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AGRICULTURE - THE NEXT DECADE

By

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INDIAN INSTITUTE OF MANAGEMENT  
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Agriculture - The Next Decade\*

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Over the years the economic base of Indian society has not undergone a marked change. The bulk of our population continues to live in rural areas, and most of rural households still depend on agriculture and allied activities for their sustenance. In spite of a gradually declining share of agriculture in GNP, fluctuations in agricultural production materially affect the lives of even those who are not directly dependent on this sector for their livelihood. Mainly, it is because of the large share of expenditure on foodgrains in the consumer's budget and a substantial contribution by agricultural products in the raw material base of industries. Agriculture's net contribution to the export earnings is also not inconsequential. In a very real sense, our future hinges on this sector's capacity to provide surplus in terms of food and raw materials on the one hand, and opportunities for gainful employment and income generation to millions of households in the countryside, on the other. For any prognosis of future, the

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\* Key-note address to the First Conference on Futurology organised by the Department of Science and Technology and the Administrative Staff College of India, Hyderabad, December 30, 1979.

moot questions, therefore, are, What will be the demand for agricultural products? and, Do we have the capacity to satisfy these demands from domestic resources? Since we have to depend on the agricultural sector also for provision of jobs and incomes for millions of households, a further question is, Will the fulfilment of demand-induced targets of production automatically ensure fuller employment and larger incomes for the dependent households? If the answer is in negative, then, we have to spell out the policy and organizational options to ensure that a balance between demand and supply would also result in enhanced incomes for the agricultural producers.

In the following paragraphs we have attempted to answer these questions. The time perspective for this essay is not a distant future, but the coming decade. Too long a perspective takes us to the realm of speculation, rather than action. A shorter time span has the advantage that the relevant variables can be estimated in a more realistic manner and also policy instruments can be deployed to achieve the desired objectives.

## I

### Demand for Agricultural Products and Projected Deficits:

Several estimates have been made of the demand for food and non-food items for the coming decade as well as for the terminal year of this century. The factors taken into account while projecting

the demand are fairly well known. These include growth rate in population, growth rate in per capita income, distribution of the gross domestic product, estimates of income elasticities of demand for foodgrain and non-foodgrain commodities, trends in the use of foodgrains for feed and, possibilities of substitution of non-agricultural raw materials for agricultural raw materials. There is a broad agreement on the magnitude of several of these variables among scholars. There are, however, differences on certain aspects of future growth path, e.g., growth in per capita income and its distribution among various sections. Also, there are variations in the methodology used in these projections. I will not comment in detail either on the justification of the assumptions made by various scholars or the methodology used by them. Most of the estimates converge around the figure of 170 to 180 million tonnes of foodgrains for 1990 depending mainly on the assumed rate of growth of population and per capita income. On the demand for non-foodgrains the estimates are few, but these also are not very different from one another.

The estimates prepared by the International Food Policy Research Institute (IFPRI) may be regarded as typical; so also the assumptions underlying these estimates. The IFPRI has worked

out consumption targets for 1990 on the basis of four different assumptions.

1. Food needs to provide, at 1975 average per capita consumption levels, for the increased population in 1990.
2. Food needs under a low income growth assumption
3. Food needs under a high income growth assumption
4. Food needs to meet minimum calorie recommendations \*

For India, the IFPRI has maintained that the projected domestic demand for major staples would be 160.4 million metric tonnes at 1975 per capita level, 173.7 million tonnes with low income growth, 178 million tonnes with high income growth, and 195.5 million tonnes at 110 per cent of energy requirements. This means there is need to increase foodgrains production at an average rate of 3.3 per cent a year to sustain the market demand (with higher incomes growth) and at 4 per cent to satisfy 110 per cent of energy requirements.

As regards the non-foodgrains, both the National Commission on Agriculture and Planning Commission estimates would roughly indicate a growth rate of 3.5 per cent per annum for low per capita income scenarios and 4 per cent for high per capita variants.

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\* See Food needs of Developing Countries: Projections of Production and Consumption to 1990; International Food Policy Research Institute, Research Report 3; Washington, Dec. 1977, p.25-26.

If we are not postulating a major shift in cropping pattern from foodgrains to non-foodgrains or vice versa, then, the figures of 3.5 per cent per annum suggest the lower boundary and 4 per cent per annum suggest the higher boundary for growth in agricultural production to meet the domestic demand for agricultural commodities from country's own resources till the 1980s. This has to be contrasted with the current (1960-1975) rate of growth of nearly 2.5 per cent per annum. It is abundantly clear that mere projection of past trends will aggravate the demand-supply imbalance. Taking into account only foodgrains, the IFPRI study reports that projected domestic demand for major staples in 1990 would exceed projected production by 18 million metric tonnes with low income growth and 22 million metric tonnes with high incomes. Roughly double these amount would be required to fill the indicated energy deficit.\* The need for introducing some "supply-shifters" is, therefore, obvious.

## II

The Supply Shifters: The basic question to be answered in this context is whether it is feasible at all to raise agricultural

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\* *ibid*, p.76.

productivity from 2.5 per cent per annum to 4 per cent per annum and to sustain it for a period of time.

Various projections of future agricultural output are available. Most of these are based on certain assumptions on the availability of inputs like high yielding varieties, fertilizers, and irrigation as well as the nature of technology. Rarely the socio-economic assumptions are clearly spelled out or the coefficients used made explicit. A typical example is the NCA's projection of output, which is prefaced by the statement that the estimates are based "on the assumption that the crop would be grown in the most appropriate time and with the full backing of inputs like irrigation, seeds, fertilizers and manures, plant protection chemicals and that they will be grown on lands with proper tilth and inter culture of these soils made possible by use of ideal implements and tools". \*

Recently, a few studies have looked into the aspect of supply more carefully. Among these, the Planning Commission study is more helpful in this respect since it takes into account the principal yield-raising inputs and provides appropriate weights to them. \*\*

\* Report of the National Commission on Agriculture, 1976, Part III, pp.51-52.

\*\* "Agricultural Sub-model of Fifth Five Year Plan and the Perspective Periods - A preliminary Paper" in Studies on the Structure of Indian Economy and Planning for Development, New Delhi, May 1977, p.29-42.



The study examines the prospects of the expansion in irrigated area, increase in gross cropped area, expansion of <sup>arable</sup> area, and high yielding varieties and increase in the use of fertilizers. The impact of these factors on the growth of production is assessed in a realistic manner. The study concludes that the growth in foodgrains production during the Fifth Plan is likely to be around 3.6 per cent per annum while the rate of growth postulated for other field crops is around 4 per cent per annum. It is further assumed that with greater emphasis on irrigation and quality inputs, the growth rate in the agricultural sector is likely to accelerate in subsequent years.

One may agree with the projections of the Planning Commission as far as technical feasibility of achieving the set targets is concerned. But, production decisions in agriculture are made by millions of farmers. The factors influencing their behaviour are of crucial importance. They will be guided by economic incentives or disincentives; will be constrained by institutional arrangements in regard to land, water or credit; will be handicapped or facilitated by supportive services available. On these behavioural aspects, save in one area, we have very little to guide our analysis.

One aspect of the farmers' behaviour on which there is greater understanding is their response to price signals. There is enough

evidence to indicate that, other things remaining equal, farmers respond to price signals in a positive, and almost predictable, way. There are not many studies to indicate the influence of institutional and organizational framework on farmers' decision-making. It is for this reason that I am tempted to report on the findings of a study conducted at the Indian Institute of Management (Ahmedabad) as a part of the FAO's global project on "Agriculture Towards 2000 A.D.". \*

The study inter-alia aimed at assessing the relative role of technological and institutional variables in explaining changes in land productivity. Assuming that the expansion of arable area will be negligible, the study examines the prospects of agricultural output growth in terms of increasing yield per acre, by three types of policy interventions: 1) basic investment in inputs, such as fertilizers and irrigation, 2) public investment for technological change as embodied in HYV seeds, and 3) institutional factors like land reforms. The question posed at the outset was: "Are land productivity changes possible if each of the following factors is altered separately: a) land ownership distribution, b) types of tenancy, c) availability of modern inputs

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\* See, "Relative Roles of Irrigation, Fertilizers and Land Inequality Changes in Land Productivity" in, Income Distribution, Poverty and Nutrition Aspects of 2000 - An Exercise in India, (memo), Ahmedabad, April 1979, hereinafter referred as FAO/IIMA study, p.124-139.

like fertilizers and irrigation, and d) availability of superior technology as embodied in high yielding variety seeds."\* The study maintained that not only one would like to know the contribution of each of these variables, it is also important to assign the relative importance to each factor.

A simple model was conceptualized to examine cross-sectional variations in per hectare yield as a dependent outcome of the factors listed above. Agricultural production data for 56 agro-climatically homogeneous regions were utilised for this exercise. Because of the paucity of data, at the sub-regional level, the impact of land tenure and HYV seeds could not be assessed. The study was, therefore, confined to assess the impact of the per hectare availability of fertilizers, extent of irrigable land, and inequality in ownership of land. Results are summarized in table I. The relative importance of explanatory factors are provided in table II.

Some of the important conclusions of the study are worth underlining:

1) There still exists an inverse relationship between land productivity and inequality in land ownership which suggests that

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\* *ibid*, p.124-125.

Table I: Yield Regressions for All India 1971-72

Crop-Yields	Functional Form	Co-efficients for					Constant D	R <sup>2</sup>	'F' Value	Degree of Freedom
		X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	X <sub>5</sub>				
1	2	3	4	5	6	7	8	9	10	
1) Rice	L	18.40 (4.14)*	819.42 (2.66)*	-883.02 (-1.32)***	1186.53 (3.24)*	-	.518	17.17	48	
2) Wheat	L	4.69 (7.56)	1159.00 (2.26)**	-366.54 (0.36)	1077.64 (1.94)**	-	.171	3.24**	47	
3) Bajra	L	5.23 (1.36)***	345.86 (1.33)***	-67.58 (-0.14)	436.00 (1.64)***	-	.359	6.16*	33	
4) Jowar	L	15.41 (3.28)*	-154.28 (-0.51)	-1061.70 (-1.82)**	975.74 (3.05)	-	.288	4.85*	36	
5) Maize	DL	7.28 (3.08)*	-0.09 (-1.09)	-0.50 (-1.15)	5.87 (12.52)*	-	.196	3.51**	43	
6) Cotton	L	-0.05 (-0.03)	193.77 (1.85)**	176.13 (0.85)	-6.48 (-0.05)	-	.296	4.35*	31	
7) Groundnut	L	5.90 (1.05)	81.62 (7.23)	567.36 (0.85)	282.07 (0.78)	-	.225	3.38**	35	
8) Rapeseed and Mustard	DL	0.005 (0.07)	0.16 (2.54)**	-0.57 (-1.70)**	6.04 (17.50)*	-	.315	4.29**	28	
9) Sugarcane	DL	0.12 (2.93)	0.74 (0.99)	-0.16 (-0.57)	7.92 (32.84)*	0.52 (7.40)*	.651	22.42*	48	
10) Aggregate Agricultural output	L	22.71 (5.89)	440.99 (1.59)***	-907.78 (1.37)***	1140.00 (3.15)*	-	.627	24.64	44	

(cont d...)

Foot Notes to Table-I

- X<sub>1</sub> = Fertilizers (Kg. per hectare of Gross Cropped Area)  
 X<sub>2</sub> = Irrigation Ratio (Ratio of Gross Irrigated Area to Gross Cropped Area)  
 X<sub>3</sub> = Gini Ratio of Distribution of Owned Land  
 D = Dummy for Region; taking value of 0 for north and north-west regions and that of 1 for the other regions.

Figures in parentheses are 't' values.

- 1 = Excent for Aggregate Agricultural output all crop-yields are in kilograms per hectare. Agregate agricultural output of a given crop is evaluated at the same price to eliminate variation due to price differences in various regions.
- 2 = Those regions in which the concerned crop did not have significant place were dropped
- \* = Significant at 1 per cent  
 \*\* = Significant at 5 per cent  
 \*\*\* = Significant at 10 per cent  
 L = Linear  
 DL = Double Log

Table II : Ranking of Relative Contribution<sup>1</sup> of Explanatory Factors for Crop Yields

Crop Yields <sup>2</sup>	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	D
Rice	1	2	3	-
Wheat	2 <sup>NS</sup>	1	3 <sup>NS</sup>	-
Bajra	1	2 <sup>NS</sup>	3 <sup>NS</sup>	-
Jowar	1	3 <sup>NS</sup>	2	-
Maize	1	4 <sup>NS</sup>	2 <sup>NS</sup>	-
Cotton	3 <sup>NS</sup>	1	2 <sup>NS</sup>	-
Groundnut	1 <sup>NS</sup>	3 <sup>NS</sup>	2 <sup>NS</sup>	-
Repeseed and Mustard	3 <sup>NS</sup>	1	2	-
Sugarcane	2	3 <sup>NS</sup>	4 <sup>NS</sup>	-
Aggregate Agricultural Output	1	2	3	-

X<sub>1</sub> = Fertilizer Per Hectare (in Kilograms)

X<sub>2</sub> = Ratio of GrossIrrigated Area to Gross Cropped Area

X<sub>3</sub> = Gini Ratio of Owned Land

D = Region Dummy taking Value of D<sub>0</sub> for North and North-west regions and that of 1 for the rest.

NS = Regression Coefficient is not significant.

1 = This is judged by computing beta coefficients, since the size of the regression coefficients which are measured in different units cannot be compared. They may be made comparable by computing beta coefficients as follows:

$$B_k^* = \hat{\beta}_k \left( \frac{S_{X_k}}{S_{Y_i}} \right) \text{ where } \hat{\beta}_k \text{ is the estimated net regression coefficient for } k^{\text{th}} \text{ variable, } S_{X_k} \text{ is the standard deviation of the } k^{\text{th}} \text{ variable and } S_{Y_i} \text{ is the standard deviation of } i^{\text{th}} \text{ dependent variable (For details on this see, } \underline{\text{Methods of Correlation and Regression analysis. Ezekiel \& Fox, Ch.12 Third Edition.})}$$

2 = Crop yields are in Kg. per hectare for all crops except for aggregate agricultural output which is in rupees per hectare.

the programme of land redistribution in favour of small farmers would contribute to increasing per hectare yield. This would particularly be the case for rice, jowar, rapeseed and mustards and aggregate agricultural output for which the indicated relationship between land productivity and inequality in land ownership is statistically significant.

2) However, crop-wise yield as well as aggregate yield is explained more by the variations in one or both of the two surrogate variables of technology, namely, fertilizers and irrigation, rather than by the inequality in land ownership.

3) In six of the 10 crops the per hectare availability of fertilizers contributed maximum in explaining the variations in per hectare yields. For three other crops irrigation ratio (i.e., irrigated area as a proportion of gross cropped area) emerges as the most important variable explaining per hectare yields. In the remaining crop, i.e., sugarcane, the regional/<sup>i.e. locational</sup> factor was the most important variable. \*

These findings imply that although reduction in land ownership inequality would in itself contribute to increase in land productivity, an increase in the availability of fertilisers and

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\* *ibid*, p.135.

irrigation would make relatively a larger contribution.

The conclusions arrived at by this study, especially the 1 one, has important policy implications. While reduction in inequality in land holdings is an important contributory factor, the most important is the availability of fertilizers and irrigation. Since the availability of fertilizers and credit, and also irrigation - except the irrigation provided by public sources - is positively related to the size of holdings, these findings allow a different perspective on reduction of inequality in land holdings. It is suggested that a more desirable course is the grouping of tiny holdings rather than concentrating exclusively on breaking-up of large holdings. In other words raising the floor of holdings is as important as lowering the ceilings.

Our land reform legislations have emphasised on the former strategy keeping the distributional aspects in the centre. I have shown elsewhere that the process of breaking-up of large holdings was also helped by the demographic and market-induced factors.\* Precious little has been achieved by way of integrating tiny holdings, i.e., bringing together the small and marginal holdings as coalitions of similar interests. Since this has not been attempted,

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\* V.S. Vyas, "Mainsprings of Agricultural Growth in India" Fane Memorial Lecture, New Delhi, August 9, 1977.



in spite of several organizational experimentations, a proper interface between the delivery systems and recipient systems could not be achieved. The infructuous efforts in mid-'50s and early-'60s to organize co-operative farming have set/clock back. We have not examined seriously the other forms of integrative arrangements to impart benefits of scale to the small and marginal farmers. Unless serious efforts are made to organize small and marginal producers as viable economic units, the attempts to generate surpluses of the order indicated by the growing requirements for food and non-food agricultural commodities are not likely to succeed.

### III

Impact on Poverty: It is clear from what I have said earlier that technologically it is feasible to raise the rate of growth of agricultural output from the current 2.6 per cent to the desired 4 per cent per annum. But there are institutional and organizational constraints which cannot be wished away. But these are not insurmountable.

Normally, one would have assumed that with such a rise in production and consequently in incomes the poverty problem could have been effectively tackled. However, it is not to be. Although with the projected growth in agricultural production the proportion of poor in the population will decline, a hard core of poor households will still persist. It was brought out in the FAO/IIMA study cited earlier that if the postulated increase in the rate

of growth in production is uniformly shared by all classes of land holdings, the percentage of people lying below poverty line in rural India will fall from 61.92 per cent in 1971 to 31.78 per cent at the end of this century. Even a 30 per cent increase in the share of marginal holdings, i.e., those operating less than a hectare of land will not make material difference in this situation. The proportion of poor households in that case will be reduced to 30.12 per cent. \*

The situation turns out to be so hopeless because of the existence of a large number of landless labourers, marginal farmers and very small farmers. A significant improvement in the rate of increase in output also does not yield, in absolute terms, adequate amounts to raise these households above the poverty line. As in several other studies on poverty, in this study also a minimum calorie intake, in this case 2250, is taken as the cut-off point. In rupee value it turn out to be Rs.33 per capita per month for rural areas in terms of 1970-71 prices. Some scholars have seriously questioned calorie intake being considered as an indicator of poverty.\*\*

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\* FAO/IIMA study, pp 67-82. It should be noted that FAO/IIMA study directly estimates agricultural incomes, i.e., income from crop-raising and agricultural wages, of the rural households. The non-agricultural income is imputed as the difference between the agricultural incomes and total consumption expenditure as suggested by the NSS rounds. These estimates, therefore, are not very firm.

\*\* see, for example, C.H. Shah, "Food Preferences and Nutrition: A Perspective on Poverty", Presidential address, Thirty-Ninth Indian Agricultural Economics Conference, Bangalore, December 18, 1979.

in my judgement

They do have a point. However, the Rs.33 as the minimum desirable income, per capita per month, is a realistic amount to distinguish poor from the non-poor. The per capita incomes of two most disadvantaged sections, namely, landless labourers and marginal farmers (in 1971) was estimated at Rs.21.33 and Rs.21.07 respectively. This calls for very large increases in the incomes of these groups to enable them to cross the poverty line. Looking to inconsequential share of the small and marginal farmers in agricultural production, productivity on their holdings have to increase manifold to yield the minimum desirable income. As was mentioned earlier, even an increase of 30 per cent in their share of aggregate agricultural production is not going to generate adequate incomes to resolve the problem of poverty of these households.

Besides, increase in production on the marginal and small farms implies a trade-off between the share of marginal and small farmers on the one hand and landless labourers on the other. Since wage component in total production cost on the last two categories of holdings is small compared to that on "other farms", the increase in production on the former category of holdings does not benefit the landless labourers in the same proportion.

Whatever assumptions one may make on the rise of agricultural productivity, so long as a very large section of rural producers are cultivating miniscule holdings, agricultural activity

alone is not going to resolve the poverty problem in rural areas, not at least as far as the bottom one-third of the households are concerned. If these households are to be lifted above the mire of poverty, we will have to carefully examine other available options.

## IV

Available options: It will be readily agreed that in the near future organized industrial sector cannot provide gainful employment to a sizable number of work force from rural areas. Given the size of the organized industrial sector, the composition of products, and the labour component in the technology, an increase in industrial production by any realistic rate is not likely to make a dent on the rural labour surplus. Less than 8 per cent of work-force was engaged in the modern factory sector in 1961. This proportion did not change in any material sense by 1971. As regards capital intensive nature of the factory sector it is germane to quote the Planning Commission's figures. Reviewing past performance, the draft Fifth Plan pointed out, "Between 1961 and 1976, in the modern factory sector, investment increased 139 per cent and output 161 percent but employment increased only 71 per cent. Therefore, employment per unit of gross output decreased by 34 per cent and employment per unit of capital declined by 28 per cent".\*

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\* Draft Five Year Plan, 1978-83, Planning Commission, Government of India, New Delhi, p.82.

While postulating future change in the sectoral distribution of work force, the plan document has further maintained, "Even if this absorption is miraculously doubled by a phenomenal growth in large scale industry and public service, it would not employ more than 20 per cent of the annual increase in our labour force".\* In this regard India's experience is not much different from other developing countries. After reviewing the experience of a number of countries, the World Bank has come to a similar conclusion, that, "While industry and primary production account for equal shares of total output when the economy reaches an income level of just under US \$ 700 per capita, parity in labour force shares is not achieved until average income is more than twice that level".\*\*

One is inclined, therefore, to agree with the Planning Commission's projection on the sectoral distribution of work force which suggests that a bulk of the rural force would continue to depend on agriculture till the end of next decade. It is clear that at the end of 1980s, the organized factory sector will be able to absorb, in percentage terms, only a marginally larger work force. We will have to search for other alternatives to provide income earning opportunities to the rural poor.

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\* *ibid*, p.103.

\*\* World Development Report, 1979, The World Bank, Washington, D.C. August 1979, p.45.

In the current discussion on planning, much hope is placed on the small rural industries. Undoubtedly, this sector can make an important contribution in raising the incomes of the rural poor, but it will be unrealistic to assume that it will provide a substantial scope for gainful employment to them.

This is because of two reasons. Firstly, the base of rural small and household industries is too narrow and hence the needed rate of expansion too large to make these the main instrument for fuller employment at least - in the near future. For the country as a whole, according to 1971 census, only 3.21 per cent of rural work force was engaged in household industries and another 2.29 per cent in 'other than household industry' - in all about 5.5 per cent - against 84.8 per cent in agriculture. It is clear that for the next decade the rural industries sector will not be able to contribute in any major way in changing the occupational structure in rural India. It may be interesting to note in this connection that there has been a net decline in the proportionate absorption in this sector in 1971 compared to 1961, (from 7.6 per cent to 5.5 per cent). These facts should make the advocates of rapid industrialization more sober.

Besides, several writers have questioned the economic viability of this sector. After a critical analysis of the data collected under NSS

(29th round) on non-agricultural industries in rural areas, Prof. B.V. Mehta has concluded that, "The level of economic activity of the enterprises in this sector presents a disquieting picture which makes the task of putting them on a reasonably sound economic footing truly herculean". \*

Foot-loose landless agricultural workers have a tremendous scope for gainful employment in infrastructure building activities. The activities will also strengthen the base of agriculture, particularly small farm agriculture. We have discussed this aspect in greater detail elsewhere. \*\*

For the marginal and small farmers the basic thrust in the coming decade should be on enterprises supplementary to agriculture.

There are three principal reasons for pursuing this strategy. In the first place, the demand for these products namely milk, eggs, meat, vegetables and fruits is highly income elastic and, therefore, they will not suffer from a demand bind with the increased production. Secondly, these are all labour intensive products and, therefore, an increase in their output would give rise to more

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\* B.V. Mehta, "Industry and Employment in India", Presidential address delivered at the 11th Annual Conference of Gujarat Economic Association, Bhavnagar, November 10, 1979, p.16.

\*\* see, V.S. Vyas and George Mathai.

than a proportionate increase in labour absorption. Finally, a large bulk of peasantry in this country, including the marginal and small farmers, is familiar with these enterprises. Already necessary skills exist, and these can be further perfected.

While projecting future agricultural production, generally three major constraints are postulated, namely, i) the scope for increasing multiple cropping is limited, ii) scope for increasing high value crops on small holdings is limited, and ~~iii~~ iii) scope for increasing labour component in input mix is limited. If these constraints can be relaxed, not only the overall growth rate can be lifted but the contribution of marginal and small farmers can also be made more substantial. Only by relaxing these constraints the economies of the marginal farmers can be made viable. In other words the future developmental thrust in the agriculture should be directed to 1) provide adequate infrastructure, which would include irrigation, to enable maximum use of the scarce land resources and a larger proportion of double and multiple cropping, 2) encourage such enterprises as would raise the value of output per acre, and 3) suggest such enterprises as would enable more productive use of the surplus labour on the small and marginal farms. Supplementary enterprises like dairying, poultry and horticulture and vegetable gardening fulfil all these conditions.

The most crucial factors for the success of this strategy are



a) provision of adequate infrastructure, in terms of communication, transport, credit and marketing, and b) an organization of the beneficiaries who can have a meaningful interface with the delivery systems.

Summing Up: It may be useful to highlight the major conclusions to which I have drawn your attention. For the coming decade the demand for food and non-food agricultural commodities would warrant a rate of growth of 3.5 per cent to 4 per cent per annum in agricultural production, the exact figure depending largely on the rate of growth of population and the GNP. For the foodgrains sector the demand can be predicted with greater confidence. At the end of 1980s it is likely to be in the range of 170 to 180 million tonnes. Technological capabilities to ensure the targeted growth exist. However, with the present distribution of holdings and consequently a very small share of production accounted for by a large number of small and marginal cultivators, an increase in production by 3.5 to 4 per cent per annum, even uniformly shared, will not generate adequate demand to sustain that production, nor will it eradicate rural poverty even by the end of this century. Even with 4 per cent per annum growth in agricultural sector, we will have 30 per cent of rural households below poverty-line in the year 2000. Besides, if the present structure of holdings continue any increase

in production above 2.9 to 3 per cent per annum will result in a glut, in spite of the fact that food and fibre requirements of a large number of household will go unsatiated.

To avoid this situation more purchasing power is to be injected among the low-income rural households. Increase in agricultural productivity, in the restricted sense of increasing the output of crop, is not a complete solution to this problem because of the initially low production base of the bulk of the farmers. Neither organized industry nor household and small scale industries can make a measurable contribution in diversification of occupational base in coming decade or so. For a majority of small farmers supplementary occupations, which produce high value products and at the same time are labour intensive, provide a feasible alternative. Such supplementary occupations are dairying, poultry, piggery, horticulture and vegetable gardening. These have added advantage as their products have high income elasticity and a large bulk of producers possess the modicum of skills to pursue them. The success of such a strategy basically hinges on two pre-conditions a) the creation of infrastructure facilities in the countryside, and organizing homogeneous groups of producers, particularly small producers, to impart them the requisite strength to interact with the delivery systems in a meaningful way. The coming decade will test our capacity to move in these directions.