized for each district, and a brief report sent to each district extension director within two weeks after the reference period.

6.34 In addition, the State Evaluation Unit should prepare a summary for the whole state, district by district, so that individual districts can be compared with respect to certain summary measures. Among these are, at least:

Proportion of contact farmers who knew the name of their VEW;

Proportion of contact farmers who were visited by the VEW at least once in the previous two weeks;

Proportion of contact farmers who were visited by the VEW at least twice in the previous four weeks;

Proportion of contact farmers who attended at least one group meeting in the previous four weeks;

Proportion of contact farmers who accurately reported knowledge of at least three of the most important recommendations;

Proportion of contact farmers who rated the extension program (a) extremely useful, (b) quite useful.

6.35 Summaries of the above statistics for the state as a whole will provide a basis for comparisons over time. The above reports should also be passed on to the District Extension Headquarters and will show each district how it stands with respect to the others. Selected basic information should also be included in the semi-annual Progress Reports on project implementation, to be sent to IDA. The leads offered by the sample surveys on critical aspects should be used as starters for initiating follow up, personal on the spot checks by project management, and in-depth analysis through special studies.

VII. THE CROP CUTTING AND FARMERS' EVALUATION SURVEY

7.01 Evaluation of extension impact should focus primarily, though not exclusively, on yields and on changes in farmers' behavior and attitudes. Information on yields, of course, can be obtained only at harvest. That is when a survey should attempt to capture the relationships between yields and the influence (or lack of influence) of the extension service on farmers' behavior.

7.02 As was emphasized (Paragraph 6.03), the harvest phase of the survey flows from and deepens the preharvest survey, shifting the emphasis from monitoring to ongoing evaluation. Compared with the first survey, the second would have three added features: it would (a) address a cross section of the total farming population, (b) subject it to a more in-depth interview than the monitoring survey interview, and (c) generate yield measurements.

A. Crop Cutting

7.03 A distinctive feature of the evaluation survey will be the use of crop cutting to estimate yields. Estimation of yields would not rely on farmers' verbal statements or on impressionistic estimates, but on measurements of crops harvested from randomly selected plots. An interview will be carried out with the farmers whose plots fall in the crop cutting sample. For evaluation purposes, the interview schedule would be more detailed than the interview schedule used for the monitoring survey, but will certainly collect information on all the questions included in the monitoring survey as well. By addressing a sample of the total farming population, thus including "contact" farmers, partial "followers" and "non-followers," the evaluation survey will assess the extent to which the influence of extension is percolating, or not, beyond the farmers directly addressed by the VEW, and will attempt to compare yields of adopters and nonadopters of recommended practices. In addition, information will be generated on the non-contact farmer's knowledge of recommended practices, the sources of his knowledge, his adoption of practices, and his attitudes toward the extension service. This should also provide guidance to management as to how best to expand in subsequent years the influence of the extension organization among the farmers not reached in the initial years.

7.04 Benchline and Time Series of Data. Due to the periodicity of the evaluation survey, a time series of data on yields will be gradually built up. The surveys in the first year of the program will serve for establishing the benchline data; the following surveys will estimate whether incremental increases in yields are achieved as the extension project is being implemented. Finally, the ex-post evaluation will benefit from accumulated data over a broad time horizon.

7.05 When the implementation of the extension project is phased over a few years, the benchmark survey might be carried out in some districts even before the T & V system is introduced. For instance, in Madhya Pradesh the T & V system will be implemented in a first batch of five districts in project year one and in an additional 10 districts in project year two; thus, in one or more of the districts of the second batch a benchmark survey might be carried out during year one, when implementation of the project has not yet started. Such a benchmark survey would use a sample of all farmers. Its primary purpose would be to estimate the distribution of current (traditional) agricultural practices. This would provide a basis for making comparisons with the results of the evaluation survey that is instituted after the T & V system is introduced.

7.06 An objective of the evaluation survey should also be to determine differences in the extension impact and take-up rates of various socioeconomic categories of farmers. It is important to evaluate whether extension and the recommended practices are beneficial to all farmers or only to certain groups and to find out which practices are preferentially adopted by which farmers, being more feasible within the given resources of various farm sizes. This would generate useful feedback information both to the extension service and to the research centers and should help adjust the immediate priorities of the agricultural research programs in accordance with the needs and resources of various categories of farmers.

7.07 Economic Evaluation. In the last instance, the economics of the extension service impact altogether should be evaluated against the economic justification assumed at the project's inception. The extension and research program produces, collects, and passes on knowledge to farmers. The accumulation and distribution of knowledge requires certain expenditures, diverting economic resources from other uses. But the knowledge thus transferred is of economic value and it raises agricultural productivity. Therefore evaluation should attempt to answer the query of the policy makers about the soundness of economic investments in extension, in terms of individual benefits for farmers and general increases in the country's crop production. The findings about the nonquantifiable social and institutional effects of extension will also have to be taken into account. This integrated information will then illuminate further policy choices among various investment alternatives.

B. The Design of the Sample

7.08 How to obtain reliable information on yields? The only proven and objective means is to measure actual yield levels through a crop-cutting sample survey. Which would then be the best strategy to organize a crop-cutting survey, and the interviewing which has to go with it, given the known difficulties always involved in such surveys?

7.09 We visualize two main possibilities to obtain survey information on yields:

(a) to make use of the regular crop estimation sample survey, carried out routinely in Indian states either by the Department of Agriculture or by other administrative entities, and graft on to it the additional information requirements for evaluation of extension impact.

(b) to harvest a specially designed sample of plots containing specified crops (more or less similar in design to the sample used in the monitoring preharvest survey).

7.10 Regardless of which of these two options is chosen, the evaluation survey at harvest time will differ from the monitoring (preharvest) phase in that it will address a random sample of the total farming population, i.e., it will cover non-contact farmers as well as contact farmers. It will have to estimate the relationship of yield rates of the crop to the farming practices followed, and to the activity of the extension service. Hence the harvest phase will involve not only harvesting a sample of small plots of the crop but also interviewing the corresponding farmers to determine their behavior and changes in their behavior, for example, their adoption of recommended practices. Further, the two survey options have some common as well as different features and we will examine them in turn.

Option One

7.11 A crop survey is conducted routinely in India to estimate yield levels and total agricultural production. It consists of a crop-cutting part and an interview with the farmers whose fields were randomly selected for the sample on which to make the cuts.

7.12 There are several advantages, as well as disadvantages in using the ongoing crop-cutting survey for the evaluation of extension impact. First, advantage would be taken of the training and experience of the primary workers in the crop estimation program, rather than using a group which has yet to be trained in the techniques of selecting plots, cutting crops for statistical purposes, drying, weighing, etc. Second, the work load of the evaluation data collectors would be reduced, permitting a larger sample of interviews. Third, two parallel crop estimate surveys may not necessarily produce identical results, due to differences in survey methods and personnel, and will generate uncertainty about the validity of the findings. Fourth, if the regular crop-cutting were utilized, then the evaluation of extension would be working with an already well-developed survey procedure and the results would be directly comparable to present and past state-level yield estimates.

7.13 As to the sample size, in a few states the regular crop-cutting survey appears to use larger samples than the evaluation of extension can afford within its given resources; larger samples would lead to more accurate

results. However, in many states the sample size of the regular crop estimate survey appears to be smaller 1/ than is desirable for the evaluation survey; in such cases, the sample would have to be augmented.

7.14 There would also be some significant disadvantages in using the regular crop cutting. For instance, a high non-response rate is experienced by the crop estimation survey in some states; this would require training at least some of the evaluation data collectors in the crop-cutting techniques, so that they could help the regular primary workers to complete their assignments.

7.15 Moreover, past experience indicates that the questionnaires which are filled out during the seasonal crop-cutting surveys are almost never processed and analyzed. 2/ But the interviews with farmers whose plots are cut are essential since it is the only way of finding out whether there is any relationship between their yields and the suggested practices. It appears that to expand and deepen the scope of the interview that is conducted now would be impractical and hopeless for several reasons. First, it would involve additional training and workload for the interviewers; this would probably make the process unacceptable to the regular crop survey. Second, the additional workload and the fact that the crop cutting is the primary task of the crop estimation survey, would certainly have a depressing effect on the quality of the interview data. Third, delays in processing the entire mass of data would reduce the effectiveness of evaluating the impact of extension. Fourth, even for such processing, the project would have to contribute its resources to strengthen the interviewing and data processing staff involved

---

1/ According to the NSSO report for the year 1971-72, the total number of plots planned to be cut for all food crops was 123,924, of which 101,667 (or 92%) were completed and analyzed. For any individual crop, the numbers were much smaller. Thus, for rice the number planned was 42,410, of which 36,584 were analyzed. Moreover, the latter numbers cover two crops of rice in three states. The actual sample size within a state for a single rice crop varied from 48 to 5,076. Of the 31 rice crops in 20 states, for which crop cuttings were analyzed, there were only 19 in which the sample size was greater than 500.

Similarly, in the 15 states that contributed data for wheat, the total number of cuts planned was 14,475, of which 11,851 (or 96%) were analyzed. The number analyzed in an individual state ranged from 145 to 3,040. The samples were even smaller for other crops. (See: Consolidated Results of Crop Estimation Surveys on Principal Crops, 1971-72. Government of India, National Sample Survey Organization, Report No. 24, New Delhi 1975).

2/ In Uttar Pradesh a special experiment is being currently conducted to ascertain whether the great mass of data collected will give significant results when coded and analyzed.

in the regular crop cutting, yet without getting effective control upon this staff. Therefore, even if the crop cutting of the routine survey were utilized, we do not recommend combining the two questionnaires; the interviews for establishing the relationship between yields and the extension program should be conducted independently by the staff of the Extension Evaluation Unit.

7.16 Such a combination of resources might pose logistical problems, and its feasibility should be carefully assessed before any decision is made. If the evaluation unit's data collector joins up with the regular statistical staff who carry out the crop-cutting experiments, he should concentrate on the evaluation questionnaire while the regular crop-cutter does the crop-cutting. Common identification codes could be assigned to ensure that the crop-cutting results could be matched up accurately with the survey questionnaire.

7.17 It should also be noted that the sample designs for the crop estimation surveys are not uniform from state to state, 1/ so that the probability of selection of a field or of a farmer is to be calculated differently in different states. These characteristics should be taken into account in constructing estimates of the characteristics of crop acreage or farmers.

Option Two

7.18 The second option consists of organizing an independent crop cutting and farmer sample survey for the purpose of the project's ongoing evaluation. This would give the Evaluation Unit, on the one hand, complete control over the design of the sample and the carrying out of the crop cutting and the interviews, avoiding many difficulties which may be encountered if a merging of the two surveys is attempted; on the other hand, this may significantly limit the size of the sample, in some cases, or increase the logistical and technical difficulties involved in setting up a crop cutting exercise per se, as was pointed out in reviewing Option one.

7.19 The choice between the two possibilities should be considered on the merits of each option in each particular state. The circumstances may be different from one state to another. In weighing them, the Evaluation Unit should look at both the substantive statistical reasons and the feasibility of institutional arrangements, for either case, and select the path which it is felt could lead to most conclusive results for evaluating the impact of the T & V system.

1/ See, for example, Pages 1 of the Report of the NSSO cited earlier and Pages 102, 9-11 of Manual on Crop Estimation Surveys on Food and Non-Food Crops in Andhra Pradesh, Bureau on Economics and Statistics, Government of Andhra Pradesh (1971).

7.20 During the discussion of a draft version of this paper with the managers of the Extension Projects in several Indian states in October 1977, it was felt that in some cases option one might better fit the existing pattern and available resources.

7.21 For instance, in Madhya Pradesh the actual crop cutting will be done by the Land Records Department, which is in charge of the regular yield estimates, while the data collectors of the M/E Unit 1/ will conduct the interviews with the farmers whose plots enter in the crop cutting sample. This option would ensure that the personnel most experienced in crop cutting will contribute with an objective measurement of yields, while the investigators of the M/E unit, experienced in interviewing farmers about their relationships with the extension service, would do the interviewing. 2/ This institutional arrangement may also entail some supplementing of the sample used by the Land Records Department in the districts covered by the extension projects (as explained further in para. 7.23). In Orissa, the evaluation survey will be taken over by the Bureau of Statistics and Economics (Agricultural Statistics and Crop Survey Division) which is responsible for the routine crop yield estimates in this state, while the interviewing will be carried out by a special group of 60 data collectors to be assigned to BSE (2 in each agricultural district) who will be doing the monitoring survey as well.

C. Determinants of the Sample Allocation for the Evaluation Survey

7.22 In Option one, the sample allocation and survey procedures would be determined basically by the approach already in use in the regular crop cutting. The Extension Evaluation Unit should review these allocations for its own satisfaction and introduce the adjustments deemed necessary, if feasible. In this, it should be guided by the methodological considerations proposed in this paper for ensuring an evaluation relevant for extension management purposes.

7.23 More specifically, when crop cutting and interviewing in the evaluation survey are done by different organizations, as in Madhya Pradesh, the organizations must coordinate their efforts in both the design and the implementation of the operation. The crop cutting organization (the Land Records Department in this case) will have information on the size of the sample it intends to use, and on the sampling error of the yield estimates that they expect to attain with that sample for the area that the Monitoring and Evaluation Unit wants to have covered for that particular harvest survey. The Evaluation Unit must then determine whether that level of sampling error is acceptable, or whether supplementation of the crop cutting sample is required in order to reduce the sampling error to a tolerable level. If supplementation is required, a proportionate increase in each stratum of villages should be

---

1/ To be located within the Directorate of Agriculture.

2/ As well as the monitoring survey and the special studies.

specified. It is likely that such supplementation will be necessary particularly in the cases when the extension program focuses on a certain crop only in a part of the state area on which the yield estimates are carried out for this crop. The evaluation of the extension program should be done for this concentration area. But it may be found that out of the total state sample used by the Land Records Department only a very small fraction is residing in the extension program area. If this fraction is too small, it needs supplementation to ensure a tolerable standard error for this more limited area. The Land Records Department would then select the additional villages at random in each stratum in the given program area, as in their original sample, and would make the selection of the supplemental sample plots in the usual way.

7.24 After these adjustments in the sample design and size, the same co-operation must continue between the two organizations in the actual carrying out of the survey. The crop cutting organization would inform the Monitoring and Evaluation Unit of the appointments made with the cultivators of the selected plots, so that an assigned data collector of the Evaluation Unit can be present at the time that the plots are harvested, to conduct the evaluation interview with the cultivator. The data collector should arrange for transcription of the yield result on his own questionnaire at a later time, after the produce is dried and weighed, by giving a common code to the crop cutting produce and to the interview schedule. The transcription may be done after the schedule has been returned to the state Evaluation Unit. In any case, however, it may be desirable to transcribe on the extension interview schedule the additional data obtained by the crop cutter, such as data on variety, irrigation, fertilizer, etc., which would be useful in the analysis of the harvest survey.

7.25 For Option two, since there is no ready-made sample to be used, full recommendations for sample allocation and a specific illustration are given below.

7.26 The sample design in Option two will be similar to that of the preharvest survey. However, the field investigator will locate and harvest a small plot of the crop for that season for each farmer in the sample, as well as carrying out an interview. Thus the costs in terms of the field investigator's time are different. The survey will be carried out during the two and one-half to three weeks in which each crop is harvested. In addition, the variability of crop yields at the various stages of selection is different from the variability of the items measured in the pre-harvest surveys. As a consequence of these facts, the sample must be smaller and differently allocated in order to make efficient use of the available time and manpower for data collection. One consequence of this is that estimates derived from this round are not likely to be precise enough to permit useful comparisons among districts or sub-regions for many statistics. They should be sufficiently reliable for state estimates.

7.27 We may determine the sample size and allocation on the basis of preliminary assumptions in the following way. We expect the yields to have higher intraclass correlations than the characteristics of farmers determined by the interviews. Therefore, for the purpose of fixing the initial allocation of the sample, we assume that the correlation in yields among plots selected in the same Group will be about .8.

7.28 We also anticipate that the coefficients of the cost function K_1 and K_2 will also have somewhat different values. We assume that $K_1 = 3$ (hours) as in the pre-harvest phase. However, since the data collector must locate and supervise the cutting of a sample plot we add 2 hours per farmer and take $K_2 = 2.5$. With these values of the costs and variances 1/ and assuming that the data collector has about 120 hours available for the work during the harvest period, the optimum allocation of the sample is given by

$$\hat{f} = .55$$

o minimize the sampling error, we should therefore take only one farmer per Group. 2/ The number of Groups to be assigned to a data collector is then

$$\hat{g} = \frac{120}{3+2.5x1} = 22$$

For this allocation, we can calculate the standard error of the estimated yield if the value of σ is known. It appears from data published by the national survey of crop yields that, roughly, σ = .5 x mean yield; it varies from crop to crop, apparently being somewhat higher for wheat and somewhat

---

1/ From data kindly supplied by J.S. Sarma of the NSSO, it appears that the intraclass correlation of yields of paddy and wheat, both irrigated and unirrigated, between fields within villages with the tehsil taken as stratum, was close to .5 for Madhya Pradesh in the years 1973-1976. This would raise the theoretical optimum number of farmers per Group to $\hat{f} = 1.1$; thus, we should still use a sample of one farmer in each sample Group.

2/ If this sampling plan is adopted, it is desirable (in at least a subsample) to select two farmers per Group to permit the estimation of the intraclass correlation, so that appropriate modification of the sample allocation can be made for subsequent impact surveys.

lower for paddy. 1/ From the NSSO publication 1/ we estimate the value of the fraction of mean yield, specifically for Madhya Pradesh, as follows:

Crop	Estimated Value of Coefficient	
	All India	Madhya Pradesh
Rice	.48	.53
Jowar	.81	.99
Maize	.69	.78
Wheat	.84	1.56
Gram	.69	.85

No doubt more recent data can be made available. For the present purpose, we assume that σ = .5 x mean yield. It then turns out that the relative standard error of the estimated average yield for a district for which two field investigators are assigned would be about 10.7 percent, which is probably too great to permit comparison of district yields. However, the estimated average yield for a state with 15 districts would have a relative standard error of only about 2.8 percent. This should permit useful comparison of changes in yield from one growing season to the next, as well as comparisons between states.

7.29 With the same allocation, and with assumptions about the correlations like those assumed for the pre-harvest survey the standard errors would be given by the following table:

Proportion P Being Estimated	Standard Error of the Estimates	
	For a District	For the State
.10 or .90	.045	.012
.20 or .80	.060	.016
.30 or .70	.069	.018
.40 or .60	.074	.019
.50	.075	.019

Thus it may be seen again that this sample size and allocation provide useful precision at the state level but that the sampling errors are probably too large to make distinctions among districts unless the differences between them are quite large.

1/ "Sample Surveys for Assessment of High Yielding Varieties Programme," Annual Report 1973-74. Volume I - Results of Yield Estimation Surveys. Institute of Agricultural Research Statistics, New Delhi (1976).

2/ The "Consolidated Results of Crop Estimation Surveys on Principal Crops, 1971-72", Government of India, NSSO, Report No. 24, New Delhi, 1975.

7.30 It is clear from the description of the harvest survey that the work of the field investigator is quite different from his work in the pre-harvest survey. In the harvest survey, the data collector will be given his assignment of Farmers' Groups and farmers, which will have been drawn for the sample shortly before the harvest period. The field to provide the sample plot for each farmer will also have been selected in advance and an agreement reached with the farmer on the precise day on which the field is to be harvested. It will then be the duty of the field investigator to visit each farm assigned to him, identify and mark the sample plot, have it cut, weigh the produce, and complete the questionnaire.

7.31 We emphasize again that the proposed allocation of the sample depends upon the assumptions that we have made about cost functions and about the values of the variances. While these are our best judgments based on the data available to us at this time, the assumptions should be checked by the experience in the actual conduct of the survey. The sample allocation can then be modified using the same development that has been followed in the preceding discussion.

7.32 In the illustration above, we have used 15 districts, which would get about 660 interviews and 660 crop cuttings. We have seen that, based on our assumptions, this would give an estimate of the average crop yield in the state subject to a relative standard error of about 2.8 percent, which is acceptable in view of the evaluation objectives. The standard error for single districts taken separately would be about 10.7 percent, which is probably too large to make a comparison of districts meaningful. For a state with fewer districts, say 10, in which 2 field investigators are assigned for each district, the total sample would be reduced to 440 and the standard error for the state would increase to about 3.4 percent, with the standard error for a district remaining the same as before. A state with a large number of districts would have the option of retaining 2 field investigators in each district and thus using a larger sample or, alternatively, defining (say) 15 sub-regions of the state, assigning 2 field investigators to each sub-region and obtaining a sample of about 660.

7.33 Other alternatives for the sample size of farmers and crop cuttings are also available. For instance, the users of the evaluation system may deem it necessary to have yield estimates on <u>two</u> major crops in each harvest period. This could be accomplished (with the same number of field investigators) by cutting each crop for half the total sample of farmers in the state. Of course, the resulting estimates of yield would then have greater

standard errors than if only one major crop were measured for the whole sample. The increase in standard error would be about 40 percent if each crop is fairly uniformly spread throughout the state, but may be about 60 percent for a crop that is concentrated in about half the area of the state. That is, the standard error of the estimated yield may be about 3.9 percent or 4.5 percent, instead of the 2.8 percent quoted for a single crop. These sampling errors may still be tolerable. The Project Management and the Evaluation Unit will have to make the decision on which option would be preferable under the circumstances of a particular state or at a certain point in the project period.

7.34 In view of the short length of the harvest period, it may not always be possible to schedule the field investigators so that they can be present at a sample plot at the time agreed on to harvest the plot. Of course, the sample of farmers and fields for the harvest phase survey should be selected slightly in advance of the harvest period, appointments arranged with the sample farmers for the harvest, and a schedule determined for the field investigators' itineraries. This should be done by the evaluation supervisory staff. The supervisory staff should also be available to do any interviewing and crop cutting which cannot be scheduled for the regular field investigator.

D. Processing, Analysis and Feedback of Evaluation Survey Data

7.35 The data from the evaluation sample survey comprise the completed questionnaires and the actual produce of the crop cutting obtained from a sample of farmers. The field investigator will weigh the green produce when it has been cut and threshed, will record the weight on the farmers' questionnaires and will package and label the produce. When his assignment is completed, he will prepare a simple summary of the questionnaires he collected, send one copy of the summary to the district agricultural officer for his information, and as quickly as possible send another copy of the summary as well as the completed questionnaires and the produce sample to the State Evaluation Unit. There the questionnaires should be edited, coded and tabulated, and the produce samples should be dried and weighed and the dry weight transcribed to the corresponding questionnaire before tabulation. The regular crop estimation survey has accumulated an immense amount of experience and if option two is adopted, advantage should be taken of this knowledge to formulate the procedures for crop cutting, packing and drying the produce, shipment and analysis. Again, we emphasize the importance of testing the procedures and questionnaire before using them in the full-scale survey. All

the associated operations (weighing, drying, transmittal, etc.) should be pretested if they are to be used by the data collectors of the Evaluation Unit.

7.36 In the analysis, it will certainly be desirable to compare the yields of different sub-groups of farmers. For example, one may well wish to compare the average yield for farmers who applied a certain set of practices with the average yield of all other farmers. A good way to make such a comparison is to calculate the ratio of their estimated average yields.

7.37 To illustrate, if one of the sub-groups comprises about one-tenth of the farmers while the other sub-group comprises the remaining farmers, the ratio would be subject to a relative standard error of about 8.5 percent, assuming the illustrative sample allocation given in para. 7.28. Thus, a difference in yields of 17 percent or more would be statistically significant. If the two sub-groups being compared were each about half of the total farmers, the ratio would be subject to a smaller relative standard error, perhaps as small as 4 percent. We should note that, for some comparisons that may be deemed important, the sampling error will be quite large, making the comparisons tenuous. Of course, this would be true no matter how large the sample. If comparisons not reliably supported by the sample are sufficiently important, they should be made the subjects of separate special studies.

7.38 Estimates of the proportions of farmers based on the harvest survey, having specified characteristics, would be subject to different standard errors. For a state with 15 districts or sub-regions, as assumed in the illustration, an estimate of a percentage would have a standard error of from 1 to 2 percentage points. For an individual district, the standard error would be in the range of 4 to 7 percentage points.

7.39 To the extent that they have items in common, the same compilations would be made from the harvest phase questionnaires as from the pre-harvest phase questionnaires. Similar simple tabulations should be made for new items. In particular, mean yields should be calculated for certain sub-groups of farmers:

(a) Farmers who used three or more of the important practices recommended for their crop; and

(b) Farmers not in sub-group (a).

It may also prove desirable to estimate mean yields for other groups of farmers.

7.40 The most useful analyses of yields will consider changes over time in the proportion of farmers who adopted recommended practices, and changes over time in yields of farmers who adopted the practices compared to the changes for farmers who did not. Useful information about the success of the extension program should also be revealed by tabulation of the sources from which farmers learned about the practices they used, and their attitudes toward the usefulness of the program.

7.41 More sophisticated analyses are also possible, but great caution must be exercised in interpreting them. For example, one might calculate the regression of yields on such variables as:

(a) number of recommended practices adopted for the crop;

(b) amount of rainfall at various periods of the growing season;

(c) mean temperature at various periods of the growing season;

(d) irrigated or not irrigated;

(e) amount of specific fertilizers applied per ha;

(f) type of seed used; and

(g) type of soil.

7.42 This is a long list of significant variables since each of (b), (c), (e), (f) and (g) constitutes several variables in the regression equation. Such regression analyses 1/ should be made by experienced and competent analysts and the state Evaluation Unit may probably need some outside assistance as well. For instance, in West Bengal such analysis could be carried out, under contract, by the Indian Statistical Institute in Calcutta. Similar arrangements can be made with universities or research institutes in other states. The Central Evaluation Group may either provide assistance in this respect to State Units or initiate and coordinate such analysis at the central level. These studies require not only sophisticated analytical methodologies, but will very likely draw on data accumulated from a variety

---

1/ Other sophisticated analytical techniques are also available, including factor analysis, the AID analysis (University of Michigan), and other techniques of multivariate analysis.

of sources as well as the sample surveys. They may also require the use of electronic computers, whereas the simpler tabulations and analyses prepared by the evaluation unit can be done by computer clerks using hand calculators.

VIII. THE SPECIAL IN-DEPTH STUDIES PROGRAM

8.01 To complement and/or deepen the information generated by the large-scale sample surveys some ad hoc studies are recommended. Such special studies are a tool of high flexibility and versatility, adaptable to very different situations and relatively easy to carry out. Looking for a deeper sociological insight, they offer the advantage of using more refined research techniques on smaller social units, thus obtaining knowledge which usually is not accessible to large-scale surveys.

8.02 The special in-depth studies constitute a continuous program. While each particular topic may be considered "ad hoc", for a specific purpose at a certain time, the program all together should by no means be viewed as an incidental operation, but as a permanent, continuous component of the monitoring and evaluation effort. The extensive surveys alone would be inadequate or inconclusive unless they are simultaneously complemented by intensive in-depth studies, sharply focused on key linkages in the chain of T & V extension operations.

A. Study on the Selection of Contact Farmers

8.03 The selection of contact farmers is a crucial action in the setting up of the T & V extension system: it is, usually, among the first steps undertaken by the VEWs when they get into their assigned areas. A large part of the success of the extension operation hinges upon a good selection of the contact farmers. Such a selection could speed up significantly the message diffusion processes and increase the adoption rates of the new practices in the villages. But what is a "good selection" of contact farmers? And how is this selection performed presently?

8.04 A special sociological/sociometric study could be undertaken to monitor whether the contact farmers are being selected in line with the T & V system's prescription, as far as their socio-economic status, credibility, influence and role in the community are concerned. The monitoring and evaluation surveys, described in the previous sections, deliberately do not address this sequence of the implementation process of the T & V system.

8.05 Project Management may assume that its suggestions for selecting the contact farmers, albeit general, are applied more or less consistently by the VEWs. This assumption should be verified both by the normal supervision performed by the AEOs or DEOs and by the Monitoring and Evaluation Unit. Various spotchecks signaled that the selection is not always made as recommended. Some VEWs tend to select the contact farmers mostly or exclusively from the upper strata of the village, or only from among one of the existing factions in a village. (Such factions may also tend to co-opt the VEW and to benefit from his services exclusively, at the expense of other village groups). Thus, the VEWs are subject to both conscious and unconscious biases

in the selection of the contact farmers. This may, in turn, affect the spread of the message through the village communication network.

8.06 This special study could also evaluate the comparative advantages of various selection methods practiced in different states or districts, in terms of the degree of credibility and efficiency which the selection procedure confers on the contact farmers. For instance, in Madhya Pradesh the project management recommends that the VEWs use one of the following two selection procedures: (a) convene an assembly of the Farmers' Group, and ask them to select/nominate the contact farmers from among the Group or (b) designate the contact farmers himself, particularly if the VEW has some previous acquaintance with the Group. But the Project Management has no precise knowledge either about which one of the two procedures actually prevailed in real life conditions or which one was conducive to selecting contact farmers who are more efficient as adopters and as diffusion agents. It is expected that a special ad hoc study on the selection of contact farmers may yield such information.

8.07 There is much flexibility in determining the scope of this ad hoc study. While a study of all the contact farmers would be too time consuming, several clusters (15-20) of contact farmers could be selected randomly in two or three districts and analyzed against the social background of their communities. It is important to take the entire group of contact farmers in one unit and to compare systematically their characteristics (in terms of land holding size, irrigated or rainfed farming, literacy, caste, ethnic composition where there is a multi-ethnic situation, etc.) with the corresponding indicators for the village at large.

8.08 Basically, the necessary data can be collected with a short interview schedule or from the farmer's records. A cadastral map, available almost anywhere, of the village area would indicate the centrality or marginality of the contact farmer's land vis-a-vis the bulk of village holdings, since visibility is also a factor in diffusion.

8.09 A sociometric test, easy to administer to a group of non-contact farmers, can help evaluate the leadership qualities of the contact farmers as perceived in the village society and their ranking as opinion makers in the community. 1/ If possible, the informal authority systems of the village should be identified and the contact farmers positioned versus them.

8.10 A sociologist would be most appropriate to carry out this study. He may be either from outside the project or the sociologist on the staff of

---

1/ In West Bengal, an interesting experience in using a sociometric procedure for assessing the prestige of contact farmers as good cultivators and their potential as opinion leaders is offered in a study carried out by the sociological unit of the Evaluation Branch.

the Project M/E Unit. Once the methods and instruments for this study are tested out, the data collection could probably be undertaken by a group of investigators from the monitoring field staff or by university students, with appropriate training. This type of study could be developed into an easily usable operational spot check. It should take not more than a week for field work and a week for analyzing and reporting of findings. If the project management suspects that there are problems with the proper selection of contact farmers in certain districts, such spot checks should be carried out where and when necessary.

8.11 This study should be able to tell management if corrections in the composition of contact farmers are necessary. If distorted selection practices of contact farmers are identified, it would be very educational to present them not only to management, but to discuss them during VEWs' and AEOs' training sessions as well. The study should also aim at defining simple procedures for guiding the VEWs to select the contact farmers with genuine community participation.

B. Sociological Village Case Studies on Extension Impact

8.12 The Monitoring and Evaluation Unit should initiate a number of village focused sociological studies on extension impact as an indispensable complement to the extensive sample survey. These studies should be carried out by a group of participant observers which would reside for about 3 months in the selected villages. The Unit may either contract out such studies to a local University or use some of the research assistants of the central staff of the unit to carry out these studies.

8.13 The sociological village studies are proposed in order to incorporate in the design of the M/E system intensive community level observation. A balance should be struck between surveys, which allow only for brief contacts with individual respondents, and intensive village analyses.

8.14 Despite the important role assigned in the present proposal to sample surveys, one should be also well aware of the limits built into their approach; the survey design subjects the extension network (in which patterns of inter-personal communication and linkages are of the essence) to a sampling procedure. This results into a monadic, atomistic analysis, under which the continuity of the communication channels is shattered into pieces. Some "fragments" (i.e., individuals randomly taken out of their communications network) are introduced into the selected sample, but the network of interacting individuals, as such, cannot be reconstructed within the statistical sample. The sample is only a mechanical aggregate of scattered respondents who, in real life, do not function as a social group or network. However, in the case of extension even more than in others, taking into account the channels of communication in their continuity and the social-cultural network of interpersonal relationship becomes important. Therefore, exploring some villages and farmers' groups in their entirety may offer important insights.

8.15 The distinct role of the sociological village community study, compared to other evaluation tools, would be an in depth exploration of the operation and impact of the Extension Project at the level of a "social molecule" -- the village micro-society taken as a whole. The village-centered studies should complement other evaluation instruments by capturing aspects which the latter cannot cover and by compensating for methodological limitations which otherwise cannot be overcome.

8.16 Evaluation Objectives. Taking advantage of the broader range of cognitive possibilities offered by the design of community studies, the village case analyses should attempt in particular to observe the following aspects:

a) the dissemination process of the extension message in the micro-social territorial unit;

b) the reaction of the socio-economic and political system of the village to extension;

c) the appropriateness of the recommended technology to the farm level technical conditions and resources; the timing of other supply-services (is there a good coordination between inputs-supplying organizations, credit, marketing and the extension recommendations?)

d) the consistency of the contact farmers' behavior over the agricultural season in applying the received recommendations;

e) the degree of completeness with which the new practices are performed, when adopted;

f) the behavior of the VEWs and AEOs who visit the villages studied;

g) the actual impact of extension on yields in the village and the benefits of the different categories of farmers, with special emphasis on the small and marginal farmers;

A short elaboration of some of these objectives follows.

8.17 There is one area which remains rather little known to the extension organization: the dissemination process from contact to non-contact farmers. How does it happen? With what speed? The ultimate achievement of the Extension Project is predicated upon the breadth of the diffusion of new practices from the farmers who are directly visited by the VEWs and who initially represent about only 10% - 20% of the village population, to the remaining 80% - 90% of farmers.

8.18 In fact, the VEW comes into a village just one day in a fortnight and then leaves. What occurs in the remaining 13 days? The assumption of the extension organization is that the contact farmers would tell the other farmers about the recommended practices, and also that the others would probably "see" and imitate what the contact farmers are doing. But does this really happen? Aren't some contact farmers hoarding information, rather than spreading it? And if the contact farmer does turn into an "agent", what is his communication behavior? How does the message flow through the village network? who is his primary clientele: neighbors? relatives? farmers of the same economic status? What hampers this process and how can it be speeded up? In other words, the small group processes should be studied. An analytical look at the "percolation effect" could provide significant indications for the strategy of the extension organization.

8.19 The "neighborhood effect" which is hypothesized to happen creates an outward diffusion movement along a mobile frontier, as ripples on the water, while at the same time the general density of adoption behind the advancing frontier is assumed to increase continuously. The VEWs and subsequently their "micro-centers of spread", the contact farmers, are emitting wave after wave over long periods of time in a manner that is repetitious and, probably, along the same communications channels. The village studies can therefore attempt a "mapping" of this dissemination movement. And if, for instance, such hypotheses are confirmed, these ongoing evaluation studies can feed back useful findings about how and where the VEWs should gear their efforts more efficiently on the map of the village society.

8.20 There might also be changes in the behavior of the contact farmer over the season, which could explain good or poor yields on his own field or fast or slow dissemination rates of certain practices in the community. Such changes may escape the observation of the VEW, but may become noticeable for a participant observer in a village. In other cases, even practices accepted wholeheartedly may be performed improperly from a technical point of view or differently by different family members, affecting the expected results (see details in 8.40-8.42).

8.21 It is assumed that the overall acceptance of the extension service in a village depends not only on the innovativeness of individual farmers but also on the socio-economic structure and political factors of the community. The relationships established by the VEW with the traditional village leadership, his tact and ability in facilitating group formation, his dealings with already existing groups and factions etc., may generate confidence and sympathy and thus enlist powerful social forces in the village in promoting the extension advice (mutatis mutandis, this may refer to the relationships between contact farmers and village leadership as well); on the contrary, if things are handled improperly, it may generate hostility and undercut extension impact even if the technical recommendations are proper. These rather "invisible" processes, however, holding important explanatory power, may be grasped by an in-depth village study and account for trends and constraints otherwise difficult to understand.

8.22 Selection of Investigation Units. A few villages should be selected for intensive study in each state. Project management should guide the researchers' choice of villages for the study. The main criteria for selection should be the estimated dissemination rate in the villages in order to identify factors which account for various takeup rates: 2-3 villages in which a high takeup rate is achieved rapidly, others where the response is low, a few with a more or less "average" takeup rate.

8.23 The social unit of investigation should preferably coincide with a "Farmers' Group" (one of the 8 units serviced by one VEW - a chak in some irrigated zones in Rajasthan, a har in Madhya Pradesh, an anchel in West Bengal etc). There are basically 2 ways in which such social units are identified for extension service purposes: (a) the "Farmers' Group" coincides with an existing village when the latter has a number of families approximately between 80-120, depending on the VEW/farmers ratio established in this particular state; (b) the "Farmers' Group" is a fraction of a larger village, which may thus contain 2 or 3 Farmers' Groups. It would be reasonable to include among the case studies both types of Farmers' Groups. Where possible, two adjoining villages preferably belonging to two different VEW circles might be assigned for study to one researcher. During the 3-4 months of the season he could easily cover both villages, if no significant travel time is involved, and thus he would have the additional advantage of the comparative method in his observations.

8.24 Method of study. These sociological studies should be carried out through participant observation, which requires the observer to live in the community for 3-4 months. It is preferable to cover a full season (Kharif or Rabi) and to follow the agricultural season from beginning to harvest. The methods should be those usually applied in sociological or anthropological village studies with the basic difference that instead of a holistic treatment of the community, the study will be sharply focused on the gradual takeup of the recommended practices. Census taking would be an appropriate beginning for the researcher, to give him an adequate knowledge of the area. He should establish rapport with villagers and combine interviewing respondents with formal questionnaires with asking informal questions of various people. The researcher can judge the reliability of replies received, rather than taking them at face value, through his own observations and through cross-checking. Observing the personal influence exerted by the VEW, the individual reactions of farmers, and their relationships to one another, is of crucial importance. Quantifications should be used when possible.

8.25 At the end of the season, a small number of crop yield measurements would be desirable for farmers with different takeup rates of extension advice. This may back up the assessments made by the study with some objective measures. Arrangements for such crop cuttings may be made with the personnel specialized in these experiments. Also, where feasible, an evaluation of increments in family net income due to the effects of improved agricultural practices might be very useful.

8.26 The participant observers. These studies can be best carried out by a group of graduate students in sociology, anthropology or agricultural extension, under the responsibility and supervision of one professor (preferably a sociologist). An appropriate pre-field training should be given to the observers. In collecting data and in presenting their findings, they shall follow a more or less similar pattern (indicators, methods, presentation of findings), thus facilitating the secondary analysis and synthesis of the individual case studies. It is essential that the members of the group carrying out the village studies receive a preliminary common training in methods and objectives of community studies, so as to unify to the extent possible their approach. They should also be continuously informed and updated about the instructions given by the extension organization to the VEWs.

8.27 End product. The team leader responsible for the group of case studies will prepare a synthesis report for Project Management, summarizing the findings of all the village cases. Individual reports for the most interesting villages should be attached. The report should be submitted within two months after the completion of the field work. If appropriate, the researchers should present the findings of their study during a regular fortnightly training session of the area's extension workers.

C. Study of the VEWs and AEOs

8.28 While the basic two sample surveys will focus on farmers, the extension staff itself may be also surveyed from time to time. For project management it is important to ascertain what is the field staff's morale and motivation, its own opinions and perceptions of the effectiveness and difficulties of the extension program. Of course, information of this kind flows in through the normal reporting channels. But at the present time, the feedback from VEWs to the management is primarily oral and experience teaches that much useful information is lost in transmission.

8.29 These ad hoc studies, based on interviews with samples of AEOs or VEWs, should be focused on a limited number of current issues. Illustrative items are:

(a) What does the AEO (VEW) consider to be the two most important impediments to carrying out his assigned task?

(b) Do the fortnightly training sessions provide the VEW with satisfactory enough information about the practices being recommended?

(c) What are the reasons for farmers' hesitation to adopt a (specific) recommended practice?

(d) Are there differences in the reactions of small farmers and more well-to-do farmers towards the extension service?

(e) Do the VEWs and AEOs receive their wages and allowances in time, have they any unsolved problems with housing and transportation?

8.30 In certain situations, the questions to be asked may be of such a type that it is feasible to use a self-administered questionnaire, with possibly a larger sample.

8.31 Various sampling options are available for this study. One is to take clusters of VEWs: for instance, the questionnaire may be given to all the VEWs who attend a fortnightly training session. Thus, with limited resources a very large number of extension agents can be surveyed during one or two weeks. Using a self-administered questionnaire, whose completion requires only 20 minutes, a few field investigators could easily cover many training sessions in a state. If this approach is used, care should be taken to see that each VEW completes his questionnaire independently and anonymously, so that he is assured that there will be no adverse effect on him.

8.32 Such special surveys, relatively easy to undertake, could be repeated at intervals on the same or different topics, as the need for them is seen. They will provide a "shortcut" for additional communication from the mass of extension agents operating at the grass roots directly to the top management of the extension program.

D. Study on the Quality of Training Sessions

8.33 While it is easy to keep quantitative track of the forthnightly traiing sessions, project management usually has difficulty in monitoring their quality. A small group of participant observers, attending a reasonable number of sessions, could gain useful insight into possible defects in the training and possible ways of improving it.

8.34 It is not feasible in such a qualitative study to have each observer complete a questionnaire. Instead, he should be given a general outline of the aspects of the training session and be asked to make notes on each of them during the session and to write a narrative report on each of them immediately after the session. The aspects should include, but not necessarily be limited to, the following:

- Appropriateness of the physical environment;
- Effectiveness of the instructor, in terms of his knowledge and clarity of presentation;
- Reaction of the trainees in terms of attentiveness, questions asked, clarifications requested, objections raised, etc.;
- Discussion of good and bad extension methods;
- Evidence of feedback from farmers to SMS and to agricultural research;

Amount of time and attention given to matters not relevant to the current extension messages.

8.35 Particular attention should be given to the ways in which the training sessions fulfill two basic functions within the extension organization: (a) to ensure a two-way vertical communication flow between agricultural research and the farming system, i.e. not limiting themselves to a top-bottom transmission of technologies but promoting permanent bottom-up circulation of field information, farmers' queries, local results, etc.; (b) to ensure the horizontal diffusion of good experience from one VEW to another, by encouraging them to report on their most relevant achievements, problems, and difficulties.

8.36 The reports of the participant observers of these training sessions should be submitted to a group discussion to distill the principal conclusions. Only then should a report be prepared for transm ission to the management of the extension project.

8.37 The sample size for such a study need not be large. Each observer should cover several training sessions in a single fortnight, thus giving a sample of about 20 sessions for the whole group. The sample should be selected from strata defined by sets of AEOs within extension subdivisions. This will help to ensure that the range of quality of training is represented in the sample.

8.38 This case study may be carried out by a small team of extension specialists from the Department of Agricultural Extension of the state university. Alternatively, the group of Junior Research Officers in the state Evaluation Unit, with proper instruction, may also be an appropriate team for making the participant observations.

8.39 Another simple option for evaluating the quality of training is to question the VEWs about <u>their</u> perception of the training sessions. The VEWs are the immediate "users" of training sessions and it is important to obtain, through an anonymous questionnaire possibly at the end of the session, their evaluation and criticism. They are in the best position to say whether what they hear and discuss at the session is sufficiently helpful for their work in the field.

E. <u>Farm Practices Studies</u>

8.40 The improvement of farm practices is the central emphasis in the T & V system and the goal of the research component of the project. In addition to the survey-generated information on changes in farmers' practices, some ad hoc, in depth studies on the actual changes in the patterns of agricultural work might produce a very worthwhile insight. These should be planned and executed as needs for them arise. For instance, it is recommended to mount such in depth studies whenever the sample surveys reveal that a

certain new practice was either very widely accepted or, on the contrary, is taken up by a surprisingly low proportion of farmers.

8.41 Moreover, studies involving direct observation of fields and practices can yield more refined knowledge than a survey by questionnaire. When during an interview a farmer indicates, for instance, that he accepted certain advice, one cannot yet be sure about the degree of "acceptance" and about whether the farmer has indeed learned to properly perform the new practice as recommended, or whether he only believes that he is doing it properly but in fact is not. Thus, it may be useful to mount a study of the degree of completeness with which farmers adopt a recommended practice, and the reasons for their behavior. For example, a farmer may adopt a recommendation that certain fertilizers be used, but may apply the fertilizers in different amounts or proportions from those recommended. Another study may concern itself with the competing relationship between traditional agricultural practices and certain recommendations made by the extension service: old habits in performing various agricultural operations may prevail with him or some members of his family, although he tends to believe that he has adequately modified his way of doing things. Such information may prove invaluable for the fine tuning of the VEWs' efforts right on target.

8.42 Detailed studies on farm practices are not difficult to carry out and offer scope for a very imaginative selection of topics. They may be undertaken when a new crop or variety is being introduced, when a new fertilizer or insecticide should be spread with a more efficient technique, or when a certain number of farmers are observed to make an innovation on their own, and more knowledge on "why" and "how" the innovation fares would be directly useful to project management. In such small scale studies the data collection would, in general, involve detailed monitoring of the sample farmer (selected purposively) as well as direct observation of the farm operation by the junior researcher of the Evaluation Unit carrying out the investigation. The studies would not be expected to yield definitive estimates but should be regarded as a means to attain a deeper insight into the problems of the extension program. It is possible that they may, in turn, lead to larger scale studies of specific problem areas.

F. Farm Budgets

8.43 As indicated earlier, the evaluation impact study should be carried through even further than yields, when possible: i.e., it should attempt to estimate the effects on incomes and on farmers' well-being. True, sometimes incomes are not a relevant indicator for extension's success or failure, since the fluctuations in market prices may annihilate or may inflate the incremental gains in yields produced by extension. True also, information on income increases is not at all easy to obtain and the use of proxies (nutrition levels, tin roofs, clothing, etc.) is not always significant; for instance real increases in income (due to extension) may not lead to improved quality of life because of misuse of the incremental income.

8.44 A limited number of actual farm budgets or farm management studies are desirable as a separate study, to complement the evaluation information produced by other investigations. They should be organized by the Evaluation Unit in cooperation with the Regional Research Stations, which have on their staff farm management specialists and statisticians to evaluate the economic impact of farming system and cropping patterns developed as a result of the research program. In Orissa, for instance, the Extension Project puts great emphasis on this type of study as an evaluation instrument and a special Farm Management Data Unit is being created in the University to carry out systematic observations for this and other types of special studies. In particular, farm management studies should focus on cost/benefit analysis and should estimate, in retrospect, after harvest, whether the practices (implicitly, increased labor and physical inputs) recommended by research and the SMSs are or are not economically convenient for different socio-economic categories of farmers. The same cultural practice or technological package may yield different economic benefits depending on the size of the farm and of the farmer's family labor resources.

8.45 The farm management studies should cover only a small number of cases, more or less representative of different categories of farmers and soils (irrigated vedrsus rainfed areas in particular). The procedures are those widely applied in this kind of study.

G. Review of Research Output

8.46 This is not actually a typical ad hoc "study", but there is no conventional way of evaluating the quality of research output either, except the test of life. The research activities under the project should be subject to period external reviews by appropriate specialists, which will prepare their report and recommendations. A peer review committee has traditionally been regarded as a very useful device for the evaluation of the research activity, especially if the committee not only reviews the research activity and products, but also takes cognizance of the information provided by the sample surveys and special studies. (Detailed suggestions for the use of this information for ongoing evaluation of research were given in paragraphs 4.11-4.12, 7.06-7.07, 8.35, 8.40-8.41). Annual workshops for reviewing research progress, to which some of the best VEWs, AEOs and SMSs could be invited, and arrangements with outside organizations for the evaluation of the quality and relevance of the research program should be promoted by Project Management.

8.47 Flexibility. The potential of the ad hoc studies could be used very imaginatively and flexibly. It is up to Project Management and the Management of the M/E Unit to decide which topics are more important, which ones are not, which topics should be added as the need arises, or when it is necessary to carry them out. They can be one-shot exercises or they can be replicated at variable intervals. They may cover several districts or be limited to one district where a particular difficulty exists. The list given above is in no way exhaustive and the creativity of the M/E Unit has unlimited room to express itself.

IX. ORGANIZATION AND STAFFING OF THE EVALUATION UNIT

9.01 A Monitoring and Evaluation Unit should be created for each state-wide Extension Project. It would design the monitoring and evaluation surveys, conduct the field studies, further process and analyze the collected date and prepare reports and proposals for management action. It would be easier to create the Unit by building upon already existing evaluation or statistical cells within the administrative framework of a State Government in India.

A. Location

9.02 The Monitoring and Evaluation Unit should be under the responsibility of, and report directly to, either the Secretary of Agriculture or the Agricultural Production Commissioner. This would strengthen the single line of command of the T & V system and would help to ensure that the results and analyses are seriously and immediately considered for the improvement of the extension program.

9.03 However, there appear to be some alternatives for the specific institutional location for an evaluation unit of the extension project:

(a) The statistical wing of the Department of Agriculture or the Socio-economic Evaluation Branch of the Department of Agriculture (such as exists, for instance, in West Bengal);

(b) The Bureau of Statistics and Economics (which exists in some states within the Planning Department) or the Department of Land Records which does the regular crop cutting experiments;

(c) The State Government's Evaluation Organization (such as exists, for instance, in Rajasthan).

A division of responsibilities for monitoring and evaluation between twof of these organizations in one state is also feasible, provided a continuous and good cooperation between them can be assured.

9.04 None of these organizations presently has the full staff required for monitoring and evaluating extension. Appropriate staffing and logistical strengthening would have to be provided.

9.05 Out of the available alternatives, it would be preferable to select the formula which would bring the monitoring and evaluation unit closer to the Department of Agriculture, but still not subordinated to the extension organization itself. Independence of operations and of judgment should be assured for the Monitoring and Evaluation Unit. The staff assigned to the

Monitoring and Evaluation Unit should be a full-time staff with no responsibility for operational functions in the T & V program. Separation from responsibilities for extension delivery will enhance objectivity of results and analysis, while the fact that the Monitoring and Evaluation Unit to the State Commissioner for Agricultural Production would gear it to timely monitoring and essential operational areas and would increase effectiveness of findings.

9.06 The Evaluation Organization, in states where such an organization exists, might also be suitable, since it is a group professionally trained for this type of work and might maintain a high level of objectivity. But institutionally it may be too far removed from the operating departments to provide rapid feedback to management. It tends also to deal more often with ex post than with ongoing evaluation. Moreover, as is well known, recommendations and criticisms across department lines are often met with scepticism and defensiveness. The same reservations would apply to the option of the locating the Monitoring and Evaluation Unit in the Planning Department and would favor its placement with the Directorate of Agriculture. True, there is in this case a danger that some objectivity might be lost. But that danger is slight so long as the Evaluation Unit reports to someone above the Director of Extension (the Agricultural Commissioner) and it is outweighed by the advantage that the management cycle can operate within the same organization. Of course, the final decision on location should rest with the State Government and it may vary from state to state.

B. Structure and Staffing

9.07 The Evaluation Unit should consist of two sections:

(a) The sample survey section, concerned with the successive rounds of surveys;

(b) The special studies section, concerned with the continuous program of special in depth analyses.

9.08 The staffing of both sectors should be multidisciplinary and so recruited as to ensure high quality in carrying out the following main functions of the Unit:

(a) to design surveys and studies;
(b) to collect and process primary data;
(c) to analyze the collected information.

9.09 While the first and the second function tend to be generally recognized, experience of evaluation in other development projects indicates that the importance of a strong analytical capability is often underestimated when such units are staffed. The consequence is that data are generated and piled up, but the analysis is lagging behind or never done, thus defeating the whole

purpose. The analysis of monitoring and particularly evaluation information means much more than the tabulation of survey data. It should extract the sociological and economic meaning of farmers' reaction to extension, identify trends and detect causes. We therefore emphasize the importance of function (c) in particular and that it should receive appropriate recognition in both the staffing of and the time assignments within the Monitoring and Evaluation Unit.

9.10 The head of the Evaluation Unit should be a well qualified statistician (preferably Ph.D) with strong managerial capabilities, having training and at least ten years of experience in the conduct of sample surveys. It would be essential that he be familiar with farm practices in the state.

9.11 The Sample Survey Section should be headed by a statistician with at least a Master's degree in that field and five years' experience in the design and conduct of sample surveys. Familiarity with farming practices would be highly desirable. With help from, and under the direction of, the Head of the Evaluation Unit, he would specify the particulars of the sample design for the sample surveys, supervise all aspects of the work in the sample surveys, and participate heavily in the analysis of results and preparation of reports. It should also contain two other professionals: an agricultural economist and a rural sociologist, with at least the equivalent of Masters' degrees in their respective fields. Their duties would include participation in the design of the questionnaires to be used in the sample surveys, the specification of the interviewing procedure, the training of data collectors, field supervisors and statistical clerks, the specification of data processing, and participation in the preparation of analyses and reports.

9.12 The Sample Survey Section will need a staff of statistical clerks for data processing. The number of clerks needed will depend upon the size of the sample; a group of five clerks and two typists should be able to handle 4,000 interviews per month, and a group of three clerks should be able to handle 2,000 interviews per month. Typically, data processing will not require electronic computers, but can be done manually using only hand or desk calculators. Any special, sophisticated statistical analyses should be sent to some computing center for implementation.

9.13 Field Investigators. The Unit's main arm for data generation are the field investigators (research assistants). They will carry out the sample surveys and will have to contribute to some of the special studies. Two to three field investigators for each district (area of investigation - see para 6.07), and one field supervisor for each 5-6 data collectors, would be stationed locally, but would be administratively responsible to the head of the Survey Section. This total number would vary from state to state depending upon the size of the sample that is determined to be appropriate for the state and should also include a leave reserve. Transportation should be made available to the field investigators and supervisors by the project.

9.14 The qualifications of the field investigators for carrying out interviews with the farmers are of utmost importance for the success of the entire enterprise. They should, where possible, be BA graduates in agricultural extension or in one of the social sciences (sociology, social anthropology, rural psychology, etc.) and should have training in social research field methods as well as knowledge of agriculture. The field investigators would not be simple collectors or compilers of existing statistical information; they will h ave to interview farmers with different personalities, establish a rapport with them, maintain objectivity and not influence the answers. They should be trained continuously by the Unit for their assignments and should also receive regular information about the agricultural practices extended by the VEWs during the period under study.

9.15 The Special Studies Section should be headed by a social scientist with at least a Masters degree in sociology or social psychology and at least five years' experience in some area of social research. Under the direction of the Head of the Evaulation Unit and with technical assistance in sample design from the head of the Sample Survey Section, he would design ad hoc in depth studies of various aspects of the extension activities, supervize the conduct of the special studies carried on by the Section, and participate in the analysis of results and preparation of reports.

9.16 The Special Studies Section should contain another social scientist (sociologist) with professional qualifications who would be responsible for the training and supervision of five junior research officers with Bachelors' degrees in some field of social or agricultural science. The junior research officers would be the primary investigators in any in depth study pursued by the Section. Two statistical clerks for compiling data and making computations, and one typist, would complete the personnel of the Section.

9.17 Appropriate pretesting of each survey, and preliminary pilot phases, should be conducted by the Unit in order to check and adapt the survey questionnaires and procedures and, in particular, allow the Unit's staff to go through the motions of quick survey rounds and feedback. While the basic design proposed here is rather simple and disaggregates the objectives of monitoring and evaluation among a set of mutually reinforcing studies, a note of caution should be sounded about the inherent complexities in carrying out these studies. The entire success of the monitoring and evaluation operation will hinge on the quality of primary data generation, on the adequacy with which interviews with farmers are carried out, on the exactness in recording responses, on the precision in coding and processing them, on the accuracy of collating them with the crop yields reports. The monitoring and evaluation effort may simply fail if these prerequisities for high quality in field work are not satisfied. The management of the Monitoring and Evaluation Unit should not spare its efforts in closely supervising the field staff, training and re-training it continuously, learning from experience and mistakes and continuously improving and adapting the research procedures.

9.18 Use of outside researchers. Assistance to the Monitoring and Evaluation Unit from outside sources would appear to be necesary in particular for some ad hoc in depth studies. The present report does not recommend entrusting the main evaluation or monitoring surveys to an outside agency (for instance, to a University), because these can be better carried out not as a one-shot operation but as a continuous endeavor of a full time staff, permanently in contact with the T & V system itself. However, funds would be provided for the Agricultural Production Commissioner to commission, through the Monitoring and Evaluation Unit and when necessary, such ad hoc studies which require the lengthy presence of trained participant obervers. For instance, a university Department of Sociology/Anthropology could carry out the ad hoc village case studies on extension impact, with probably better results than non-professional investigators; or, a university Department of Extension, employing faculty and graduate students, could undertake the ad hoc studies on the degree of acceptance and implementation by farmers of the extended practices or on the quality of training sessions.

9.19 The estimated cost of the Monitoring and Evaluation system would be of about 2% of the new project's cost, or roughly about 1% of the total cost of the entire extension service. The staff required will represent, numerically, about 1.5% of the total staff employed by the extension organization. A staffing table with two variants, for projects covering a larger or a smaller geographic area, is given in Annex 9.

C. Reporting and Diffusion of Findings

9.20 The Unit should produce monthly short Monitoring and Evaluation Reports, synthesizing the main results generated by the sample surveys and/or the ad hoc studies completed in the previous month. Detailed accounts on the separate surveys and studies should be provided in full to management as they are completed and as quickly as possible, but the monthly summary report should highlight promptly the findings which are immediately consequential for T & V operation. It is expected that the reports be produced on an absolutely regular schedule and fed back immediately, so as they may become part of the normal management information flow. Decisions on the extension strategy for each coming season should benefit from the findings of the monitoring and evaluation surveys of the previous season.

9.21 As a part of its analytical responsibilities, the Evaluation Unit would have to corroborate the empirical data generated directly by its own studies with aggregate statistical information accruing from other sources. Such aggregate statistical information will be provided either through the internal reporting channels (see para 5.04-5.10) or by various agencies responsible for credit, fertilizer distribution, seed distribution, weather monitoring, etc. The variations (at state and district levels) in input use (increase or decrease), credit use and repayment, rainfall, etc. should also be interpreted in terms of their relevance to the extension effort: do the aggregate figures suggest an increase in consumption of fertilizers and

insecticides along the lines recommended by the extension service? Were there any bottlenecks in the delivery of inputs requested by farmers following the advice of extension? Integrated analysis would increase the operational usefulness of the reports prepared by the Evaluation Unit.

9.22 The Evaluation Unit should also communicate the evaluation findings which are relevant for agricultural research to those applied research institutions operating under the project. The information on the relevance and acceptability to farmers of recommended practices, on the reasons for acceptance and, in particular, of non-acceptance, the subjective reaction of farmers as well as their objective economic and/or manpower constraints on adopting these practices, should be detailed for the benefit of the Research Units and help identify research priorities.

9.23 The Unit would assist the Director of Agriculture to prepare the semi-annual progress reports on implementation to be submitted to IDA. At project completion, the Unit will assist the State Government in preparing the Project Completion Report to IDA.

9.24 The Unit would also develop certain activities for making its findings known to the extension staff. Taking advantage of the fortnightly training sessions for the VEWs, the senior staff of the Unit should present periodic analyses of the findings generated by surveys and studies. Unless the evaluation exercise is aimed to increase the Village Extension Workers' comprehension of the effects of their work and the ways by which these may be improved, its main purpose will be lost. Continuous feedback communication not only to management but also to extension field agents will contribute to increasing VEWs' and AEOs' motivation and skill.

D. Implementation Time Table

9.25 It follows from its objectives that the Project Monitoring and Evaluation Unit should preferably be on site when the project begins and should start immediately to establish baseline data. The effectiveness of the proposed monitoring and evaluation system depends largely on its timely implementation and on the soundness of its institutional arrangements. But the majority of the recent statewide extension projects have already started without an Evaluation Unit. It is therefore necessary to take appropriate action to catch up with project implementation, by eliminating further delays in the building of the Unit.

9.26 The following sequence of actions is recommended for establishing immediately the State Monitoring and Evaluation Units:

Month

1 - Advertisement for all slots in the Evaluation Unit.
- Request for price quotations on field and office equipment.

2 - Interviews for all positions.
- Placing orders for field and office equipment.

3 - Selection of office staff of the Evaluation Unit, two field supervisors, and 10 data collectors.
- Design of a pre-test of the pre-harvest monitoring survey.

4 - Training of recruited staff.
- Execution of the pre-test of the pre-harvest monitoring survey.

5 - Evaluation of the pre-test results, and modifications of monitoring survey procedures.
- Selection of remaining data collectors and field supervisors.

6 - Selection of sample for the first round of the monitoring survey.
- Full training of field staff, including crop cutting.

7 - Execution of the first round of the monitoring survey.
- Selection of sample for the second round of the pre-harvest survey.

8 - Execution of the first round of the monitoring survey.
- Selection of sample for the harvest evaluation survey.
- Analysis of the First round of the monitoring survey.

9 - Execution of the harvest evaluation study.
- Beginning of ad hoc studies.

X. THE CENTRAL EVALUATION GROUP

10.01 While each state with an extension project would have its own full fledged monitoring and evaluation capability, there are significant advantages in establishing a small Central Evaluation Group in the Government of India, with essentially a methodological role. The rationale for such a Central Group stems from the opportunity to exploit the advantages of having in all states a standard approach to monitoring and evaluation and from the need to provide coordination and scientific support to state units.

10.02 The Evaluation Group would be responsible for:

1) assuring that the procedures used by the State Monitoring and Evaluation Units are such as to yield results that are reasonably comparable and that monitoring and evaluation is carried out as agreed;

2) providing technical advice to the State Units on the scientific acceptability of procedures used in data collection, processing and analysis;

3) facilitating the transfer of research experience and procedures between State Units, acting as a methodological clearing house; and

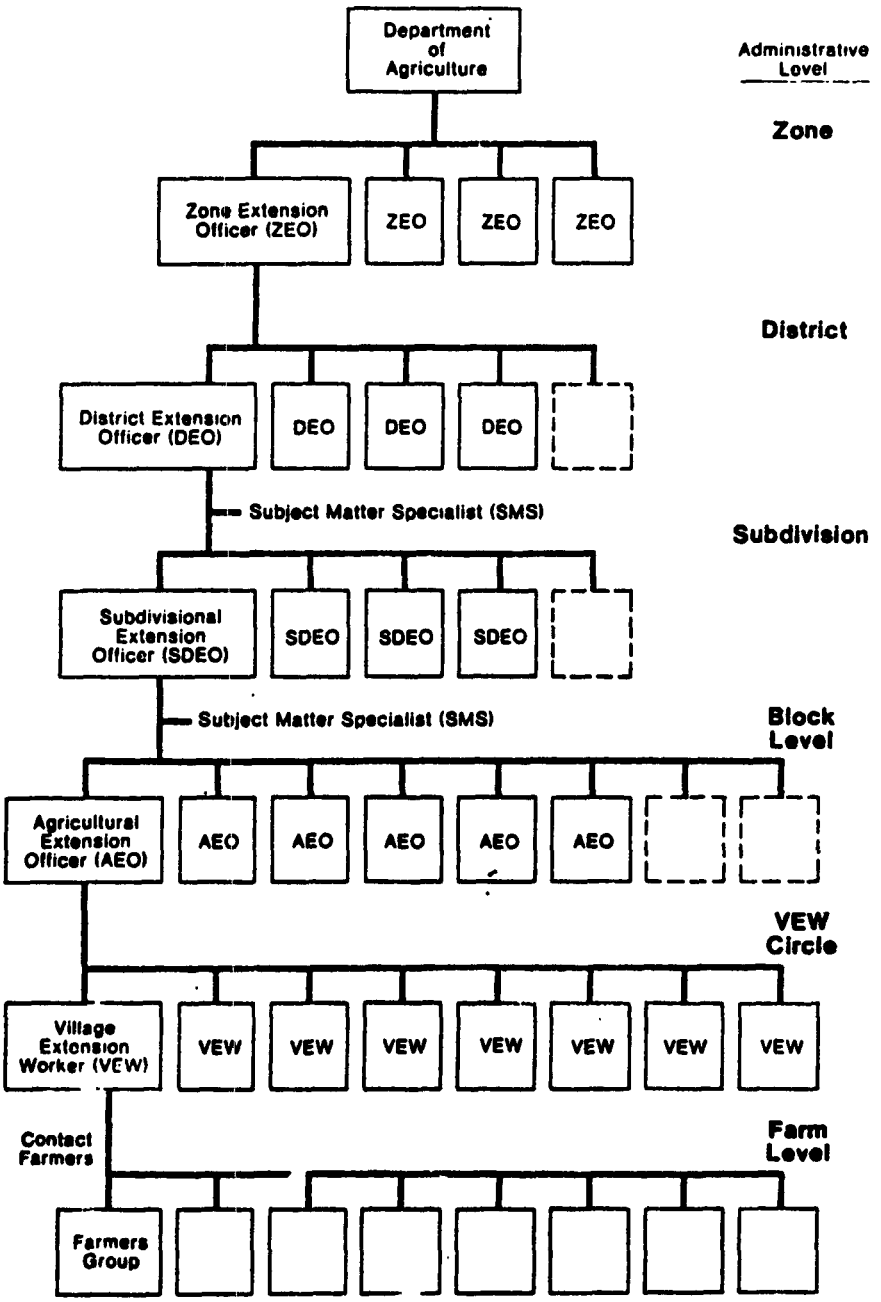
4) preparing seasonal or annual synthesis of evaluation findings in different states, based on comparative analysis of local data and reports, to be used for policy decision making and planning of the extension programs in all India.

10.03 The Central Evaluation Group should be under the direct authority of the GOI Commissioner for Agriculture and should be located in the Ministry of Agriculture, Government of India. It is important that the Central Group include highly competent and experienced specialists in statistics, sociology, survey design and analysis, and agricultural economics. Highly qualified scientific assistance, possibly in the form of a permanent Advisory Board, should be drawn from the Central Institute for Agricultural Statistics, New Delhi, from the Indian Statistical Institute, Calcutta, from NSSO, (for statistical aspects) and from the Institute of Public Administration or Delhi University (for sociological aspects).

10.04 The Central Group should remain in close and constant touch with all the State Units, not only receiving and studying their reports but also visiting them to review their current activity and provide constructive advice on content, design and evaluation of their activities. In addition, the Central Group could perform a training function by setting up workshops at the center for members of the State Units. Each workshop could cover the techniques and procedures for a given study, or a small set of related studies. The expertise that can be provided by the Group can do a great deal to ensure that acceptable methods are used in all states and that the results are comparable. This will also make it possible for the Central Group to prepare all-India reports on results of agricultural extension programs.

ANNEXES

Organization Pattern of Intensive Extension Service in One of the States in India



ANNEX 2

MAIN INDICATORS OF AGRICULTURAL EXTENSION PROJECTS
which are Implementing The T & V System In India

Project	Appraisal Report Date	Area Covered			Expected 6/ beneficiary farm families (million)	Number of contact farmers	Ratio VEW/Farmers	Ratio AEO/VEW	Extension staff at full development						Project Cost 8/ (US$ million)	
		Ha (million) 5/	Administrative Units Dists.	Sub-Div.					VEW	AEO	DEO & SDEO	SMS	Support	TOTAL	TOTAL	Bank Credit
1) Chambal Command Area Development 1/ (R430-IN)	May '74	0.05	2		0.04	600	1/320	1/8	120	15	3	20		158	2.7	0.3
2) Rajasthan Canal Command Area Development 1/ R447-IN)	July '74	0.02			0.03		1/240	1/8	144	18	3	12		180	3.3	0.4
3) West Bengal Agri. Extension & Research Project 2/ (R1288a)	March '77	6.6	17	50	4.0	320,000	1/1,000	1/8	4,000	450	67	200	500 7/	5,217	28	12
4) Orissa Agric. Development Project (R1301-IN)	Feb. '77	4.5	13	30	3.4	448,000	1/600	1/8	5,600	700	103	155	500 7/	7,058	40	20
5) Madhya Pradesh Agric. Extension & Research Project 3/ (R1442-IN)	May '77	7.0	15	50	2.1	317,000	1/600	1/6	3,970	730	100	200	500	5,500	27.1	13
6) Rajasthan Agric. Extension & Research Project 4/ (R1443-IN)	June '77	6.5	17	50	2.9	320,000	1/720	1/8	4,000	640	106	230	685	5,660	34.4	17
7) Assam Agric. Extension & Research Project (R1535-IN)	June '77	2.1	9	27	2.0	195,000	1/800	1/8	2,440	305	68	82	400 7/	3,295	16	8

1/ Integrated Agricultural Projects in which there is a T & V extension component.
2/ The State-wide West Bengal Agricultural Extension & Research Project (1977) covers 17 districts, including the 6 districts in which the T & V system was first introduced in 1975 as a component in the West Bengal Agricultural Development Project (Credit 541).
3/ The Madhya Pradesh project covers 15 of 45 districts in the State, but the 15 covered districts account for the most important arable areas in Madhya Pradesh.
4/ The Rajasthan Project covers all the districts of reasonable agricultural potential.
5/ Cropped land
6/ At full development, including the contact farmers.
7/ Estimated figures based on actual figures in two different states.
8/ Project costs cover not only the extension service proper, but also agricultural research, which is strengthened and expanded under the project. Some other components are sometimes included as well. The project cost of the extension services includes only the cost of additional staff, equipment and housing required because of the reorganization of extension.

ANNEX 3

Typical Timetable for a Village Extension Worker
(fortnightly visits)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
First Fortnight	1	2	3	4	TRA SMS	EXT VIS	H	5	6	7	8	TRA AEO	EXT VIS	H
Second Fortnight	1	2	3	4	TRA SMS	EXT VIS	H	5	6	7	8	TRA AEO	EXT VIS	H

1-8 = Visit farmers group.

TRA SMS = Training conducted by Subject Matter Specialist (SMS).

EXT VIS = Extra visits for checking field trials, office work, make up visits due to holiday, illness, etc.

H = Holiday.

TRA AEO = Training conducted by Agricultural Extension Officer (AEO).

ANNEX 4

State.....

PROFORMA FOR
SEMI-ANNUAL PROGRESS REPORTS
AGRICULTURAL EXTENSION AND RESEARCH PROJECT

6 Month Period Ending .....
(Corresponds Roughly to _____Crop Season)*

SECTION ONE: EXTENSION

PART I Physical Progress

	Project Target 1/		Progress up to end of previous period		Progress during Period under report		Staff Departed, vehicles and building written off, wastage from training during period	Cumulative Total at end of period	Vacancies/ Excess	Remarks
	Total at Full Dev.	To be Achieved under Project	Target[1]	Achievement	Target[1]	Achievement				
A. Staff Recruitment 2/										
1. VEWs										
2 AEOs										
3 SMSs (Sub-div level)										
4. Sub-Div Agri. Officer (SDAO)										
5. SMSs (Distr level)										
6. DAOs										
7 Addl Dir. of Agri. (Extension)										
8. Monit/Eval Hquart.										
9. Field Investigators										
10. Other staff at Hquart (specify)										
B. Transportation & Equipment Procured										
1. Bicycles (VEWs)										
2. Motorcycles (AEOs)										
3 Motorcycles (others)										
4. Jeeps (Sub-div level)										
5. Minibuses										
6. Other vehicles (specify)										
7 Equipment										
C Construction of Buildings										
Offices										
Subdivisional offices										
Training Centers										
- Improved										
- New buildings										
Housing										
1 VEW's quarters										
2 AEO's quarters										
3 Other (specify)										

PART II Staff Training

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 Preservice Training								
- No. Completing Phase I								
- No Completing Phase II								
- No. Completing Phase III								
2 15 day courses								
3. One month courses								
4. Three months courses								
5. Training abroad								
- Short term								
- Fellowships								

PART III. Progress in Area Covered Under Reformed Extension

	Project Target 1/ At full Devt.	Project Target at end of previous period	Achievement at end of previous period	Target at end of previous period	Achievement at end of previous period	3 as % of 2	5 as % of 4	5 as % of 1
- No. of Dist. or Subdivisions								
- Area Covered (000Ha) - arable land)								
- No. of designated contact farmers								
- Total farmers in areas for which contact farmers were designated								

PART IV. Progress of Expenditure for

	Overall progress up to end of previous Indian Fiscal Year							Withdrawl Applications Submitted		
	Total provision under the project	Provision up to end of previous year	Expenditure incurred up to end of previous year	Budget for the current year	Expenditure up to end of previous reporting period	Expenditure during the current period	Total Expenditure	up to end of previous Period	During Current Period	up to end of Current Period
A. Items Against which IDA Disburses										
1 Incremental Staff Salaries										
2 Civil Works										
3 Vehicles										
4 Locally Procured Equipment										
5 Local Training										
6 Overseas Training										
7 Local Consultancy Services										
B Other Project Items										
1. Existing Staff Salaries										
2 Extension Materials										
3 Travel & Other Allowances										
Total										

Note: 1/ Target, unless otherwise specified, to be taken from implementation schedule in IBRD Appraisal Report. Target refers to target at point of time closest to end of current reporting period. Target (Full Development) refers to target at end of project period.

2/ Add appropriate categories where relevant, for instance zonal or range AEOs

As soon as the proposed monitoring and on-going evaluation system passes through the first testing period and starts to produce periodically substantive information on project implementation, appropriate columns would be introduced into the proforma for the semi-annual reports. These columns would report on actual percentage of contact farmers covered, achieved frequency of visits, field trials, proportion of accepted recommendations etc.

* If possible, try to make 6 month periods correspond roughly to major crop seasons.

ANNEX 4 (continued)

SECTION TWO: RESEARCH

PART I	PROJECT TARGET AT FULL DEVELOPMENT TOTAL	INCREMENTAL	PROGRESS UP TO END OF PREVIOUS PERIOD TARGET	ACHIEVEMENT	PROGRESS DURING PERIOD TARGET	ACHIEV.	WASTAGE IN STAFF, VEHICLES ECT. DURING PERIOD	CUMULATIVE TOTAL AT END OF PERIOD TARGET	ACHIEV.	VACANCIES (EXCESS)	REMARKS
Physical Progress											
A. STAFF RECRUITMENT											
1) DOA											
1.											
2.											
3.											
etc.											
ii) UNIVERSITY											
1.											
2.											
3.											
B. VEHICLES & EQUIPMENT											
1) DOA											
1. Motorcycles											
2. 4-Wheel Drive Vehicles											
3. Automobiles											
4. Vans											
5. Others											
6. Equipment (specify)											
ii) UNIVERSITY											
1.											
2.											
3.											
4.											
5.											
6.											
C. CONSTRUCTION											
1) DOA											
1. Field Testing Stations - New - Repaired											
2. Housing											
3. Other											
ii) UNIVERSITY											
1.											
2.											
3.											
D. NUMBER OF FIELD TESTING STATIONS FULLY OPERATIONAL (names)											
E. STAFF TRAINING											

PART II PROGRESS OF EXPENDITURE
(See Part IV of Section One)

ALTERNATIVE DESIGN FOR A FOUR STAGE STRATIFIED SAMPLE

As indicated in the main text (see paragraph 6.06 and footnote), an alternative design to the two stage stratified sample for the monitoring survey can be a four stage design. Should this option be considered preferable in certain circumstances, the following illustration may be used as a guide for stratification and determination of sample allocation.

The four stage stratified design would consist of a sample of AEO jurisdictions, a sample of VEW Circles within each sample AEO jurisdiction, a sample of Farmer Groups within each sample VEW Circle, and a sample of farmers within each sample Group. The actual size of the stratified random sample in a state should depend upon the degree of geographical detail and the level of sampling error that is desired by project management.

Thus, similar to the two stage design presented in the paper, in the example given below we have assumed that there are 15 districts in the project for each of which estimates are desired, and that two field investigators are assigned full-time to each district. On the basis of the assumption made regarding the basic variances and the time-costs involved in the collection of data, this results in a sample of approximately 3,000 interviews per month, usefully small sampling errors for individual districts, and very small sampling errors for the state as a whole. If a state has fewer than 15 districts for which estimates are desired, the same assumptions would lead to a smaller total sample size, the same sampling errors for each district, and larger sampling errors (although perhaps quite tolerable) for the state as a whole.

If each district has two field investigators working full time, the sample in the district must be limited by the amount of work that can be accomplished within a period of approximately five weeks (about half the length of the growing season). We shall assume that this is equivalent to 25 working days for each investigator. The sample design will comprise within strata, each of which is about half a district, a sample of AEO jurisdictions at the first stage, a sample of VEW circles at the second stage, a sample of Farmers' Groups at the third stage and a sample of farmers at the fourth and final stage (see the Organization chart of the T & V system, Annex 1).

The allocation of the size of sample at each of the four stages should be such that the data collection can be accomplished within the 25 working days that are available and such that the resulting sampling errors are as small as possible. The determination of the desired allocation of the sample must therefore depend upon two kinds of information, namely (i) the cost per unit at each stage in terms of the data collector's time; and (ii) the degree of variability among the units at each stage. 1/

1/ Good data on these parameters are not now available to us. However, we may speculate on appropriate values for the cost and variance parameters, based on previous experience, and it turns out that, within a fairly broad range, the proper allocation of the sample is relatively insensitive to the speculated values.

To be specific, let us suppose that we wish to estimate the proportion of farmers that have a given characteristic (for example, have talked with the VEW at least twice in the last month, or have adopted some specific recommendation or set of recommendations, or have expressed a particular attitude toward the extension service). The precision of the estimated proportion in each stratum is measured by its standard error whose square is given approximately by the formula:

$$\sigma_p^2 = \frac{\sigma_A^2}{a} + \frac{\sigma_V^2}{av} + \frac{\sigma_G^2}{avg} + \frac{\sigma_F^2}{avgf}$$

In this formula, the quantities σ_A^2, σ_V^2, σ_G^2, σ_F^2 are measures respectively of the variability among the average of AEO jurisdictions, among the averages of VEW circles within AEO jurisdictions, among the Farmers Groups within VEW circles, and among farmers within Farmers' Groups. In the denominators of the formula, a denotes the number of AEO jurisdictions in the sample, v denotes the number of VEW circles in the sample for each AEO, g denotes the number of Farmers Groups in the sample for each VEW circle and f denotes the number of farmers in the sample for each Group. The total cost, in terms of the data collector's time, is given by:

$$K = K_A a + K_V av + K_G avg + K_F avgf$$

where K_A is the time spent for each AEO in the sample, K_V is the time spent for each VEW in the sample, K_G is the time spent for each Group in the sample, and K_F is the time spent for each farmer in the sample. It can then be shown that the allocations a, v, g, f, that minimize the standard error of the estimated proportions are given approximately by the following formula:

$$\hat{f} = \sqrt{\frac{K_G}{K_F}\frac{\sigma_F}{\sigma_G}}$$

$$\hat{g} = \sqrt{\frac{K_V}{K_G}\frac{\sigma_G}{\sigma_V}}$$

$$\hat{v} = \sqrt{\frac{K_A}{K_V}\frac{\sigma_V}{\sigma_A}}$$

$$\hat{a} = \frac{K}{K_A + K_V \hat{v} + K_G \hat{v}\hat{g} + K_F \hat{v}\hat{g}\hat{f}}$$

We have assumed that 25 working days are available, so that we may take K = 200 hours. We speculate that, on the average, the field investigator may spend 4 hours per AEO in the sample, including the time needed to travel from his home to an AEO jurisdiction or from one AEO to another, so that we take $K_A = 4$. Similarly, we tentatively assume that the field investiator must spend an average of one hour for each VEW, one hour for each Farmers Group and one hour for each farmer in the sample. Thus, we take $K_V = K_G = K_F = 1$.

We anticipate that the correlation between farmers in the same Group will be fairly high, say about .5. We anticipate that there will be a moderate correlation between the averages of Groups in the same VEW circle, say about .2. We further anticipate that there will be a lower, but still appreciable correlation between the averages of VEW circles in the same AEO jurisdiction, say .1. These values of the correlations lead to the following, where P denotes the proportion that is being estimated:

$$\sigma_F^2 = P(1-P)/1.61$$

$$\sigma_G^2 = P(1-P)/3.22$$

$$\sigma_V^2 = P(1-P)/16.1$$

$$\sigma_A^2 = P(1-P)/161.$$

These values, in turn imply that the optimum allocation of the sample is given by:

$\hat{f}$ = 1.44 farmers per Farmers' Group

$\hat{g}$ = 2.24 Groups per V.E.W.

$\hat{v}$ = 6.33 V.E.W.s per A.E.O.

$\hat{a}$ = 4.50 A.E.Os.

In practice, of course, these allocation numbers cannot have fractional values. Nevertheless, we may look first at the sampling errors that the theoretical allocation would yield, for estimates of various proportions at the district level:

Proportion P being estimated	Standard error of the estimate for a district
.10 or .90	.026
.20 or .80	.035
.30 or .70	.040
.40 or .60	.043
.50	.044

A realistic allocation which approximates the theoretical optimum is given by f=2, g=2, v=6 a=4. With this allocation and the same assumptions regarding the correlations, the sampling errors at the district level are given by the following table:

Proportion P being estimated	Standard error of the estimate for a district 1/
.10 or .90	.028
.20 or .80	.037
.30 or .70	.042
.50	.046

Thus it is seen that moderate departures from the optimum results in quite small increases in the standard errrors. On the other hand, large departures from the optimum values would result in marked increases in the standard errors.

This is illustrated by the following table, which shows the standard error of an estimate of the proportion P, for all allocations of a, v, g and f for which the standard error when P = .1 is less than .0275 and for which the expected time spent by the field investigator is no more than 210 hours. It will be noted that the particular allocation given above is not included, since the standard error for that allocation when P = .1 is .0277 (i.e. slightly greater than .0275). Thus, as a practical matter, either the allocation given above or any of the allocations shown in the Table may be chosen. This being the case, one may well choose the allocation which has the smallest expected number of work hours (192) associated with it, namely a=6, v=4, g=2, f=2.

1/ To illustrate, if the proportion of farmers who have adopted a given practice is 80 percent, there is a probability of about 2/3 that the estimates of that proportion would be between 76.3 percent and 83.7 percent; there is a probability of about 19/20 that the estimate of the proportion would be between 72.6 percent and 87.4 percent. Similarly, if the proportion is 40 percent, there is a probability of about 2/3 that the estimate of the proportion would be between 35.5 percent and 44.5 percent; there is a probability of about 19/20 that the estimate of the proportion would be between 31.0 percent and 49.0 percent (see interpretations of the standard error in footnote to para. 6.23).

For K1 = 4 K2 = 1 K3 = 1 K4 = 1
For rho-1= .1 rho-2= .2 rho-3= .5
The standard errors are:

a	v	c	f	Hours	P=.1	P=.2	P=.3	P=.4	P=.5
11	3	2	1	209	0.027	0.036	0.042	0.045	0.046
7	5	2	1	203	0.027	0.036	0.041	0.044	0.045
6	6	2	1	204	0.027	0.036	0.041	0.043	0.044
5	7	2	1	195	0.027	0.036	0.041	0.044	0.045
8	3	3	1	200	0.027	0.036	0.041	0.044	0.045
6	4	3	1	192	0.027	0.036	0.042	0.045	0.046
5	5	3	1	195	0.027	0.036	0.041	0.044	0.045
5	4	4	1	200	0.027	0.036	0.041	0.044	0.045
4	5	4	1	196	0.027	0.036	0.041	0.044	0.045
3	7	4	1	201	0.027	0.036	0.041	0.044	0.045
8	2	5	1	208	0.027	0.036	0.041	0.044	0.045
3	6	5	1	210	0.027	0.036	0.041	0.044	0.045
7	2	6	1	210	0.027	0.036	0.042	0.044	0.045
3	5	6	1	207	0.027	0.036	0.042	0.045	0.046
8	3	2	2	200	0.027	0.036	0.041	0.044	0.045
6	4	2	2	192	0.027	0.036	0.042	0.045	0.046
5	5	2	2	195	0.027	0.036	0.041	0.044	0.045
6	3	3	2	204	0.027	0.036	0.041	0.044	0.045
7	2	4	2	210	0.027	0.036	0.042	0.044	0.045
3	5	4	2	207	0.027	0.036	0.042	0.045	0.046

In this tables, K1, K2, K3 and K4 are, respectively, the cost components denoted by K_A, K_V, K_G and K_F in the paper. The values shown as rho-1, rho-2 and rho-3 are respectively the intraclass correlations among VEW circles within the same AEO jurisdiction, among Farmers' Groups within the same VEW circle, and among farmers within the same Group.

Similar computations for other values of the parameters may be easily made to cover situations that may prevail in different states, in terms of difficulty of travel and other variables. For instance, for different sets of values for Ks and rho-s, the following sample allocations and standard errors will ensue:

For K1 = 3 K2 = 2 K3 = 1 K4 = 1
For rho-1= .1 rho-2= .2 rho-3= .5
The standard errors are:

a	v	c	f	Hours	P=.1	P=.2	P=.3	P=.4	P=.5
11	2	3	1	209	0.028	0.037	0.043	0.046	0.047
6	4	3	1	210	0.027	0.036	0.042	0.045	0.046
4	6	3	1	204	0.028	0.037	0.042	0.045	0.046
3	8	3	1	201	0.028	0.038	0.043	0.046	0.047
9	2	4	1	207	0.028	0.037	0.042	0.045	0.046
6	3	4	1	198	0.028	0.037	0.043	0.046	0.047
5	3	5	1	195	0.028	0.038	0.043	0.046	0.047
4	4	5	1	204	0.028	0.037	0.042	0.045	0.046
11	2	2	2	209	0.028	0.037	0.043	0.046	0.047
6	4	2	2	210	0.027	0.036	0.042	0.045	0.046
4	6	2	2	204	0.028	0.037	0.042	0.045	0.046
3	8	2	2	201	0.028	0.038	0.043	0.046	0.047
8	2	3	2	200	0.028	0.038	0.043	0.046	0.047
3	6	3	2	207	0.028	0.037	0.042	0.045	0.046

For K1 = 3 K2 = 2 K3 = 1 K4 = 1
For rho-1= .1 rho-2= .4 rho-3= .7
The standard errors are:

a	v	c	f	Hours	P=.1	P=.2	P=.3	P=.4	P=.5
10	3	2	1	210	0.030	0.040	0.046	0.049	0.050
6	5	2	1	198	0.031	0.041	0.047	0.050	0.051
5	6	2	1	195	0.031	0.042	0.048	0.051	0.052
4	8	2	1	204	0.031	0.041	0.047	0.050	0.051
11	2	3	1	209	0.030	0.040	0.046	0.050	0.051
6	4	3	1	210	0.030	0.040	0.046	0.049	0.050
4	6	3	1	204	0.031	0.041	0.047	0.050	0.051
9	2	4	1	207	0.031	0.041	0.047	0.050	0.051
6	3	4	1	198	0.031	0.042	0.048	0.051	0.052
9	4	1	2	207	0.031	0.042	0.048	0.051	0.052
11	2	2	2	209	0.031	0.041	0.047	0.050	0.051
6	4	2	2	210	0.030	0.041	0.046	0.050	0.051
4	6	2	2	204	0.031	0.042	0.048	0.051	0.052

These and other calculations illustrate (a) that for a fixed set of cost components and intraclass correlations, there is considerable flexibility in the choice of the sample allocation without substantial increase in the sampling error and (b) that the approximately optimum allocation is relatively insensitive to the values of the cost components and intra-class correlations.

The standard errors of estimates for the whole state would be about one-fourth of those for a single district, if the state has 15 districts.

If the assumptions presented above are acceptable, it results that initially the sample for each field investigator should consist of a random sample of six AEO Jurisdictions (if feasible, the AEO jurisdiction in the field investigators' assignment may be classified into three strata, possibly along subdivision lines, and two AEOs selected at random from each stratum), a random sample of four VEW circles for each AEO, a random sample of two Groups for each VEW, and a random sample of two farmers for each Farmers' Group. Another possible and convenient allocation may be a=8, v=3, g=2, f=2.

Data accumulated during the course of the continuing survey will provide information on actual costs and correlations and thus provide the basis for modifying the allocation in future rounds of the survey. It should be noted that the approximations used above for the sampling errors are conservative, so that the standard errors shown may be larger than the actual values by as much as a one-fifth. When the survey is actually in operation, it will provide the data for making valid estimates of the standard errors of the various statistics derived from the survey. Such error estimation should be carried out routinely for the most important statistics of the survey.

DRAFT QUESTIONNAIRE FOR THE MONITORING SURVEY

The following draft, as well as the evaluation questionnaire in Annex 8, are illustrations of the type of interview schedules which could be used for the sample surveys. Each Monitoring and Evaluation Unit should adjust the questionnaires to its own objectives and consider whether additional questions need to be included. However, we would like to encourage the M/E Units to obstinately resist the temptation to lengthen the questionnaire, which may overburden the field investigators and may pile up more information than actually needed and than the unit can process and analyze. The drafts proposed here, if used, should be pretested in the field and the wording of each question, appropriately translated, should be unambiguous. Appropriate instructions for the field investigators detailing the points made in the "Notes" which follow below should be worked out.

The outcome of the entire monitoring and evaluation operation will largely depend on the quality of primary data generation, on the adequacy with which interviews with farmers will be carried out, and on the precision and accuracy of recording farmers' responses.

DRAFT QUESTIONNAIRE - MONITORING SURVEY

Contact farmer's name _____

Farmers' Group identification _____

1. (a) What is the name of your VEW? _____ known ☐
   unknown ☐
   uncertain ☐

   (b) Which is the usual day of the week for the VEW's visit? _____

2. When did the VEW last visit your farm or some other farmer's fields with you present? _____

3. How many times in the last 4 weeks did the VEW visit you? _____

4. How many group meetings with the VEW did you attend in the last 4 weeks? _____

5. (a) How much land do you operate? _____ (Acres, Hectares, etc.)

   (b) How much of it is irrigated? _____

6. Please tell me what practices does the VEW recommend for this crop season?

Description of Practice	Area Adopted	Area will Adopt	Extent of Adoption or Reason for Non-adoption
(Continue the list on the reverse side of page)			

7. Do you expect to have increased yields on areas on which you applied the recommended practices? _____ If yes, how much? _____
   ~~yes or no~~

8. How many farmers do you know who have learned the recommended practices from you? _____

9. Rate the usefulness to you of the agricultural extension program:
   (1) Extremely useful
   (2) Quite Useful
   (3) Useful
   (4) Not of any real use
   (5) The recommended practices are wrong

10. Please give any comments or suggestion the farmer would like to pass on.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ _____

Field Investigator Date of Interview

NOTES OF THE QUESTIONNAIRE - MONITORING SURVEY

Identification block. The Farmers' Group identification should be a numeric code that has been assigned, but the contact farmer's name should be written out in advance. The data collector should have an assignment sheet giving the name of the contact farmers he is to interview, the Farmers' Groups codes and the names of the villages in which they are to be found. He should be informed in advance about the name of the VEW and the day of the visit for each village in which interviews should be carried out.

Item 1. Enter the name of the VEW just as it is given by the farmer. Do not help the famer to remember the name. It may happen that the farmer uses a nickname or doesn't remember the full name, but he indicates that he knows the VEW. The field investigator should then probe and find out, to his satisfaction, whether the farmer does know or does not know the VEW. Then, in the small box on the right side of question one, he should indicate his own assessment, by marking only one of the following possibilities: (known), (unknown), (uncertain).

Item 2. Do not ask for month, day and year. Ask the farmer on what day of the week the VEW visited him (either on his fields or some other farmer's field), and whether it was this week, last week, etc. Then convert to month, day and year by consulting your calendar.

Item 3 and 4. These refer to the 28 days preceding the date of interview.

Item 5(a). This should include all agricultural land that the farmer is cultivating this crop season, whether owned by him or not. Give the area unit used (area, hectares, or local unit of area).

Item 6. Enter the farmer's description of each practice in the farmer's own words, as nearly as possible. Ask probing questions to bring out a complete description of the practice, as the farmer knows it. Ask such questions as "how much," "what kind," "at what times," "for which crop" etc. After getting the description of the practice, ask "Have you adopted the practice?" If the answer is "yes" or "partly", enter the size of area on which the practice was adopted in the column headed "area adopted." If the answer is "no," ask whether he intends to adopt the practice, and if he answers "yes" to this question, enter the area on which he intends to adopt the practice in the column headed "Area will adopt." Now ask about the extent to which the farmer has or will adopt the practice (e.g., he will fertilize but not as much as recommended, he will weed less often than recommended, he will use a different pesticide, etc.) or his reasons for not adopting the practice, and enter his responses in the last column, as nearly as possible in the farmer's own words. Draw a horizontal line after each practice, for separation. If there is not enough room on the page, continue on the reverse side, and if necessary on the reverse side of the second page of the questionnaire.

Item 9. Read the whole question to the farmer, including the alternative responses, and then enter the number of the response which the farmer feels most nearly corresponds to his attitude.

Item 10. Enter the farmer's comment and suggestions in the farmer's own words, as nearly as possible.

Be sure to enter your name and the date of the interview in the spaces provided.

ANNEX 7
Page 1

FIELD INVESTIGATOR'S COMPILATION SHEET
(Monitoring Survey)

Field Investigator: _____ Date: _____

Number of interviews assigned _____

Number of questionnaires completed _____

Item 1. Knowledge of VEWs by farmers

Known	Unknown	Uncertain

Item 2. Number of days since last visit

	Less than 7	7-13	14-20	21-27	28 or more
No. of farmers					

Item 3. Frequency of visits in last four weeks

	No visits	1 visit	2 visits	3 visits	4 or more
No. of farmers					

Item 4. Frequency of group meetings attended by contact farmers in last four weeks

	No. meetings	1 meeting	2 meetings	3 or more
No. of farmers				

Item 5. Practices mentioned and adopted

	Practice A	Practice B	Practice C	Practice D	Practice E
No. of farmers mentioning the practice:					
No. of farmers adopting the practice:					

(NOTE: The practices listed should correspond to the five most important recommendations made in the current crop season).

Item 6. Ratings of extension service

	1	2	3	4	5
No. of farmers:					

ANNEX 8
Page 1

DRAFT QUESTIONNAIRE FOR THE EVALUATION SURVEY

Crop _____ Farmers' Group Identification _____

District _____ Farmer's Name _____

Is the field on which the cropcutting was done irrigated? _____
yes no

Is the crop a high yielding variety? _____
yes no

Interview Section

1. Are you a contact farmer? ___ Yes ___ Not now, but earlier ___ Other

2(a) What is the name of the VEW for this area? _____

(b) Which is the usual day of the week for the VEWs' visit _____

3. On how many times in the last four weeks have you talked to the VEW? ___

4. How many group meetings of the VEW have you attended in the last 4 weeks? _____

5(a) How much land do you operate? _____ (Acres, Hectares)

(b) How much of it is irrigated? _____

6. Please tell me what were the most important practices the VEW recommended for this crop season?

Description of Practice	Area Adopted	Extent of Adoption or Reason for Non-adoption

(Continuation of answers to question 6, if necessary.)

7. Which new practices did you use on the plot selected for the crop-cutting and how did you learn about the practice? (Mark all applicable columns.)

Practice used (Code from standard list)	Source			
	The VEW	A Farmer	Own Observation	Other (explain)

8. What would have been the difference between your present yield and what you would have obtained without following the recommended practices?

_____

9(a) What is the total area you have planted in this crop? _____

(b) How much of that is under newly recommended practices? _____

10. How would you rate the usefulness of the agriculture extension program?

1 ☐ Extremely useful

2 ☐ Quite useful

3 ☐ Useful

4 ☐ Not of any real use

5 ☐ The recommended practices are wrong

Crop Cutting Section

11. Code number for identifying the plot and the dried weight of produce from plot: Code _____ Weight _____

12. Green weight of produce from plot _____

13. Was crop sown ☐ pure ☐ mixture

_____ _____

Field Investigator Date

ANNEX 9

STAFFING STRUCTURE OF A STATE EVALUATION UNIT

	Variant A (15 administrative units of extension)	Variant B (10 administrative units of extension
Head, Evaluation Unit	1	1
Head, Sample Survey Section	1	1
Agricultural Economist	1	1
Rural Sociologist	1	1
Field Supervisors	6-8	4-6
Field Investigators	35-50	23-35
Statistical Clerks	5	3
Typists	2	2
Head, Ad Hoc Studies Section	1	1
Social Scientist	1	1
Junior Research Officers	5	5
Statistical Clerks	2	2
Typist	1	1

BIBLIOGRAPHY

Agriculture Extension Service in the Rajasthan Canal & Chambal Command Areas, (An Evaluation Study), Evaluation Organization, Government of Rajasthan, Jaipur.

Analyzing Impacts of Extension Programs, U.S. Department of Agriculture, Washington, D.C., 1976.

Ascroft, Joseph, Niels Roling, Joseph Kariuki, and Fred Chege, Extension and the Forgotten Farmer, First Report of a Field Experiment, Bulletin Number 37, Afdelingen Voor Sociale Wetenschappen Aan de Landbouwhogeschool, Wageningen, 1973.

Bangladesh: Appraisal of the Extension and Research Project, Document of The World Bank, June 1977.

Benor, Daniel, Report to the Government of Rajasthan on Extension Service, India - Chambal Command Area Development Project (Rajasthan), January 1974.

Benor, Daniel and James Q. Harrison, Agricultural Extension, The Training and Visit System, with a Foreward by Robert McNamara, World Bank, May 1977.

Castillo, Gelia T., All in a Grain of Rice, Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Collete, Laguna, 1975.

Crop Estimation Study, Agriculture Extension Programme in Chambal Command Area, (Results of Crop Cutting Experiments on Paddy and Jowar During Kharif, 1975-76), Kota Rajasthan.

Crop Estimation Study, Agriculture Extension Programme in Chambal Command Area, (Results of Crop Cutting Experiments on Wheat and Gram During Rabi 1975-76), Kota Rajasthan.

Crop Estimation Study, Agriculture Extension Programme in Chambal Command Area, (Result of Crop Cutting Experiments on Paddy and Sorghum During Kharif, 1976-77), Project Director (extension) Kota, Rajasthan.

Crouch, Bruce R., Planning with People: An Integrated Extension Service Papua New Guinea, paper presented at the Fourth World Congress for Rural Sociology, Torun, Poland, August 9-13, 1976.

Desai, A.R., Rural Sociology in India, 3rd. ed, Vora & Co., Bombay, 1961.

Elkana, Joseph, Research-Extension Links in Agriculture: A Study of Communication Behavior, in Molho, S. (ed), Agriculture Extension, A Sociological Appraisal, Keter Publishing House, Jerusalem, 1970.

Evenson, Robert and Y. Kislev, Agricultural Research and Productivity, Yale Y.P., New Haven, 1975.

Extension Evaluation, Foreward by A.P. Barnabas, Allahabad Agricultural Institute, 1957.

Fliegel, Frederick C., Prodipto Roy, Lalit K. Sen and Joseph E. Kivlin, Agricultural Innovations in Indian Villages, National Institute of Community Development, Hyderabad.

India: Appraisal of the Assam Agricultural Development Project, Document of the World Bank, May 1977.

India: Orissa Agricultural Development Project, Document of the World Bank, February 1977.

India: Appraisal of the Rajasthan Agricultural Extension and Research Project, Document of the World Bank, March 1977.

Inkeles, A. and D.H. Smith, Becoming Modern: Individual Change in Six Developing Countries, Cambridge, Harvard U.P., 1974.

Jones, Gwyn E., The Adoption and Diffusion of Agricultural Practices, World Agric. Econ. & Rural Sociol. Abstr., Vol. 9, No. 3, September 1967.

Katz, Elihu, M. L. Lewis, H. Hamilton, Traditions of Research on Diffusion of Innovations, American Sociological Review, 1963.

Kotter, Herbert R., Some Observations on the Basic Principles and General Strategy Underlying Integrated Rural Development, Monthly Bulletin of Agricultural Economics and Statistics, Vol. 23, 1974.

Lionberger, Herbert and H.C. Chang, Farm Information for Modernizing Agriculture: the Taiwan System, Praeger Publishers, N.Y.

Lynch, Frank, S.J., Field Data Collection in Developing Countries: Experiences in Asia, ADC, June 1976.

Manual on Crop Estimation Surveys on Food and Non-Food Crops in Andhra Pradesh, Burau of Economics and Statistics, Hyderabad, 1971.

Molho, Sara (Ed.), Agricultural Extension, a Sociological Appraisal, Keter Publishing House, Jerusalem, 1970.

National Sample Survey Organization, Consolidated Results of Crop Estimation Surveys on Principal Crops, 1971-72, Report No. 24, New Delhi 1975.

Prodipto, Roy, Frederick C. Fliegel, Joseph E. Kivlin, and Lalit K. Sen, Agricultural Innovation Among Indian Farmers, National institute of Community Development, Hyderabad.

Results of Yield Estimation Surveys, Annual Report 1973-74, Volume I. Sample Surveys for Assessment of High Yielding Varieties Programme, Institute of Agricultural Research Statistics, New Delhi, 1976.

Rogers, Everett M., Communication and Development, The Passing of the Dominant Paradigm, Communication Research, 3, 2, 1976.

Rogers, Everett M. and F.F. Shoemaker, Communication of Innovations: A Cross Cultural Approach, New York Free Press, 1971.

Roling, Niels, Adaptions in Development: A Conceptual Guide for the Study of Noninnovative Responses of Peasant Farmers, Economic Development and Cultural Change, 19, 1, 1970.

Rossi, Peter H., Sonia R. Wright, Evaluation Research, An Assessment of Theory, Practice and Politics, Evaluation Quarterly, Vol. 1, No. 1, February 1977.

Rural Development - Sector Policy Paper, World Bank, 1975.

Shingi, Prakash M., and Bella Mody, The Communication Effects Gap: A Field Experiment on Television and Agricultural Ignorance in India, Communication Research, Vol. 3, No. 2, April 1976, Sage Publications, Inc. 1976.

Sinha, B.P. and Prayag Mehta, Farmers' Need for Achievement and Change-Proneness in Acquisition of Information from A Farm-Telecast, Rural Sociology, Volume 37, No. 3, September 1972.

Thailand: Appraisal of the National Agricultural Extension Project, Document of the World Bank, March 1977.