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BUDGETING AND PROGRAMMING IN FARM MANAGEMENT

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Management is a continuous process in any business, and farming is no exception. Prices are constantly changing and adjustments must be made in line with new price relationship as they occur. Weather and disease are unpredictable, making emergency decisions a part of the usual farm pattern. New technology and equipment become available each year and their place in each individual business creates important problems that must be acted on without delay. Changes in technology must be constantly studied and decisions made on what to do, how to do it, how much to do, and when to do it.

Institutional changes in market requirements, regulatory measures, and farm programmes set up new situations that must be recognised and plans made accordingly. And finally the wants and likes of the family will change. A desire that seems highly important today may be replaced by another quite unrelated want a few years hence. These shifts in conditions and in what gives satisfaction are influential forces in making management a continuous process.

The management of today's farm is a complex assignment, but stated in its simplest form, the farmer's job is to decide how to use what he has to obtain what he wants.

Management, as is well understood, refers mainly to choice of factors of production, enterprises and farming practices and their judicious combination and use for increasing farm earning, comprising profits, goods and services. It is a task which involves decision-making; management aims at improving the farmers' ability for decision-making; managerial efficiency is thus undoubtedly the key to all productivity. "Briefly and positively stated, farm management from the general agricultural viewpoint is the act of managing a farm or farm properties; from the viewpoint of education, it is giving organised instruction about the management of farms; from the viewpoint of research, it is gathering, systematically recording, analysing, and interpreting data relating to the details of organizing, managing and operating specific farm units or properties. Farm management as an economic function consists essentially of planning and directing the operations of an individual farm from the viewpoint of maximum returns to the operator."[2]

BUDGETING AND FARM PLANNING

In U. S. A. and other economically advanced countries the application of budgeting in farm management has reached an advanced stage. For a number of years considerable discussions were held regarding the real utility of the technique to increase net farm returns. Now the utility of the technique has been

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1. Views expressed are purely in personal capacity.
2. Boss and Pond: Modern Farm Management—Principles and Practice, pp. 7-8.

accepted beyond any doubt. In India the application of budgeting in farm planning and management is of recent origin.

All constructive planning of a farm organization involves the use of budgeting method. Disappointment and financial loss can be avoided by first testing future plans by the budgeting method rather than by actual operation. It is much cheaper to make mistakes on paper than in practice.

In its simplest form a budget is a plan for future using and spending. A farm budget is a plan for the future use of land, labour, power, equipment and other resources of the farmer. It may be used to determine the probable income that may be expected from a farm. Most systems of farm appraisal involve a budgeting for future income and expense in computing the net income to be capitalized into the productive value of the farm. "A budget can be used (1) to set up a new farm business, (2) to compare alternative plans of organization for a going farm business, (3) to compare two or more competing lines of production, and (4) to compare alternative methods of production and the returns from alternative investments."[3]

A farm budget involves the allocation of resources among various uses in accordance with the concept of equi-marginal returns. It thus offers a practical means of working out the least-cost combination of scarce resources with alternative uses, consistent with a pre-determined goal which may be the maximization of profits or welfare of the family. It also makes possible to work out a set of budgets under the existing level of resources and with some changes in these which are feasible. These plans can be tested under various assumptions and the most profitable one can be adopted. In brief "Farm planning and budgeting is a method of research for analyzing the probable effects on cost and returns of the various alternative systems of enterprise combination or resource use."[4] The basic requirements for working out a budget are input-output ratios and expected prices.

A farm budget is no better than the information upon which it is based. To use the budget method effectively one must know the kind and quality of resources available. He must also know the kind and quantity of labour, power, and production goods required for production of the crops and livestock under consideration.

METHODS OF BUDGETING

Farm budgeting may be classified into two: (i) complete budgeting, and (ii) partial budgeting.

Complete budgeting: It means making out a plan for the whole farm. It relates to efforts to consider all aspects of farm organization at the same time, *i.e.*, all crops, livestock, producing methods, costs and returns. It allows for the complementary, supplementary or competitive relationships between enterprises and substitution relationship between resources. It helps to draw the attention to the multitude of factors affecting farm earnings and requiring the special attention of farm operations, and thereby reduces the likelihood of important con-

3. Boss and Pond: *Op. cit.*, p. 198.

4. W. Y. Yang: Methods of Farm Management Investigations, F.A.O. Agricultural Development Paper No. 64, 1958, p. 123.

siderations to be overlooked by the farm-managers. It also provides an opportunity to compare the probable total earnings of the same (or similar) farm(s) with different enterprise combinations and permits to avoid the necessity of allocating joint costs between enterprises.

The requirements, however, for the complete budgeting regarding the input-output and cost-returns data are considerably greater than that of partial budgeting and thus it requires much time and energy. Another disadvantage under the method of complete budgeting is that it is unlikely to indentify individual enterprises which are profitable or unprofitable.

Partial Budgeting: It involves estimation of income and expense for a single farm enterprise such as sugarcane, wheat or some other small part of the total farm business. It may also relate to treatment of any part of a total farm plan, such as plan for a single resource or a single field such as labour, fertilizer or irrigation water. There are some situations where the effort required for complete budgeting seems unwarranted. A farm manager may not be willing to make any important changes in his overall management plan, and he may be interested to enquire specifically about something like possibility of earning a profit from one enterprise, say dairying. Under such situations only a partial budget, one which treats solely those factors related to this enterprise need to be considered.

How many cows or buffaloes are to be kept, how are replacements to be obtained, how often is the herd to be replaced, how much building space and equipment and of what type will be required, how much of various feedstuffs and veterinary supplies will be needed, how much labour will it take, how much milk can be expected per cattle, where can it be sold and at what price? All these questions are to be replied. But there is no need to consider unrelated questions such as how many bullocks are required to cultivate the fields of the farm.

Briefly attention is concentrated on a single enterprise or resource. The method of partial budgeting is of particular importance in testing the desirability and economic feasibility of new inventions or innovations in the technology of agriculture. The output estimates through the adoption of new technique make available data for guidance to the farmer for adoption in advance without waiting for actual results from other approaches.

The partial budgeting is likely to result in fuller treatment of related problems by putting concentrated attention on a single enterprise and resource. It may provide a clear indication of the profitability of a particular enterprise and thus may set forth a clear plan for utilizing a particular resource. It facilitates comparisons of a particular field planted to different crops and from a given supply of feed to different classes of animals. The comparison of costs and returns associated with different practices, such as use of bullocks or tractor power is feasible under this method. It may also serve as an efficient means of adopting total budgets without completely re-working them and the last but not the least important advantage is that the method of partial budgeting is comparatively quick and easy.

There are certain limitations or disadvantages also associated with this method of budgeting. Complementarity and competition between enterprises and substitution between resources are likely to be overlooked under this method and it may result in a failure to consider some of the relevant factors in plan-

ning. In case of some items of production, such as fodder crops, which are seldom sold, somewhat arbitary evaluation is required. A collection of partial budgets may not "add up" to a satisfactory total budget.

Total and partial budgets do not necessarily need to be considered strictly as mutually exclusive alternatives but are complementary in many respects. It is always better to use a partial budget in the beginning to fill in weaker points in the production plan, particularly where the standard requirement of different enterprises and resources are not precisely known. If some partial budgeting is done much work and time are eliminated and often the results obtaind are satisfactory. A synthesised total budget combining these various parts can be made later.

SOURCES OF BASIC DATA FOR FARM BUDGETING

The accuracy and efficiency of preparing a budget depends largely on the quality of basic input-output data available to serve as raw materials. Basic data are also needed in respect of prices of finished products of various enterprises constituting the business. There is a universal need for better basic data as for farm budgeting and planning. The following are the important methods generally used for the collection of data.

(1) *Controlled Experiments*: The controlled experiments conducted by specialists in the various fields either at research stations or in farmers' fields contribute most of the basic input-output data needed in farm budgeting. The further testing of the results of the researches conducted at research stations or in cultivators' fields increases their usefulness. While preparing a budget for an individual cultivator, these relationships are adopted after due modifications according to the situations at the particular holding.

(2) *Farm Records*: Records kept by farmers especially in developed countries contribute another important source of providing basic input-output data needed in farm budgeting and planning. In case of under-developed countries the basic material has to be collected from the farmers by personal inquiry, as no farm records are kept by them. Under such situations, it would be advisable to collect the information by discussing with a group of farmers instead of obtaining it from a single farmer.

(3) *Farm Surveys*: Farm surveys based on a sufficient number of samples in the region and properly conducted are another source of collecting the needed data. Particularly in most under-developed countries this may be the only feasible method to collect data required in budgeting. In India the data obtained through the farm management studies conducted in different regions of the country may prove quite helpful in farm budgeting and planning.

(4) *Secondary Sources*: There are certain other informations such as relating to the marketing facilities and outlook, prices, the means of transportation and costs, local tenure systems, credit and interest rates, the supply and skill of temporary labour, the availability of non-farm employment and wage rates, soil and land classification, weather, etc., required in farm budgeting and planning. But these can neither be derived from controlled experiments, nor can be reliably obtaind from farmers by farm management specialists. It is, therefore, essential that the farm planner should make use of secondary sources such as market reports, price and income studies, taxation records, census reports, soil analysis

and classification reports, land classification reports and maps, and meteorological records pertaining to the area. Reports of nearby experiment stations should be studied to learn some of the improved farming methods and practices and the various input-output factors which can be applied to local conditions.

HOW TO DEVELOP A BUDGET

The developing of a budget consists the following procedure:

1. Survey of actual conditions or resources;
2. Analysis of the present plan of operations to find out its faults or weaknesses;
3. Analysis of the causal factors of faults or weaknesses in the present plan;
4. Examination of the possibilities of improvement and preparation of alternative plans; and
5. Selection of the final plan.

Survey of Actual Condition

The detailed information regarding the following items are to be collected:

(*i*) *Land*: (a) Size of the holding—area rented-in and rented-out should also be enquired. A map showing the locations of different plots may be secured. If possible soil analysis of the various plots may be got done. (b) Plot-wise topography, slope, drainage, etc.

(*ii*) *Farm Building*: Cattle shed, godown and other structures relating to farm business.

(*iii*) *Dead Stock*: Farm implements and equipment—kind and numbers.

(*iv*) *Labour*: (a) Availability of permanent home labour including family labour, *i.e.*, the labour of the cultivator and all his family members, and bullock labour available at the farm and labour-saving machinery, if any. (b) Casual human and bullock labour and other labour-saving implements which may be available at the proper time and the sources of their availability.

(*v*) *Irrigation*: Kind of irrigation facilities available, its adequacy and frequency, period during which water remains available.

(*vi*) *Farm Supplies*: Seed, manure, insecticides, etc.

(*vii*) *Working Capital*: The amount of capital owned and the amount which can be profitably borrowed if needed, with the sources of its availability.

Analysis of Present Plan

After making the farm inventory, an analysis of the existing plan is made. For this the cropping pattern followed on the holding is listed out. The different

resources utilized in raising the crops together with the expected crop yields are noted. Such budgeting analysis gives the information on how the farmer is utilizing his resources at present, the production from different enterprises, gross income, expenses, profit and return to family labour, management and investment.

Analysis of Weaknesses in the Present Plan

After obtaining the information regarding the available resources, their utilization and income, expenses and profits, etc., accruing from the existing plan, one proceeds to locate the weaknesses of the present plan. The weaknesses may be of two types: (i) Structural, and (ii) Operational. Structural weakness refers to excessive human and bullock labour, inadequate irrigation facilities, shortage of capital, defective drainage, etc., whereas operational weakness relates to inferior quality seeds, a defective cropping pattern, faulty cultural practices, inadequacy of plant protection measures, etc. Some of the structural as well as operational weaknesses such as defective drainage in former case and control of pests and plant diseases in the latter may be of a type which cannot be removed by the individual farmer and group action of the farmers may be necessary.

Preparation of Alternative Plans

After determining the adequacy and inadequacy, and locating and identifying the limitations of the present plan, efforts are made to determine which restrictions or limitations or weaknesses can be more readily and more profitably removed. It requires a great deal of information on the probable effects of alternative changes that might be made in organization. Based on the structure and level of resources available and the resources which can be added by farmer himself and which can be managed by external help, a few alternative plans are developed. Alternative plans so developed will show physical production, gross income, expenses, etc., by change in cropping pattern, livestock programme, fertilizers and other inputs. While preparing plans it is worthwhile to note that a judicious crop rotation for each field is to be indicated to maintain and increase the basic fertility level of the soil and help in maximization of returns. Due to low risk-bearing capacity of the cultivators it may not be advisable to suggest drastic modifications in their cropping programme at the first instance. Provision should be made for introducing short duration and labour intensive crops such as onion and potato in between the peak periods of labour requirements of the major crops. These can be started profitably for some time. Only in case of very clear and definite necessity the area under main crops should be adjusted. The adjustments will increase the utilization of permanent human labour including family and bullock labour at the farm and will cushion the labour demand.

After taking into account the economics of water used for different crops, due consideration should be paid for the proper utilization of irrigation and rain water. The water and soil conservation practices may be included in the plan to have the maximum utilization of the available water.

Similarly for maintaining the fertility level of different fields at a profitable level the allocation of manurial and fertilizer resources should be co-ordinated through judicious crop rotations (including green manure programme and leguminous crops), systematic application of farmyard manure and proper addition of fertilizers.

Selection of the Final Plan

Taking into due consideration the points mentioned above two or three alternative plans are developed for several levels of investment. In one of them no additional investment is needed, the inputs already used by the farmer are so combined through better crop programmes, utilization of surplus family and bullock labour, etc., that the farmer may expect the optimum return. A few more plans by up-grading the levels of investment are prepared. The plans so developed can be tested under different assumptions and the most profitable can be selected for implementation according to the availability of the resources. The alternative plans developed for more than one level of investment provide simultaneously valuable information on the relationship between various levels of inputs and outputs. In case the returns from two plans are almost similar, the plan having the smallest risk is to be recommended. After deciding the cropping plan of the farm, the details for the optimal requirements of the different crops to be grown are to be worked out for (1) preparatory tillage, (2) seed treatment, seed rate, variety, sowing time etc., (3) inter-culture and hoeing, (4) manuring and fertilization, (5) control of insects, pests and diseases, and (6) harvesting and threshing. For an ideal situation it is essential that the plan is developed by a team comprising of farm management specialists, extension personnel of the region, and agro-technical specialists on the basis of on-the-spot discussions with the individual farmers and their neighbouring farmers. This procedure will create among the farmers the confidence about the usefulness of the plan and will be conducive to a full response to the idea among them. However, the best budget and plan cannot be followed rigidly because of uncontrollable factors. Changes in weather, prices or costs may change the picture. Insect|pest may destroy a growing crop. So a cultivator needs to be informed to keep up with a changing situation or else he will be not likely to maximize profit in his farm business.

Some subsidiary pursuits such as poultry farming and dairying which are allied to agriculture can also be tied up with the cropping plan to supplement income from farm business and set up the level of employment of family labour.

USES OF FARM BUDGETING

Apart from making feasible the optimal allocation of available resources, and thereby increasing the production and income of the farmers, budgeting in farm planning has the following uses:

1. It acts as a two-way traffic between the research institutions and the farmers by testing the desirability and economic suitability of improvements in the technology and bringing back to the research workers, the problems of the cultivators for needful solution and fixing priorities among these. The technical research programmes will be better oriented to farmers' needs.

2. It helps to improve the management ability of the farmers and thereby overall efficiency of farming.

3. It facilitates the acceptance by farmers of technical and technological improvements by making them aware of their economic implications and by giving them a clear conception of adjustments in farm resources on the basis of entire farm as a unit.

4. It makes available the basic data regarding the potentialities of farm

production and farm income under different patterns of farming in different agricultural situations at different levels of investment.

5. It helps to estimate the additional resource-needs of the cultivators as well as the amount of credit in a more rational way. This will facilitate the formulation of loan policies and supplies of seeds, fertilizers, etc.

6. The results of budget analysis can be widely used in implementing supervised and guided credit on a large scale.

7. It provide a demonstration on a combined basis with the farm as a unit. Such an approach has been found more convincing to the cultivators than single factor approach. Thus the results obtained from budget analysis serve as an extensive tool for the extension workers and facilitate the speedy spread of technological improvements among the farmers.

8. It is very effective in educating the farmers in farm planning and to make them plan-minded.

9. It helps to confirm technical and technological recommendations or point to the directions in which modifications are required in them to suit regional situations.

10. It helps in the formulation of extension recommendations and preparation of extension literature.

SCOPE OF BUDGETING UNDER INDIAN CONDITIONS

Indian agriculture is still a way of living largely based on traditional methods. Land and capital are the limiting factors of production whereas labour is generally available in more quantity than required. In spite of land being the most scarce factor of production in India, it is common knowledge that its potentialities are not fully exploited. The average yields per acre are disturbingly low. Uneconomic use of land in utter disregard of soil conservation principles is entailing heavy national loss. Large areas are affected by soil erosion. A majority of farmers cultivate small farms and are burdened with surplus family labour force (few off the farm employment opportunities). These farms suffer from shortage of capital too.

The inadequacy of one of the factors of production also affects the economic efficiency of the other factors. Recently progress in farming science is steadily widening the scope for technical improvements in agriculture. This has widened the range of choices available to the farmer regarding farming practices, use of seed, fertilizers and implements, and selection of enterprises. His choice of the factors of production and enterprises is not as limited as it was towards the beginning of this century. The phenomenal growth in population has made it imperative to put land, the most scarce factor in Indian farming, to the most intensive use.

Besides, the economic development of India under the Five-Year Plans had considerable impact on regional agricultural situation in the country. A few of the important factors influencing the situation singly or in various combinations are : (i) Changes from rain-fed to irrigated farming; (ii) Industrialisation ;

(iii) Rural electrification; (iv) Increase in transport and communication facilities; (v) Development of new townships and the phenomenal growth of a number of existing ones; (vi) Change in consumer's demand and improvement in diet, and (vii) Development of cold storage, preservation and canning industries.

All these changes emphasize the need for adjustment in the agricultural production pattern. The regional studies of farm economy and extent of adjustments in farming pattern in response to changing agricultural situation could indicate the lines of future action. True, some enterprising farmers observe the need for such adjustments and initiate them but it often takes long for the adoption of such adjustments on any appreciable scale. The valuable time lost at present could be saved through programmes of research and extension relating to farm budgeting and planning. "Both the study of input-output relationships on farmer's holdings and the farm budgeting and planning programmes based on such studies and the results of experimental stations are needed for: (i) relating farm production programmes to changing demand situation, (ii) judicious combination of crop, livestock and poultry enterprises, (iii) application of results of technical and technological researches, and (iv) reallocation of farmer's resources with a view to avail their most profitable and efficient utilization."[5]

Obviously, to meet the challenge of circumstances, and to enable agriculture to play its role, agriculture needs to be planned on a more comprehensive basis than merely to emphasize the use of fertilizers, improved seeds and improved cultural practices. In India the need for guidance on farm planning and management is all the greater because the farms are small and a majority of the farmers are illiterate. As re-allocation of resources is required in adopting technical and technological changes, the need for guidance to the farmers becomes even more pressing.

In the extension programme, the emphasis has generally been on a single factor approach. There is necessity for integrating the technical know-how available relating to farming as an improvement. Budgeting and planning would help to locate the weaknesses in the existing production plan of cultivators, analyse the causes thereof and find out remedies. Basically, it improves the management side of farm business which had not been emphasized in the extension or development programmes. It is an excellent tool for educating the farmers in farm planning. Once the farmers are convinced regarding potentialities of this technique through demonstrations on their holdings by maintaining the records of the implementation of the plans, automatically they will start getting plan-minded. No doubt it can be developed into a very powerful extension tool. Very valuable basic data for preparing sound agricultural policies will be available by maintaining the records of the implementation of the plans for a sufficient number of farms.

LINEAR PROGRAMMING

Linear programming offers a promise as an analytical control for studying the economic aspects of farm management. In agriculture the contribution of the technique of linear programming is primarily that of furnishing a conceptual framework within which problems of resource allocation on farms may be more

5. G. D. Agrawal, "Management and Management Education in Agriculture," AICC *Economic Review*, dated May 15, 1959, p. 30.

systematically studied. The technique of linear programming is based on the following four assumptions:

(i) A constant input-output ratio (or transformation coefficient) irrespective of the scale of operation.

(ii) That both the farm resources and the farm enterprises are divisible and additive in order to achieve the goal of maximization.

(iii) That the selection of one enterprise does not necessitate the selection of the other. In short, each farm enterprise is independent of the others.

(iv) That the number of enterprises adoptable is finite, and consequently choices and combinations can be made only within this finite number of enterprises.

Once the assumptions have been explicitely stated, thc problem of obtaining a solution is purely mechanical. In brief its aim is the same as that of budgeting. Of course it is a mathematical procedure and as such under this system the relationships connecting the resource supplies, institutional restrictions, and enterprises chosen as production possibilities are worked out in algebraic form. Consequently with a large range of alternatives available linear programming affords a mathematical solution to the problem of resource allocation where it becomes difficult to apply the budgeting technique. However the technique of linear programming requires a thorough practical training for the technician in its application to agriculture based on a higher educational level and a complete understanding of the assumptions involved. These reasons restrict the use of this technique in farm planning only by economically advanced countries. In underdeveloped countries like India where the educational level of the cultivators is comparatively low and the resource choices are also limited, the technique of budgeting in farm planning is to be preferred and is generally and widely used.

APPLICATION OF BUDGETING AND LINEAR PROGRAMMING IN FARM MANAGEMENT ANALYSIS

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Budgeting helps in the preparation of advance estimates of expenses and income of farm business. As a forward-looking and problem-solving approach, it is a popular tool of farm management analysis with the farm management economists. It involves programming, but as usually practised, it is not a highly systematic method and relies strongly on the judgment and initiative of the research worker. There is no guarantee that a most profitable combination of