

IS N 73592

PNABJ316

DECEMBER 1966

BEST AVAILABLE DOCUMENT

reprint

Farm Management Research for Planning Agricultural Development*

RAINER SCHICKELE†

The Agricultural Development Council, Inc., New York

The Forward Look	1
From Description to Planning	2
Development Planning	3
Improving Internal Farm Organization	4
Improving External Environmental Conditions	5
Incentives for Farmers	6
National Plans and Local Implementation: A Two-pronged Approach	7
Closing the Gap	9
The Challenge to Farm Management	10
Appendix I: An Illustration of the Use of Farm Planning and Budgeting for Agricultural De- velopment Policy	12
Appendix II: Proposal of a National Research Program for Agricultural Production Plan- ning	15

The Forward Look

Farm management work deals with the organization of the whole agricultural production process at the farm level. My thesis here shall be that farm management work, especially in the newly developing regions of the world, should be forward-looking and become an essential part of the national planning for economic development.

It should not exhaust its efforts in describing what is—but should be directed at planning what ought to be. It should not limit its enquiries to what happens within the border of the individual farm—but should also identify those external factors which obstruct the farmer's opportunities and his motivations for modernizing his farming methods and increasing his production and farm income.

Ours is as truly the century of the agrarian revolution as the 19th century was that of the industrial revolution.¹ Before the 20th century will close, agriculture in the developing countries will have experienced an impact of science and technology, of modern economic and social institutions, as far-reaching as Western countries did in the 19th century. And this had better be so—lest we lose the battle for Freedom from

* This paper originally appeared under the same title in the *Indian Journal of Agricultural Economics*, Vol. XXI, No. 2 (April-June 1966), pp. 1-15, and is reprinted with the permission of the Journal. Appendices I and II are published here for the first time.

† The author gratefully acknowledges the criticism received from G. K. Boin, R. T. Burton, Hermann Felschhausen, Glenn L. Johnson, Raj Krishna, A. T. Mosher, Shao et Ong, Vernon W. Rutt, and Clifton R. Wharton, Jr., which proved most useful in the preparation of this paper. Responsibility for the views expressed remains with the author.

¹For a stimulating discussion of this central problem in economic development see Shri Asoka Mehta, "Toward an Agricultural Revolution," *Indian Journal of Agricultural Economics*, Vol. XX, No. 1 (January-March 1965), pp. 13-19. See also Rainer Schickele, "Evolution of Land Tenure in World Perspective," *AICC Economic Review*, Vol. VI, Nos. 18-19 (New Delhi, January 21, 1955), pp. 59-61, and *Problemas Agrícolas e Industriales de Mexico*, Vol. VI, No. 1 (Mexico, 1955), pp. 45-51.

Hunger in the race with population. Around the year 2000, world agriculture must produce at least three-times more to feed twice the present population adequately.²

In essence, this means that the task of farm management, in forward-looking perspective, is not so much the improvement of present farming practices but the *establishment of whole sets of new production methods and farming systems*. Farmers need not only technical and managerial assistance, but also new socio-economic, marketing and other institutional arrangements which will enable them and make them willing to adopt modern production methods. This, in turn, requires close cooperation between farm management and agricultural policy experts, a combination of micro- and macro-economic methods of analysis.

To accelerate this changeover to new farm production processes and to guide it in desirable directions for the benefit of farm people and of the welfare of the country, farm management work³ must orient its efforts and develop effective analytical methods of approach to this end.

From Description to Planning

In farm development planning, we must, of course, know something about the present situation—not for the sake of complete and detailed descriptions of what is now, but for the sake of setting benchmarks, of knowing from where we must start and for measuring the rate of agricultural progress. This calls for a wise selection of data, of questions to be asked; a selection according to what is *relevant* for bringing about far-reaching changes in production processes and farming systems.

For instance, why should we gather mass statistics on hundreds of detailed items intended to explain how present crop yields, input-output relations and net income were obtained from unimproved varieties,

²Food and Agriculture Organization of the United Nations, "Population and Food Supply," *Freedom from Hunger Campaign Basic Study No. 7* (62.1.22) (New York: United Nations Office of Public Information, 1962); and Willard W. Cochrane, "The World Food Budget: A Forward Look to 2000 and Beyond," *Proceedings Commemorating Centennial of the World Food Forum* (Washington, D.C.: U.S. Department of Agriculture, 1963), p. 95.

³"Farm management work" as used here means research as well as extension, since there is a desperate need in developing countries for action oriented research designed to guide and hasten the adoption of improved farming systems. For an excellent treatment of the broader aspects of farm management research work, see W. Y. Yang, *Methods of Farm Management Investigations For Improving Farm Productivity* (revised edition), FAO Agricultural Development Paper No. 80 (Rome: FAO, 1965), Chapters 6 to 11.

poor seed, no fertilizer, no pesticide, inefficient tillage and harvesting methods, exorbitant interest and rent charges, and unduly low prices realized by farmers, since we know that these practices and environmental conditions *must* be changed? Such data tell us nothing about what kind and how much fertilizer should be used on what crops in which localities and under what cost-price relations, nor what changes in production methods, enterprise combinations and levels of capital and labor input would be desirable and feasible in view of the country's population growth and economic development. The orientation of farm management work should be forward looking, produce the data and analyze the issues pertinent to determining desirable and feasible improvement in productivity and income, and to operating successful action programs directed to these ends. A good part of the research effort must be applied to the many intricate problems of changing production processes and economic and institutional conditions for the purpose of accelerating agricultural progress.

For instance, we must concentrate on studying the crop yield responses to new and much more efficient practices, various levels of mechanization, and the input-output relations and net incomes resulting from these new production processes. We must determine what improvements in tenure conditions, in credit facilities, and in cost-price relations are needed to render farmers able and willing to adopt modern production methods. These are the issues around which farm management research and extension in the developing countries should be centered.

Just to illustrate: we can learn more about the problems of a certain farming area and their possible solutions from a few hundred farm survey schedules of 30 to 50 items each, than from thousands of schedules with 150 items each—provided the study is well conceived and the selection of farms and items is made according to their relevance to the problems of achieving higher levels of production and income. We should remember that we are faced with the need for major structural changes in production methods, in input and output levels and relations, and in enterprise combinations. These structural changes, in turn, require changes in the institutional and socio-economic environment which offer farmers incentives and practical opportunities for meeting the country's food needs and contributing their part to national economic development.

Production functions based on average input-output relationships under traditional farming systems do not help us in estimating the expected new input-

our relations from a new modern farming system in a particular area. We must adapt our analytical methods to the really urgent problems at hand and not select problems of minor importance for study just because they fit our traditional analytical tools better. This sounds perhaps more formidable a task than it really is because the methods required for this new task demand a comparatively simple set of data and analytical tools and a good deal of common sense, keen observation and judgment, gifts which fortunately can be found among farmers, local leaders, trained researchers and responsible officials in developing countries.

Essentially, what is needed is an experimental approach, *at the farm and village level*, to finding out what changes in land use and crop rotations are needed, what crop varieties respond well to what kind and how much fertilizer. We must find out how much credit farmers will need, at what terms of interest rates and repayment, and what cost-price relations will make it profitable to farmers to adopt these modern techniques. This crucial information can be obtained from systematic trials and demonstrations on selected typical farms and in well located pilot project areas representative of major farming regions; by judicious use of analogy and transfer of experience obtained from experiment station research work and in practical farming cases under similar conditions elsewhere; by a much wider and more sophisticated use of typical case and farm group studies; and by organized teamwork with specialists in agronomy, marketing, land tenure and agricultural policy who contribute their up to date knowledge of technology and institutional innovations.

Farm Development Planning

This calls for farm planning and budgeting. Our enquiries should center around the key questions:

- 1) What types of farming, crop and livestock combinations, crop varieties, and levels of capital and labor input are needed to use land and labor resources fully and efficiently?
- 2) What changes from the present position are needed to get there?
- 3) What farming practices, fixed and operating capital, and what incentives and facilities through credit, cooperative and government services, tenure and marketing conditions and cost-price relations are necessary to make farmers willing and able to bring about the desired changes?

To what extent, and how effectively, does the current farm management work in research and extension address itself to these questions? This we should ask ourselves most seriously if we want to make our best contribution to accelerating farm development and the countries' economic progress.

There are, of course, some beginnings of work along these lines going on in developing countries. For instance, the Food and Agriculture Organization of the United Nations, with the support of the Agricultural Development Council, started in 1951 a series of farm management seminars throughout the Far Eastern Region, which were centered around the key problems of forward-looking farm development planning and the adaptation of farm planning and budgeting methods to local conditions in the various countries.⁴

In a number of universities in the developing regions, some research has been conducted and some training courses have been offered in farm planning and budgeting. This type of farm management work represents a promising start. Its dominant focus, however, has usually been the internal production organization within the farm boundary, with the external environment of tenure, credit, marketing and price conditions treated as given. Moreover, little or no attention has been paid to aggregating the input and output quantities of representative farm plans for regional and national totals. Much work has still to be done before farm management research can contribute its required part to accelerating agricultural progress and general economic development.

In 1960-61, India started the first large-scale government action program somewhat along farm development planning lines anywhere in the world: the "Intensive Agricultural District Programme."⁵ In prin-

⁴After six years of such pioneer work, the governments of this region established a "Working Party of Farm Management for the Far East" under FAO auspices and technical guidance. The members of this Working Party initiated farm management studies in their respective countries and issued the *First Farm Management Manual for the Use of Agricultural Extension Workers in Asia and the Far East* (Bangkok: Regional Office for Asia and the Far East, Food and Agriculture Organization of the United Nations, October 1961). A *Second Farm Management Manual for Agricultural Research Workers* is in preparation.

The Working Party also publishes a periodical, *Farm Management Notes for Asia and the Far East*, under the competent leadership of its Technical Secretary, Dr. Shao er Ong of the FAO Far Eastern Regional Office in Bangkok. Its July 1965 issue carried a keynote article on "Farm Planning and Agricultural Development" by Dr. W. Y. Yang of FAO, Rome.

⁵*Report on Intensive Agricultural District Programme, prepared by the Expert Committee on Assessment and Evaluation* (Ministry of Food and Agriculture, Government of India, 1961-63).

While the approach of the Programme rests upon farm management planning and budgeting and institutional improvements for raising agricultural productivity.⁶ In practice, the implementation of the Programme concentrates on using very simple partial farm plans and budgets, limited to a "package" of modern practices including fertilizers, improved seeds, pesticides, etc., and applies them to groups of farms in selected districts by promoting a joint effort of farmers to adopt the "package" of practices. "The choice offered is a simple one, between the old way and the new one which includes not only improved practices but also the assurance of supplies, credit and guidance. The farm plan is then used to inform the local cooperative of the farmer's expected needs—of great importance where the distribution system is poorly developed—and is further used to develop the farmer's loan application for production credit."⁷ There is no doubt that this general approach is sound and promising.

What, then, are the modifications in farm management research needed to meet the problems of farm development?

There are two types of modifications required: one deals with the approach to the internal farm organization, the other with the external environmental conditions.

Improving Internal Farm Organization

Concerning the *organization of the internal production process* in each farm unit, the research emphasis needs to be shifted from detailed description to problem-solving.

This means, *first*, the identification of problems. In general terms, the dominant problem is how to increase productivity per acre and per man, within the physical limitations of soil and climate. What are the various alternatives a farmer has for raising the productivity of his land and labor resources, *with capital requirement treated as a variable*? We know that additional capital is needed to modernize agricultural production; the question is how much and in what forms, and that will vary according to the alternative farm plans. The input requirements and the expected output of the farm products under the vari-

ous technically feasible alternatives of crop rotations and livestock enterprises, of fertilizer use and feed rations, of kind and degree of mechanization, are estimated.

Cooperation with *agronomists* is needed for information on improved crop varieties and their yield response to fertilizer, with *agricultural engineers* on the technical feasibilities of tractor and machinery use for various field operations and transport tasks.⁸ *Local progressive farmers* are consulted on tillage and crop practices (such as weed control and harvesting, etc.) and other methods they have found to increase production. On the basis of these technical data and discussions, the farm management worker tentatively selects a few alternative farm plans for a set of "typical farms" representing the main types of farming according to soils and farm sizes of the area which would utilize the land and the family labor force as fully as possible the year-round, and which would expand or introduce high-value crops and livestock products where this seems feasible. It may often be sufficient to work out only partial farm plans involving only a few key enterprises and related new practices.

Secondly, for these high priority alternative farm plans we budget the costs and returns of the production plans under *prevailing* local prices of factors and products. In close consultation with local farmers, we determine the credit requirements, the interest, loan repayment, rent charges, and taxes they would have to meet under now prevailing conditions. These cost-return calculations of the production plans need to be carried out only for the more important crop and livestock enterprises and only in approximate terms, by simple arithmetic. The physical output of each alternative plan is bound to be substantially larger than the present output. But their net financial returns to the farmer may in some cases be little higher than at present, due to unfavorable cost-price relations (of fertilizer and crop, for instance), or due to high

⁸The lack of reliable data on physical input-output relations under local field conditions is a serious obstacle difficult to overcome. Simple trials and demonstrations on cultivators' fields, especially with improved crop varieties and their response to fertilizers and similar strategic practices, are most promising and deserve a much wider use in farm production research and planning. The FAO is carrying out such a program, under the Freedom from Hunger Campaign, with the financial support of the world fertilizer industry, and with very active cooperation of the governments of the countries participating. See H. L. Richardson, *Developments in the FAO Fertilizer Programme Under the Freedom from Hunger Campaign*, The Fertilizer Society, Proceedings No. 73 (11 Russell Square, London, W.C.1: 1962); and H. L. Richardson, "The Freedom from Hunger Campaign—Five Years of the FAO Fertilizer Program," *Outlook on Agriculture*, Vol. V, No. 1 (London, 1966), pp. 3-16.

⁶For an excellent exposition of the approach used in this Programme, see Narindin S. Raudhawa, "Farm Planning Project under Intensive Agricultural District Programme in India," *Indian Journal of Agricultural Economics*, Vol. XX, No. 3 (July-September 1965), pp. 1-12.

⁷Carl C. Malone, "Some Responses of Rice Farmers to the Package Program in Tanjore District, India," *Journal of Farm Economics*, Vol. 47, No. 2 (May 1965), p. 268.

rents and interest rates eating up too large a share of the increase in returns, or due to high risk losses in case of a crop failure.

Thirdly, -and this is a crucial step in the research method- *we identify the obstacles in the present external environmental conditions which render the technically much superior production plans economically unattractive to the farmer.* In consultation with local farmers, village leaders, merchants, landlords and managers of cooperatives, we explore in some detail the nature of these obstacles, such as lack of credit at interest rates and repayment terms acceptable to farmers, lack of supplies of the inputs required or available only at costs too high to make their use profitable, farmers' fear that prices would drop too low if they produce more, and that rents or taxes might take away too large a share of the increase in returns. In these discussions, we must try our best to obtain a *realistic sense of the nature and the extent by which these obstacles would have to be reduced in order to motivate farmers to adopt the superior farm plans.*

Since this is a step much needed in farm management research, let us discuss it in a little more detail.

Improving External Environmental Conditions

Concerning the improvement of the external socio-economic and institutional conditions affecting the *incentives* of farmers to adopt a desirable farm production plan and their *ability* to implement it, we must identify those external factors which impede the implementation of the farm production plans, and indicate the specific incentives required for farmers to improve their production efficiency.

In most farming areas of the developing countries, the research worker is bound to detect several obstacles to progress in farm production. Where *rents* are too high, we can, always in consultation with farmers, determine an approximate level of rental charges which would increase the farmer's incentive to raise production. Sometimes, a conversion of share rent to fixed per acre rent in cash or kind will raise production incentives, especially if provisions are made to reduce the risk a fixed rental rate imposes on the tenant. Where *interest rates* for production credit are too high, we can indicate the interest level at which farmers are willing to borrow for the purchase of fertilizer, pesticides, machinery and other important factors, and the *repayment terms* which fit into the timing of the income stream. Where *cost-price relations* are unfavorable, we can indicate how much

the input cost would have to be reduced, or the output price raised, to induce farmers to produce more. Where the *local marketing facilities* are such that the farmer is at the mercy of a few middlemen, or storage facilities and grading standards are absent, and as a result he receives unduly low prices for his products at harvest time and pays unduly high prices for the input factors he buys (or cannot get them at all because they are not available in the local market), we can indicate what the storage and grading requirements for the output should be and what kinds and amounts of input goods will be needed under the various production plans in the area as a whole. For new crop and livestock production practices, we can indicate to the *extension service* the *kind of assistance and field demonstrations* the farmers will need in order to adopt these practices. A simple example of a farm planning and budgeting approach to these issues is presented in Appendix I.

These are only some of the more common obstacles to agricultural progress which depress farmer's incentives and production capacity and which have to be overcome. These external socio-economic conditions are amenable to change by cooperative organization and various kinds of group action and government policies and programs. We must remember, of course, that the farmer and the farm researcher cannot determine on their own just which and how much of these production incentives will in fact be feasible for implementation through public policy measures, because the various land reform, credit, and price control programs also have their costs in public funds and trained manpower, and do affect other groups such as landlords, merchants, and urban consumers who will voice their reactions before such policies can be adopted and effectively carried out by the government. Nevertheless, the fact remains that it is very important for planners to know how farmers feel concerning production incentives, and how they have responded to them in areas where they have been offered.

To orient our work to this end, we must broaden the scope of farm management beyond the borderline of the individual farm unit and deal also with those aspects of the environmental conditions, which are amenable to change and to planned control through group action, but are beyond control by the individual farmer. This requires teamwork with specialists in other fields, such as land tenure, credit, cooperative organization, agricultural and price policy. But the *farm management point-of-view furnishes basic*

specifications of what improvements in these environmental conditions are needed to motivate farmers toward agricultural progress.

The specialized competence of the farm management research and extension worker is to understand the farmer's entrepreneurial problems, to know what motivates him in organizing his production processes, in deciding between alternative choices, and to observe how he responds to specific incentives and opportunities, how he accommodates himself to certain obstacles, risks and fears. It is this competence of the farm management worker, who identifies himself with the farmers, who works with them in personal contact and gains their confidence, that plays a crucial role in action-oriented research and extension work. The farm management worker should interpret farmers' needs, aspirations and fears to others, to private merchants, managers of cooperatives, political leaders and government officials, and thus contribute to finding ways for improving these environmental conditions.

To summarize: there are a number of socio-economic external conditions, which are beyond the control of the individual farmer, but are amenable to change by group action, by cooperative or government programs and policies. The economic location and marketing facilities of an area can often be greatly improved by roads. Poor land tenure systems can be improved by various agrarian reform measures. Cost-price relations can be improved by cost reductions and price supports.

For farm development planning, these alterable environmental conditions must be dealt with explicitly and effectively. They can be changed so as to have profoundly favorable effects upon the farmer's production process, upon his incentives and motivations. These in turn can have a very strong effect upon the aggregate production performance of agriculture in the context of national economic development.

The agricultural development of Japan offers striking examples of how improvements in environmental conditions stimulated farmers' incentives and motivated them for stepping up their production performances rapidly. In the last 100 years, there were two periods of outstanding progress: the first, 1868 to 1912, was marked by a strong development of marketing cooperatives, education and extension services, and improvement of the land tax systems; the second, 1916 to 1960, by a far-reaching land reform, greatly expanded production credit, and a price support and stabilization program for rice and some other key

products. There is much to be learned from Japanese experiences in agricultural and general economic development processes which is of direct concern to many of the newly developing countries.⁹

Incentives for Farmers in Rural Development Projects

The farm management worker has much to contribute in finding effective ways and means of implementing agricultural development plans, particularly regarding incentives which farmers need in order to change their farming methods and production patterns in desirable directions. In most under-developed regions, among powerful incentives needed to trigger the farmer's motivation to overcome serious obstacles blocking his road toward progress are the following:

1. Ready availability of critical inputs, such as fertilizers, improved seeds, pesticides and machinery;
2. Supervised credit at terms attractive to farmers enabling them to buy these production requisites and use them efficiently;
3. Favorable cost-price relations with a minimum of uncertainty so as to reduce the price-risk which is often hampering production increases;
4. Tenure conditions which provide two basic incentives for farm development: increasing rewards commensurate with increased production effort of the farmer, and security of his farm occupancy encouraging him to improve the land and invest in more than short-time "hand to mouth" operations. In more concrete terms this means that rent, debt and tax payments must not be allowed to siphon off from the increased farm income more than the farmer considers acceptable, from the viewpoint of justifying his increased effort, cost, and risk;

⁹ For a very interesting and useful summary record of Japan's experiences, see Takekazu Ogura, ed., *Agricultural Development in Modern Japan* (Tokyo: Japan FAO Association, 1963), and W. Y. Yang, *Farm Development in Japan*, Agricultural Development Paper No. 76 (Rome: FAO, 1962). Farm management and agricultural policy specialists will realize that the organization of farmers' movements or associations representing the cultivator's interest might be instrumental for improving the environment through land reform, better marketing and credit facilities, farm price supports, etc. Researchers should work with such farmers' groups and help in getting the facts and interpreting them. In many cases, farmers' organizations under dynamic and responsible leadership will be needed to bring about the desirable changes, including sociological and cultural ones.

¹⁰ For instance, see Stephen A. Manglin, "Insurance for Innovators," *Policies for Promoting Agricultural Development* (Cambridge, Massachusetts: Center for International Studies, Massachusetts Institute of Technology, 1965) pp. 257-60.

5. Protection against risk, as the farmer sees it, particularly the risks involved in adopting new farming methods which are, for him, untried and at best but vaguely understood.¹⁰

For determining the quantitative and qualitative requirements of these five incentive measures necessary to induce farmers to modernize farming practices and production organization, farm management work has much to offer, much more than is at present recognized by planners, experts, administrators and civic leaders in developing countries.

Such questions as how much credit will a farmer need, for what purposes, and at what terms of repayment geared to his income flow and ability to pay, are best answered by farm economists familiar with the farm production process and the farmer's attitudes toward his managerial function, his motives and aspirations, and the obstacles he has to overcome.

The problem of providing these incentive requirements, through various institutional arrangements and administrative policies and measures, is not the responsibility of farm management workers but of workers in the fields of land tenure, co-operative organization, marketing and price policy, credit and government services of various kinds, including the agricultural extension organization. Here again, teamwork is required, with the farm management worker bridging the gap between over-all planning and national institutional and administrative measures on one side, and their implementation at the farm level where actual production takes place, on the other. For instance, some of the policy measures needed to provide sufficient incentive to farmers for increasing a particular crop production may be found too costly or for other reasons unfeasible by the agricultural policy expert or the general economic planner. Perhaps an alternative crop can be found for whose increase adequate incentives can be more readily provided. The decision on such national policy measures rests, of course, with the government.

The most appropriate place to start this kind of farm management research is in one or several of the country's major agricultural areas, especially those with a considerable production potential. Areas which have been selected for demonstration of farm development action programs, such as farm settlement, or irrigation and other land improvement projects, or fertilizer and machinery use projects, deserve highest priority for such studies as they are needed to guide present farm development in the right direction and

to avoid serious mistakes in the implementation of these projects.¹¹

Such studies need not be costly, nor do they require a large staff of highly specialized and theoretically trained personnel. Under the general guidance of one well-trained farm economist, a series of such studies could be undertaken in various selected areas, and especially where rural development projects are currently underway. One senior officer can be placed in charge of each local study. This officer does not necessarily have to be a farm management specialist but must be capable and genuinely concerned about the farmers and their progress, and accept the guidance of the trained farm economist. The local project officer must learn to know the area well and get the confidence of the farmers. One or few young, bright and well motivated graduates of secondary schools or vocational training institutes should be assigned to him as assistants. It is more important to start research along these lines, and have all persons involved grow in competence in the process, than to reach for perfection which will be beyond reach for many years to come. (See Appendix II.)

National Production Plans and Local Implementation: A Two-pronged Approach

We need a much stronger emphasis in farm management work on the problems of farm planning and budgeting for the purpose of changing production patterns, input and output levels, farming practices and the required incentives and motivations so as to achieve a rapidly increasing farm production of a desirable "product mix." This is essential for increasing the living level of farmers and the purchasing power of the rural population as well as for promoting general economic development of the country.

The planning of agricultural development, and particularly the implementation of plans and programs, necessitate the closest cooperation between economic planners and farm management specialists.

In principle, the nature of the task is as follows:

1. The economic planner determines one or preferably several tentative sets of production targets de-

¹¹The Food and Agriculture Organization of the United Nations is operating a large number of United Nations Special Fund Projects, in cooperation with many developing countries, in the field of land and water development, resources and pre-investment surveys, farm settlement and pilot development schemes in selected areas. In many of these projects, a senior farm economist is included in the interdisciplinary team of experts to conduct such farm planning studies and determine the major obstacles farmers are facing in adopting modern farming methods.

desirable from the national viewpoint, according to population increase, domestic nutritional and industrial needs, foreign trade prospects and foreign exchange requirements, etc.

2. The farm development planner indicates, on the basis of farm plans and budgets for a set of typical farm types of each major farming area, the production performance farmers can be expected to achieve, and the socio-economic conditions which must be created for enabling and motivating the farmer to implement these production plans.

3. These farm production plans are aggregated for the various major agricultural areas to yield a rough estimate of national agricultural production.

4. At the same time, the national production targets are broken down by major agricultural areas, in consultation with the farm development planners of the various areas.

5. If the practically feasible production performance of farmers deviates widely from the nationally desirable production targets, a "feed-back" procedure is applied to bring about a reconciliation of national targets and practical feasibility of farmers' performance by readjusting both national production targets and area farm production plans. This may also involve certain adjustments in the environmental conditions in the various farming areas and in some aspects of national economic and agricultural policies.

This feed-back process is essential for planning and implementing a viable program of agricultural development and requires active cooperation between farm managements, researchers and economic planners at all levels, from the local farming areas up to the national planning agency and back down to the local level. This feed-back process also provides for the dynamic flexibility of both plans and implementation measures. It facilitates a continuing readjustment and mutual reconciliation of plans and measures in the light of experience and changing national and local situations. Farm management and economic planning experts have much to learn from each other, have much to give each other, in a team spirit of dedication to the urgent task of accelerating agricultural and economic development.

This is new, untried, and in many of its administrative and personnel aspects may even be unwelcome under some existing government and university types of bureaucratic organization and professional mentality. It is all the more urgent to realize clearly the necessity of such cooperation in the planning and

feed back process, and to concentrate ingenuity and effort to bring it about.

In this two-pronged approach of aggregating regional agricultural production potentials to national production totals, and breaking down national to regional targets, it is highly desirable to interpose a "regional development plan" to serve as a link between farms and villages and the national level. This regional plan provides for increases in industrial production and service activities which complement the agricultural development through rural processing plants, market and banking facilities, education and government services on the one hand, and which complement the urban industrialization process through rural industries, wholesale and retail merchandise outlets, etc., on the other. Such "comprehensive regional development planning" is gaining ground in some countries, as in Israel where this approach has been applied more systematically and successfully than anywhere else, but it is used also on a more limited scale in some European countries.¹² Also in developing countries, this comprehensive regional planning approach promises to play an increasing role, especially in connection with large-scale irrigation schemes and major land development and farm settlement projects. Israel is rendering technical assistance in this field in several Latin American countries with strong support from the respective governments. In all these regional development programs, the planning and implementation of agricultural development is one of the most difficult aspects and requires the help of farm economists.

Let us be very clear about the nature of this basic issue. The implementation of a national agricultural development plan requires that the production targets must be broken down to regional and local levels; increasing agricultural production requires that modern farming methods are introduced through local farm production plans. These two approaches must be harmonized. The agricultural output level and product combination that is nationally desirable must be matched to what is possible and profitable to achieve at the local farm level by the farmers. This two-pronged planning and implementation process requires among

¹² One of the most succinct discussions of the comprehensive regional planning approach, with concrete examples of its implementation, is found in Raanan Weitz, *Agriculture and Rural Development in Israel: Projection and Planning*, The National and University Institute of Agriculture, Bulletin No. 68 (Rehovoth, Israel: February 1963). See also Walter Isard and John H. Cumberland, eds., *Regional Economic Planning: Techniques of Analysis for Less Developed Areas* (Paris: Organization for European Economic Cooperation, 1961).

targets, the knowledge and skill of farm economists who are trained in dealing with the organization of production processes at the farm level.

Farm management workers are in a strong position to help determine the economic and social factors and the incentives required to achieve the production targets and to overcome the obstacles which prevent the adoption of modern farming methods. In the developing countries today, it is precisely this function of farm management economists which is most urgently needed, and is, as yet, least recognized by economic planners and administrators.

Closing the Gap Between National Plans and Local Production

National production targets are derived from: past production records for the country as a whole (*i.e.*, from national statistical data often of dubious reliability), from prospective market demand estimated on the basis of expected population and of an assumed increase in per capita income and income-elasticities for the various products, and from various other estimates and assumptions none of which are based upon the particular agricultural resources, the farming experiences and the potential production capacity of the various agricultural areas of the country.¹³

On the other hand, farm management research works out various improvements in production methods and enterprise combinations which would increase production and net income of farmers in specific areas without reference to what the effect would be on aggregate output, product by product, and aggregate supply requirements, input by input, of the various farming areas and the country as a whole. Hence, the national planners really don't know whether their production targets can, in effect, be achieved, or what it takes to achieve them. The farm management researchers really don't know what effect the general adoption of a series of specific improvements in farming methods and enterprise combinations would have on the aggregate output of the various products, on the aggregate requirements of inputs, and on the total supply and demand, and import and export situation of the country. For agricultural development planning, the bridging of this gap, the harmonization of these two approaches, is essential.

For instance, as the farm economist works out a set

¹³For a clear exposition of economic planning techniques for establishing national production targets, see Jan Tinbergen, *The Design of Development* (Baltimore: The Johns Hopkins University Press, 1958), pp. 9-28.

of farm plans for a certain area, he is guided by two types of basic considerations: (1) what patterns of enterprises and products and what levels of intensity of inputs are appropriate under the physical conditions of soils and climate, and (2) within these physical limitations, which crops and livestock products should be pushed more than others from the viewpoint of yielding the best net returns from the farm. The national economic planner works out a set of agricultural production targets from the viewpoint of national economic development according to prospective demand, nutritional needs, foreign exchange requirements, etc. If the economic planner learns from the farm economist the considerations of local production potentials, and if the farm economist learns from the economic planner the considerations of national requirements, they can work out the details of their plans much more readily in harmony with production feasibility and national desirability, than if they don't know of each other's considerations.

Another example: if the farm management worker estimates the proportion of the farmland that would come under the various farm plans he has outlined, and the proportion of farmers who can be expected to adopt these farm plans under specified improved conditions of extension assistance, tenure, credit, etc., during the next five years, he is in a much better position to estimate the aggregate effect on production of the area as a whole than without such studies.

Take a case where an agricultural area requires four types of farm production plans to suit the soil conditions, climate and farm size distribution. An approximate estimate showing that roughly 45% of the area might adopt farm plan A, 30% plan B, 15% plan C, and 10% plan D, will give some idea of the output of the various farm products that the area as a whole would achieve under these plans. Further, we can estimate the rate at which farmers will follow these plans, *e.g.*, 10% in the first year, 35% in the second, 60% in the third, 80% in the fourth and fifth year (leaving a recalcitrant minority of 20% clinging to traditional farming methods), and get a more realistic idea of the rate of progress over time.

We should not attempt a high degree of accuracy for such estimates. Not only will year-to-year weather fluctuations affect actual production; but fairly wide variations also can be expected in the actual performances of individual farmers under any of the proposed farm plans. *We need to develop a good sense of what orders of magnitude are realistically relevant to the development process.* It usually would not be worth the cost of obtaining quantitative refinements

which bear no practical relation to the magnitude of the effects we can expect from policy actions and program measures.

For instance, there would be no use in preparing three farm development plans yielding a 25%, 30%, and 35% increase respectively, in output of a certain product over a five year period. If the area now produces 10,000 tons of rice, the program measures designed to implement a plan to produce 13,000 tons (i.e., +30%) is just as likely to actually yield 12,500 or 13,500 tons. A 4% plus or minus variation is well beyond the level of accuracy of control that can be expected from such a plan, however effectively it is implemented. Hence, agricultural plans must represent major differences in the production process. Plan A might call for a 30% increase in rice (13,000 tons), and plan B for a 60% increase (16,000 tons). This difference of 23% more rice under B than under A might roughly represent the lower limit of relevance for a difference in plans. Any in-between position may materialize under either plan A or plan B. This example highlights an important quantitative aspect of planning whose neglect is causing an illusion of control accuracy and a waste of valuable time and effort of highly trained planning personnel.

After the various alternative production potentials for the major farming areas have been aggregated for the country as a whole, the economic planners can indicate which of these alternatives fits best into the overall development plan. This practical farm development planning may lead to considerable adjustment of the original national plan targets. This illustrates the important "feed-back" from what production performance is possible at the field level to the aggregate level of plan targets.

The point is that to make agricultural development planning effective we must work simultaneously and in current consultation from the grass-roots level up and from the national level down. And in working together from both sides, we should remain flexible with respect to adjusting (a) the national targets for individual products, (b) the farm plans, and (c) the measures for improving credit, tenure, cost-price relations and other environmental conditions.

If a detailed national development plan with specific agricultural commodity targets is not available,¹⁴ the farm management research approach to planning agricultural production should still be followed, so that realistic national production prospects can be built up from the local farming areas which can then be adjusted to general national requirements for a balanced diet, for earning or saving foreign

exchange, and for any other national development need.

The absence of this two-pronged approach is partly responsible for the fact that agricultural development planning has often been rather ineffective and the farm production response disappointing. To blow life into a national development plan, one must translate it into the language of people involved in the production process and mobilize the willingness and ability of local farmers to raise their production performance. Let us remember Lord Chesterton's words that nothing is vital until it becomes local.

The Challenge to Farm Management

Farm management studies should deal with alternative farming systems technically feasible and economically profitable in major farming areas, with the expected production results from these plans, and with the institutional, credit, tenure and cost-price incentives required to induce farmers to adopt these farming systems. Such studies furnish indispensable information and data for economic development planning and for implementing policy measures on the regional and national level. Without such studies, it is not possible to appraise in any reliable way whether a certain set of national agricultural production targets--however desirable they may be for the national development plan--is in fact realistic and practically attainable. A national agricultural development plan without its implementation worked out and guided by farm management research and extension is like a big schooner without wind in its

¹⁴One may, of course, question the usefulness of establishing national production targets for individual products in a predominantly private enterprise economy. I am inclined to go along with W. Arthur Lewis who argues convincingly for "piecemeal" or "partial" planning, rather than "comprehensive" planning, under such conditions. See W. Arthur Lewis, *Theory of Economic Growth* (London: George Allen and Unwin, Unwin University Books, 1955), p. 381; and Rainer Schickele, *Motives and Criteria for National Agricultural Planning*, Rehovoth Conference on Comprehensive Planning of Agriculture in Developing Countries (Jerusalem: Jewish Agency for Israel, 1963). See also a brief but informative article about experience with development planning in many countries, by Albert Waterson, "What Do We Know About Planning?," *International Development Review*, Vol. VII, No. 4 (December 1965) in which he points out that some countries without any comprehensive national plan (e.g., Mexico, Puerto Rico, Germany) have developed at a faster rate than countries with such plans. This is, of course, no argument against comprehensive planning, since Mexico might have developed even faster under a well-conceived and effectively implemented plan. The point is that the approach, the complexity and the detail in formulating economic development plans must be functionally related to the scope and effectiveness of the policy measures, operational programs and administrative control the government is able to implement.

...: it is beautiful to look at but it is not getting anywhere.

Herein lies a tremendous challenge to the field of farm management. If we are to live up to this challenge we must concentrate much more effort in farm management research and extension work upon these farm development problems, in relation to the requirements of general economic development. This means:

- 1) A shift of emphasis from pure descriptive to more problem solving and action-oriented research, through farm planning and budgeting, with environmental factors amenable to change treated as variables;
- 2) The determination of feasible improvements in environmental conditions which will offer farmers incentives and enable them to adopt modern production processes;
- 3) Establishing methods and procedures for farm development planning, taking into account environmental improvements, and aggregating input and output estimates from plans and budgets for typical farms in major farming systems to area, regional and national totals;
- 4) Breaking down national production targets to regional and local levels, according to their respective production potentials for various crop and livestock enterprises;
- 5) Closing the gap between national production requirements and possible farm production per-

formance by matching or harmonizing, through mutual adjustments, desirable national targets and feasible local production plans;

- 6) A vigorous promotion and judicious use of trials and demonstrations of farm development planning and budgeting on selected farms and in well-located pilot project areas, complemented by careful inferences drawn from analogy and transfer of experiences with input-output relationships and socio-economic policy measures obtained in cases under similar conditions elsewhere.

The *translation* of a national plan into local implementation at the grass roots level is much more difficult and complicated than the drawing up of the national plan itself. In this translation and "feedback" process, the farm management economist is placed in a *key position*. Farm management work, in research, extension and training, should be deliberately and effectively directed toward meeting the requirements of this key position.

This opens an exciting and highly constructive field for farm management workers throughout the developing countries. The sooner and the more clearly this approach is recognized by leaders in agriculture and the top echelon of the government's ministries and planning bodies concerned, and is promoted by government services and in university research and teaching, the better are the prospects for an effective acceleration of agricultural progress.

APPENDIX I
AN ILLUSTRATION OF THE
USE OF FARM PLANNING AND BUDGETING
FOR AGRICULTURAL DEVELOPMENT POLICY

Let us look a bit more closely at the various ways in which the planning and budgeting of typical farms can be of decisive use in the formulation of national plans and policies for agricultural development.

Table I shows the present farming system on a typical 5 acre rice farm in Southeast India or East Pakistan, and the problems which the introduction of fertilizer use on rice raises in the mind of the farmer and of the national planner and policy maker. Part B of the table indicates how crucial the relationship between rice price and fertilizer cost is for the farmer's incentive to use fertilizer. At a farm price of 6 Rs. per maund of rice, and at a fertilizer cost of 3.60 Rs. per lb. of N to the farmer, he has no incentive whatever to use fertilizer. There have undoubtedly been many areas in Asia where the actual prices received by farmers for rice, and paid by farmers for fertilizer, were so unfavorable as to prohibit the introduction of fertilizer use.

A critical test of the profitability of fertilizer use is the returns from the crop yield increase per rupee invested in fertilizer use. Since the small farmer is very vulnerable and fears the risks he sees in departing from traditional farming practices--an attitude which is perfectly rational--he will not adopt modern practices until he is persuaded that the returns are sufficiently high and certain to compensate for the risks of crop failure and increased indebtedness. The experience in recent demonstration projects for fertilizer use indicates fairly clearly that unless farmers can expect at least a return of 2 rupees for every rupee invested in fertilizer, they may be well advised not to use it. In our example in Table I, where 6 Rs./maund of rice represents a fairly typical price received by many farmers, especially in remote areas, and where a fertilizer cost of 3.6 rupees, or of 2.7 rupees under a 25% cost subsidy, there is no effective incentive for farmers to use fertilizers. No one can blame them for laziness or stupidity if they don't respond to extension service and general government exhortations to use fertilizer.

If, therefore, the government is serious with its planning for output increase, it will have to either increase the rice price actually received by farmers, or reduce the fertilizer cost actually paid by farmers, or both in combination up to a point where average

return per rupee (or yen or rial or dollar) invested by the farmer is safely above 2 rupees, according to our example.

This relationship between returns from the additional input (in this case fertilizer) and the cost of the input is a simple example of a benefit-cost ratio often used to judge the economic feasibility of a new technique or investment. Its interpretation for passing such a judgement is, however, not so simple. From the individual farmer's point of view, a 1:1 ratio is usually not sufficient for his adopting a new technique involving substantial cash outlays, because this ratio does not reflect various risks and uncertainties such as drought or floods or lodging of grain or pest infestation, and inconveniences entailed such as having to borrow money with much red tape and embarrassing inquisitions concerning his character and repayment ability. Just how much higher than 1:1 this ratio has to be varies between areas, between crops and different techniques, and can best be determined through farm planning and budgeting studies carried on in the field in close consultation with farmers. For some crops, the ratio required might be only 1.5:1, for another it might be 3:1, depending on the factors just mentioned. Once the critical level of the benefit-cost ratio is determined, the national planners and policy makers can gear their specific policy measures to this critical level of producer incentive and response. There are many other examples for this very strategic role of farm planning and budgeting in gauging the *amount* and *kind* of production incentives which development policy will have to provide to farmers.

This benefit-cost ratio is also dependent upon the physical yield response to fertilizer application. If, for instance, the 40 lbs. of nitrogen dosage yields an increase of 10 maunds of rice per acre instead of 6.6 maunds--which might well be the case if an improved rice variety is introduced--the benefit-cost ratio is raised from 1.4 to 2.2 in the case of a rice price of 6 Rs. and a fertilizer price of 2.70 Rs. This means for the government that a fertilizer subsidy of 25% would be a sufficient incentive to farmers to use fertilizer, instead of a 50% subsidy with a yield response of only 6.6 maunds.

Our example can also serve to illustrate the effect of crop share rent on farmers' incentives. If the tenant pays half of the crop to the landlord for rent but must bear the cost of fertilizer, he will not use fertilizer unless the benefit-cost ratio is at least 4:1, instead of only 2:1 in case of an owner-cultivator. From Table I we see that an owner-cultivator will find it profitable to use fertilizer at a 6 Rs. rice price and a 1.80 Rs.

TABLE I
PLANNING AND BUDGETING FERTILIZER USE
ON RICE IN A TYPICAL 5-ACRE ASIAN FARM (INDIA OR EAST PAKISTAN)

A. Present Farming System (Area in Crops: 5 Acres)

CROPS	ACRES	YIELD PER ACRE	PRODUCTION	PRICE GROSS INCOME	
				PER MAUND	(CROP VALUE)
			maunds		rupees
Rice	4.0	17	68	6.0	408
Gram	1.3	7	9	6.0	54
Sugar Cane	0.8	700	560	1.6	896
Jute	0.1	15	1	18.0	18
Mustard	0.1	6	1	18.0	18
Acreage of Crops Per Year	6.3		Total Gross Income		1,391
Percent of Crop Land Double Cropped	26.0		Total Farm Cash Expenses		102
			Net Farm Income		1,292

B. New Farm Plan (Farm Size and Crop Acreages Remain the Same)²
Effect of Fertilizer Use on Income From Rice, 40 lbs. N per Acre
Rice production increase 6.6 maunds per acre, or 26 maunds total)

	Additional GROSS INCOME	EXPENSES	NET INCOME	RETURN PER RUPEE INVESTED
	rupees			
<i>At Rice Price of 6 Rs./Maund³</i>				
<i>At fertilizer price of:</i>				
0.84 Rs. per lb. N	156	34	122	4.6
1.80 Rs. per lb. N	156	72	84	2.2
2.70 Rs. per lb. N	156	108	48	1.4
3.60 Rs. per lb. N	156	144	12	1.1
<i>At Rice Price of 12 Rs./Maund³</i>				
<i>At fertilizer price of:</i>				
0.84 Rs. per lb. N	312	34	278	9.2
1.80 Rs. per lb. N	312	72	240	4.3
2.70 Rs. per lb. N	312	108	204	2.9
3.60 Rs. per lb. N	312	144	168	2.2

¹ The "present" farming system corresponds to a typical 5-acre rice farm in India or East Pakistan as reported in W. Y. Yang, *Methods of Farm Management Investigations*, FAO Agricultural Development Paper No. 80 (Rome: FAO, 1965), pp. 149-52.

² The "new farm plan" involves only one major change from the "present" one: the introduction of fertilizer use on rice, based on yield response as reported in P. C. Raheja, "Economics of Fertilizer Use," Farm Planning and Management Papers presented at the FAO Development Centre, Oct. 14-Nov. 9, 1957 (Government of India Press, 1959), pp. 155-56.

³ The rice and fertilizer prices pertain to the years around 1957. The rice price of 6 Rs./maund is taken from W. Y.

Yang, *op. cit.*, p. 149, representing a typical price received by farmers; the rice price of 12 Rs. is taken from P. C. Raheja, *op. cit.*, p. 156, and represents a wholesale price as is the wholesale fertilizer price of 0.84 Rs. per lb. of N. The fertilizer price of 3.60 Rs. per lb. of N is taken from "Fertilizers—An Annual Review of World Production, Consumption and Trade, 1962" (Rome: FAO, 1963), p. 163, where "prices paid by farmers" for bagged Ammonium Sulphate in India in 1956/57 is shown as 167 Rs. per 100 kg, which corresponds with a 21% concentration of N to 3.60 Rs. per lb. The prices of 2.70 and 1.80 represent government cost subsidies of 25% and 50% of the farm price, respectively.

fertilizer cost, giving him a return of 2.20 Rs. per rupee invested. A share tenant, however, will receive only 78 Rs. from the value of the total yield increase of 136 Rs., which gives him a return of only 1.1 Rs. per rupee invested. Here, again, farm planning and budgeting can indicate, in a practical way, the level of income incentives required to motivate farmers to use fertilizer under various tenancy conditions.

One other issue can be illustrated by our simple example. Prices of crops actually received by farmers, and prices for inputs actually paid by farmers are difficult to ascertain, and are not known and statistically reported with a degree of accuracy and of detail as is true for wholesale prices. In fact, most developing countries do not report regularly and systematically statistical series of prices received and paid by farmers simply because they are not available. Hence, studies of the economics of fertilizer use often employ wholesale prices, the only price data currently available. This makes for a strong favorable bias in the benefit-cost ratios. Table I shows that this ratio based on a wholesale price of 12 Rs. per maund of rice and a wholesale fertilizer price of 0.81 Rs. per lb. of nitrogen is 9.2, while farm prices obtained presumably from a few sample surveys indicate a rice price of 6 Rs. per maund, or half the wholesale price, and a nitrogen price of 3.60 Rs. per lb., or four times the wholesale price, resulting in a benefit-cost ratio of 1.1. This points to the great need for much better data on farm prices. For instance, if this wide range between wholesale and farm prices of fertilizer in our example should be correct, the benefit-cost ratio for farmers might be much improved by reducing the distribution cost through better organized transport and storage facilities and more ample supplies of fertilizer at the village level, rather than by subsidies. Similarly, rice prices received by farmers might be increased in some areas by improvements in the marketing process and by strengthening the farmers' bargaining position in the local markets through cooperatives and pertinent price information readily accessible to farmers.

This is, of course, only a very simple illustration of how farm planning and budgeting can contribute to a much more effective national planning and policy formulation for agricultural development. The same approach can be applied to determine the incentives and policy measures needed to make farmers willing and able to adopt many other modern practices and inputs, such as better crop varieties, farm machinery and equipment, harvesting, threshing and storing methods, more and better use of irrigation water, water and new livestock enterprises in proper combi-

nation with crop rotations, pasture and forage use so as to make the best use of the farm's land, capital and labor resources throughout the seasons of the year.

APPENDIX II

PROPOSAL OF A NATIONAL RESEARCH PROGRAM FOR AGRICULTURAL PRODUCTION PLANNING

This research program is placed in charge of a directorate of three imaginative and well trained researchers; one in farm management and production economics, one in national economic planning (macro economics and fiscal policy), and one in agricultural policy and rural institutions. Several individual consultants and advisory committees are placed at the disposal of the triumvirate for cooperation with the researchers upon request on matters of their respective fields of competence, such as agricultural technology, public investment, rural industries, marketing and trade, and rural sociology. The farm economist functions as chairman of the directorate and has an agronomist assigned to him full-time as an associate for current liaison and active cooperation with the technical department (agronomy, livestock production, agricultural engineering, irrigation, etc.), experiment stations and extension services. The research program consists of three concurrent projects:

1. *The farm planning and budgeting project:* For each major farming area of the country, 20 to 100 typical farms are selected on the basis of their representativeness of the most important farm types (with respect to soils, farm size, etc.) of the area. In cooperation with these farmers their operating units are studied, and in cooperation with agronomists, livestock and farm machinery specialists a set of alternative farm plans and budgets are worked out indicating the range of different crops and livestock enterprise combinations which are technically feasible—most of them carried on at substantially higher levels of output. The inputs and outputs from the farm plans are aggregated for the major farming areas and the nation, and are evaluated with respect to national production needs and the possibilities of meeting the supply requirements for the various inputs. No high degree of detail and accuracy is required, and only a few selected major products and input items are handled. The analysis is deliberately restricted to selected key items and relevant orders of magnitude for the quantitative aspects, as going beyond these limits would not be worth the cost. This project is under the direct supervision of the farm economist.

2. *The harmonizing of local farm plans and national production targets project:* This requires a tentative breakdown of the national production targets to the major farming areas and comparison with the aggregated farm plans for the farming areas and the nation. Major discrepancies between the national plan targets and the national production aggregated from the farm plans for important individual agricultural products are harmonized by working out alternatives acceptable both from the viewpoints of national needs and local production feasibility. Similarly, the aggregate input requirements derived from the farm plans are evaluated from the viewpoints of national supply prospects, financial feasibility and foreign exchange considerations. Infrastructural investments needed in transport, marketing, storing and processing facilities to make the required supplies of inputs available to the farms in the various areas, and to move the increased output of the agricultural products efficiently through the various market channels are assessed. This project is under the direct supervision of the national planning economist.

3. *The agricultural policy and institutional measures project:* Changes in socio-economic conditions required to put the farm plans into action are explored in each farming area. Those factors affecting the motivations of farmers and the conditions offering incentives or deterrents to production expansion are given primary attention. Among these, prevailing tenure arrangements, credit arrangements, cost-price relationships, marketing facilities, availability of inputs at farm level, nature and effectiveness of extension and other government services, cooperatives, etc., are of crucial importance for determining the policies and their administrative measures needed to render farmers *able* and *willing* to adopt modern methods and increase production. This project is under the direct supervision of the agricultural policy expert.

Projects one and two lead to a reconciliation between the original national plan targets and what can be practically achieved by farmers in the various farming areas, and project three deals with the various policy and institutional measures needed, such as rent controls, supervised credit for specific farm practices, support prices for some crops, cost reductions for some inputs, and training managers to run cooperatives efficiently, to mention just a few examples.

These three research projects must go on simultaneously and in close working relations between the three directors and their supporting staff at headquarters as well as in the field.

Such a research program might best be started on a small experimental scale, with in-service training for junior staff, and with emphasis placed on working out practical research methods and techniques and simple field schedules and procedures, preferably in cooperation with a university. Even in its full-blown stage, it should not involve the gathering and processing of mass-statistics, nor the establishment of a large clerical and administrative staff. This research program does not need a large budget, but does require a few experienced and exceptionally talented researchers who hold each other in high respect and really enjoy working together as a team. The program deserves and should get active support and protection from some top leaders in government and agriculture.

Preparing the Ground

In most of the developing countries, such a program could be started immediately. A number of small research projects could be developed, at various levels and in various fields which would fit into whatever agricultural development programs are underway and being planned. Such studies would contribute much toward their implementation. Relatively simple research techniques and procedures could be worked out dealing with the practical problems of observation and analysis in the three fields of farm planning, agricultural sector planning, and institutional-economic environment planning. Such studies might well be made an integral part of the planning and implementation of development programs.

1. *Research techniques for farm planning and budgeting* of selected typical farms in one or more of the major agricultural areas of a country must be worked out for the specific purpose of serving the modernization of the farm production process. The immediate objectives are to determine: how to select the farms; what is the minimum number needed for each type-group to reduce the fortuitous effects of irrelevant factors on the group averages; what are the criteria for classifying farms into representative type-groups; how to select crucial items for survey questionnaires; what to observe and what questions to ask the farmer concerning motivational factors concerning production expansion; what simple tests of reliability of answers could be devised, etc. Out of such a study should come a "how to do it" manual for field supervisors and surveyors, which should be usable, with some modifications, in other areas as well.

2. *Aggregating input and output estimates of farm plans* for area and national totals, and breaking down

national targets to local areas, requires research techniques specifically designed for this purpose. Considering the nature and magnitude of necessary changes in the "product mix" and the output level in agriculture, the feasibility of production targets and their respective input requirements can only be tested by means of viable farm plans for each area. This involves the selection of key crops and livestock products for more detailed analysis of their local geographic origins, their position in crop rotations and other structural aspects of the agricultural production process of the area, their respective comparative advantage positions, etc. The main objective of such studies is to obtain, with a minimum of data and manpower, the particular kinds of information most useful to agricultural production planning and program implementation, and of sufficient reliability to serve as a basis for policy decisions.

3. *Socio-economic and institutional conditions affecting ability and willingness of farmers to expand production* require studies for which simple research techniques must be developed to get at the relevant aspects and feasible measures for improving the environmental conditions to which the farmer is exposed. Again, such studies should be exploratory and forward looking in nature. Which of the existing institutional arrangements hamper farmers' incentives for production expansion, and how could they be changed to encourage farmers to produce more? What risks are farmers incurring by adopting new

practices? How could those risks be reduced sufficiently to render farmers willing to modernize their production methods? What specific inducements, and how much of them, would be needed to produce more of specific products? Answers to such questions must be found to accelerate the rate of progress in agriculture.

Such studies, deliberately limited in scope and purpose in order to have a specific operational usefulness in the development process should be given top priority by universities and research agencies in developing countries. They form the building stones for the nation-wide research program proposed above. They can be initiated on a very small or a larger scale. They fit admirably into any longer-time research program of universities and government agencies. Current development projects need them also, from the planning phase through the implementation phase, as "program planning, execution and evaluation studies," for the immediate benefit of the respective projects.

Such studies for agricultural production planning require the sponsorship of some government agency or university or institute, involving specific, though not necessarily costly administrative provisions, technical and financial support. A few well-trained and experienced senior researchers from abroad might be obtained through the FAO-UN or some other technical assistance agency. For agricultural development planning to become much more effective than it has been in the past, vigorous progress in action-oriented research work along these lines is essential.

This is one of a series of *Papers and Reprints* issued by The Agricultural Development Council, Inc., formerly The Council on Economic and Cultural Affairs, Inc.