REGIONAL PLANNING GOAL: EMPLOYMENT OR INCOME? A CASE STUDY OF AN ARID REGION IN INDIA

Baldev Singh

Hypothesis

The failure of development strategies adopted during the U.N. development decade (1960s) to reduce differentials across regions and within a region across social and income classes has led to an added emphasis on alternative strategies for the development of rural areas. Accordingly, we find greater emphasis on the redistribution aspect as advocated by the World Bank and its member governments. For instance, growth with equity has been the prime objective of the Indian fifth and sixth five year plan.

The welfare of the poorer sections of society can be enhanced through a number of policy instruments. The redistribution of productive assets, particularly land, is the most obvious policy option during the initial phase of the development process, although it is politically as well as administratively the most difficult. (For a strong theoretical case in favour of fundamental structural reforms during the initial phase of development process see Fox, Sengupta, and Thorbecke, p. 447-467.) It is no wonder that policymakers and planners easily succumb to the politically rewarding soft options. The planning objective of employment maximization with the help of state power appears to be such an option. Indeed, employment maximization is the prime objective of India's sixth five year plan (Government of India, p. 3).

The success of this objective will, however, depend on how far the government succeeds in influencing through its policy instruments (fiscal or monetary) the factor-product price structure in favour of labour intensive rather than capital intensive technologies. The plan fails to suggest any innovative way to achieve this.

However, even when the price structure is successfully changed in favour of labour embodying technologies, there is no a priori evidence that the present capitalistic production structure in the country will increase employment opportunities, particularly for the poorer sections of society. Given that the entrepreneurial behaviour relations flowing from the existing production relations appear to be governed more by income (or profit) than by employment maximization considerations (except in a self-sufficient subsistence agricultural economy where the production decisions are likely to be governed more by household consumption than by market considerations), there is no reason to expect that they will change in the near future. If so, the employment maximization objective, instead of solving the problem, is likely to introduce more distortions in production relations.

Objectives

An empirical validation of these behavioural premises is essential, especially when planning at the region level is the prime objective. The region is likely to adopt the national planning objective as its planning structure. This paper is, accordingly, devoted to verify empirically whether entrepreneurs of the region maximize income or employment. Since the possibilities of the subsistence mode of production exist more in the primary sector than in other sectors of the economy, the verification is confined to the primary sector. Moreover, it is the primary sector which, in India, has historically been forced to play the role of host to the swelling ranks of the unemployed or underemployed. For instance, the primary sector accounted for 73 percent of the Indian work force in 1921 and again in 1961 and 74 percent in 1971. (For details, see Government of India, p. 82.)

Methodology

We propose to accomplish this verification task with the help of a 78 x 83 regional programming model. For details on the specification and estimation of the coefficients of this model, see Singh (1978b), p. 160-197. In 1971, the Surendranagar district had a population of 8.45 lakhs. Of these, 73 percent lived in rural areas. The primary sector was the dominant sector in the district economy; it employed 66.3 percent of the male workforce and contributed 61.9 percent of the district's domestic product. Indeed, farm households are represented by three relatively homogeneous farm size classes: small (up to 12.5 acres), medium (between 12.5 and 25 acres), and large (above 25 acres). On the resource front, 16 of the 78 regional resource constraints represent the macro resource position of the rural economy of the district, while the other 62 resource constraints represent the specific resource position of each of the four rural classes: small, medium, and large farm households, and nonfarm households. On the activity front, 58 of the 83 regional activities represent the productive activities (that is, crop and animal activities engaged in the four groups), and the remanent 25 regional cost activities represent the households' option to supplement their resources from the regional pool at regional market prices.

Results

Presentation and Interpretation

The regional programming model has been developed to achieve employment and income maximizing objectives. The standard simplex technique was employed to obtain the optimum solutions. But as the mode of production becomes relatively capitalistic in nature--as the contribution of capital input to the production process increase and that of labour input declines--the two objective functions are likely to generate divergent optimum solutions.

Regional Scenario: Employment or Income?

It can be seen from table 1 that the employment maximization objective is not only inferior to the income maximization objective, but unrealistic. With the given range of regional technology, it not only yields substantially low regional income estimates (that is, 30.11 crores compared to 82.84 crores generated by the income maximization objective) but even fails to maximize regional employment. In fact, the income maximizing objective yields higher regional employment estimates (380.94 lakh labour days) than those generated by the employment maximizing objective (303.83 lakh labour days).

Interestingly, the two objective functions invoke markedly different responses from rural huseholds. While the income objective encourages market dependence of rural households, the employment objective discourages this trend. Of the four factor markets considered, the optimum solution based on the employment maximization objective reveals dependence of rural households on only one factor market (the capital market), whereas the income maximization objective reveals the rural household's dependence on three factor markets--the labour market (with a dependency rate of 27.2 percent), the capital market (2.1) and the animal labour market (1.1). The policy implications of the limited market response generated by the employment maximization objective is that it restricts the ability of policy intervention effectively to influence the behaviour pattern of rural entrepreneurs in the planned direction.

Incidentally, neither of the two optimum solutions given in table 2 suggest any dependence of the regional rural sector on the plant nutrient market; that is, chemical fertilizers. This result highlights the limited success or probably failure of the high yielding crop technology in a typically dry region like

Table 1--Relative Economics of Income and Employment Maximization Objectives as per Optimum Solutions of the Regional Linear Programming Model, Surendranagar, 1975/76

Selected Economic Aspects	Optimum Solutions	
	Income	Employment
1. Labour use (lakh labour days)	380.94	303.83
2. Income (rupees crores)	82.84	30.11
3. The degree of dependence on factor markets for farm resources		
(a) Labour services (percent)	27.22	--
(i) Hired labour (lakh labour days)	103.68	--
(ii) Total labour used (lakh labour days)	380.94	nc
(b) Draft power services (percent)	1.74	--
(i) Hired animal draft power (lakh animal pair days)	1.11	--
(ii) Total draft power (lakh animal pair days)	63.70	nc
(c) Plant nutrient input (percent)	--	--
(i) Nitrogen bought (lakh kg.)	--	--
(ii) Total nitrogen input (lakh kg.)	nc	nc
(d) Farm capital input (percent)	2.05	2.09
(i) Borrowed capital (rupees lakhs)	34.45	34.45
(ii) Total farm capital input (rupees lakhs)	1,677.77	1,646.73

nc = Not computed.

Surendranagar. We may note that during the last 45 years that district received an average rainfall of 439 mm with the probability of 0.72 that it will fall between 20 mm and 600 mm.

Given the regional technology spectrum, regional income and employment cannot be increased by injecting fertilizer supplies into a dry region. But this can be done by promoting the use of farmyard manure, which also helps in the absorption, retention, and conservation of the region's limited, highly uneven precipitation.

Overall Regional Scenario: The Historical Test

How do these optimum programming solutions of income and employment maximizing objectives stand the test of historical experience? Since land is the most important resource input of rural India, this test is conducted in terms of the pattern of land use. Historical experience is confined to three periods: the decade of the 1960s, the agricultural census year 1970/71, and the reference year of the programming model, 1975/76. Historically, cultivators of the district have been taking one crop per annum from the cultivable land. This is reflected by the coefficients of cropping intensity which have hovered around 100 (table 2). It is the optimum solution based on the income maximizing objective which yields a cropping intensity of this magnitude (99.70 percent). The optimum

Table 2--Historical and Optimal Land Use Patterns for Income and Employment Maximizing Objectives as per Optimum Solutions of the Regional Linear Programming Model, Surendranagar

Aspects of Land Use	Historical Experience			Optimum Solutions	
	Between 1960/61 1969/70	1970/ 71	1975/ 76	Income	Employment
1. Cropping pattern (percent)	100	100	100	100	100
Bajri					
Nonirrigated	18	22	25	20	16
Irrigated	--	1	3	1	2
Cotton					
Nonirrigated	43	40	32	43	14
Irrigated	--	4	5	3	--
Jowar					
Nonirrigated	19	20	15	1	21
Irrigated					
Kharif	--	1/	2	2	1
Rabi	--	1/	2	1	1/
Wheat					
Nonirrigated	3	3	5	1	3
Irrigated	--	1	4	3	4
Groundnuts					
Nonirrigated	10	4	2	13	--
Irrigated	--	1/	1/	--	--
Til					
Nonirrigated	2/	2/	3	11	--
Pulses					
Nonirrigated	2/	1	2	--	15
Green fodder					
Irrigated	3	1/	1	1/	7
Vegetables					
Irrigated					
Kharif	2/	1/	2	1	13
Rabi	2/	--	--	--	5
Other crops	6	3	--	--	--
2. Gross cropped area (lakh acres)	17	17	3/25	17	7
3. Net sown area (lakh acres)	17	17	3/24	17	17
4. Cropping intensity (percent)	101	102	102	100	43

1/ Less than 0.5 percent.
2/ Included in other crop category.
3/ Unit acres.

solution based on the employment maximizing objective fails miserably, however, with the cropping intensity being 42.9 percent. The decision behaviour of the farmers appears to be governed by the income maximizing objective. On the other hand, forcing the employment maximization objective on farmers is likely to lead to underutilization of tilled land.

A comparative analysis of the cropping pattern brings to light further distortions in the land use pattern introduced by the employment objective. While the cotton crop, which enjoys a specialized market in the district, loses its share from 40 to 14 percent, the vegetable crop, with very poor marketing facilities, improves its share from around 1 percent to 18 percent.

Regional Disaggregated Scenario

Since rural households do not form a homogeneous group, it will be interesting to explore how far different groups of these households support the overall supremacy of the income maximizing objective. An examination by category of optimum solutions of income and employment maximizing objectives, given in table 3, tends to corroborate the overall supremacy of the income over the employment objective.

Table 3--Relative Economics of Income and Employment Maximization Objectives as per Optimum Solutions of the Regional Linear Programming Model, Surendrenagar, 1975/76, by Category

Selected Economic Aspects	Optimum Solutions	
	Income	Employment
A. Cultivator Households		
(i) Labour use (lakh labour days)	359.67	283.54
(ii) Income (rupees crores)	78.69	29.07
(a) Small cultivator households		
(i) Labour use (lakh labour days)	66.10	67.66
(ii) Income (rupees crores)	10.13	8.21
(iii) Gross cropped area (lakh acres)	1.73	1.73
(iv) Net sown area (lakh acres)	1.41	1.41
(v) Cropping intensity (percent)	122.70	122.70
(b) Medium cultivator households		
(i) Labour use (lakh labour days)	106.57	107.79
(ii) Income (rupees crores)	25.04	15.27
(iii) Gross cropped area (lakh acres)	5.04	3.23
(iv) Net sown area (lakh acres)	4.68	4.68
(v) Cropping intensity (percent)	107.69	69.02
(c) Large cultivator households		
(i) Labour use (lakh labour days)	187.00	108.09
(ii) Income (rupees crores)	43.52	5.59
(iii) Gross cropped area (lakh acres)	9.81	2.20
(iv) Net sown area (lakh acres)	10.60	10.60
(v) Cropping intensity (percent)	92.55	20.75
B. Noncultivator rural households		
(i) Labour use (lakh labour days)	21.27	20.29
(ii) Income (rupees crores)	4.15	1.04

However, when assessed in terms of the employment norm, the differentials in the optimal solutions of the objectives are marked in the case of the large cultivator group which is most sensitive to the change in objective functions. Under the employment objective, it puts under plough only one-fifth of its land (and that mainly under irrigated cultivation of vegetables and green fodder), hires no labour, and, thus, causes a steep fall in the income of labour households in the nonfarm category. The small cultivator is not as sensitive to change.

Lastly, both objectives suggest the need for land redistribution, although the need is more vividly brought into focus by the employment objective. Note the marked decline in cropping intensity as we move from the small to the large cultivator category. For a comprehensive treatment of the land distribution aspect of the regional programming framework see Singh (forthcoming), and for its resource development alternative as approximated by irrigation investment, see Singh (1978a).

To sum up, the disaggregated analysis by category reveals that as the mode of production becomes relatively capitalistic in nature (that is, as we move from the small cultivator category to medium and large cultivator categories), the two objectives, income and employment maximization, yield divergent solutions.

Concluding Remarks

In conclusion, it would not be too much to say in the light of our empirical analysis that the employment maximization objective, if rigorously implemented in dry regions, will adversely affect not only regional income but also regional employment. Thus, for drought prone regions, the objective of a growth strategy should be income, not employment maximization.

References

Fox, K. A.; Sengupta, J. K.; and Thorbecke, E. (1966) The Theory of Quantitative Economic Policy with Applications to Economic Growth and Stabilization. Amsterdam; North Holland Publishing Co.

Government of India (1978) Draft Five Year Plan, 1978-83. New Delhi; Planning Commission.

Singh, B. (1978a) Economics of irrigation: A regional perspective. Indian Journal of Agricultural Economics, 33 (4) 231-239.

Singh, B. (1978b) Integrated local level planning: Some empirical explorations. Ahmedabad, Gujarat, India; Sadar Patel Institute of Economic and Social Research.

Singh, B. (forthcoming) Planning for rural development: Economics of land redistribution, in Seminar on the Design of Backward Areas Development (Indian Economic Association). New Delhi; Vikas Publishing House.

OPENER'S REMARKS--Andre H. Brun

To maximize employment and income are two objectives which may diverge. This kind of question is obviously challenging and concerns not only developing countries but developed countries as well, whether or not they have market or centrally planned economies. We must thank Singh for attempting to tackle this problem in a very concrete and closely examined example--the Surendranagar district.

In the income maximization run, the results seem quite logical as tested by the land use pattern in the 1970/71 census. However, one distortion appears: farmers in fact grow jowar (millet), yet the model predicts groundnuts. But by and large, farmers seem to behave in such a manner as to maximize regional

income. At this stage one can raise the problem of aggregation. To behave in such a manner as to maximize regional income is not necessarily identical to an individual's income maximizing behaviour, even within the prevailing rules of the game reflected by the market prices and given technology.

What would the model predict if it were disaggregated into four submodels corresponding to maxima for each of the four social groups identified? What are the conflicts existing in the region which are not reflected by market prices and can interfere with individual and collective targets?

In the employment maximization run of the model, nothing has been changed in the matrix--only the objective function has been changed. To maximize employment without any consideration of or constraint on income is easy for the simplex procedure. But it is difficult for our common perception. It means that we must imagine a kind of productivity which would be a ratio between the work done (taken as output) and the costs implied by the labour input. It is equivalent to postulating that labour intensive activities are more productive than activities requiring more capital. In this case, it is clear that it is not always possible to use all the labour available in the regions since each labour day is associated with the consumption of other limited resources.

But, what is more difficult to understand from the very sketchy knowledge that we have of the model is that in maximizing employment the model could give an optimum in which the rate of employment is lower than the employment level obtained when income is maximized. The author agrees that since income is taken as unimportant, the model generates only a small cash flow for large farmers and, as a result, they cannot hire as much labour as when income is maximized. This would imply that the maximization process cannot occur. Something is probably impeding the process and forcing it to stop at some second best solution. It is necessary to identify this obstacle in order to be able to interpret this second best solution. This point is mathematical in nature, not behavioural.

RAPPORTEUR'S REPORT--Dinesh K. Marothia

The inherent deficiencies in the too simplistic linear programming model and the emerging conflicting conclusions were highlighted. The inherent deficiencies in the model include the static nature of input-output coefficients based on the existing factor endowments and market technologies. The policy implications under such a situation with regard to output, income, and employment issues were questioned as being seemingly conflicting (an aggregation problem). To explore the desirability of pursuing employment or income objectives, it is necessary to consider alternative production and marketing technolgies, resource endowments, and policy measures.