

**PROCEDURES FOR ANALYZING AND PLANNING THE
AGRICULTURAL ENTERPRISE****FARM
MANAGEMENT****HAND-
BOOK****Guillermo Guerra**

The need to plan and reorganize farm enterprises can emerge from agrarian reform programs, campesino settlement plans, supervised credit programs, colonization plans or the final phases of agricultural sector planning projects as a part of overall planning. In any activity of this type, it is necessary to delimit and evaluate various alternative management programs, taking into account the quantity and quality of available resources, their production potential and the ecological conditions under which agricultural enterprises will be operating in the future.

There are several methods for planning and analyzing agricultural enterprises. Planning can be done through the budgetary approach, simplified programming or line programming, while the analysis of the enterprise can be approached through comparative budgets or marginal analysis. Marginal analysis was discussed in Chapter 3.

Of these three planning methods, budgeting and simplified programming have been singled out for more detailed treatment in this chapter. These two methods are considered the most appropriate for the conditions and situations of the agricultural enterprises in Latin America. This is especially true in view of the availability of information from records or accounting systems. Although linear programming is a widely accepted method, we will present only a summary of its characteristics, possible applications and limitations.

The term "budget" refers to any means of controlling expenses according to established guidelines. However, as it is generally used in agricultural management, the term implies only a tentative estimate of revenue, expenditures and net income, useful in management plans for a future period of time. But agricultural management frequently emphasizes the outcome of various alternative plans; therefore, the results of these plans must be evaluated through comparative budget studies.

Simplified programming, also known as systematic budgeting, is a tool used for planning the agricultural enterprise, especially in determining the combination of crop and/or livestock products which will maximize net income for a given quantity of available resources. The distribution of resources among various alternative production lines (income maximization), the minimization of production costs for a

given output, or the optimum use of resources over time are standard problems which can be solved through linear programming. The optimum level of input can also be determined with this system, although marginal analysis is preferred for this type of problem.

COMPARATIVE BUDGETING

Comparative budgeting is a technique for evaluating alternatives during the fourth and final phase of planning. Naturally, this method is useless unless two or more alternatives have been selected for analysis. At the same time, there is no point in drawing up comparative budgets if no action is going to be taken on the final decision.

PLANNING BY SUCCESSIVE APPROXIMATION

The planning of an agricultural enterprise could be illustrated as the mathematical process of solving a series of simultaneous equations. Some would represent the possibilities for transformation under existing technology, while others would symbolize limitations imposed by available quantities of essential resources.

When plans are drawn up for new enterprises, the illustration of anticipated outcome could include relevant restrictions or limitations. For example, recent studies in the United States have sought to determine the minimum size at which a business can produce a net income of "X" dollars for the operator and the farm family (Brewster¹). This type of objective can also be stated in terms of employment, or the number of hectares necessary to provide full-time work to the farmer and the farm family living on a development project. This type of situation commonly occurs in settlement or resettlement programs (Franklin⁵).

The problem is to determine the most suitable size for the agricultural firm, or the most beneficial volume of production for the business. In a settlement project, the size depends on the number of families to be settled, as well as the quantity and quality of available resources and their possible uses. This implies the need for numerous analyses to be undertaken by management specialists prior to the final determination of the limits of farm size. It should also be understood that size can change over the years. Generally, technological progress tends to increase the size of the farms over time, unless large numbers of farm families remain in agricultural work.

Although planning processes can be compared to solving simultaneous equations, strictly mathematical methods sometimes provide less than optimum results. On the other hand, a process of successive approximations with simple arithmetic operations is often preferable.

When a business is reorganized, a series of small changes in the existing plan can be examined successively, and the result generally is

the emergence of new possibilities which should be explored. In any case the probable outcome of drastic changes can be estimated by making exaggerated assumptions about the farmer's administrative abilities; in such a case, the analysis should not be viewed as rigorously mathematical. It should also be noted that the transformation function is seldom continuous, and for this reason, a mathematical approach may be difficult and misleading. In view of such problems, mathematical planning methods are generally less efficient than expected. Another advantage of the technique of successive approximations is that it can be applied by a capable farmer or analyst using only paper and pencil.

The first step in planning

The crucial step in applying the technique of successive approximations is to identify and select the most promising alternatives for the test of comparative budgeting. This step is as important for new farms as for the reorganization of existing enterprises. In both cases the comparative budget method can be used for evaluating alternatives.

In the literature on planning agricultural firms, many writers have tried to designate a series of steps which should be followed in a given sequence for an orderly planning procedure. Some suggest that this process should begin with a resource inventory; a few even believe that a look at the physical capacity of the farm's natural resources will reveal the best plan. Others strongly lean toward considering the objectives and goals of the farm family, assuming that any given objective can be reached through adequate use of available resources. However, the goals must often reflect some kind of trade-off between ends and means. Thus, it would be equally appropriate to suggest that the goals cannot be established until the possible alternatives have been examined.

In some cases, promising alternatives emerge immediately and appear to be worth studying and testing; in others, a list of possibilities, similar to Form 1, can help stimulate the farmer's and the farm planner's imaginations. Once certain alternatives have been partially identified, the factors listed in Form 2 can be studied in order to define each alternative more clearly.

In view of all this, it is unlikely that a specific sequence of steps can prove to be an ideal technique for all situations. The most essential qualities for any planner include an active imagination moderated by a familiarity with the types of organizations that have been most successful under more or less similar conditions.

Developing meaningful comparisons

A comparative analysis of various alternative plans is, therefore, the major objective of every planning process. The economic basis for such comparisons can be developed with the use of Form 3, although many non-monetary considerations should also be taken into account. The essence of the economic planning process for either new or already existing units is to test out the various budgets, as shown in Form 3. The subsequent stages of the process strive for all these objectives.

The structure of the model presented in Form 3 varies according to the nature of the major alternatives in each area. The list of products and inputs will vary from one zone to another or from one type to another. The number of alternative plans to be considered can also change for each case; at times the comparison covers only two plans, while in other cases, a dozen or more can be compared. However it is impractical to try to juggle too many plans simultaneously.

Form No. 1. List of managerial changes to be considered.

General nature of change	Specific means for achieving change	What I plan to do	Will it be effective?
1. Increase quantity and value of commercial crops	a. Select high-value crops; b. Plant improved varieties; c. Use more fertilizers; d. Control pests and diseases; e. Search for new markets; f. _____		
2. Produce and provide more high-quality forage	a. Change rotation; b. Increase lime and fertilizers; c. Purchase less concentrates; d. Increase silo capacity; e. Increase per-animal milk production; f. Increase livestock; g. _____		
3. Produce more milk per cow	a. Control diseases; b. Use selection and cross breeding; c. Improve pasturage; d. Use silage or hay; e. Use forage and concentrates; f. Keep better records; g. _____		

Form 1. (Cont.)

4. Increase number of piglets per litter	a. Improve hygiene; b. Establish a permanent weaning house; c. Acquire equipment for weaning house; d. Improve pig feed; e. _____		
5. Increase output of labor	a. Specialize; b. Use equipment prudently; c. Increase yields; d. Eliminate unnecessary worker-days; e. _____		
6. Seek source of additional income	Look into: a. Secondary enterprises; b. Processing and direct sales; c. Off-farm employment; d. Custom work; e. _____		
7. Reduce expenses	a. Plan feeding programs for increased production, rather than for appearances; b. Resist temptation to spend; c. Purchase wisely (seek discounts); d. _____		
8. Reorganize milking operation	a. Use a storage tank; b. Establish a milking room; c. Expand herds; d. Change crops; e. _____		
9. Achieve self-sufficiency in corn	a. Increase planting; b. Harvest for storage; c. Increase yields; d. Automate processing; e. _____		
10. Include family in business	a. Introduce youth projects; b. Establish family companies; c. Rent; d. Transfer the farm; e. _____		

Form No. 2. Identifying alternatives to be considered in planning a farm or household.

ITEM	Alternative I	Alternative II	Alternative III
General nature of alternative			
Specific nature of implied changes			
If these changes are made, how will they affect:			
Crop area and rotation?			
Fertilization methods?			
Other cropping methods?			
Number of animals?			
Feeding methods?			
Other stock handling methods?			
Building use?			
Machinery use?			
Labor use?			
Total investments?			
Credit use?			
Food produced for home consumption?			
Food purchases?			
Family housing?			
Household appliances and furniture?			
Free time and recreational activities?			
Other?			

Form No. 3. Summary of comparative budgets under alternative plans for farm _____

ITEM	PLAN 19 __	BENCHMARK PLAN	PLAN II	PLAN III
PRINCIPAL FEATURES OF EACH PLAN				
GROSS REVENUE:				
Crops				
Livestock				
Milk				
Eggs				
Chickens				
Machinery rental				
Land rental				
TOTAL GROSS REVENUE				
EXPENDITURES:				
Permanent Laborers				
Temporary Laborers				
Social benefits				
Seed				

Form 3. (Cont.)

ITEM	PLAN 19—	BENCHMARK PLAN	PLAN II	PLAN III
Fertilizer and lime				
Feed				
Veterinarian and drugs				
Stock purchases				
Shipping charges				
Taxes				
Repairs				
Ongoing replacements				
One-time replacements				
Current interest				
Additional interest				
TOTAL EXPENDITURES				
NET INCOME				

It often occurs that one of the future alternatives for existing farms is to continue without making sizeable changes. This alternative can serve as a point of reference or a basis of comparison for other plans that involve changes.

This benchmark plan should represent future events which will occur with the continuation of activities of past years. When crops, herd size, yield and methods have not varied greatly from one year to another, the development of a benchmark plan, based on historical data, may be very easy. However, practically all agricultural firms make changes in their physical and economic activities. In many cases, therefore, the benchmark plan will not accurately reflect the real activities of any specific year, while in others, such a plan may

be almost totally meaningless. Finally, in the planning for a completely new farm, historical data are simply not available for developing a benchmark plan.

In Form 3 each alternative plan is described by a series of monetary values for revenue, expenditures, and net income. It should be noted that the expenditure and revenue items are determined by multiplying a quantity by a price. If the comparison of alternatives is to have any value, all expenditure and revenue items must be calculated with the same price tables, reflecting prices which are expected in the future. This is applicable to the benchmark plan as well as to the alternatives. Therefore, the revenue, expenditures and net income figures of the benchmark plan may differ considerably from past figures, even though the quantities may be based on historical data. This is why the development of a benchmark plan implies much more than merely accepting the historical records.

The income figure (see Chapter 5) in Form 3 should show the profit that the producer and the farm family will earn with the use of a fixed quantity of available resources. Generally, this group of resources includes:

- the farmer's labor;
- unpaid family labor;
- fixed capital equal to the total value of the farmer's land, buildings, machinery and animals;
- the farmer's administrative activities.

Because the net income figure represents combined earnings on these family resources, the individual items need not be singled out and assigned arbitrary values. Since the purpose of planning is to determine how to increase income by combining the resources of the farmer and the family, no value should be assigned to family labor or to the producer's own capital. Therefore, most gross income or expenditure entries represent cash transactions expected under a given plan of operations.

In a comparative analysis, any variations that may occur in the combination of resources used by the agricultural enterprise must be handled very carefully. For example, if Plan III will reduce labor enough for the operator to devote one-third of his time to off-farm work, the change should be explicitly recorded in some manner. The simplest procedure in such a case may be to add the income from off-farm work to the Plan III gross income figure, so that net income under this plan reflects earnings on the same resources as those considered under Plan II. For the same reason, transportation costs from the farm to the off-farm employment site should be included as an expenditure of Plan III.

However, it may happen that the savings in worker-hours under Plan III is used to provide the producer with free time. This benefit

should be included in the analysis but should not be assigned a monetary value or be listed as real profit under gross income. It is much more accurate to regard this benefit as a non-monetary advantage of the plan. These are two different types of profit and should be evaluated separately.

The opposite case may arise when an increase in the volume of farm sales requires the use of working time previously engaged in off-farm activities. In this case off-farm income would be included in the figures for the benchmark plan. When there is no change in off-farm activities, the resulting revenue can be included or excluded without affecting the comparison.

Almost all the revenue and expenditure entries listed in Form 3 are calculated by multiplying a physical quantity by a price. Therefore, some type of work sheet should be used for calculating the figures. When forage is grown on the farm for cattle feed, it can be very helpful to have charts or diagrams showing the differences between the quantities purchased from outside and the quantities grown on the farm. The same problems occur in calculating seed and fertilizer needs.

Form 4 has been successfully used in making these calculations for various types of specialized and diversified agricultural enterprises in regions of Colombia and Brazil. Similar tables could be developed for Brazilian coffee enterprises or Argentine cattle ranches, but each should be carefully adapted to the calculation needs for the specific type of business. The table shown here was designed for a farm on which forage and grains are produced for feeding cattle on the farm. The two types of feed are measured in "corn equivalents" and "hay equivalents" in the columns on crop production and feed consumption. Crop and cattle sales are calculated by determining total production, subtracting the quantity used on the farm, and multiplying by prices. Expenses incurred for fertilizers, seed, cattle and feed purchases are also determined with quantity and price data. The application of nutrients (nitrogen, phosphorus and potassium) to crops can likewise be calculated in terms of units per hectare cultivated. Some of these calculations are suitable for Colombian coffee farms, while others are irrelevant. Generally, it may be necessary for coffee farms to use a special form for calculating labor needs at different times of the year.

The use of partial budgeting

When simple administrative changes are under consideration, it is helpful to calculate changes in revenues and expenditures. Thus, for a given change in Plan B it is necessary to consider only those revenue and expenditure items which are expected to increase or decrease, and then calculate expected changes in net income. This calculation is sometimes known as partial budgeting (Form 5), as distinguished from "total budgeting."

Form No. 5. How to calculate changes in income that will result from specific changes in the management of the agricultural enterprise.

Name of farm _____	
I. Projected changes in operations _____	
II. Expected changes in net income:	
1. Additional income	\$ _____
2. Reductions in income	\$ _____
Net increase in income	\$ _____
3. Additional expenditures	\$ _____
4. Reductions in expenditures	\$ _____
Net increase in expenditures	\$ _____
INCREASE IN NET INCOME	\$ _____

TIME PERIODS FOR COMPARATIVE BUDGETS

Special attention should be paid to the time periods used for comparative budgets, as some decisions are important only in the very short term, while others have a long-run impact. Some of these variations fall into the following categories:

- a. Decisions which affect activities and output in the very short run, such as:
 - daily decisions concerning the use of regular workers for feeding and planting;
 - decisions on input purchases for immediate use, purchase of gasoline, hiring temporary workers.
- b. Decisions which have a major effect on activities and output over a time period ranging from several weeks to a year; such as:
 - crops to be planted next year;
 - the use of fertilizers;
 - feeding rates for cattle;
- c. Decisions which affect the firm over the long run, such as:
 - plans for crop rotation and herd size;
 - plans for labor and machinery use;
 - plans for land improvements, water supply, construction, etc.

All these decisions are interrelated, but the third category should be considered separately due to its long-run effects on the enterprise and because, generally, these decisions involve investments which should be recovered through increases in future income over many years.

SOME PROBLEMS IN MAKING COMPARISONS

When comparisons are made, it is indispensable to define very clearly the items to be compared, the basis of comparison and the period under consideration. Some of the most common problems involve distinguishing between operating expenses and capital investment.

Operating expenses versus capital investment

In accounting practice, distinctions are generally made between operating expenses and expenditures incurred for capital investment. Generally, disbursements for capital investment involve items which provide a service for the enterprise for a period of time greater than one year, while operating expenses cover items consumed in the

current operation of the business. The distinction is not always very clear; fertilizer, for example, can contribute to improving the soil, although its primary purpose is to increase the current harvest. Generally, seeds, fertilizers, animal feed, materials for repairs, packing materials, insurance, taxes and other such items are considered operating expenses, while new buildings, heavy equipment, breed or production stock and land improvements are considered capital investments.

Capital investments in comparative budgets

The purpose of drawing up comparative budgets is to compare the outcome of various alternative plans for managing a company or private operation over a fixed future period of time. In agricultural management, interest is often concentrated on the outcome of various alternative plans whose benefits will be felt for at least 5 or 10 years. Thus, it is very important to account carefully for capital disbursements in making budgetary comparisons. It is also necessary in such comparisons to specify alternative plans and time periods very clearly.

When a new plan is put into practice, it is common to make capital disbursements for a period of two, three or more years, although benefits are not completely reflected in annual results until the fifth year or sometimes later. Thus, to make a complete comparison of two or three alternative plans, it would be necessary to prepare budgets for each plan during each transition year.

When a budgetary comparison is prepared for the transition years, capital disbursements should appear under operating expenses. The resulting net income will be expressed in terms of cash, and it will not be necessary to include depreciation figures for items newly acquired under operating expenses. Annual variations in surpluses or deficits can be determined by comparing one or more series of net income figures.

In many cases credit is necessary over the medium or long term to finance at least part of the new investments. There are two procedures to follow in this case:

- loans or principal payments can be included in annual plans, or
- a separate plan for loans and repayments can be prepared.

Comparing normal budgets

Even when only two plans are being compared, the procedures described above require a great deal of detailed planning work; if as many as four or five plans are involved, the quantity of work increases proportionately. One way to simplify the problem of

making comparisons between two or more plans is to compare their performance for a normal year after the transition period has passed. This type of comparison appears in Form 3, where expenditures include the costs of replacing buildings and machinery as well as interest on new investments. These depreciation figures should be calculated using the procedures discussed in Part II of this text. The useful life of the equipment should be calculated not only on the basis of natural wear and tear, but also in view of the possibility that the article may become obsolete or useless. Interest charges on new investments should be calculated by averaging real cost and salvage value.

The net income estimates resulting from these procedures are equal to normal net income over a period of time long enough to cover the normal expenses needed for replacing fixed assets. However, these estimated figures will probably not be equal to net cash income for any one specific year.

This type of comparative budget can provide a very useful basis for selecting between various alternative plans, and it is useful for both the farmer and the analyst. Once a tentative selection has been made, the producer will have to develop more detailed plans for each year of the transition period.

Another useful calculation is the number of years needed to recover fixed capital investments. The purchase of a new stable is much more attractive if the investment can be recovered through additional profits over a period of five years rather than ten years or more.

A simplified comparison of the "normal" performance of alternative plans after a period of transition may leave much to be desired in the area of perennial crops such as fruit trees, forests or even coffee. In such cases some type of analysis is needed to show comparisons among a series of years or periods.