CHAPTER VIII

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CHAPTER VIII

8.0 SUMMARY AND CONCLUSIONS

8.01:

The Linear Programming Model so evolved and applied for the present study is a simple one wherein only three constraints viz. Soil types, water availability and food requirements are considered. The optimisation functions used are value added and employment generated. The model suffers from some Limitations. Apart from the assumption of linearity involved, it has not been attempted the optimisation over a crop cycle. Further soil types were classified only into three categories and subject to the restrictions of these three types, it was assumed that crops can be grown on any Land except that rabi crops are not grown in the light soil. Many constraints which actually operates in the field like that of credit, fertilizers etc. have not been introduced in the model. Also the model, as was presented, optimises over the entire district but this may not necessarily mean that it is the sum of the optima of individual farmers. The last two limitations mentioned above, in one sense, prove a blessing because the planning effort really lies in removing such constraints as
credit facility, fertilizers availability and ensuring to optimise the aggregate regional production. It is obvious that the results of the model depend crucially on the parameters used in optimising the function and the size of the resources. More work would have been necessary on estimating these parameters and checking them more thoroughly. However it could not be done due to the limitations like time and the individuals efforts etc. The data that is utilized in the exercise are taken from the various sources and are duly acknowledged. Even if there may be some differences of opinion on the values of the parameters used in the Model coupled with its simplified form, for comparison purposes they remain valid. This in turn gives the findings and revelations which will go in a long way to solve the problems in the field of planning in general and agricultural planning in particular.

8.02 Findings of the study.

Because of the limitations enumerated above, it cannot be said that the results of this exercise give the ideal cropping pattern, accurately to the last hectare of the Land. But certainly it reveals the salient features and the broad dimensions of the ideal Land-use pattern.
The following are the important findings of the present study, keeping in view the limitations and other related matters stated above:

(1) In existing cropping pattern of Akola district Cotton is an most important crop occupying the maximum area of cultivable land of the district i.e. (40.37%). From the linear programming study it reveals that, from the point of view of profit maximization Cotton is not a profitable crop. Though larger area is under cultivation but generally this crop is grown in the district during Kharif season on rainfed conditions and therefore on district level the productivity of this crop is low, which results in less profitability. The pattern obtained by employment maximization is relatively in tune with the existing pattern. This goes to show that the farmers, perhaps believe that if more work is there on land it would result in better incomes or welfare. Existing plan creates employment for 2.73 lakh persons and generates the per capita income of Rs. 629/- where as plan-4 creates 4.45 lakh persons employment and per capita income is Rs. 1800. And if we consider the plan 2 with objective of profit
maximization without growing cotton crop, the per capita income comes to Rs. 2649 and this plan generates the employment in the district to the tune of 3.91 lakh persons. This seems to be impracticable as the tract of the district is most suitable for cotton crop considering the moderate rains in the district. It is true that the more persons are employed on farms for this crop. Cultivators will have to think to increase their income level by reducing persons engaged for this crop and by increasing the productivity of cotton crop by employing the modern agricultural techniques on their fields. Major steps to be taken are to reduce area and increase the profitability of the Cotton crop, otherwise it will be a reason for the poor condition of the farmers in the district.

(2) Jowar is the second important crop of the district. Jowar is a principal crop, considering the food habits of the people of Akola district. If objective of profit maximisation is considered then the plan 1 and plan 2 shows that Jowar is not a profitable crop. However to meet requirement of the district this crop should be grown. Local jowar gives the low production, hence Hybrid should be increased and the area under jowar should be decreased as far as possible.
Plan-3 has only shown the hectarage under Local Jowar i.e. 15.4 percent with objective of maximum employment generation. Plan 1 and 2 shows that the area under jowar should not increase beyond 5 percent. In general, for better prospect of the district the area under jowar should be transferred for better profitable crops considering the soil fertility, water availability and other favourable crop situations of the Akola district under study.

For the maximisation of both the objective functions Jowar, Bajra, Paddy, Udid, Mug, Wheat, groundnut (wet and dry) should not be encouraged beyond certain limits. They are only to be produced to the extent of consumption requirements of the district. However plan-1 showed largest area to be occupied by the crop Tur. In this plan, Tur attracts the attention of scientist. This should be viewed, as there is a special drive to increase the production of pulses everywhere in India to cater the minimum requirement of the people. Tur is grown in rainfed condition (dry) and if the soil and conditions are suitable then there is tremendous scope to bring more land under the cultivation of Tur in this district which will help to maximize the income of the district and will raise the social status of 'Cultivators'.
(4) Paddy is not crop to be recommended in district from the point of employment maximisation. However irrigated paddy is shown in plan-2 if the water is available in ample condition. In this situation 50 percent of total area goes under paddy cultivation. This is imaginary situation as the soil of the Akola district is not suitable for paddy crop and second thing is water is not available to the extent to meet the requirement of paddy crops. Plan-1 showed only 0.6 percent area of paddy which is more are less same with the existing cropping pattern.

(5) Safflower is not advisable crop from both the objective functions. It is out of the crop combination of L.P.P., hence the area under safflower should not be increased any more.

(6) Groundnut crop is an important crop among oilseeds. Being cash crop it has constant demand. Model plans show that the area under groundnut should be increased than the existing cropping area. This will help to increase the total income of the district. From the point of employment generation this crop is not suitable.
(7) In the existing cropping pattern Sugarcane crop covers only 0.33 percent of the total cultivated area. If profit maximisation is the objective then according to plan-1 the cropped-up area may be increased up to 18 percent and if considering the full availability of water, a free hand is given to this crop to increase up to the 29 percent area (plan-2). If the second objective of employment generation is considered then plan-3 allows to increase the under Sugarcane crop up to 0.9 percent i.e. three times to that of present area. And plan-4 suggest the area to be increased up to 29 percent.

It is clear fact that Sugarcane requires three times more water to that of other crops. If water is not available to the extent of requirement then instead of growing Sugarcane on large scale the land should be used to grow some other crops which will maximise the yield and income.

(8) Wheat is grown in the district to fulfill the minimum requirement of the district. Both the plans 1 and 2 for object of profit maximisation shows that the area under wheat crop should be increased up to the limit of double, to that of the area under existing cropping pattern it does not generate the employment to the considerable extent.
(9) There are considerable differences between the results of the L.P.P. Model and the existing pattern.

(10) Rabi Jowar generates the employment and hence it should be grown in the district allowing the area up to 5-6 percent only. It is not a profitable crop. ✓

(11) With the present availability of water it was found that value added can be increased by 3.35 times and the employment increases of 1.20 times than the existing pattern depending upon output is maximised or employment is maximised.

(12) If proper planning is made, the present per capita income of Rs. 629/- of per annum based on the existing plan, can be increased to Rs. 2649/- per annum by the operation of the model plan OBJ1-RHS-2.

8.03. Conclusions.

The existing cropping pattern projects the district level planning, which shows the lower income and less employment generation in the district. It is suggested that the changes in the cropping pattern as outlined above would give better results. The exercise shows that the judicious landuse pattern would make the region as whole to provide adequate
employment opportunities for the people and can generate growth potential for the district. It is in this perspective that the following strategy is suggested for the whole Akola district (region).

8.04: A Planning Strategy:

The modernisation of Agriculture and organisation of rural employment are fundamental to the overall strategy of planning for the agrarian based district like Akola. The Block level micro regions should be studied and the whole district level strategy should be evolved. While adopting this planning technique on overall view of the resources and their efficient utilisation will have to be taken into consideration before framing the model. The availability of resources and the demand constraint should be taken into account on block levels where ample water and other resources are available. The crop like Sugar-cane should be considered in the vicinity of irrigation projects, where abundance of water is made available to the farmers. The integrated plan so formulated will have a sound economic footing utilising the resources of the district in a most efficient manner. The new plans so arrived will have a bright chance of being implemented since they are based on sound economic base coupled, of course, with due care for the aspects of physical and social planning.
A new approach to agriculture with the application of Linear Programming Model tackling the problems of output maximization and the burning problem of unemployment has been squarely placed in the centre of the picture. The increased production should be used as an investment for further production in other sectors of economy. Thus the present stagnation can be broken. The plans so arrived cannot be claimed to be a perfect one and the one that is being followed by the farmers is also a optimum plan from the point of view of the farmers within the constraints under which they are working. It is quite natural that the farmers will be willing to adopt a plan which maximises his *fortune* in terms of his income and welfare. It is, therefore, the question of proper education, persuasion of the farmers, and to remove the hurdles in attaining these optimum proposition in point of time.

To make more realistic model it would have included more crop activities and also livestock activities. Since it was not possible to incorporate more detail and non-linear and non-discrete objective functions in the present study, the results so presented have some obvious limitations in exact specifications of equilibrium quantities. However, as a broad indicator of the competitive position of particular district in the
field of crop production and employment, the results are considered to be adequate and likely to be helpful in suggesting:
(a) adoptions in spatial pattern of the crop production, and
(b) Optimisation of agricultural labour giving rise to surplus labour force released from absorption in the other sectors of economy.
(c) Evolving an integrated Regional planning strategy for the entire region based on sound economic planning.

The refined estimates may prove of greater use in public policy and planning. The present study is an necessary step in attaining these estimates.

8.05: The Role of Farm Planning:

The main concentration in the rural development, having the agrarian character, has to be on the agricultural development. Owing to the imperatives of the required structural transformation the more efficient combination of capital and basic inputs like Land, water and fertilisers with the available manpower have to be reorganised effectively. In the overall strategy agriculture would be a leading sector in the immediate future and the farm planning has to play its role in this perspective.
Keeping in view the role of the farm planning in the development of the agrarian structure of the District and on the basis the results obtained by the application of Linear Programming Model, the following policy recommendations are suggested.

8.06: Recommendations and Suggestions.

(1) The farmer needs to be helped by Government in creating situations which will lead him to take right decision for increasing his income in right time. Suggestions of crop planning based on optimum plans in the present Model depend on the relative prices of the crops. If there is a great fluctuation in relative prices, it will make the planned income very uncertain. In order to make the farmer to reorganise his resources with a view to maximise his income, the Government can help him either by reducing price uncertainty or by sharing with him the consequences of price fluctuations.

(2) The price policy should be evolved in such a manner so as to motivate the farmers to produce those commodities in quantities which are desirable and
necessary in the context of development. In other words the farmers should be encouraged to grow those crops which are suggested by the optimum model plan by resorting to a suitable price structure for the agricultural commodities.

(3) The farmers should be protected from the vagaries of nature by ensuring their farm income.

(4) Optimum plans of representative farms of a region can be obtained by applying Linear Programming technique acting as a demonstration plots to the people.

(5) A sound water management technique should be evolved and applied in the district, as the efficient utilization of water is the most-critical activity in the overall development of agricultural sector of the district.

(6) Sugarcane cultivation should be discouraged in favour of food crops (such as Paddy, wheat, tur) or cotton since the sugarcane consumes three times more water than the other crops per hectare. This will bring more hectare under irrigation giving rise the benefits of water to the maximum farmers and overall increase the production of the district. This will serve both the economic as well as the social welfare function in the planning area.
(7) The formation of objectives in the planning process should be undertaken with the full considerations of the problems, values and goals to be attained by the planning unit. If the objectives so framed do not reflect the aspirations and values of the people, the optimum plans worked out will not be acceptable to the people for whom they are meant. This thing has been exemplified by the application of the Linear Programming Model in the present study which shows how the plan is changing depending upon the objective functions to be maximised and hence the importance of the ideal formulations of objective in planning.

(8) The greatest hurdle in applying the technique of mathematical models in the planning is the non-availability of refined basic data for programming. It is therefore, suggested that a research and development wing should be setup at regional level.

(9) The kind of economic regional analysis that is obtained by the application of Linear Programming Model and the advanced computer Technology, it is the imperative of the time that the planner should switch over from the conventional planning methods to the systems-view of planning, for better results and convincing solutions of the complicated problems of urban and rural planning.
(10) If the double cropping (or multiple cropping) pattern in the district is followed the overall income and also the employment to the people will be increased if, however, this level of double cropping is not feasible to this extent, this means that the massive efforts are to be made as regards investment in the secondary sector so as to provide employment to the people of this district.

(11) The major constraints in irrigation water and managements are unassured supply of canal water leading to excess or deficit of irrigation, improper land development (shaping/grading) in the communal area leading to uneven distribution of water,
- field distribution are not properly maintained leading to wastage of water.
- Releasing of canal water does not coincide with the requirement of cropping pattern,
- Heterogeneous cropping pattern and soil types vary the demand for irrigation water and lack of knowledge of improved technology.
The water requirement of long duration crop and summer season crops viz. Groundnut, sunflower, Mug etc. is more due to higher rates of evapotranspiration which require more number of irrigations. So it is advisable to utilize available irrigation water for (a) Kharif season crops for protective irrigation to ensure maximum yields and (b) for Rabi crops depending on availability (limited or adequate) so that more area can be brought under cultivation which will ultimately reflect in increase of total productivity.

8.07 Scope for Further Research:

Further scope for research can be understood from the inherent limitations of the model itself. To overcome these limitations further research and development in the model with the adoption of rotational crops system may be included. Similarly, the fulfillment of the two objective functions simultaneously may be tried finding a judicious solution for the maximisation of both these functions. This may give rise to adopt the non-linear relationship between the various activities in the system.

The model can be refined by adopting more crop activities including the live stock, forest, Horticultural activities with non-discrete functions. At present farmers are more interested in engaging themselves in the Labour oriented cropping patterns instead of maximisation of their incomes. This requires further investigations from planning point of view.