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Focus

Focus

Agricultural Employment Planning in India

Yoginder K. Alagh

Progressive reduction of unemployment has been one of the principal objectives of economic planning in India. It has been envisaged that the growth of the economy would not only increase production but would also provide the capability for absorbing the backlog of unemployment and underemployment and a substantial proportion of additions to the labour force. The problem has been perceived as that of planning for an appropriate rate and pattern of growth. This paper attempts to trace development of agricultural employment planning strategies in India.

Yoginder K. Alagh is a former member of the Planning Commission and is currently a Professor in the Sardar Patel Institute of Economic & Social Research, Taltej, Ahmedabad - 380054. This article has been abstracted from the author's book, 'Indian Development Planning and Policy,' Vikas, 1991.

The approach to the Eighth Plan has a major focus on employment generation. It states:

"The new mandate rightly stresses the need to correct these distortions and to reorient development policy in such a way that it gives primacy to the immediate and urgent needs of the poor namely, employment opportunities to all at minimum wages and access to adequate means of livelihood and skills, as also supplies of food, education, health and child care services, and other basic necessities such as housing." (GOI, 1990 : 5)

Progressive reduction of unemployment has been one of the principal objectives of economic planning in India. It has been envisaged that the growth of the economy would not only increase production but also provide the capacity for absorbing the backlog of unemployment and underemployment and a substantial proportion of the additions to the labour force. The problem has been perceived as that of planning for an appropriate rate and pattern of growth. The solution to the problem of unemployment — and the poverty that goes with it — has to be found ultimately through a high rate of overall economic growth. Considering, however, the relatively low levels of income from which the economy has to be pulled up, it was recognised that there would be some leakage in the percolation effects of growth and, in any case, these percolation effects would not be sufficient to generate the required employment opportunities. It was, therefore, felt necessary in the different plans to have supplemental programmes for specific target groups/areas for employment creation, income generation and poverty alleviation. These have taken the form of direct employment programmes for providing seasonal employment to the agricultural labourers on rural capital works and beneficiary/target-group-oriented programmes of asset provision, input deliveries and marketing and credit infrastructure creation. The task is perceived as one of adopting a suitable structure of investment and production, appropriate types

of technology and mix of production techniques and organisational support which would help promote growth in productive employment. The following statement typifies the concern of the Planners for employment planning:

> "The rate and pattern of growth realised in the last 27 years has enabled the country to become one of the major industrial countries of the world with a significant record of import substitution, technological development and export promotion. But these achievements have been over-shadowed by the failure of achieved growth to reduce the unemployment problem. The awareness of this failure generated a new national commitment to make a determined effort in the next two Five Year Plans to eliminate unemployment. In the present Plan therefore, an attempt has been made to make radical changes in the pattern of investment and to initiate a technology policy which would stimulate labour absorption at a satisfactory rate." (GOI, 1978 : 81)

The intricate relationship perceived among output, investment patterns, policies like land reforms and regional development with employment planning is highlighted in the following prologue to one of the early technical discussions on the employment sub-model of the Indian plans:

> "The employment aspect of planning can only be conceived as a part of an output and income generation strategy and, in the rural context, as a part of the regional dimensions of production and investment possibilities. The Perspective Planning Division conceives of the employment aspect not only conceptually but also on its scheme of numerical calculations as integrated with the general inter-sectoral model of the economy and particularly the agricultural sub-model. As shown subsequently, the investment and production planning strategies as contained in both, provide the driving impulses for the employment strategy which is outlined below. Thus, policy variables, such as production levels in the organised sector of the economy and the input growth and production implications of the agricultural sub-model, in turn, get reflected in the employment generation strategies and, in fact, determine the employment results for the economy. In addition, for the employment generation aspects, numerical estimates of policy variables such as regional spread of investment and crop extension and more important, the land reform objectives of socio-economic policy, get translated into employment generation possibilities worked out on the basis of structural analysis of India's rural economy and its employment dimensions. "(Alagh, PPD., 1979 : 43).

In the conceptual scheme of plan modelling in India, the employment sub-model was prepared in the final version of the Fifth Plan and as the name implies, it was an add-on to the core planning models. (Alagh, et. al, 1979). In the Sixth Plan, however the employment calculations were a part of the core model calculations. (GOI, 1978).

Major Studies on Employment Planning

In the earlier Indian plans (e.g. the Fourth Plan, 1968/73), the employment content of plan schemes was estimated directly for each scheme. "Indirect" employment effects were added and total employment potential calculated. At the state, district and project levels, such procedures continue till date. In fact the Institute of Applied Manpower Research, sponsored by the Planning Commission has a wealth of studies estimating the manpower requirements of various plan projects and considerable expertise in this area. The Committee of Experts on Unemployment Estimates (Dantwala Committee)of the Planning Commission (GOI, 1970) which examined in depth the methodology for arriving at the aggregate estimates of employment/unemployment, pointed out the futility of making uni-dimensional estimates and recommended, *inter alia,* that studies should be undertaken to measure unemployment on the basis of different activity status categories, taking into account such distinguishing characteristics as region, rural-urban residence, status or class or workers, age and sex, industry, occupation, educational attainments and also seasons.

The International Standards on Employment and Unemployment Statistics were set at the Eighth International Conference of Labour Statistics (ICLS, 1954). These standards were modified to some extent in 1966 and thoroughly revised at the 13th ICLS (1982). The International Standards are very similar to those recommended by the Indian Experts in 1970. Adopting the recommendations of the Dantwala Committee, the National Sample Survey Organisation (NSSO) in its 27th round (1972/73) launched a large scale employment-unemployment survey along with the consumer expenditure survey — both the surveys were conducted in the same sets of households. Since then, these two subjects of enquiry have been taken together, once in every five years. The second quinquennial survey (NSS 32nd round) was undertaken during July 1977-June 1978. The third quinquennial survey on the same pair of subjects was conducted by the NSS in its 38th round during the calendar year 1983 and the fourth in 1987-88 (43rd Round).

In all the quinquennial surveys, the main objective was to measure the nature and extent of employment and unemployment in quantitative terms, disaggregated by meaningful correlates, such as sex, age, education, residence, status, etc. To achieve this objective the attempt in all the

three surveys was to classify the population of age 5 years and above and belonging to different activity categories adopting three different approaches, namely:

(i) *usual status approach* with a reference period of 365 days preceding the date of survey.

(ii) *current week status approach* with a reference period of 7 days preceding the date of survey, and

(iii) *current day status approach*, reference period being each day of the 7 days preceding the date of survey.

Based on the data collected through the three approaches adopted by the NSSO in its quinquennial surveys on employment and unemployment three different estimates of employment and unemployment, are obtained for the population of 5 years and above. The three estimates are:

(i) number of persons usually employed/unemployed,

(ii) number of persons employed/unemployed on an average in a week; and

(iii) number of persons employed/unemployed on an average in a day.

composition of Labour Force

The sectoral composition of the labour force, which had remained constant at around 73 per cent in agriculture is now changing. The constancy of this rate had been emphasised in a plan document in which the employment chapter was widely attributed to the late Prof. Raj Krishna. "It is a historically unique fact that over the last decennial Censuses, in spite of impressive development of the large-scale manufacturing and infrastructure sectors, the share of agriculture in the workforce has not diminished at all. It was 73 per cent in 1921, 73 per cent again in 1961 and 73.8 per cent in 1971. The figure for 1971 is in fact slightly higher than for 1961. In almost all countries economic development is associated with a significant decrease in this share. Even during the decade 1965-75, the share declined in 13 Asian countries. But in India a fairly rapid growth in the non-agricultural sectors in the last 25 years of planned development has completely failed to make any noticeable impact on the industrial distribution of the workforce". (GOI, 1978 : 82). The latest figures, however, show that there has been a dramatic change in this constancy. The share of male agricultural workers dependent on the agricultural sector has fallen from 83.2 per cent in 1972/73 (NSS 27th Round) (Table 1) to 75% per cent in 1983/84 (NSS 38th Round) and 74.5 per cent in 1987/88. The results of the 1981 census had also indicated this trend as emphasised in a recent study by Sheela Bhalla and it is best to quote her on the subject:

"It will be argued that, on the employment front, the most exciting thing that has happened in India in the past 50 years is the 3.9 per cent fall in the share of male agricultural workers (cultivators plus agricultural labourers equals agricultural workers) in total male workers, recorded by the 1981 Census," and again, "now 3.9 per cent does not look like a very big shift in percentage terms, but in India it represents an awful lot of people — roughly 6,800,000 male workers. More important, for the sake of people who remain in agriculture, and for the economy as a whole, this shift, which at long last brings the direction of the trend in the employment structure into line with that of the output structures, may have many positive implications."

Table 1. Usually Employed Persons by Industry (Percent)

Sector	Round and Year	Rural		Urban	
		Male	Female	Male	Female
1	2	3	4	5	6
Agriculture	27(72/73)	83.20	89.70	10.70	32.80
	33(77.78)	80.60	88.10	10.60	31.90
	38(1983)	77.50	87.50	10.30	31.00
	43(87/88)	74.50	84.70	9.10	29.40
Industry	27(72/73)	6.50	4.90	28.70	25.80
(Manufacturing	33(77/78)	7.10	6.10	29.60	30.20
and Electricity)	38(1983)	7.80	6.70	29.10	27.50
and Mining	43(87/88)	8.40	7.30	28.40	28.00
and Quarring					
Services, Trade,	27(72/73)	10.30	5.40	61.30	41.40
Transport and	33(77/78)	12.30	5.80	59.80	37.90
Construction	38(1983)	14.70	5.80	61.60	41.50
	43(87/88)	17.10	8.00	62.50	41.60
Total	All rounds	100.00	100.00	100.00	100.00

Source: GOI, NSSO, 1990 : 101.

Rural labour has been studied in India in some cases in considerable detail. (Alagh, et. al., 1979). The impact of differential agricultural growth has been noted in explaining migration; in particular the role of factors like irrigation and the spread of the new technology. More recent studies attempt to measure the impact of migrant labour itself on agricultural economic outcomes. But systematic studies of rural/urban migration and intersectoral shifts in the labour force are fewer. In fact as noted above intersectoral shifts in the labour force are only now being emphasised while earlier studies had generally underlined the phenomena of constancy in sectoral shares. In view of the trends discussed above the whole question of inter sectoral shifts in the labour force is a matter of considerable empirical and policy details and needs to be studied on a more extensive scale than earlier.

Demand for Labour

Demand for agricultural labour has been extensively studied in India. Farm management data has been analysed to estimate crop-wise labour demand, as also the role of complementary and substitute inputs. (Mehra, 1976 and Vaidyanathan 1978, 1986). Mehra (1976) has estimated the impact of commercial crops and irrigation on increasing labour intensity on land and other studies have tended to corrobrate her findings. Thus, even when the labour demand for a crop goes down on account of the new technology (for example, generally labour person day use in high yielding paddy or wheat has been measured lower than in traditional varieties) labour intensity per hectare rises on account of cropping pattern shifts and/or increase in cropping intensity. Most studies tend to measure the simultaneous nature of cropping intensity, HYV, irrigation and fertiliser impacts on employment. Vaidyanathan measures such impacts with farm level data. Macro estimates are as follows (Bhalla and Alagh, 1981) :

(i) Districts in which Crop Output grew by 3% compound per annum or higher in the period 1962/65 to 1971/73 (N = 100)

Lab = –4.47	+1.83 GCA	+ 0.22 Fert	- 0.16 Trac	R^2=0.58
NAS (3.10)	(6.16) NAS	(6.62) NAS	(5.36) NAS	

(ii) Districts with Crop Output Growth 1.5 to 3.0%

Lab = –6.94	+ 2.32 GCA	+ 0.23 Fert	–0.10 Trac	R^2=0.67
NAS (3.85)	(6.17) NAS	(6.14) NAS	(2.16) NAS	

As regards the factors substituting labour in agricultural operations, Vaidyanathan has examined the impact on the demand of labour of substitutes like bullock power and machines and relative prices. In general at the current stage of agricultural development, mechanical power, including tractorisation is seen as a substitute to demand for labour, although in some highly developed areas while tractors are treated as complementary, harvestor combines are seen as substitutes. (Binswanger, 1978; NCAER, 1980). Also there is a strong tradition of empirical studies which estimate an inverse relationship between labour intensity and size of the farm. (Bardhan, 1977) The micro studies referred to above are a sample of the rich literature on employment aspects of Indian agriculture. The final version of the Fifth Five Year Plan had a quantitative framework of agricultural employment which put together output, complementary and substitute inputs, farm size and regional effects on the demand for labour in the agricultural sector. It was argued that:

"The employment strategy being advocated for the Fifth Five Year Plan and the period beyond consists essentially of three components. The first component is the integration of the employment strategy with the production planning aspect of the rural economy. The second aspect, related with the first, consists of a special policy focii on the regional spread of the development effort and careful examination of the growth and employment behaviour in the process of the modernisation of the rural economy. The third consists of special focus on the employment implications of institutional change in the rural sector, particularly the relationship between security of tenure for small and marginal farmers through land reform policies, the strengthening of the production capabilities of a section of the rural economy and the relationship of such policy instruments with the strategy of employment generation in the rural sector".

The results of the National Sample Survey 27th Round were analysed particularly for the first sub-rounds. The data was processed at the level of an NSS region. The NSS regions were formed in the early fifties after careful studies of the details of socio-geographic characteristics at the sub-regional levels. The results indicated that for the country, as a whole, as examined through sub-regional data, the employment elasticities with respect to output were negative. Thus, a percentage increase in employment per hectare of land tends to fall with a percentage increase in output per hectare. (It may be noted that this does not imply falling aggregate employment since output and cropped area would expand). The relationship of employment per hectare with irrigation variables, such as pumpsets installed per hectare or gross irrigated area, however, was strongly positive. For the country as a whole surrogate variables for the new technology like fertiliser inputs per hectare, tractors per hectare and the gross value of assets per hectare, also showed negative elasticities. A significant feature estimated from these studies, however, was the fact that employment per hectare or employment per rupee of output, was strongly associated with and showed significantly positive elasticities with respect to percentage of land operated in farms consisting of 5 acres or less. Thus, in those NSS regions in which the total proportion of land in small farms (2 hectares or below) was high, the employment implications were strongly positive. Employment elasticities with regard to variables like output, fertiliser consumption etc., under different situations are given in table 2. The elasticities for the preferred case used in the Fifth Plan are given in table 3.

It was decided to explore these results in a decomposed fashion. The national rural economy was broken into two sub-segments. The first segment consisted of approximately 25 per cent of the NSS regions, and included those areas in which the gross value of output, gross irrigated area as a percentage of total gross cropped area and fertiliser input per hectare, was significantly above the national average. This segment of the national economy included the commercialised agriculturally developed part,

Table 2. Ranges of Rural Employment Elasticities

Sl. No.	Variables	All Regions	Developed Regions	Underdeveloped Regions
1.	Output/hectare	(-)0.95 to (-)0.97	(-)1.86	0.33 to (-)0.70
2.	Fertilisers/hectare	(-)0.17 to (-)0.21	0.58 to (-)0.32	(-)0.12 to (-)0.33
3.	Tractor/hectare	-	-	(-)0.10 to (-)0.18
4.	Electric pumpsets/ hectare	0.12 to 0.18	0.09 to 0.12	-
5.	Oil engines/hectare	-	-	-
6.	Elect. pumpsets and oil engines/hectare	0.14 to 0.10	-	0.24 to 0.09
7.	Value of assets/hectare	(-)0.21 to (-)0.32	(-)0.52 to (-)0.56	(-)0.18
8.	Irrigated area/hectare	-	-	(-)0.20 to (-)0.12
9.	Food grain output/ hectare	(-0.45) to (-)0.30	- -	- (-) 0.61 to
10.	Non-food output/hectare	(-)0.17 to (-)0.19	-	0.53
11.	Area operated (inequality)	0.31	0.29	0.22

Source: Alagh, et al. (1979), : 46.

Table 3. Rural Employment Elasticities of Labour (on Person-day Basis) Per unit of Output for the Preferred Case

Sl. No.	Variables	All Regions	Developed Regions	Underdeveloped Regions
(1)	(2)	(3)	(4)	(5)
1.	Output/hecare	(-)0.973	(-)1.861	(-)0.673
2.	Fertiliser/hectare	-	0.578	(-)0.173
3.	Tractor/hectare	-	-	-
4.	Electric pumsets/hectare	0.085	-	0.152
5.	Oil engines/hectare	-	-	-
6.	Electric pumpsets and oil engine/hectare	-	-	-
7.	Value of assets/hectare	(-)0.237	(-)0.553	-
8.	Irrigated area/hectare	-	-	(-)0.120
9.	Area operated (inequality)	0.465	0.401	0.406

Source: Alagh, et. el. (1979) : 46.

while the remainder consisted of the traditional rural economy. This decomposition was considered essential to examine the employment implications of planning strategies. The results were broadly along the lines enumerated earlier, apart from the fact that in the commercialised regions, fertilisers applications per hectare also showed a positive relationship with employment per hectare and employment per rupee of output.

The Fifth Plan argued that the major conclusions from the then available data on rural employment when examined simultaneously with data on output and associated inputs for the rural economy, such as fertilisers, tractors and irrigation. For the country, as a whole, rural employment tends to be strongly associated with the increased provision of irrigation facilities. In commercialised regions, such association was also co-terminus with fertiliser application, which was a surrogate for the application of the new technology. Generally, factors such as output per hectare and investment variables like tractorisation showed negative elasticities with regard to employment. However, a powerful result obtained was the strong association between higher employment elasticities and the success of the land redistribution variable namely the proportion of the land operated in farms equal to or less than five areas.

The upshot of this analysis was that in a theoretic sense Tinbergen policy irrigation and cropping intensity were policy variables mapping not only the output, but also the employment objectives of Indian development policy. Thus, "the growth of output per hectare, irrigation facilities, fertilizers application per hectare and related variables, were taken as set in the agricultural planning strategy and the employment implications of these changes estimated for the rural sector". (Alagh, et.al., PPD., 1979 : 47). But unlike later employment planning models, which postulated that agricultural employment would grow faster than output (employment elasticity "Optimism"), the Fifth Plan model relying on econometric estimates discussed above was far more conservative on the employment generation possibilities of output expansion. Thus, "while employment opportunities were generated through a production planning strategy by the agricultural sector, they were not enough to absorb the additions to the labour force and the backlog inherited at the beginning of the Fifth Five Year Plan". (Alagh, et.al. PPD : 47 compare with GOI, 1985,).

Given the estimates discussed earlier, Indian development policy postulated that a regionally disaggregated agricultural development strategy and a policy focus on land reforms, were essential components of employment strategies. Thus "the second policy focii which has to be underlined for employment generation in the rural sector is the sub-regional dimension of the agricultural planning strategy. It is postulated in the Fifth Five Year Plan that the agricultural regions, which are underdeveloped, shall grow at a rate which is 10 per cent higher than the aggregate growth rate of the national agricultural economy. This postulate is substantiated by the fact that regions, which are at present underdeveloped, shall be provided irrigation facilities in the Fifth and the Sixth Plan periods. Funds are also being provided for the strengthening of the extension mechanism for this purpose. A concerted drive is also being made to spread fertiliser application to selected

regions which have the pre-requisites of assumed irrigation and the extension mechanisms. Given the analysis indicated above, the output generation and input provision facilities being postulated separately for the developed and underdeveloped regions, were related with the employment generation aspects of the Plan. It was established that the decomposition of the national rural economy into the two sub-sets added significantly to the employment generation possibilities of the planning focus for the agricultural sector". (Alagh, et. al., 1979 : 48). And again, ".....studies in the Planning Commission suggested that if in a phased manner for the country as a whole, additional 10 per cent of the operated area is transferred to small farmers either through proprietory rights or through secure tenurial arrangements by the end of the Sixth Five Year Plan and if adequate production support is provided to such farmers through the general agricultural planning effort, particularly through the special programmes such as the Small Farmers Development Agency (SFDA) and Marginal Farmers and Agricultural Labourers (MFAL) programmes, India can look forward to the successful achievement of the objectives of providing adequate and viable rural employment possibilities for the rural labour force". (Alagh., et. al., 1979 : 48-49).

In the Sixth Plan, the method of estimating the elasticities using data which was subject to macro control checks (NSS data for regions/States is consistent with all India totals) was substituted by data available from micro studies (GOI, 1981). After detailed scrutiny of the data available from these sources, it was found that the data of Comprehensive Scheme which was introduced in 1970-71, was the most representative and up-to-date. The self weighing design of this scheme which automatically gave weightage to varied relationships between the size of holdings and labour inputs was a great advantage. Since the samples for the study were based on the stratification with reference to cropping pattern, rainfall pattern, soil types, etc. these also enhanced the reliability of the estimates of labour inputs. However, the data did not allow disaggregation for HYV, local irrigated and unirrigated cultivation practices. Therefore, in the Planning Commission, through the Comprehensive Scheme data formed the basis for getting a composite labour coefficient for each principal crop separately, the disaggregation for irrigated and unirrigated areas was done on the basis of data made available from earlier Farm Management Studies. It was assumed that the relationship between labour inputs in irrigated areas and unirrigated areas as observed in the Farm Management Studies would remain stable.

The Seventh Plan followed the methodology of the Sixth Plan. (GOI, 1985). Only the employment capsule was no longer in the core model, but was again a sub-model. The instrumental aspect of land reforms was given up in the formal employment models in the Sixth and Seventh Plans. Also since numerical coefficients were not published, it is not possible to comment on the details of the work.

Employment Elasticity Controversy

There has been surprisingly little discussion on the employment methodology contained in the Fifth, Sixth and Seventh Plans in the technical literature. The Plans, however, relied on both the improved data base available and as noted earlier, the structural analysis conducted by experts in the field. Both Tyagi (1979) and Dantwala (1979) argued that employment elasticities in the Fifth Plan were low. In correspondence with Prof. M.L. Dantwala, the present author has commented on this controversy as follows:

> "You had earlier pointed out in the EPW that was arguing in some of my work that the employment elasticity in Indian agriculture is negative and you felt that this needed to be examined closely. Later, D.S. Tyagi taking a clue, critically reviewed these findings in the journal published by the Institute of Development Studies at Sussex. My position is that a positive elasticity of employment with respect to output in an aggregate sense is perfectly compatible with a negative elasticity of employment with respect to output, provided in the latter both employment and output are normalised with regard to land. This follows from the rather simple proposition that the total productivity curve per unit of land even in text books rises and levels off at a certain stage, while over the relevant range, the average productivity and marginal productivity curves fall. It is this basic point that Tyagi had missed in his critique. The PPD work with which I was associated at the time of formulation of the final Fifth Five Year Plan was in terms of employment per unit of output or employment per hectare of land being explained by independent variables like proportion or irrigated area, fertilizer per hectare, proportion of area under commercial crops, growth of agricultural productivity and proportion of land available to small farmers. In fact, in a numerical example I had also shown that with output, crop area and irrigated area rising, even with negative elasticities w.r.t. output, the land augmentation effect would lead to the growth of agricultural employment for the mid and early eighties. Personally I believe that working with average productivity or a marginal productivity ratio is better because it structurally captures the demand for labour in a more detailed form and is statistically a better method. Purely from the econometric angle Tyagi's critique is highly suspicious because it has obvious specification errors, but as one gets older, mere technical differences become less exciting. The only point I wanted to clarify was that both the methods gave similar results. You are quite right in hinting that the aggregate elasticity of employment with respect to output will not be negative in Indian agriculture. This is not incompatible with my statement that the demand curve for labour will be downward sloping."

On the Sixth and Seventh Plan work, the critique has been the other way round. Tyagi and Dantwala had argued that in its Fifth Plan version, the Planning Commission was much too pessimistic in its employment projections. In the Sixth and Seventh Plans, on the other hand, the critique has been that the employment coefficients are much too optimistic. In particular it has been argued that additional employment is being estimated on the basis of falling productivity of labour. Kothari estimates that for the agricultural sector as a whole and particularly for non-crop sector the gross value added for standard persons year falls as shown in table 4 (Kothari, 1986).

Table 4. Employment and Productivity in Crop and Non-Crop Sector

	Agriculture					
	Crop Sector		Non-Crop Sector		Total Agriculture	
	1984/85	1989/90	1984/85	1989/90	1984/85	1989/90
1. Estimated Employment Million (SPY)	58.8	65.7	37.4	48.4	96.1	114.1
2. Gross Value Added (GVA) Rs. crores at 1984/85 prices	60603	68579	10694	12102	71298	80681
3. GVA per SPY Rs.	10307	10438	2860	2500	7419	7071

Source: V.N. Kothari (1986).

In fact there has been a remarkable consistency, both in aggregated unemployment rates in rural areas as well as the main features of the structural characteristics of rural unemployment. Male usual status adjusted unemployment rates in rural areas have remained within the range of 1.2 — 1.8%, current weekly rates being between 3.0 — 4.2%. Only daily current status rates which ranged between 6.8 and 7.6% in the period 1972/73 to 1983 are now reported at 4.6 in 87/88. (GOI, NSSO, 1990, p. 113). On structural features of the employment situation, Dantwala's brilliant survey article more than a decade ago (1979) still captures a lot of the literature since. No wonder then, the employment policies highlighted in the Eighth Plan, reiterate the discussion reported for earlier plans. These features are:

(i) a concern for widespread agricultural growth, particularly in backward areas ;

(ii) the use of land and water management strategies as a policy instrument relying on labour intensive methods of soil conservation, traditional water harvesting structures and improvement of canal systems,

(iii) concern for the small farmer, relevant agricultural and non farm employment in rural areas, and

(iv) organizational aspects of labour intensive decentralized development.

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Basic Needs

For a very long time we have been advocating and spending enormous sums fulfilling certain minimum needs of the rural population. It is generally believed that provision of clean drinking water, housing facilities, elementary education, minimum food requirements, electricity and roads would ensure a tolerable level of quality of life that would again ensure a hygienic environment in the rural areas. It would be interesting to take a stock of the status of accessibility of rural people to some of the basic amenities (table - 1). So far as the laying down of the objective of providing basic minimum needs is concerned, it is universally accepted that every effort should be made to accomplish this at least by the turn of the century. But in terms of achievements, it is disheartening to note that still hundreds of villages in the country do not have safe drinking water for millions of villagers. Deprivation of accessibility to drinking water on caste basis in villages adds one more dimension to this problem. On the literacy front, the achievement is not at all encouraging. At the all-India level, more than 60 percent of the population is illiterate with female literacy at an abysmally low level. Exceptions to this phenomenon are states like Kerala where there are districts which have achieved 100 percent literacy. The reason for this achievement can be seen in the sincerity with which the Kerala Government made huge allocations for education from the very beginning of planning. Neglect of this sector by many states has resulted in low literacy levels. We do find similar imbalances in the provision of health facilities for rural areas.

Table 2 shows the variations in per capita expenditure in development activities across states. Apart from this the more glaring imbalance is the wide gap between the rural and urban areas in the provision of many of the basic needs. If we consider efforts for providing food to the deprived class in the rural areas, we again come across certain exceptions like Tamil Nadu where "Mid-day Meal Programme" ensured availability of food to school going children and the aged. Andhra Pradesh also provides food through its programme of "Two Rupee Kilo Rice Scheme". Even though these schemes have undergone certain changes they remain exceptional and are not an all-India phenomenon. Since the experience in the recent past has left us with glaring imbalances in the provision of basic needs in the country, we have a huge task before us for the Nineties to fulfil the basic needs of the rural population.

Table 1 : Poverty and Village Amenities

State	Percentage of population below poverty line 1983-84	Percentage of villages served by water supply scheme 1985	Percentage of villages electrified 1987	Percentage of villages with all weather roads 1987	Percentage of villages with primary schools	Percentage of villages served by health facilities	Percentage of villages served by veterinary services
Gujarat	24.3	95.4	99.0	74.0	95.72	20.12	31.71
Haryana	15.6	80.5	100.0	99.0	98.88	31.26	71.58
Karnataka	35.0	99.9	98.0	33.0	94.86	51.78	53.47
Maharashtra	34.9	97.7	95.0	53.0	93.23	24.08	45.54
Punjab	13.8	90.0	100.0	99.0	98.96	50.30	77.80
West Bengal	39.2	74.7	60.0	41.0	96.60	36.09	44.69
Andhra Pradesh	36.4	99.6	92.0	43.0	90.02	31.56	49.89
Bihar	49.5	98.5	58.0	35.0	92.02	45.93	40.67
Kerala	26.8	98.7	100.0	100.0	99.69	78.43	81.52
Madhya Pradesh	46.2	98.5	71.0	23.0	85.76	20.56	37.41
Orissa	42.8	97.3	58.0	15.0	88.29	23.57	50.43
Rajasthan	34.3	89.2	65.0	21.0	81.33	31.79	17.20
Tamil Nadu	39.6	100.0	100.0	63.0	95.09	39.23	50.58
Uttar Pradesh	45.3	98.8	65.0	43.0	90.79	46.51	53.35
All India	37.4	93.4	73.0	41.0	90.12	35.48	45.19

Source : Government of Karnataka, (1989).

Full Employment Needs

This is an extremely important objective for realising rural development. The task of providing employment to growing rural masses particularly to the rural poor, has been a challenging one. Census data indicates the phenomenal growth in the population depending on agriculture and allied activities. The pressure on land has made it difficult to absorb the ever increasing number of unemployed in the rural areas. Estimates of unemployment (current daily status) obtained from NSS data shows that 12.34 million persons are unemployed in rural areas at the begining of 1990-91. One of the major tasks undertaken to solve the problem of rural unemployment has been to implement employment-oriented rural development programmes all over the country. The benefits of large scale generation of employment in the rural areas in recent times have been neutralised by the increase in the population. It is also necessary to note that funds allocated for these so called employment-oriented programmes are not fully utilised (table 3).

One of the major bottlenecks for bringing about change

of the process of economic development (Dantwala, 1986). Thus, regional imbalances in development, high pressure of population on land due to increased population growth and lower productivity levels are some of the important issues that need to be tackled by evolving an appropriate mechanism/approach in the coming decade to overcome the problem of rural unemployment.

People's Participation in Rural Development

The belief that growth alone would bring about changes in the socio-economic life of people stands discredited. We do not mean that growth will not result in any percolation effect at all, but the way in which the growth objectives have served only the rural rich has made the policy makers to seriosuly consider the need for adopting decentralised planning. The decentralised planning or the Panchayati Raj System is expected to bring in the much needed element of equity within the framework of development process (Government of Karnataka, 1989). It is hoped that these institutions would pave

system, we find that the decision making process is concentrated in such groups which do not seem to have much stake in the development of rural areas. This is evidenced by the fact that only 10 to 15 per cent of the amount spent reaches the so-called "target groups" under IRDP programmes. It is extremely important to overcome these leakages by means of transferring to people the power to decide about such planning and development activities which have a direct bearing on the life styles of the majority of the rural population. But there are divergent views on the timing of the transfer of power to the people. Some experts feel that transfer of power in the name of decentralised planning would be premature if people are not ready to shoulder such responsibilities due to lack of awareness of their rights and necessary organisational arrangements to carry out local level planning tasks. This argument may not sustain, in view of the fact that in many parts of the country we have not been able to reduce the massive illiteracy and it is also unlikely that we are going to make

Rural Development Strategies: The South Asian Experience

Kamta Prasad

Rural development is a subject on which the countries of South Asia can benefit substantially from each other's experiences. They share many common features in terms of agricultural-cum-rural character of their economies, pressure of population on land, dominance of subsistance farming, influence of monsoon on agricultural production and so on. Even the approaches and strategies for rural development followed in these countries exhibit good deal of similarities. This paper provides several examples of measures which have been adopted by more than one country.

Kamta Prasad is a Professor of Economics and Rural Development in the Indian Institute of Public Administration, New Delhi - 110 002.

Rural Development has emerged as a subject of major concern in all the countries of South Asia. And rightly so, in view of the pre-dominantly rural character of this region. The percentage of rural to total population is as high as 95 in Nepal, 85 in Bangladesh and above 70 in India, Pakistan and Sri Lanka. Agriculture provides the principal source of livelihood to above 70 per cent of population in most parts of this region. The percentage is substantially higher in Nepal, being 85. There is, of course, a trend towards urbanisation and industrialisation, but it will take quite some time before the rural background of this region is changed.

Rural development is also a subject on which the countries of South Asia can benefit substantially from each other's experiences. There is much that is common in their rural scenario both in terms of physical endowments as well as socio-economic milieu. Some of the more important among these common features, relevant to our discussion here, comprise the pre-dominantly agricultural-cum-rural character of their economies, pressure of population on land, dominance of subsistance farming, considerable influence of the monsoon on agricultural production, the ongoing transition from primitive to modern agriculture, socio-economic inequality in villages, inadequate infrastructure, a common colonial heritage, etc. Even the approaches and strategies for rural development followed in these countries exhibit a good deal of similarities. This paper provides several examples of measures which have been adopted by more than one country. This is partly the result of common features mentioned above and partly due to the influence of donor countries, international agencies and international academic centres which too have been more or less common.

The Development Initiatives

The need for socio-economic development in general and agricultural-cum-rural development in particular was realised by the new rulers who came to power in India, Pakistan and Sri Lanka after the end of foreign domination

around 1947-48 and in Nepal after the overthrow of the Rana regime in 1951. The then prevailing rural scenario was highly unsatisfactory, though it was much better in Sri Lanka and somewhat better in West Pakistan. All the countries of South Asia were faced with the problems of malnutrition and rising food deficits even though they were primarily agricultural. Hence, the new governments gave high priority to the objective of raising agricultural production. The lead in this was taken by India. The launching of its First Five Year Plan in 1951 started a systematic process of development. Agricultural production expanded though more on account of increases in area under cultivation than of growth in yield. Technological changes were few. Sri Lanka was another country which activated its agriculture and made it more diversified. On the other hand, agriculture in both the wings of Pakistan more or less stagnated during the fifties. It was only from 1960 that agricultural production in Pakistan (including Bangladesh) started increasing at a fast rate. The sixties, indeed, represent the most vibrant period of growth for both the wings of Pakistan. Agriculture in Nepal, however, continued to be sluggish.

A second major concern of policy makers during the fifties and early sixties was one of bringing about a more egalitarian rural society. The beginning of the fifties saw the abolition of the zamindari system in both India and Pakistan. Laws on land ceilings were also made in both countries. The ceiling limits, of course, varied. Despite political differences, these laws evoked more or less similar reaction in both India and Pakistan and have produced similar impact which has been marginal. However, unlike India, the sixties saw the then Pakistan raising the upper limit of holdings from 33.3 acres to 125 acres. Tenancy reforms were also attempted in India, Nepal and Sri Lanka. However, the success achieved was limited. Sri Lanka attempted a politically neutral strategy of peasant colonization which involved settlement of the peasants on state-owned land. Despite its high cost, this strategy is reported to have "a lasting impact on the problems of landlessness and unemployment" that prevailed in Sri Lanka, especially in the wet zone.

Overall development of rural life was another area of concern during the fifties in most of the South Asian countries. In 1952, India launched its famous Community Development (C.D) Programme. At about the same time, Pakistan, (both wings) also launched a similar programme based on community development strategy known as Village Agricultural and Industrial Development Programme. Both these programmes came to an end by about the same time in the beginning of the next decade. The impact produced was not much. Sri Lanka, too, experimented with a Tribhuvan Village Development Programme in Nepal launched in 1952 on the pattern of the C.D. Programme in India and met the same fate.

Another set of institutional reforms related to formation of local bodies in rural areas for performing limited functions as also one of encouraging the formation of different types of cooperatives was introduced. India's panchayat, Pakistan's basic democracies, Nepal's panchayat, Sri Lanka's Multi-purpose Cooperative Societies introduced in 1956 are examples of this type of strategy. Their impact too was limited.

The Technology Interventions

The mid-sixties saw the introduction of new agricultural technology in both India and Pakistan. Governments of both the countries introduced a package of policy measures covering research, extension, supply of subsidised seeds and fertilisers, credit, prices, marketing, irrigation facilities, etc. so as to facilitate its adoption. Based on HYV seeds, fertilizer and water, the new technology brought about phenomenal increases in production and productivity of wheat in the then West Pakistan and North West India. In Sri Lanka also, the period from 1965 to 1970 saw intensification of efforts in the agicultural sector resulting in the Green Revolution. The effect of HYV was quicker and more prominent in the case of wheat than in rice, which is the main crop of India, Bangladesh, Nepal and Sri Lanka. Consequently, the proportion of wheat in cereal output increased in the region. Rising production trends have been maintained in all countries since then. Consequently, both India and Pakistan became self-sufficient in foodgrains by the middle of the seventies. Sri Lanka also attained self-sufficiency in rice production towards the late seventies. Bangladesh and Nepal however, have yet to reach this stage. Increasing agricultural production has helped in the process of diversification of the rural economy and also development of rural infrastructure. Raising the wage rates and providing foodgrains at cheaper rates, has helped the rural poor also. However, it has increased personal as well as regional disparities. As is to be expected, its benefits have been derived more by better-off farmers and limited to better-off areas.

The Cooperative System

Meanwhile the Rural Development Academy at Comilla in East Pakistan (now Bangladesh) made an experiment in establishing a two-tier cooperative system with a network of primary farmers' cooperatives at the village level,

federated under a Central Cooperative Association at the lowest level of administrative unit i.e. Thana (now Up-Zila) in East Pakistan (now Bangladesh) and a Markaz in Pakistan. The objective was to involve farmers in increasing agricultural production through providing them training, credit and other inputs and services through the cooperative system. The initial success of this experiment led both Pakistan and Bangladesh to adopt the Comilla model for nationwise replication in 1972. And thus a new programme known as the Integrated Rural Development Programme (IRDP) was born. The programme, however, failed to pick up in Pakistan. Hence, it was terminated in 1978. The experience was different in Bangladesh where the Comilla Cooperatives have been established throughout the country and have been playing an important role in agricultural and rural development.

Area Development Programmes

While the Green Revolution helped in Overall expansion of agricultural production, it could not do much to relieve the distress in more backward areas within a country. To take care of this problem, a number of area development programmes were, therefore, launched in many of these countries from the beginning of the seventies. India introduced a special programme initially for the development of its drought prone areas. Subsequently, special programmes for the development of other backward areas like desert and hilly areas were also developed. However, being peripheral, these programmes have not produced much impact. A somewhat different and more general area development programme has been adopted in Bangladesh, Nepal and Sri Lanka. Known by region-specific Integrated Rural Development Project or Programme in Nepal and Bangladesh, and Integrated Rural Development Programme in Sri Lanka, these programmes aim at increasing production and income specially of the rural poor, improving the quality of services and developing infrastructure. A significant feature is the development of mutually supportive activities with a view to overall improvement. The programmes also strengthen the capacity of government agencies to make their services more effective and helps in removal of critical bottlenecks and constraints. The programmes have several components like training, extension, credit, input distribution, irrigation development, livestocks, fisheries, rural industries, etc. While these programmes cover selected areas in Bangladesh, they cover the entire country in Nepal and Sri Lanka. In both Bangladesh and Nepal, international donor agencies provide the major chunk of finance and technical assistance.

Wage Employment

The period since 1970 has been associated with a reorientation of the rural development strategy in India. And similar trends can be found in Bangladesh and to some extent in other countries also. This has been prompted by an increasing realisation of the need for taking up specific measures for the benefit of the vast multitudes of the poor in rural areas who have not benefited much from the general programmes of development. As a result, a target-group approach has been adopted and several programmes launched. These can be divided into two parts: programmes for wage employment and those for self-employment for the rural poor.

Programmes for wage employment owe their origin to the scarcity relief or rural works programmes which used to be taken up during periods of scarcity in the Indian subcontinent even during the British days. Rural works programme and crash employment programmes were undertaken in India during the sixties and early seventies. In 1977 the Government of India started a massive programme of this type known as the Food for Work Programme. This involved part payment of wages in foodgrains. Employment opportunities were provided for a few days in the lean season. In 1980, this programme was renamed as National Rural Employment Programme. It has been in operation since then. Since 1983, this has been supplemented by another programme known as Rural Landless Employment Guarantee Programme. In 1989, both these programmes were merged and renamed as the Jawahar Rozgar Yojana (JRY) to be implemented with greater involvement of the Panchyati raj institutions.

In Pakistan (including Bangladesh) a Rural Works Programme, to be implemented largely through governmental machinery, was launched in 1963-64. But, as in India, the outlay set apart was too small to produce any significant effect on employment generation. Further "while the projects were expected to be labour intensive, the labour cost accounted for only 29 per cent of project cost. This does not compare favourably with labour intensity of 94 per cent in Korea and 87 per cent in Moroco.

In 1972, Pakistan replaced that programme by another programme known as People's Works Programme. Yet another programme known as Agrovilles was also launched in 1972 to provide basic amenities to rural people. However, not much work was done under this. In 1978, Pakistan terminated the Peoples Works Programme and instead established a Rural Development Organisation having multiple objectives. Bangladesh, after it became independent, continued the rural works programme. Subsequently, as in India, it also launched a Food for Works Programme. This is currently the most important rural works programme in Bangladesh.

Self—Employment

On account of limited outlays set apart for them as well as other deficiencies, the various rural works programmes have had only a limited impact. Hence, an effort has been made to provide opportunities for self-employment. India took the initiative in this respect when it launched a programme for development of small and marginal farmers in early seventies. In due course, Nepal also launched a somewhat similar programme. In the later years of the seventies, India launched its famous Integrated Rural Development Programme (IRDP) which was extended to the whole country in 1980. This is a programme for providing credit-cum-subsidy to the rural poor for starting self-employment ventures. This programme is now continuing as the main programme of rural development in India.

During recent years, the Bangladesh Government also formulated self-employment programmes for the rural poor. But its approach is different from the Indian one in two respects. First, in Bangladesh, the poor are assisted only through bank credit for production activities. The subsidy component, which is an essential feature in India, is absent. Second, a group approach has been adopted. Bank loans are given not to an individual borrower but to groups of poor organised in a cooperative. The Bangladesh Rural Development Board, the official agency for rural development in Bangladesh, has been promoting the formation of cooperatives of the weaker sections and the women for this purpose.

A significant measure undertaken in Bangladesh for alleviation of rural poverty is the so called Grameen Bank experiment. This programme has been implemented successfully in more than 6000 villages in Bangladesh and is also being copied in a few other countries. Grameen Bank, which is a semi-government organisation operates through a network of village branches. The bank worker plays a very important role in forming groups of the rural poor, in the disbursement of loans and in collection of repayment. Appropriate institutional mechanisms have been devised to ensure repayment of the loan. Its loan recovery rates exceed 95 per cent. Most of the beneficiaries belong to the category of the extremely poor of which 83 per cent are women. Other countries in the South Asia may like to examine this scheme for adoption in their own countries.

A similar innovative approach to rural development has been implemented in Sri Lanka since 1978. Known as the Change Agents Programme (CAP), it helps poverty groups who generally failed to benefit from earlier programmes. CAP tries to equip them with knowledge, skills and resources. It emphasises human resource development with a view to developing capability of groups to identify socio-economic and cultural constraints to their progress and develop strategies for overcoming them. The officials (trainers) of the CAP play a catalytic role similar to that of bank workers of the Grameen Bank in Bangladesh.

Rural Poverty : A Pervasive Phenomenon

Notwithstanding the above measures, the problem of poverty in general and rural poverty in particular still persist in a pervasive manner. According to the latest World Development Report, 1990 of the World Bank, "nearly half of the developing world's poor, and nearly half of those in extreme poverty, live in South Asia". According to the same source, in 1985, the percentage of population below the poverty line of $ 275 per capita income per year was 29 in South Asia. And their number was 300 millions. Taking a slightly higher poverty line figure of $ 370 per capita per year, the number was 520 million constituting 51 per cent of the total population. The rural poor are located mainly in regions where arable land is scarce, agricultural productivity is low, and drought, floods and environmental degradation are common.

Rural development so far has been pursued mainly through the bureaucratic apparatus. However, some attempts to introduce an element of popular participation have also been made. India was first to take the initiative. It created the three-tier Panchayati Raj institutions in the late fifties. This institution, however, could not play any meaningful part in the rural development process. Of late, however, there is some revival. The Panchayati Raj institutions have been assigned a role in both the IRDP and the NREP. A few years ago, the Government of Karnataka took a revoluntionary step towards popular participation. In Bangladesh also, certain powers have recently been handed over to popularly elected councils at the Up-Zila level. In Sri Lanka, a major step towards decentralisation was taken in 1974 when separate funds were allocated at the district level. Arrangements for participation of the people's representatives at the district level also took place at the same time.

As regards Nepal, the Panchayats formed an integral part of the administrative system for a long time. Since 1960, when Parliamentary democracy was replaced by the Panchayat System, the village level Panchayat has been treated as the vehicle to bring about grass-root level changes in rural areas. The Third Plan of Nepal, established the Panchayat Sector in addition to the public and private sectors.

Conclusion

It is obvious that each country has experimented with a large number of policy measures for promoting rural development. The number of such measures goes up substantially when we add up the experiences of all the five countries of the South Asian region. There is hardly any measure, which one can conceive or visualise, which has not been adopted in one country or the other. But, apart from the Green Revolution, the impact of other measures has been limited. This is specially so with respect to the alleviation of rural poverty which should be treated as the major objective of rural development. Sri Lanka, of course, is an exception. Its strategy of development has differed sharply from that of most South Asian countries. Programmes and policies benefitting the poor have always been given a high priority, even higher than the growth objective. While the other countries adopted several measures, they never assigned a very high priority to alleviation of rural poverty. The funds allocated to poverty alleviation programmes remained extremely inadequate. The delivery system too remained weak. In addition there were policy deficiencies.

A frontal attack on the problem of rural poverty in India, Nepal and Bangladesh, is where the hardcore of South Asian progress lies. This would require reorientation of policies and programmes.

On the basis of Sri Lankan experience, one can say that the alleviation of rural poverty should not be at the cost of growth but should be integrated with the growth process. In other words, poverty alleviation should be pursued mainly through programmes of income and employment generation rather than through those of social welfare alone. Details of these programmes should vary from country to country and within a country from region to region depending upon physico-climatic and socio-economic conditions. For example, certain areas, generally the more poor ones, may like to place greater emphasis on programmes of wage employment while others, generally the less poor ones, may do so on programmes of self-employment. Some areas may have potential for development of agriculture while others for non-agricultural activities. The necessary complement of infrastructural facilities should form an integral part of any approach to rural development. Better infrastructure tends to increase productivity, bring about technical change and strengthen market linkages. A study of sixteen villages in Bangladesh as reported in the latest World Development Report of the World Bank shows how the development of infrastructure-roads, electric power, banks, markets, schools and health centres - affects the income of rural households. With other factors controlled, the study found that greater infrastructural development was associated with one third increase in average household incomes. Investment in education and training should be another component.

The size of the programme, measured in terms of quantum of resources set apart for rural development, should be in consonance with the size of the problem. As a result, the delivery and receiving system would need to be revamped and strengthened. There should be a substantive degree of popular participation in the formulation, selection and execution of the programmes. Mere bureaucratic approach would not be enough. Further, for countries like Bangladesh, Nepal and dry, drought-prone, flood-prone and other backward areas of India, agriculture by itself would not be sufficient to remove the problem of rural poverty. These need to be supplemented by programmes of livestock, fishery and forestry on the one hand and rural industries on the other. A massive programme of rural industrialisation would require selection of appropriate technology for different types of industries and suitable policy measures to promote them. Finally, there is need to reduce the rate of growth of rural population. These require sustained efforts and adoption of better policies. All these call for difficult choices and hard decisions. One would like to hope that the governments of the countries in South Asia muster the necessary political and administrative will to take these decisions.

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Productivity, Real Wage and Poverty in Rural India

Madhusudan Ghosh

This paper examines the cross-section and temporal variations in rural poverty in terms of some selected factors influencing the living conditions of the poor. The results of the study suggest that any development strategy which secures regular productive employment to agricultural labourers at wages sufficient to meet their basic needs, and enables the marginal and small farmers to raise their land productivity would be more effective in alleviating rural poverty than any other which augments overall agricultural productivity but does not provide income opportunities to the poor households. Moreover, inter-state variations in rural poverty can be reduced by reducing inter-state variations in foodgrains productivity through equitable distribution of agricultural inputs like fertilizers, credit and irrigation among the states.

Madhusudan Ghosh is a Lecturer in the Economics, Department of Economics and Politics, Visva Bharati, Santiniketan, Birbhum-731235.

The problem of rural poverty in India has received considerable attention in the literature on India's economic development. Much of the discussion has focussed on three questions : Is there any discernible time trend in the incidence of rural poverty in India? What is the relationship between improved agricultural performance and incidence of rural poverty? What is the relationship between incidence of rural poverty and changes in the nominal prices of the commodities consumed by the rural poor?

The debate over the issues started and gathered momentum immediately after the publication of Ahluwalia's (1978) paper in which he reported that incidence of rural poverty is inversely related to agricultural production per head of rural population asserting thereby the existence of 'trickle-down mechanism', and that there is no significant time trend in the incidence of rural poverty even after allowing for changes in poverty incidence associated with changes in agricultural production per head of rural population during 1956-57/1973-74.

In an unfinished research work, Dharm Narain[1] emphasized the need for considering the changes in the nominal prices of the commodities consumed by the poor along with the changes in agricultural production per head of rural population and the time factor to explain temporal variations in rural poverty. Doing so, it was observed that while agricultural output per head of rural population is inversely related, consumer price index for agricultural labourers and index number of wholesale price of foodgrains are positively related to rural poverty. Subsequent studies by Saith (1981), Ahluwalia (1986), Gaiha (1989) and Ghose (1989) extended empirical support to the findings of Dharm Narain. Gaiha (1989) and Ghose (1989) additionally reported that fluctuations in the relative price of the commodities consumed by the poor have more powerful effect on rural poverty than the changes in agricultural output per rural person. However, the findings

1. The results of the unfinished work of Dharm Narain have been reported by Desai (1986).

of Mundle (1983) and Bardhan (1984, 1986) lent no support to the trickle-down hypothesis. While Mundle (1983) did not observe any strong or decisive effect of per capita foodgrains production and foodgrains prices on the incidence of rural poverty, the results of Bardhan's (1984, 1986)studies vindicated the possibility of growth-induced pauperisation of agricultural labour and primarily cultivator households. What is more perplexing and which defies any meaningful assessment of poverty alleviation programmes is the conflicting results about the time trend in the incidence of rural poverty. Whereas Mundle (1983) and Ahluwalia (1986) reported no decisive time trend in the incidence of rural poverty, and Ghose (1989) observed a declining time trend, Griffin and Ghose (1979) and Saith (1981) reported, in fact, a rising trend. The conflicting results have seemingly been due to differences in the procedure of calculating poverty incidence and the choice of time period.

What has not received much attention in the discussion is the question of inter-regional variations in the incidence of rural poverty. Recently, Hanumantha Rao et. al. (1986), Jain et. al. (1988) and Sundaram and Tendulkar (1990) addressed this issue. These studies reported results based on National Sample Survey (NSS) region-level data at a particular point of time and thus concentrated on the static aspects of rural poverty. However, from the point of view of policies for poverty alleviation and reduction in its inter-regional variations, it is imperative to know the dynamic aspects of rural poverty. Because, poverty alleviation programmes designed to counter the factors once responsible for poverty incidence would be ineffective if those factors are found no longer associated with poverty. The present study attempts to examine inter-state variations in rural poverty and the factors underlying it at three different points of time. Based upon state-level data (14 major states) drawn from various sources, this study investigates, in particular, the effectiveness of growth and distributional factors in alleviating rural poverty.

Estimated coefficient of variation (CV) measuring inter-state variations in the incidence of rural poverty at three points of time-1970-71, 1977-78 and 1983-84 reveal wide and increasing variations among the states, the CVs in rural poverty being 29.12 per cent in 1970-71, 32.26 per cent in 1977-78 and 34.0 per cent in 1983-84 (table-1). Inter-state variations in rural poverty and the underlying factors have been examined first and then, an attempt has been made to account for the observed temporal increase in inter-state variations and decrease in the incidence of rural poverty in most of the states.

Inter-state Variations in Rural Poverty

The Explanatory Variables. Agricultural labour households and primarily cultivator households consisting of marginal and small operational holdings are identified as the rural poor. As per 32nd round (1977-78) of the NSS report, at all-India level, about 56.0 per cent of the agricultural labour households and 31.7 per cent of the households self-employed in agriculture (a large section of whom are marginal and small farmers) are living below poverty line. Agricultural labourers and households self-employed in agriculture together account for 79.32 per cent of the total rural poor. A further break-up of the agricultural labour households into casual and regular wage labourers revealed that casual labourers are among the poorest segment of the total work force in agriculture. Estimates show that whereas 58.2 per cent of the casual workers and 49.3 per cent of the regular wage workers are living below poverty line, only 31.7 per cent of the self-employed households in agriculture reported poverty incidence. Again, incidence of poverty was found to be higher among the lower sizes of land holding[2].

Table 1. Inter-state Variations (coefficient of variation) in Rural Poverty and Related Variables.

Variable	1970-71[a]	1977-78[a]	1983-84[a]
1. Rural poverty	29.12	32.26	34.00
2. Foodgrains productivity	41.03	44.79	53.02
3. Real wage rate	42.80	38.98	36.90
4. Unemployment rate	56.68	60.26	66.37
5. Average size of small and marginal holdings	21.24	28.17[b]	29.30
6. Proportion of marginal and small holdings	28.22	28.90[b]	27.06
7. Wage labourer as % of total work force (NSS)	34.46	27.34[c]	26.29
8. Casual labour as % of wage labour (NSS)	14.52	16.16	12.35

a. Reference years for rural poverty; Reference years for other variables are given in Tables 3, 4, 5 and 6.
b. refers to 1980-81.
c. refers to 1977-78.

Identification of the households living below poverty line renders it relatively easy to select the possible factors influencing poverty incidence. Undisputedly, income is the most important factor determining the living conditions of any person. Primarily cultivator households earn their livelihood from the output of their operated holdings and the agricultural labour households from their wage income. Naturally, incidence of poverty among these households would depend upon the factors which affect their level of income. Whereas income of the marginal and small operational holdings primarily depends upon their command over income generating asset (Viz. land) and access to other inputs, income of the agricultural labour households depends upon the availability of regular or

2. For details see Mahendra Dev (1988).

casual wage employment. Even though the casual labourers are generally paid higher wage rates, their annual income is expected to be lower than the regular wage labourers because of the uncertainty in the regular flow of income. Nevertheless, since purchasing power of the wage labourers depends upon the prices of the commodities consumed by them *vis-a-vis* the money wages they receive, it is the real wage rate which should be taken as the appropriate indicator of their living condition. Another factor which may also favourably affect the income of the primarily cultivator households directly and of the agricultural labour households indirectly through its positive effects upon employment and wages is agricultural productivity. However, since foodgrains dominate the consumption basket of the poor, foodgrains productivity is considered to be a more appropriate variable in explaining poverty incidence. Thus, the following variables have been considered here to explain the variations in rural poverty (POVT).

1. Foodgrains productivity per hectare (FDPH).
2. Real wage rate for male labourers (RWRML).
3. Current-day status unemployment rate among rural males (CDUR).
4. Average size of marginal and small holdings (AVMSH).
5. Proportion of casual labourers to total wage labourers (PCWL).

The Equations : Data set used in this study relates to only fourteen major states. Hence, to avoid estimation problems we have arrived at regression equations involving different combinations of the explanatory variables. In view of the observed high correlation between foodgrains productivity and real wage rate, we have considered them separately along with alternative sets of other variables to avoid multicolinearity problem. Alternative specification of the equations involving different combinations of the explanatory variables are as follows :

$$POVT = a_o + a_1 FDPH + a_2 CDUR + a_3 AVMSH + a_4 PCWL + \varepsilon_1 \quad ....(1)$$

$$POVT = b_o + b_1 RWRML + b_2 CDUR + b_3 AVMSH + b_4 PCWL + \varepsilon_2 \quad ....(2)$$

$$POVT = c_o + c_1 FDPH + c_2 CDUR + c_3 AVMSH + \varepsilon_3 \quad ....(3)$$

$$POVT = d_o + d_1 RWRML + d_2 CDUR + d_3 AVMSH + \varepsilon_4 \quad ....(4)$$

$$POVT = e_o + e_1 FDPH + e_2 AVMSH + e_3 PCWL + \varepsilon_5 \quad ....(5)$$

$$POVT = f_o + f_1 RWRML + f_2 AVMSH + f_3 PCWL + \varepsilon_6 \quad ....(6)$$

In order to discern the *ceteris paribus* impact of the explanatory variables on rural poverty, we regressed POVT upon each exogenous variable separately.

Results

The equations are estimated by Ordinary Least Squares (OLS) method by using cross-section state-level data corresponding to three points of time; 1970-71, 1977-78 and 1983-84. The results are presented in table-2. Estimated coefficients of the explanatory variables are of expected signs and alternative specification of the equations explain adequately the variations in the incidence of rural poverty. Regression results showing the individual

Table-2. Results of the Multiple Linear Regression Equations.

	1970-71[c]	1977-78[c]	1983-84[c]
Equation : (1)			
FDPH	-1.143	-1.400**	-0.668***
	(1.099)	(1.923)	(1.478)
CDUR	2.828**	0.154	-0.580
	(1.869)	(0.103)	(0.480)
AVMSH	-7.822	-21.418	-24.875***
	(0.296)	(1.017)	(1.373)
PCWL	0.215	0.527***	0.447
	(0.423)	(1.417)	(1.129)
Constant term	37.119	46.646	36.626
R^2	0.540	0.681	0.529
F	2.647	4.857[b]	2.538
Equation : (2)			
RWRML	-7.422*	-9.929*	-8.313*
	(3.343)	(3.308)	(7.497)
CDUR	3.016*	1.913***	-0.525
	(2.894)	(1.384)	(1.154)
AVMSH	-9.658	-14.424	-38.527*
	(0.558)	(0.845)	(4.951)
PCWL	-0.439	0.167	-0.098
	(1.053)	(0.497)	(0.547)
Constant term	91.721	71.618	108.731
R^2	0.767	0.797	0.919
F	7.403[a]	8.844[a]	25.556[a]
Equation : (3)			
FDPH	-1.382***	-2.019*	-0.942*
	(1.651)	(3.306)	(2.440)
CDUR	3.178**	0.233	-0.169
	(2.620)	(0.149)	(0.145)
AVMSH	-11.434	-25.615	-28.873***
	(0.477)	(1.170)	(1.603)
Constant term	53.699	89.741	74.496
R^2	0.531	0.610	0.463
F	3.774[b]	5.205[b]	2.852
Equation (4)			
RWRML	-5.818*	-10.989*	-7.926*
	(3.583)	(5.395)	(9.631)
CDUR	2.494**	2.118***	-0.578
	(2.708)	(1.670)	(1.346)
AVMSH	-5.115	-14.727	-37.235*
	(0.303)	(0.898)	(5.208)
Constant term	58.391	84.832	99.331
R^2	0.739	0.791	0.916
F	9.473[a]	13.089[a]	38.125[a]
Equation : (5)			
FDPH	-0.519	-1.379**	-0.769**
	(0.471)	(2.077)	(2.008)
AVMSH	-17.564	-23.016***	-20.528
	(0.606)	(1.699)	(1.361)
PCWL	0.734***	0.528***	0.390
	(1.545)	(1.500)	(1.074)
Constant term	20.584	48.276	36.219
R^2	0.361	0.680	0.517
F	1.883	7.094[a]	3.567

	1970-71[c]	1977-78[c]	1983-84[c]
Equation : (6)			
RWRML	-6.090**	-7.601*	-8.645*
	(2.127)	(2.926)	(7.946)
AVMSH	-26.287	-31.249**	-34.035*
	(1.220)	(2.497)	(4.981)
PCWL	0.136	0.306	-0.143
	(0.282)	(0.913)	(0.803)
Constant term	79.495	77.352	107.238
R^2	0.551	0.753	0.907
F	4.091[b]	10.162[a]	33.556[a]

Notes:- *, **, *** Denote significant at 1%, 5% and 10% level respectively.
a. significant at 1% level.
b. significant at 5% level.
Figures in parentheses are t-values.
Numbers of observation in all the equations is 14.
c. reference year for POVT; Reference years for other variables are given in Tables 5, 6 and 7.

effect of the variables on rural poverty are presented in table 3. Variable-wise analysis of the regression results has been undertaken to gain insight in to the relative significance of the factors influencing inter-state variations in rural poverty.

Foodgrains Productivity

Regression coefficient of FDPH is found to be negative in all the equations and periods; seven of the nine negative coefficients are also found to be statistically significant. The coefficient of FDPH, when considered separately (table-3), is found to be negative in all the years and also significant in 1977-78 and 1983-84. These results suggest that states with higher foodgrains productivity have lower incidence of rural poverty indicating, thereby, that benefits of agricultural growth have trickled down to the rural poor. However, relatively low values of the coefficients and their associated statistics (viz., value and R^2 in the respective cases) are indicative of the limitation of the trickle-down process.

Table 3 : Regression Results showing *ceteris paribus* Effect of the Selected Variables upon Rural Poverty (POVT).

Independent variables	1970-71 Coefficient	R^2	1977-78 Coefficient	R^2	1983-84 Coefficient	R^2
FDPH	-0.638	0.033	-1.992*	0.463	-0.762**	0.270
	(0.642)		(3.218)		(2.105)	
RWRML	-6.524*	0.438	-8.478*	0.503	-6.857*	0.645
	(3.057)		(3.488)		(4.671)	
CDUR	3.037*	0.402	0.767	0.022	-0.134	0.001
	(2.841)		(0.524)		(0.131)	
AVMSH	-27.147	0.094	-28.152***	0.147	-15.668	0.069
	(1.117)		(1.437)		(0.945)	
PCWL	0.901**	0.336	1.056*	0.480	0.779**	0.308
	(2.469)		(3.331)		(2.315)	

Notes :- *, **, *** Denote significant at 1%, 5% and 10% level respectively.
Figures in parentheses are t-values.
Number of observations is 14.

Real Wage Rate

It appears to be the most important variable influencing inter-state variations in rural poverty. All the coefficients are negative and also highly significant. What is also noteworthy is that the regression coefficients and the associated t-values of RWRML are considerably higher than those of FDPH. When FDPH is dropped and RWRML is considered in its place in combination with other variables, explanatory power of the equations (judged by R^2) increased substantially. Explanatory power of RWRML is also higher than that of FDPH. These results strongly suggest that any policy which secures productive employment and ensures adequate real wages to agricultural labourers through upward revision of money wages and stabilisation of foodgrains prices would be more effective in alleviating rural poverty than any other strategy which increases productivity but does not provide income opportunities to the wage labourers. Our results, thus, lend indirect support to Ghose (1989) and Gaiha's (1989) finding that fluctuations in the relative prices of the commodities consumed by the poor had a more powerful effect on rural poverty than the changes in agricultural output. Minimum wage policy for agricultural labourers is, therefore, in the right direction towards poverty alleviation. What is, however, needed is the revision of wages at regular intervals and its effective implementation.

Unemployment Rate

One cannot think of any wage income without having any wage-employment. Higher unemployment rate, irrespective of the level of wages, is expected to aggravate rural poverty. The results of our regression exercise lent support to this hypothesis. Coefficients of CDUR corresponding to 1970-71 and 1977-78 are found to be positive and statistically significant in most cases. *Ceteris paribus* effect of CDUR is also positive in these two years but significant only in 1970-71. However, the coefficients of CDUR for 1983-84 are found to be negative although not statistically significant indicating that employment generation through such programmes like National Rural Employment Programme (NREP) and Rural Landless Employment Guarantee Programme (RLEGP) has not possibly had any significant effect upon rural poverty. In fact, labour absorp-

tion in agriculture without having any positive impact upon agricultural productivity cannot be expected to reduce rural poverty effectively.

This is what has actually happened in Indian agriculture in recent years. The results of a study by Bhalla (1987) amply demonstrated that labour productivity has not increased proportionately with the increase in labour absorption. She reported that total employment has increased in all the major states except M.P. and Tamil Nadu. However, whereas six states viz., A.P. Gujarat, Maharashtra, Punjab, Haryana and U.P. have enjoyed substantial improvement in per worker productivity, seven states viz., Karnataka, W.B, Rajasthan, Orissa (all have positive and generally significant growth rates in total mandays employment), Bihar, M.P. and Tamil Nadu (those suffer from negative or negligible growth rates in total employment) have much lower rates of growth in labour productivity. In Bihar, M.P., Tamil Nadu and W.B. growth rates of labour productivity have been either negative or very negligible. And these are some of the states where rural poverty is relatively high. Besides, the fact that percentage of rural people below poverty line is considerably higher than unemployment rate measured by any criterion extends support to the observation that labour productivity has not increased proportionately with the increase in employment in agriculture. What is, therefore, necessary for sustained reduction in rural poverty is that employment generation must be accompanied by proportionate increase in productivity. Otherwise, the process will not be sustained.

Average size of Holding

Since land is the most important income-generating asset of the primarily cultivator households, incidence of poverty among them is expected to be inversely related with average size of their operational holdings. The hypothesis receives empirical support from the regression results. All the coefficients of AVMSH are found to be negative and seven of them are statistically significant. High values of the regression coefficients indicate that one per cent increase in AVMSH would reduce poverty incidence substantially. These results suggest that effective implementation of redistributive land reforms would reduce rural poverty. However, in a situation of growing population in agriculture relative to cultivable land and thus declining land-man ratio, one should consider the feasibility of land redistributive policy. In such conditions, provision for credit and agricultural inputs at subsidised rates for the small and marginal farmers, which enable them to use HYV technology and achieve higher land productivity, appears to be an alternative policy for poverty alleviation.

Casual Wage Labour

The coefficients of PCWL are found to be positive in nine cases and negative in three cases. However, whereas five of the nine positive coefficients turn out to be significant, none of the negative coefficients is significant. *Ceteris paribus* effect of PCWL on rural poverty is also positive and significant in all the years. The results thus indicate that casualisation of wage labourers causing uncertainty about regular flow of wage income aggravates rural poverty.

To sum up, the results of regression exercise vindicate that the distributional factors are more powerful than the growth factor in alleviating rural poverty. Judged by the value of R^2 (in *ceteris paribus* case), RWRML is found to be the most important factor influencing rural poverty; PCWL comes next, and then FDPH. Again, judged by the statistical significance (t-value) in multiple linear regression case, RWRML turns out to be the most significant variable followed by FDPH, CDUR, AVMSH and PCWL. Therefore, any development strategy which secures regular employment to agricultural labourers at real wages sufficient to meet their basic needs, and enables the marginal and small farmers to raise their productivity would be very effective in alleviating rural poverty. Thus, poverty alleviation policy as prescribed by the results of our study by and large conforms the World Bank's prescription of a two-part strategy of achieving rapid and sustainable improvements in the quality of life for the poor[3].

Temporal Changes in Rural Poverty

NSS data reveal a gradual proletarianisation of the peasantry and casualisation of wage labourers in almost all the major states in India. Table-4 shows that proportion of wage labourers to total work force has recorded substantial increase in all the states except Maharashtra during 1972-73/1983. Population census data (not reported in the table) also revealed tremendous increase in the number of agricultural labourers in all the states except surprisingly, in U.P. during 1971-81. What is a matter of great concern from the point of view of rural poverty is that all the states witnessed considerable increase in the proportion of casual labourers to total wage labourers in

3. The first element of the strategy is the persuit of a pattern of growth that ensures productive use of the poors' most abundant asset (viz labour). The second element is the widespread provision to the poor of basic social services. See World Development Report (1990).

Table-4 : Magnitude of Marginal and Small Operational Holdings and Area, and Wage Labourer.

State	Marginal and Small Operational holdings (% of total holdings)		Area operated by them (% of total area)		Wage labourers (% of total work force)	
	1970-71	1985-86	1970-71	1985-86	1972-73	1983
	(1)	(2)	(3)	(4)	(5)	(6)
Andhra Pradesh	65.6	75.0	19.3	31.8	40.0	46.6
Bihar	78.9	88.1	29.7	44.9	39.5	42.8
Gujarat	42.9	45.9	9.8	12.9	34.4	40.4
Haryana	46.3	56.9	10.7	16.5	24.0	30.0
Karnataka	54.0	62.7	15.5	23.2	37.8	41.5
Kerala	93.2	97.3	56.7	67.6	54.3	54.5
M.P.	48.6	57.1	9.6	16.1	27.3	33.7
Maharashtra	42.8	56.2	8.8	20.3	53.5	47.4
Orissa	76.2	77.6	38.5	41.7	39.9	43.7
Punjab	56.2	42.6	15.1	11.0	30.7	33.6
Rajasthan	43.7	48.0	7.1	9.5	10.2	20.5
Tamil Nadu	79.7	87.7	37.6	48.6	42.4	54.2
Uttar Pradesh	84.0	88.3	41.9	51.9	21.6	24.1
West Bengal	82.3	90.1	63.5	63.4	48.1	50.4

Source :-

Cols. (1) and (3) : Agricultural census data as reported in *Agricultural Situation in India*, August, 1985.

Cols. (2) and (4) : Various issues of *Agricultural Situation in India* (April, 1988 Onwards).

Cols. (5) and (6) : NSS data as reported in Jose (1988).

1983 over 1972-73 (table-5). Alongside, Agricultural Census data demonstrated gradual marginalisation of the peasantry. Even though the proportion of area operated by the marginal and small holdings has recorded an increase in all the states except Punjab and W.B. (the decline is very insignificant in W.B.), the proportion of marginal and small operational holdings has, however, increased to such an extent (it has, however, declined in Punjab) that average size of these holdings has recorded a decline in all the states except Karnataka, M.P., Maharashtra and Punjab (tables 4 and 5). Thus, when Agricultural Census data are taken in conjunction with Population Census and NSS data, we observe an unmistakable trend in the agricultural economy towards gradual proletarianisation and marginalisation of the peasantry and casualisation of wage labourers. These processes are, in fact, the obvious outcome of demographic and technological changes in agriculture in a situation of more or less fixed cultivable land area.

The very processes may not, however, be associated with higher incidence of rural poverty provided, of course, sufficient income opportunities are ensured to agricultural labour households through productive employment at justified wages, and to the cultivator households through subsidised credit and agricultural inputs which enable them to raise their land productivity. Hence, an analysis of the trends in unemployment, wages and productivity seems pertinent at this point.

Unemployment among rural male has increased in seven of the fourteen major states during 1972-73/1983 (table-6). But, incidence of rural poverty has declined in all the states except A.P. during 1970-71/1983-84 (table-7). So, apparently, there has been no decisive relationship between unemployment and rural poverty. This is also supported by the regression results presented in table-3.

Foodgrains productivity has registered remarkable increase in all the states except Gujarat in 1985-88 as compared with 1970-73 (table-7). Again, all the states except Punjab and Karnataka witnessed more or less increase in real wage rates (table-6). Hence, observed decline in the incidence of rural poverty in the states may be attributed to substantial increase in foodgrains productivity and real wage rates. Significantly negative association of rural

Table 5. Average Size (hectare) of Marginal and Small Operational Holdings (AVMSH) and proportion of Casual Labour to Total wage Labour (PCWL).

State	AVMSH			PCWL		
	1970-71	1980-81	1985-86	1972-73	1977-78	1983
	(1)	(2)	(3)	(4)	(5)	(6)
Andhra Pradesh	0.736	0.752	0.730	68.6	64.6	74.2
Bihar	0.568	0.472	0.442	60.9	77.5	82.2
Gujarat	0.941	0.971	0.925	64.6	74.3	81.5
Haryana	0.877	0.915	0.798	40.3	44.2	52.3
Karnataka	0.635	0.893	0.893	72.1	75.5	87.3
Kerala	0.421	0.286	0.249	72.1	57.1	76.7
M.P.	0.791	0.817	0.821	56.8	68.5	72.0
Maharashtra	0.878	0.898	0.594	70.3	55.6	71.5
Orissa	0.956	0.822	0.789	68.3	68.4	76.8
Punjab	0.767	1.006	0.969	52.3	45.5	61.7
Rajasthan	0.897	0.867	0.861	53.5	57.7	63.1
Tamil Nadu	0.684	0.581	0.561	60.0	63.1	75.1
Uttar Pradesh	0.578	0.561	0.546	66.7	61.7	73.6
West Bengal	0.689	0.639	0.645	64.8[a]	64.8	75.4

Sources :-

Cols. (1) and (2) : *Agricultural Situation in India*, Aug. 1985.

Col. (3) : Various issues of *Agricultural Situation in India*, (April, 1988 onwards).

Cols. (4) and (6) : NSS data as reported in Parthasarathy (1987).

Col. (5) : NSS data as reported in Jose (1988).

a. 1977-78 data.

Table 6. Real Wage Rate (Rs. per day) for Male Labourer and Current-day Status Unemployment Rate (%) among Rural Male.

State	Real wage rate			Unemployment rate		
	1970-71	1980-81	1984-85	1972-73	1977-78	1983
	(1)	(2)	(3)	(4)	(5)	(6)
Andhra Pradesh	2.48	2.68	3.69	6.90	5.67	5.59
Bihar	2.64	2.79	3.67	5.67	5.73	4.24
Gujarat	2.91	3.07	4.23	3.48	4.49	3.02
Haryana	6.31	5.34	6.32	2.25	3.99	3.41
Karnataka	2.45	2.95	2.40	4.65	4.48	4.69
Kerala	4.47	5.98	7.18	12.84	13.70	13.39
M.P.	2.16	2.05	3.02	2.19	1.94	1.56
Maharashtra	2.65	2.19	2.86	5.60	3.44	3.99
Orissa	2.12	2.24	2.83	6.31	4.52	5.09
Punjab	6.48	5.48	6.30	2.89	2.94	4.08
Rajasthan	3.15	2.96	3.53	3.25	2.65	3.09
Tamil Nadu	2.57	2.65	3.10	7.19	8.36	12.00
Uttar Pradesh	3.23	2.68	3.44	1.95	2.46	2.16
West Bengal	2.93	3.42	3.75	7.23	5.70	8.80

Sources :-

Cols. (1), (2) and (3) : Acharya (1989); State level data are obtained by taking simple average of the regions.

Cols. (4), (5) and (6) : NSS 27th, 32nd and 38th rounds as reported in Sarvekshana IX, (4) 1986

Table 7. Rural Poverty (%) and Foodgrains Productivity (Qtl./Hec.) in Indian States

State	Rural poverty			Foodgrains yield (Av. of)		
	1970-71	1977-78	1983-84	1970-73	1980-83	1985-88
	(1)	(2)	(3)	(4)	(5)	(6)
Andhra Pradesh	41.0	45.45	45.45	7.93	12.34	17.46
Bihar	59.0	57.82	51.35	8.82	9.06	14.02
Gujarat	43.8	43.10	27.62	7.55	10.00	6.79
Haryana	23.6	23.21	15.19	11.35	15.45	21.38
Karnataka	47.2	53.15	37.49	8.66	9.19	10.05
Kerala	62.0	47.37	26.06	14.74	15.81	24.95
Madhya Pradesh	52.9	61.63	50.30	6.51	7.09	9.32
Maharashtra	46.0	60.36	41.50	4.20	7.06	7.10
Orissa	65.0	67.89	44.76	8.11	8.43	12.26
Punjab	23.6	13.12	10.87	19.34	26.52	36.38
Rajasthan	41.8	33.48	36.63	5.39	5.76	6.34
Tamil Nadu	57.3	56.26	44.08	13.51	14.14	22.51
Uttar Pradesh	40.6	49.79	46.48	9.50	12.48	16.62
West Bengal	70.1	58.31	43.84	11.09	11.71	22.69

Sources :-

Col. (1) : Ahluwalia (1978).

Cols. (2) and (3) : Hanumantha Rao (1986) as quoted in Rao and Despande (1986).

Cols. (4), (5) and (6) : Area and Production of Principal crops in India—1973-74, 1985-86 and 1986-88 respectively.

poverty with RWRML and FDPH observed in our regression exercise also lends support to this contention.

Even though incidence of rural poverty has declined in almost all the states, inter-state variations in it has increased significantly (table-1). Estimated CVs in the factors underlying inter-state variations in rural poverty at three points of time, reveal that while real wage rate, proportion of marginal and small operational holdings, proportion of wage labour to total work force, and proportion of casual wage labour have recorded a decline in their inter-state variations, foodgrains productivity, unemployment rate and average size of marginal and small operational holdings have registered an increase. Hence, observed increase in the inter-state variations in rural poverty may be attributed to the fact that the magnitude of increase in the CVs of the latter group of factors is much higher than the decline in the CVs of the former group.

Conclusion

Our investigation into the possible factors underlying inter-state variations in rural poverty shows that distributional factors are more powerful than growth factors as such in alleviating rural poverty. Although growth in agricultural output was found to have trickled down to the poor, the observed limitation of the trickle-down process necessitates, for poverty alleviation, that type of development strategy which secures regular wage employment to the agricultural labourers and enables the marginal and small farmers to achieve higher land productivity. This type of development strategy is expected to be more effective in alleviating rural poverty than any other policy which increases overall agricultural productivity but does not provide income opportunities to the poor households. Needless to say, that a development strategy which maintains growth in agricultural output and also ensures equitable share of benefits of development to the poor households is most desirable for poverty alleviation. Our results also show that inter-state variations in rural poverty can be reduced by reducing inter-state variations in foodgrains productivity by appropriately changing the inter-state distribution of agricultural inputs like fertilizers, irrigation and credit, which is expected to help adoption of HYV technology more or less uniformly by the states.

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The final test of a leader is that he leaves behind him in other men the conviction and the will to carry on.

—Water Lippman, on the death of Roosevelt.

"The best way to predict the future is to create it."

—Peter Drucker

Determinants of Rural Poverty

B.N. Ghosh

This paper analyses the proximate determinants of rural poverty in India by taking into account four crucial independent variables such as Net Productivity (or net domestic product) in agriculture, rural consumption expenditure, price level and sectoral terms of trade. The empirical exploration is based on the data covering the period 1960-80. The econometric exercise brings home the fact that the variance of rural poverty can be satisfactorily explained by the variables of consumption expenditure and net domestic product (net productivity). Consumption expenditure, ***ex definitione,*** *being a constituent of poverty line, can be relegated to the background. Viewed this way, net productivity comes out to be the most crucial determinant of rural poverty in India.*

B.N. Ghosh is an Associate Professor of Economics at the Punjab University, Chandigarh.

The measurement of a qualitative growth based on the welfare approach clearly shows that in India the fruits of development have not been equitably distributed between our rural and urban sectors. If Physical Quality of Life Index (PQLI) a la Morris is taken as a proxy for welfare, it will not be difficult to discern that such an index has remained palpably low for our rural sector (39 approx.) and fairly high for our urban sector (nearly 63) (Ghosh, 1990) This type of a situation prevails till today even after four decades of planning. The plight of India's rural sector can be known better by applying a two-pronged test—not only in terms of decreased relative welfare as given by Morris D. Morris's PQLI index but also in terms of increased relative ill-fare (or poverty). Thus, an analysis of the correlates of rural poverty seems to be very essential for gauging the extent of rural-urban dichotomy and for formulating policies for correcting the growing sectoral imbalances. The purpose of the present paper is to analyse the basic determinants of rural poverty in India. The analysis especially focuses on the role of productivity by taking into account Net Domestic Product (NDP) as a factor which can be regarded as a proxy for productivity (or income).

Poverty : The concept

Poverty is a relative term. Poverty must be understood with reference to the circumstances of the country in which it is being considered. Even within a country, poverty has to be defined in relative terms. Starvation line, which was suggested by Lord Boyd Orr in 1945, remains the basis of calculation of poverty line which has been suggested by Indian economists like D.R. Gadgil, P.S. Lokanathan, B.N. Ganguly, Ashok Mehta and others for estimating poverty in India quantitatively. To work out the poverty line, one has to use the criterion of minimum requirement of necessities for the bare physical existence. It is related to expenditure, mostly on food which generates 2250 calories per capita per day. This is the minimum requirement of bare existence. On the basis of this criterion, it would be found that poverty is massive in India. A feel about the extent of rural-urban poverty in India can be had from table 1.

Table 1. Extent of Poverty in India

Year	Poverty (Million)		Poverty %	
	Rural	Urban	Rural	Urban
1960-61	138	29	38	40
1970-71	200	41	45	41
1977-78	253	54	51	38
1984-85	222	51	40	28

Sources: 1985 Budget, NSS Reports and Seventh Plan Document.

Table I reveals that both in number and in percentage terms, rural poverty is substantially higher than urban poverty. The real dimension of poverty must be judged not in terms of mere numbers but in terms of its intensity. To say that people are poor because their income is below a certain level is not enough. How poor are the poor people? Poor people can be categorised into four diferent classes: destitutes, very very poor, very poor and poor. In fact, poor people do not form one homogeneous class. A revealing study by the then Union Minister, Vasant Sathe, showed that families with daily expendable income of about Rs. 18 (or Rs. 540 per month) cannot even buy the basic food items in the market place (Yojna, Jan. 1988). The study candidly observes that a vast number of officially non-poor in India actually do not have enough means to pay for basic food, let alone the other necessities of life. A.K. Sen has rightly opined that it is not sufficient to know how many poor people there are, but it is necessary to know how exactly poor they are (Sen, 1977).

Structure of Poverty

The structure of poverty in different states in India is shown in table 2. It shows that poverty is very large in some of the states like Assam, Bihar, H.P., Maharashtra, Meghalaya, Orissa, Tamil Nadu, Tripura, U.P. and West Bengal. However, it is a bit less in states like Haryana and Punjab.

In view of the available data and circumstances, it is hard to believe the claim of the Planning Commission that poverty has been declining in India in recent years. The number of poor people might have reduced, but it is possible that poverty has remained the same or has even increased. In this context, M.S. Ahluwalia observes that in India, economic growth was not fast enough to achieve the desired reduction in poverty over the years as a whole (Ahluwalia, 1986). In fact, rural poverty is much higher in India than is shown by our canned statistics. Rural poverty appears to be lesser because of the constant migration of poor people to urban areas in search of jobs. As a matter of fact, in a developing country of India's standing, where the economy is still dominated by the fury and fancy of nature, poverty line cannot remain stable for a long period of time. The poor who go up temporarily by crossing the poverty line, again slip down the line in times of natural calamities like floods and draughts which have become part of the Indian life. In 1987-88 draught, many who previosly were above the poverty line had to plunge below the poverty line. The devastating onslaught of such natural hazards has to be experienced primarily by the rural sector. Conceivably, the intensity of poverty seems to be deeper and far more onerous in the rural sector than in the urban sector.

It is, sometims, argued that rural poverty is caused and accentuated by rural population growth and large family size. This is, in fact, not quite true. A relatively large family size in India may be a consequence rather than a cause of poverty. Cassen (1978) has observed that mass poverty in India is due mainly to the failure of the economy to deliver the correlates of declining fertility. There is little evidence to support the thesis that rapid population growth

Table 2. Rural-Urban Poverty in Indian States (1980)

States	Rural		Urban		Combined	
	Number (Lakhs)	Percentage	Number (Lakhs)	Percentage	Number (Lakhs)	Percentage
Andhra Pradesh	170.35	43.89	36.44	35.68	206.79	42.18
Assam	88.34	52.65	07.07	37.37	95.41	51.10
Bihar	338.44	58.91	32.94	46.07	371.38	57.49
Gujarat	44.84	43.20	26.48	29.02	121.32	39.04
Haryana	22.10	23.25	6.95	31.74	20.05	24.84
Himachal Pradesh	10.37	28.12	0.51	16.56	10.88	27.23
J. & K.	14.57	32.75	4.35	39.33	18.92	34.06
Karanataka	124.10	49.88	38.62	43.97	162.72	48.34
Kerala	93.42	46.00	22.19	51.44	115.61	46.95
M.P.	244.59	59.82	42.74	46.09	287.33	57.73
Maharashtra	214.11	55.85	61.30	31.62	275.41	47.71
Manipur	3.42	30.54	0.56	25.48	3.98	29.71
Meghalaya	5.51	53.87	0.36	18.16	5.87	48.03
Nagaland	N.A.	N.A.	0.03	4.11	N.A.	N.A.
Orissa	158.97	68.97	10.33	42.19	169.30	66.40
Punjab	13.49	11.87	9.59	24.66	23.08	15.13
Rajasthan	85.79	33.75	19.12	33.80	104.91	33.76
Tamil Nadu	170.47	55.68	66.59	44.79	237.06	52.12
Tripura	10.93	64.28	0.61	26.34	11.54	59.73
U.P.	429.93	50.23	72.27	49.24	502.20	50.09
West Bengal	227.65	58.94	48.10	34.71	275.75	52.54
Union Territories	6.35	34.32	11.24	17.96	17.59	21.69
All-India	2527.74	50.82	518.39	38.19	3046.10	48.13

Source: Complied from NSS Reports

Note : (i) The above estimates are based on the poverty line of Rs. 65 per capita per month in 1977-78 prices corresponding to a minimum daily calorie requirement of 2400 per person in rural areas and the poverty line of Rs. 75.00 corresponding to a calorie requirement of 2100 in urban areas.

(ii) N.A. stands for Not Available.

has adversely affected savings and investment in India (Ghosh, 1990). Poverty being the villain in the piece, it is necessary to examine the correlates of poverty. Such an analysis is helpful for formulating a suitable policy for eradicating the problem from rural India.

Rural poverty (RPOV), like urban poverty, is influenced by a host of factors, proximate and remote. Some of these factors are net domestic product or the net productivity of the rural sector (DP), consumption expenditure, investment in the rural sector, price index, savings, terms of trade, unemployment and so on.

In analysing the determinants of poverty, three most crucial factors, income, consumption and price, have been taken into account by many researchers (Mellor and Desai, 1986). However, there are many more factors which can be regarded as the determinants of rural poverty. One such factor is the sectoral terms of trade. The others are savings, investment and unemployment. No doubt, investment influences income via multiplier; but since income is taken into account, investment cannot be smuggled into the analysis as a separate independent variable. In the same way, sectoral terms of trade is crucial for any analysis of rural poverty. Although we are taking into consideration the retail price index, we think it to be very important to take terms of trade as a separate independent variable. In fact, an unfavourable agrarian terms of trade is responsible for the transfer of rural resources to a considerable extent. It is unfortunate that this important factor has been overlooked by many empirical studies on poverty. We find enough justification to include this factor in our present analysis. Savings is an equally important variable affecting poverty. But once we take consumption expenditure into account, we need not take again **savings** as a separate factor. Though unemployment is highly correlated with rural poverty, the non-availability of reliable time-series data on rural unemployment prevents us to consider the impact of this highly influencing factor. Thus, our empirical analysis of rural poverty (RPOV) is based on four crucial independent variables, i.e., net domestic product or net productivity (DP) in agriculture, consumer price index for agricultural labour (PL), consumption expenditure (CE) in the rural area and the sectoral terms of trade (ST). The association between net productivity can be said to be very close and negative.

The basic objective of this paper is to provide the information regarding the determinants of rural poverty in India during the period 1960-80. The present study is based on a time-series data procured from different sources for the period 1960-80 for the Indian rural sector[1]. The rural price level takes into account the consumers price index for agricultural labour (CPIAL) which is thought to be more relevant for our rural sector. Of the four independent explanatory variables, rural price index is found to be of considerable importance in the analysis of rural poverty in India.

It goes without saying that income level has an important influence over the level of poverty in any country/region. The NDP of the agricultural sector has been taken as a proxy for rural income or productivity in our analysis. In the absence of any data on rural income distribution pattern it becomes difficult to analyse its impact on rural poverty. However, we have used the rural consumption expenditure as a variable influencing rural poverty. It can be seen that consumption expenditure like NDP is inversely related to poverty: the higher the consumption expenditure the lower is the poverty level and vice versa.

Price level (PL) affects poverty in a quite significant way. In most developing countries, although money income has risen significantly, there has however, not been corresponding increase in real income. Even in India inflation has adversely affected our rural sector since the Second Five Year Plan period and continues to ravage it. The negative real balance effect produced by inflation has led to a decrease in consumption and increase in poverty. Price escalation has a direct bearing on the level of poverty: higher the rate of inflation, the higher is the level of poverty, and vice versa. On the other hand favourable agrarian terms of trade (ST) is inversely related to the level of rural poverty.

As elaborated earlier, in a study dealing with the determinants of rural poverty, a few more explanatory variables may be accommodated under the umbrella of analysis. These additional variables may be savings, investment, unemployment and population growth. However, population growth may be a retarding factor for personal per capita income; it does not seem to have any adverse effect on the generation of sectoral income as a whole. Rather its macro effects on the rural income generation is salutary. While we do not minimise the importance of all these factors, like savings, investment and unemployment, we feel that the inclusion of the first two variables will be redundant and for the third, our stumbling block was the absence of reliable statistical data. Thus, we had to remain satisfied with the following four independent variables.

[1] The data has been collected from the Ahluwalia, (1985) Bhalla, (1988) and Ghosh, (1988) Data on price level are consumers price indexes for agricultural labourers in India (CPIAL); Rural Consumption expenditure data have been collected from NSS Reports. The gap in the required data series has been filled up by interpolation / intrapolation..

Variables Considered	
Dependent	Independent
Rural Poverty (RPOV)	Net Productivity, or Net Domestic Product in Agriculture (DP) Rural Consumption Expenditure (CE) Consumers' Price Index for Agricultural Labour (PL) Sectoral Terms of Trade (ST)

The following functions, each one including no more than three independent variables, were used by us with a view to assessing the effects of individual variables on the rural poverty in India in the context of our limited time-series study :

RPOV = f (DP, ST) ..... (1)
RPOV = f (DP, ST, PL) ..... (2)
RPOV = f (DP, ST, CE) ..... (3)
RPOV = f (DP, PL) ..... (4)
RPOV = f (DP, CE) ..... (5)
RPOV = f (DP, PL, CE) ..... (6)

We have used the method of least squares for estimating the equations. The estimated regression coefficients based on the time series data for rural India are presented in table 3.

Table 3. Estimated Regression Coefficients of Rural Poverty

Equations	Intercepts	DP	ST	PL	CE	R^2
1(1).	1.7356	-0.5379*	-0.711**	-	-	.67
		(0.1956)	(0.0020)			
1(2).	-13.6731	-0.6877	-0.0806	+0.1113	-	.85
		(0.2021)	(0.0013)	(0.1479)		
1(3).	14.4861	-0.5037	+0.1065	-	-0.2211	.74
		(0.1767)**	(0.0037)		(0.1773)	
1(4).	-11.6577	-0.6135	-	+0.1437*	-	.83
		(0.1379)		(0.0117)		
1(5).	19.7773	-0.3796	-	-	-0.3427*	.71
		(0.1117)**			(0.0927)	
1(6)	-1.1729	-0.6777	-	+0.1789**	-0.3929	.89
		(0.1239)		(0.0296)	(0.1134)	

Notes : (i) Figures in the parentheses denote standard errors.
(ii) *Denotes 5 per cent level of significance.
(iii) ** Denotes 10 per cent level of significance.

It becomes apparent from the table that the regression coefficient of sectoral terms of trade is negative in two cases and positive in one case. The negative sign will indicate that when the terms of trade is favourable for agriculture, rural poverty is reduced. However, it is important to note that the nature of the correlation between agrarian terms of trade and rural poverty cannot be uniquely determined. The point is, of course, well-taken by the very old controversy over the issue, the allusion of which is given by us elsewhere (Ghosh, 1988). However, in the case of equation 1(1), the regression coefficient of sectoral terms of trade becomes statistically significant at 10 per cent level; but in equation 1(3) and 1(6) where CE and PL have been introduced, the regression coefficient of sectoral terms of trade yielded statistically insignificant results. When this variable (ST) is dropped, situation improves for the remaining three independent variables. It should be noted that we have used data pertaining to both favourable and unfavourable terms of trade to agriculture for the years we have studied.

Regression coefficient of CE is statistically insignificant in equation 1(6); but in spite of it, R^2 obtains the highest value (0.89). In equations 1(4) and 1(5), R^2 can explain a good bit of the variance in RPOV, and the standard errors of the estimated coefficients are also reasonably small. It is gratifying to note that in all equations, the signs of the variables DP, CE and PL are in consonance with *a priori* expectations. It is intriguing to observe that, as table 3 reveals, for explaining rural poverty, CE and PL are found to be more relevant than ST. Having culled out this clue, we made a further attempt to quantify RPOV by using more detailed information by extending the time-series ahead upto the year 1988 with respect to all the variables excepting ST. On the basis of these new decadal data (1979-88) for Indian rural sector, we framed three new equations which are presented in table 4.

The new set of equations that we have inducted into our analysis, produced all statistically siginificant regressions at 5 per cent level, excepting PL which is significant at 10 per cent level in equation 2(6). Equation 2(6) represents the highest values for R^2. In case PL is dropped out, the regression coefficient of CE becomes larger and more significant than what it is in equation 1(5), although the value of R^2 is reduced. It is interesting to note that the values of R^2 in all the three new equations are losers as compared to those for the corresponding equations in table 3. This is obvious for many reasons, particularly because in the case of the new equations, we have used three independent variables and not four as in the regression analysis of table 3.

It is necessary to compare the quantitative effects of the independent variables, DP, PL and CE on rural poverty (RPOV). With a view to working out this, we have estimated partial elasticities from the average values of the variables. These elasticities for both the categories of regressions are presented in table 5.

As the table reveals (table 5), the elasticities of CE in absolute terms attain highest values, followed by the elasticities of DP and PL respectively. This shows that as a determinant of rural poverty, the expenditure on con-

Table 4. Estimated Regression Coefficients of Rural Poverty

Equations	Intercepts	DP	PL	CE	R^2
2(4)	0.2739	-0.2536*	0.1075*	-	.62
		(0.1211)	(0.0421)		
2(5)	1.3796	-0.2244	-	-0.3726*	.69
		(0.0913)		(0.2536)	
2(6)	1.5611	-0.2777	0.04467**	-0.3474*	.76
		(0.7233)	(0.0519)	(0.0775)	

Note : (i) Figures in the parentheses denote standard errors.
(ii) *Denotes 5 per cent level of significance.
(iii) **Denotes 10 per cent level of significance.

Table 5. Partial Elasticities of Rural Poverty in India

Equations	DP	PL	CE
1(4)	-1.3211**	0.3075*	-
	(0.2311)	(0.0881)	
2(4)	-0.6007*	0.3329	
	(0.1969)	(0.7001)	-
1(5)	-0.7286	-	-1.6292*
	(0.2536)		(0.4003)
2(5)	0.4139	-	-1.726*
	(0.1334)		(0.2616)
1(6)	-1.3077	0.2888**	-0.7227
	(0.2877)	(0.1424)	(0.3111)
2(6)	-0.6176	0.1589*	-1.2755
	(0.1666)	(0.0573)	(0.2713)

Note : (i) Figures in the parentheses denote standard errors.
(ii) * Denotes 5 per cent level of significance.
(iii) **Denotes 10 per cent level of significance.

sumption can be considered to be the most decisive factor, followed by the NDP of the agricultural sector (that is, net productivity) and the price level. There is a significantly negative correlation between the level of consumption expenditure and the level of rural poverty in India.

Conclusion

The econometric exercise that we have under taken has produced several interesting conclusions with respect to the determinants of poverty. *Firstly*, our analysis brings home the fact that sectoral terms of trade is not a very strong and significant determinant of rural poverty. This may be so because we have used data pertaining to both favourable and unfavourable terms of trade. After all, these have some influence on poverty. *Secondly*, the variance of rural poverty can be more satisfactorily explained by the variables of rural consumption expenditure and the rural net domestic product. When the variable of sectoral terms of trade is eliminated, the regression gives better and more significant results. Another important determinant of rural poverty is the inflation. But by far the most decisive determinant of rural poverty is the consumption expenditure. This implies that improvement in the consumption standard can go a long way in eradicating poverty and in raising the quality of life of the rural people.

It should be noted that the nexus between consumption expenditure and rural poverty involves some sort of circularity in the analysis. This is so because poverty line itself is defined in terms of per capita consumption expenditure. Hence, to by pass the fallacy of *petitio principii*, it would be pertinent to argue that net domestic product or productivity is the most crucial factor that can most satisfactorily explain the rural poverty scenario in India.

Comparatively high rural poverty is explained by lower relative productivity in agriculture. This is a well-known fact and can be attributed to many causative factors. As a matter of fact, the institutional factors and production relations in agriculture do more often than not act as fetters to productivity-induced growth in India. In many of the Indian states, the basic agricultural technology has remained extremely backward and ecologically vulnerable. Needless to say, the improvement in technology involves a massive public investment which is not really forthcoming. Moreover, the surplus-extracting big farmers do not usually invest their surpluses in developing the forces of production or productive accumulation. The surplus is rather invested in speculative *rent-seeking activities*. This partly explains the low productivity syndrome of Indian agriculture and the resultant high poverty profile.

In a sector that is dominated by high rate of growth of surplus labour, unemployment and under-employment, both overt and covert, productivity growth (NDP) becomes the first casualty. However, since productivity is highly and negatively correlated to poverty, one can perhaps surmise that the only way to reduce rural poverty (and for that matter, the overall poverty) is to raise the level of productivity of land, labour and capital.

Productivity, in turn, is related to many factors such as technology, educational level, land tenure system, class relations, man-land ratios, state policies and the like. It is, however, not the burden of the present paper to discuss the implications of all these issues relating to the rural poverty in India. But by no means are these factors less decisive. Be that as it may, an econometric analysis similar to the present study but broader in perspective can be very fruitfully utilised for the purpose of detailed analysis and projection of our rural poverty.

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Agro-Processing Industries' Potential for Employment Generation

U.K. Srivastava

Keeping in mind the large population, which is likely to touch a billion by 2000 A.D., it is mportant to increase the production of foodgrains, but also to provide employment for about 130 million persons who will be the new entrants to the labour force, majority of them belonging to rural areas. This paper is designed to elaborate on the role of agro-industries as an employment and export generating sector. It also arrives at the required organisational form for safeguarding the farmers interests in addition to identifying the constraints faced by these units.

U.K. Srivastava is a Professor in the Centre for Management in Agriculture, Indian Institute of Management, Ahmedabad 380015.

India faces the major challenge of feeding its large population which by 2000 A.D. is expected to cross the one billion mark even at a low estimate. This requires the projected foodgrain production to be 240 million tonnes by the end of century. In addition to foodgrains, as the incomes rise, the demand for milk and milk products, meat and meat products, fish and fish products and fruits and vegetable products is also going to increase rapidly.

Besides increase in production, there is a problem of improving the access of the poorer people to the food and nutrition through the improvement in incomes and quality of life of about 300 million people who are below the poverty line. It is also necessary to generate employment for 130 million persons who will be the new entrants to labour force, majority of them in rural areas. The problem is further aggravated because seed-fertilizer-water technology which is the mainstay of increasing foodgrain production, does not absorb the labour in proportion to increase in per ha production (Alagh, 1984). The country also faces the serious problem of accelerating exports. It is in this context that agro-industries assume a crucial role.

This paper is designed to elaborate the role of Agro-Industries as an employment and export generating sector, analyse the present status of these industries, emerging marketing scenario, required organizational forms for safeguarding the farmers, interests, constraints faced by these units and government policy imperatives.

Employment Generation and Role of Agro-Industries

In recent years, the major efforts for rural development have been through the Integrated Rural Development Programme and wage employment programmes, like the NREP and the RLGEP, which have now been merged into the Jawahar Rojgar Yojana. The approach under IRDP has been to give each beneficiary access to an asset like milch cow, buffalo, poultry unit, sericulture and other such activities with the hope that he will continue to derive the income and move permanently above the poverty line.

The evaluation studies have found that in only 40% cases these assumptions have proved to be correct and in rest of the cases the beneficiary once again joined the ranks of the rural poor. In the case of wage employment schemes increases in income are dependent upon continuous government support for the programme. The budgetary limitations in expanding the size of the antipoverty programmes and the concern for the failure of these programmes to generate self sustained increase in the incomes of the rural poor has drawn the attention of the policy makers to the potential and crucial role of agro industries in governing self sustained employment in rural areas.

Agro-industries process agricultural raw-materials, both ground and tree crops, as well as livestocks and fisheries (Austin, 1981, Srivastava, 1981 & 1989; Srivastava & Vadhala, 1989). These industries provide the crucial farm-industry linkage which helps accelerate agricultural development by creating backward linkages (supply of credit, inputs and other production enhancement services) and forward linkages (processing and marketing), adding value to the farmer's produce, generating employment opportunities and increasing the farmer's net income. This, in turn, motivates the farmer for better productivity and further opens possibilities of industrial development. As the products of agro-industries are both edible and non-edible, the agro-industries can be classified as agro-food industries or simply food processing industries and agro-non-food industries.

The potential for agro-processing can be viewed in two ways:

i). The degree of processing primary raw-materials and,

ii). the degree of processing all by-products under the commodity system.

The degree of processing various raw-materials varies from cleaning and grading of apples to milling and paddy and cooking, mixing and chemical alteration that create instant and ready to eat foods (table 1). An example of the degree of processing can be drawn from wheat. Initially wheat was processed into atta through atta chakkis and chapatis were made at home. Now we not only have western style bread, biscuits and confectionery but also instant noodles, ready to eat snack foods, chapatis , nan and packaged and branded vermicelli in the market.

Table 1. Categories of Agro-Industry by Levels of Transformation Process

I Manual Mechanical*	II Mechanical*	III Mechanical Chemical*	IV Chemical*
Type of Processing Activity			
Cleaning Grading	Ginning Milling Cutting Mixing	Cooking Pasteurization Canning Dehydration Freezing Weaving Extraction Assembly	Texturization Chemical alteration
Illustrative Products			
Fresh Fruits Fresh vegetables Eggs	Cereal Grains Meat Spices Animal feeds Jute Cotton Lumber Rubber	Dairy Products Fruits and vegetables Meats Sauces Textiles & garments Oil Furniture Sugar Beverages	Instant foods Textured vegetable Products Tyres

*This classification has been added by the author

Source : Austin 1981.

It may be noted from table 1 that as the transformation of raw-materials move from category I to IV the value added as well as price of finished products also rises. As we move from preliminary degree of processing to higher degree of processing, capital investments, technological complexities and managerial requirements also go up. Therefore, it has to be examined for each commodity as to what level of transformation is to be encouraged in the light of its present status and the profile of the industry, technology options available, investments required, purchasing power of the target consumer in the domestic market and specifications of the international markets.

Agro industrial potential becomes manifold when the processing possibilities of the entire commodity system are taken into account (Austin, 1981; Gaikwad, 1986; Gaikwad and Gupta, 1987; Mann, 1978; Srivastava 1989). For example, a farmer cultivates paddy, which produces the following : straw (about 50 per cent by weight), husk (about 10.5 per cent by weight), bran (about 3.5 per cent by weight), rice kernel (about 36 per cent by weight). Recent studies have indicated that with an initial investment of Rs. 2 to Rs. 3 crores, each block of 10,000 hectares under paddy crop with two paddy seasons in a year and 4 metric tonnes/ha of production has a potential of supporting a complex of processing industries (rice mills, solvent extraction plants for rice bran oil, processing of husk for a variety of products, and straw paper/board

mills). This yields 107 per cent net value added on the raw-material price. Such an exercise is also available for all commodity by-product systems.

Food processing industries are highly labour intensive and as bulk of the raw-material is to be transformed into edible and usable forms, these industries have to be set up nearer to the sources of raw-materials, mostly in rural areas. They also contribute about 35% to our total exports.

Present Status

The process of agro-based industrialisation is rapidly spreading in our country in response to increasing demand for various agro-based products for direct consumption, industrial use, and exports. There is already a shift from the early mechanical engineering-based agro-industries to chemical-based industries. For example, in addition to the traditional agro-industries (rice mills, sugar mills, cotton ginning, spinning and weaving factories, jute factories, oil mills, etc.) in recent years many new agro-based industries have established plants for solvent extraction for oilseeds, modern dairies for producing bottled milk, butter, cheese, chocolate, milk powder, etc.; factories for producing a variety of paper and boards from paddy straw, bagasse; banana stems for producing alcohol, acetone, acetic acid and other chemicals from molasses and cassava, for producing medicines from medicinal plants, roots and tubers, for producing starch, glucose and a variety of products from maize and cassava, for fruits and vegetable products from fish and meat products, wines for export and man-made fibres from forest plantations. Fresh water, coastal, and deep sea fishery industries are getting increased attention.

During the last few years, there has been a significant increase in investment in plant and machinery for mechanised and highly automated production of pasta products : instant noodles, vermicelli, and ready to fry snacks. These products have been backed by intensive advertising and promotion. Similarly, some major investments are in process fruits and vegetable industries, biscuits and confectionary industries, and other snack foods. Some major investments have also been made even in setting up of integrated paddy-rice processing complexes.

Despite all these developments, food processing industry in India comprises three groups viz., primary food processing, unorganised and cottage scale industries and processed food industries. The first group is made up of predominantly 79,000 rice hullers, 266,000 flour Chakkis, 10,000 dhal mills and 220,000 oil mills. The unorganised sector is dominated by 54,000 bakeries, 5,000 paste-good units, 15,000 traditional food units, 2,000 poha making units and 5,000 fruits, vegetable and spice processing units. There are about 18,000 manufacturing units in the organised factory sector producing a variety of food products valued at over Rs. 8,000 crores (Government of India, 1989 & 1990).

The contribution of food processing industries in generating value added can be summarized as under:

Value of raw-materials processed	Rs.	60,681.0 Crores
Value of materials after primary processing	Rs.	99,293.0 Crores
Value addition after secondary/ tertiary processing	Rs.	12,091.0 Crores
Value of all finished products	Rs.	1,11,384.0 Crores
Net value addition	Rs.	50,703.0 Crores

Source : CFTRI, Mysore

This indicates that bulk of the value addition takes place only at primary processing stage and secondary and tertiary processing accounts for only 11 to 12% of value addition as against 70 to 80% in developed countries.

The employment intensive nature of food processing industry may be emphasised. The available data from the recent annual survey of industries indicates only 11.63% of investment in agro processing (both agro-food and agro-non-food) providing 36.46% of total employment in organised industrial sector in the country (Srivastava, 1989).

In contrast to agro-food processing industries, agro-non-food processing industries (based on raw-materials like oil cakes, tobacco, raw cotton, cotton yarn and fabrics, coir yarn and jute manufacturers, leather and leather products, natural silk and wool and woolen textiles) have experienced much higher value addition but still there is a scope as demonstrated by recent increases in export of value added fashion products from leather and sericulture sectors (Srivastava & Vathsala, 1989).

Emerging Marketing Scenario

The rapid urbanisation of the country and growth of cities have brought in its wake new demands on the food industry. Changing life styles have contributed to a virtual boom in certain type of processed foods. With improved communication and transport for cities the rural population too is trying to imitate the urban patterns of consumption (Shah, 1989)

With increase in literacy level, more and more people are becoming conscious of better nutrition and hence, there is a good demand for special foods for infants, growing children, convalescent, invalids and old people.

Distances separating place of work and home have contributed generally to increase in number of meals eaten away from home. This has generated demand for frozen foods and fast foods.

Breakdown of the joint family system and emergence of the nucleus family concept has resulted in the growth of smaller families, creating greater demand for processed food products.

An increase in the working women force has resulted in less leisure time, this has generated a demand for convenience foods requiring little or no preparation.

Household labour is prohibitively expensive and not within the reach of middle income families. In order to lessen the drudgery in cooking, a housewife has to depend on these products.

The traditionally conservative Indian consumer has taken a long time to accept convenience foods but these are finally emerging. This is bringing about rapid changes in meal structures and attitudes to food. For example, in the case of the elite urban (40 million people or eight million households) the formal, traditional meals are giving way to hybrid, non-traditional meals. An opportunity is seen here for providing more 'variety and modern' quality food products to co-exist with and perhaps supplement to the traditional food items. There lies the opportunities for "ready to cook", "convenient", "nutritious", but "tasty" quality products. As the income rises the demand for processed foods is also projected to double and in some cases even triple during the next 5 years (table 2).

For example, the demand for bakery products in 1995 is projected to be 38 lakh tonnes as against the total production of 12.5 lakh tonnes. Similar rapid increases in demand are expected for confectionery, fruit and vegetable products, dairy products, soft drinks, meat and meat products, marine products, pasta products, pasta goods and others.

In addition to expanding domestic demand for processed food products several of them also form part of the thrust sector for export. These include fish and fish products (including crustaceans-prawns-molluses fresh and frozen) meat and meat products, fruits and vegetables, coffee, tea, spices, cereals and its preparations. In addition to agro food products, agro non-food products have emerged major export earners. This includes leather and leather products, silk and silk products, oil cakes, cotton and jute manufacturers. The thrust is on value added products rather than the raw materials exports.

Table 2. Processed Food Industry Dimension by 1995

(lakh tonnes)

Sector	Present Production	Projected demand
Organised Sector		
Bakery product*	12.590	34.00
Confectionery	0.260	0.37
Fruit & Vegetable products	2.170	3.40
Chocolate	0.008	0.29
Dairy products-processed :		
– Baby food	0.490	0.95
– Condensed milk	0.007	0.12
– Milk powders	0.500	1.27
– Ghee	0.200	0.63
Ice cream (Lakh KL)	0.009	0.57
Malted milk food	0.280	0.46
Weaning food	0.009	0.25
High protein foods	0.009	0.17
Soft drinks (million bottles)	1.860	3.32
Beer (Lakh KL)	1.990	4.27
Starch and derivatives	1.420	3.16
Instant coffee	0.006	0.20
Meat products	0.180	1.51
Vanaspati	8.700	17.22
Marine products	1.000	1.56
Traditional Sector		
Paste goods	0.200	0.45
Sweets/Snacks	3.200	7.20
Spice powders	0.300	0.36
Vermicelli	0.800	0.97
Phoa/Mumura	7.680	9.29

*Also includes production in the unorganised sector

Source : CFTRI, Food Processing Sector, Food Process and Machinery, VIII Five Year Plan, Report prepared by the Planning Commission working Group, 1989.

It may be noted that higher degree of value addition for export and domestic market generates more employment and foreign exchange from the same primary raw materials and land and water resources.

Organizational Forms : Policy Dilemma

Policy makers usually face a dilemma in this sector. While there is vast potential for growth from the agro processing sector, the farmers' interests have to be safeguarded (Srivastava, 1989). Food processing units, at least in the primary processing stage, have 70 to 80 per cent of operating cost only in terms of procurement of raw material from the farmers. Therefore, protecting the farmers interest also becomes the crucial consideration. In this context, it has been found that cooperatives are an ideal

organizational form. We all know the successful experience of sugar cooperatives in Maharastra, milk cooperatives all over the country, oilseed growers cooperatives and fruit and vegetable cooperatives.

These cooperatives have served as an anchor and provided backward linkages by way of supply of inputs to the farmers and forward linkages by way of pooling, processing and marketing of the products, and sharing the benefits with the members.

We are, of course, aware that every State does not have cooperative culture and even if the cooperatives are formed they do not function in an ideally expected fashion. Therefore, we have to keep an open mind with regard to organizational forms appropriate to a commodity and to a place in view.

Even the private sector units have realized that they have to build a suitable and vibrant interface with the farmers. The most controversial project in this area is the Pepsi Cola project which has undertaken to supply the farmers the hybrid seeds of tomato, potato and other horticulture crops. They have also plans to provide technical guidance to farmers and ensure market for their produce.

Thus whatever may be the organization form, we have to ensure that the food processing units serve as an anchor and build forward and backward linkages in a reliable way.

Similar concerns also arise in the case of agro non-food processing units where the interest of producers of raw materials are to be safeguarded.

Constraints on Growth of Agro Processing Units

While there is a vast potential for growth of agro processing units, these industries face major constraints at every stage. The constraints on acceleration of production for domestic and export markets can be identified in a systems framework right from the inputs supplied to farmers and production of raw materials to output processing and marketing. These are briefly listed below :

Raw materials

1) While everyone talks about lot of agricultural raw materials getting wasted, the agro processing units face the problems of inadequacy and lack of suitability of raw materials for processing, for example, it is reported that thirty per cent of fruits and vegetables are getting wasted in the process of handling and marketing. At the same time there is an underutilization of the existing processing capacity because all the available varieties are not processable (Chaddha, 1989; Virmani 1990).

2) While the units would like to integrate the production of raw materials with processing, the land laws would not permit the production of raw materials by units and efforts to build direct link with the growers are often difficult because the farmer producers are widely disbursed and units also face acute shortage of working capital.

Constraints on Processing and Marketing

1) As a substantial portion of the production takes place in the cottage and small sectors, the technology is often obsolete and gives sub-optimal yields, involves over-utilisation of energy and lack of scale economies in production. The research and development in infrastructure is very weak. These cause problems with respect to cost and attainment of higher quality and opening up of avenues for byproduct utilization.

2) In exports, international standards are very exacting, particularly when mixing, homogenising, de-accrediting and pasturisation are involved.

3) The agro processing units particularly the food processing units face the problems of non availability of suitable packaging materials at a reasonable cost. (APEDA, 1989; Virmani, 1990).

4) In developed countries mass domestic market provides an opportunity to test out new products and flavors. In India food processing industries have not been able to generate a mass market because of very high prices of finished goods. One of the major components in the price structure is the element of taxes. The indirect taxes are levied at exorbitant rates not only on finished products but also on machinery, packaging materials inputs, etc. The multiple point taxation amount to 30 to 40 per cent of the product prices. (Srivastava, 1989; Virmani, 1990).

5) The frozen food component of the food processing industry is further constrained in developing the domestic market due to a lack of infrastructural facilities including cold storages, suitable transport facilities and in house food testing laboratory facilities. Lack of suitable transport facilities are extremely crucial bottlenecks because frozen foods require a high frequency of delivery to the retailers which the manufacturers are sometimes unable to provide.

6) In case of export market, the shortage of refrigerated vans and long distances from factory to ports again act as further constraints. The exporters also face the problem of getting suitable cargo spaces in the vessels air transport. Furthermore at our ports or airports suitable storage facilities are not available to retain the cargo if it

cannot be shipped immediately. Sometimes the products are pilfered because of non availability of storage facilities (Srivastava, 1989; Virmani, 1990).

7) The thurst on the value added products in branded consumer packs require a lot of promotion build up in the importing countries which often become difficult for the individual units to undertake. Most of the units look up to the respective export promotion councils/authorities which are not geared to perform the task effectively.

Government Policy Imperatives

With the growing concern for generating non-form employment opportunities in the rural sector and improving the incomes of the farmers from the same land and water resources and exploiting the potential for exports, the agro processing industries have received considerable policy thrust in recent years. With the establishment of the Ministry of Food Processing Industries, several policy measures have been adopted to facilitate the growth of these industries. In 1988-89 the union budget introduced the following measures for the food processing industries:

a) MODVAT will now be extended to cover 100 products.

b) Reduction in the custom duty on low density polyethylene (LDPE) from the 100 per cent to 75 per cent LDPE is used as a base for production of a wide range of packing materials.

c) Measures to reduce cost in the important area of plastics.

d) Reduction in the rate of excise duty on product of the regenerated cellulose, including packing material-cello-phane, from 40 per cent to 20 per cent.

e) Imposition of a levy of 50 percent *ad valorem* on the basic excise duty on selected food items.

f) Reduction in the import duty on specified items of machinery and specific packaging from 101 per cent to 50 per cent.

The 1989-90 budget added more types of machinery to be imported at a concessional duty of 40 per cent. This is a welcome measure in the context of vast agro processing potential for generating employment and export earnings.

As several food processing units are small, they will also benefit from the general exception of income tax for this sector for partnership firms from Rs. 10,000 to Rs. 15,000. The ceiling for excise duty exemption for goods produced by SSI units has been raised from Rs. 15 lakhs to Rs. 20 lakhs. The agro processing units are also likely to benefit by the reintroduction of the central investment subsidy for small scale units in rural areas and backward regions.

Besides the above policy changes, exemption from excise duties have also been announced for jute industry, refined rapeseed and mustard oil, coffee, cattle feed, craft paper, craft paper board, hand made paper and footwear made with the help of KVIC.

In addition to the fiscal incentives, several other policy measures have been taken to facilitate the agro processing industries. This includes permission for joint ventures with foreign companies, permission to cooperatives of raw material producers to establish contacts with foreign companies for setting up units for processing and exporting 100 per cent of their produce, an "open sky" policy for foreign freight couriers to touch Indian ports in one of their secular routes for carrying cargo. This can partly reduce the problems faced by the exporters in getting space as well as reduce freight charges to some extent.

Besides the policy support measures, direct investments are contemplated for creating a chain of cold storages throughout the country for storage of processed marine, fruit and vegetable products.

All the above measures are in the right direction and they have definitely accelerated the production of value added agro food as well as agro non-food products in the country. But in the process all the manufacturers have to compete aggressively within the small domestic market segment. The processed food products remain highly priced and beyond the reach of masses. These aspects require a basic change in government attitude towards the processed food products. Instead of considering them as luxury products to be used only by higher income groups in the country, they need to be recognised as essential commodities for daily use by the common man. The agro processing industries need to be recognised as crucial for generation of employment on a self sustained basis as well as major export earners.

If this is recognised, it is necessary for the Government to take a bold initiative to systematically reduce the tax burden on processed food products. It should also be recognised that these industries need to be facilitated to play a pro-active role in helping the farmers to produce suitable raw materials. There is a need, therefore, to permit more integrated agro processing complexes in which either the units are able to forge the linkage with the farmers through the strong backward linkage, and or they

are permitted to produce at least 50 per cent of the raw materials requirements.

To sum up, it may be emphasised that there is a vast potential for agro industries in the country. These agro industries are generally labour intensive and can contribute to the export earnings. A significant progress is taking place in the direction in all the three sectors-cooperatives, joint as well as private sectors, but more bold policy initiatives as well as development of supporting infrastructure facilities would accelerate the rate of growth in this sector.

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"Imagination is more important than knowledge. For knowledge is limited, whereas imagination embraces the entire world."

—Albert Einstein

"Anyone who can spell a word only one way is an idiot."

—W.C. Fields

Opportunity—something, more pople would recognize if it didn't come disguised as hard work.

—Changing Times

An optimist sees an opportunity in every calamity; a pessimist sees a calamity in every opportunity.

—Anonymous

Focus

Employment and Productivity in Agro-Industries

B. Sudhakar Rao

Over the years approximately half of the total employment generated in the factory sector has been accounted for by agro industries. Several policy measures have also been taken to promote agro industries which, in the broad frame-work of small and cottage sector, is a means of promoting non-farm employment of a widely dispersed pattern. Agro industries also minimise regional imbalances by utilising local resources. This paper analyses the employment and productivity trends in the agro-industries.

B. Sudhakar Rao is a Member in The Rural Industries and Employment Faculty, National Institute of Rural Development, Rajendra Nagar. Hyderabad-500030.

In the overall industrial structure of the Indian economy, agro industries and agro related activities constitute an important segment. An analysis of the factory sector for 1982-83 reveals that about 45.77 per cent belongs to agro industrial category. If rubber, agricultrual implements and agro chemicals are also considered the proportion may further go up. The 8 major groups under NIC code had a share of 45.47 per cent of the number of factories in 1974-75. The fixed capital investment constituted only 10.95 per cent in agro industries in 1982-83, showing a marginal decline over 1974-75 (12.71 per cent). This implies that agro industries are relatively labour intensive. Employment in agro industries as a share of total factory sector was 46.96 per cent in 1982-83. Over the years approximately half of total employment generated in the factory sector has been accounted for by agro industries.

While the share of agro industries remained a constant net value added has registered a marginal decline from 29.25 per cent in 1979-80 to 22.22 per cent in 1982-83. Working capital utilised by agro industries in the total factory sector varied between 15 and 22 per cent over a period of 10 years. The decline in working capital utilisation from 22.86 per cent in 1974-75 to 15.72 per cent in 1982-83 shows that the limiting factor in growth in out put and value added is mostly related to the availability of working capital. Lack of modernisation efforts can be ascribed to the low capital base.

Within the agro industries sector food products have a dominant share followed by beverages and tobacco products. Next in importance are cotton textiles, wood and wood prodcuts. In terms of certain economic ratios of agro industries sector the following features can be identified :

(a) The overall compound growth rate was found to be 4.2 per cent compared to total factory sector which was also 4.2 per cent during the period 1974-83. In terms of employment, the growth rate of workers at 2.5 per cent was unfavourable compared to 3.2 per cent in the total factory sector. However, in terms of

total output generated agro industries fared better with a compound growth rate of 10.7 per cent compared to 7.7 per cent in the total factory sector.

(b) In terms of working capital/fixed capital the trend compared to the factory sector is found to be not in tune with the overall development. However, in-spite of unfavourable trends in the growth of total invested capital, the trends in value added show a positive increase indicating the efficiency of firms. The invested capital declined from an average of Rs. 5.9 lakh in 1974-75 to Rs. 3.03 lakh in 1982-83. Average fixed capital per worker increased from Rs. 643 in 1974-75 to Rs. 1514 in 1982-83. For all the industries as a whole it was Rs. 2504 and Rs. 6496 respectively for the above period (tables 1 & 2).

The conclusion that emerges is : (1) agro industries need better treatment in terms of capital flows at different levels and (2) rural development in terms of utilisation of agro resources and rural skills needs agro industrial development in a much more organised manner.

Unorganised Sector

In the unorganised sector the data availability is limited to various rounds of national sample survey. The basic information in respect of non-agricultural establishments is available from the economic census 1977 and 1980. In the light of what is available, about 75 per cent of the non-factory manufacturing establishments are located in rural areas engaging about 70 per cent of the employed persons. With only 23.36 per cent units located in urban area, its share of value added was about 56.71 per cent during 1978-79. In the unorganised category also agro industries take the highest percentage. A declining trend in value added in both rural and urban areas was observed. This may mean that in the unorganised agro industry sector the productivity is declining. This might be due to the fact that policy interventions towards capital intensity and labour productivity are not forthcoming in the right direction. The vast proportion of unorganised sector is kept out of the institutional and policy frame.

The majority of the non-factory manufacturing enterprises are own account establishments, 86 per cent in rural and 64 per cent in urban India as per 1980 economic census. In the rural sector the capital output ratio did not change much, value variations being 0.39 to 0.43. However, capital labour ratio increased slightly, more due to cost escalation than to capital efficiency. Large inter-state variations were also observed in the unorganised sector. In terms of number of enterprises Uttar Pradesh, Andhra Pradesh and West Bengal takes the ranks in that order where as value added per enterprise is maximum in Punjab, Tamil Nadu, Assam, and Gujarat in that order. It was also observed that barring a few cases, wherever

Table : 1 Growth Indicators (Compound Growth Rates) in per cent

Code No.	Name of the Industries	Growth of Factories			Growth of Workers			Growth of Output		
		1974-75 to 1977-78	1978-79 to 1982-83	1974-75 to 1982-83	1974-75 to 1977-78	1978-79 to 1982-83	1974-75 to 1982-83	1974-75 to 1977-78	1978-79 to 1982-83	1974-75 to 1982-83
20-21	Manufacture of Food Products	4.0	1.2	2.7	0.61	2.5	3.3	9.4	14.9	11.7
22	Manufacture of Beverages, Tobacco and Tobacco Products	36.9	0.73	16.9	14.5	3.9	9.1	11.8	7.6	9.4
23	Cotton Textiles	4.0	–0.23	1.8	0.16	–1.5	19.4	7.0	5.9	7.2
24	Wool, Silk and Synthetic Fibre Textiles	7.0	0.39	3.6	7.3	7.1	5.7	13.4	19.5	15.5
25	Jute, Hemp & Mesta Textiles	-8.7	–2.9	–4.1	1.5	–0.45	0.59	8.1	7.0	7.4
26	Manufacture of Textile Products including Wearing Apparel	9.1	–0.84	4.6	7.7	0.49	3.7	16.1	15.1	15.6
27	Wood and Wood Products, Furniture & Fixtures	3.8	–0.28	1.5	–0.45	1.5	0.52	7.2	13.1	10.2
29	Manufacture of Leather and Leather and Fur Products	3.4	2.5	3.1	2.5	1.7	3.8	13.2	8.7	13.5
	Agro-Industries	7.9	0.45	4.2	4.1	1.3	2.5	9.3	12.0	10.7
	All Industries	7.2	1.4	4.2	3.9	2.7	3.2	10.5	16.1	7.7

Source : Annual Survey Industries—Summary results for the factory sector for the respective years.

Table 2 : Trends in Employment and Value Added

Code No.	Name of the Industry	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1981-82	1982-83
20-21	Manufacture of Food Product	54	57	58	59	55	54	56	58
		(0.6002)	(0.6147)	(0.6039)	(0.6772)	(0.7620)	(0.8263)	(0.9435)	(1.2057)
22	Manufacture of Beverages, Tobacco and Tobacco products	90	65	44	44	43	37	41	48
		(0.3362)	(0.3557)	(0.3191)	(0.3059)	(0.2996)	(0.2934)	(0.3442)	(0.3451)
23	Cotton Textiles	167	158	149	144	147	138	124	141
		(0.3418)	(0.3292)	(0.3803)	(0.4456)	(0.4805)	(0.4909)	(0.6081)	(0.6431)
24	Wool, Silk and Synthetic Fibre	53	51	48	54	49	53	48	64
		(0.6406)	(0.6981)	(0.7266)	(0.7973)	(0.9228)	(0.9593)	(1.3216)	(1.4269)
25	Jute, Hemp & Mesta Textiles	693	131	111	106	969	980	785	1073
		(0.1793)	(0.1951)	(0.2113)	(0.2362)	(0.2435)	(0.3207)	(0.3327)	(0.3254)
26	Manufacture of Textile Products including weaving apparel	36	31	34	34	31	29	28	33
		(0.5022)	(0.5949)	(0.6177)	(0.6780)	(0.7758)	(0.8251)	(1.1971)	(1.335)
27	Wood and wood products, Furniture & Fixtures	19	18	16	16	16	17	16	18
		(0.2603)	(0.2706)	(0.3046)	(0.3501)	(0.3869)	(0.4135)	(0.5300)	(0.5973)
29	Manufacture of Leather & Leather and Fur Products	56	38	56	54	24	57	57	59
		(0.5354)	(0.7856)	(0.8225)	(0.7986)	(0.9209)	(1.2780)	(1.1661)	(1.1197)
	Agro-Industries	81	77	70	70	67	64	62	70
		(0.4272)	(0.4420)	(0.4659)	(0.5197)	(0.5658)	(0.6068)	(0.7423)	(0.8468)
	All Industries	74	70	64	65	64	63	58	67
		(0.5481)	(0.5978)	(0.6543)	(0.7012)	(0.7826)	(0.8765)	(1.2066)	(1.3661)

Source : Annual Survey of Industries : Summary Results for the Factory Sector for the respective years.
Figures in ( ) represent value added.

capital labour ratio was high the corresponding value added labour ratio was also on the higher side. The variance of capital output ratio between different states is due to (a) different varieties and quality of products produced and (b) different types of production methods adopted.

It is interesting that with 74.49 per cent of the total number of enterprises in the non-factory sector in the country located in the rural areas, the percentage of total fixed assets was only 5.36 per cent, as against 89.88 per cent in the factory sector. Likewise the percentage of total output was found to be 6.73 in the non-factory sector in rural areas compared to 80.92 in the factory sector. Again the percentage of value added was only 11.47 for non-factory sector in rural areas as against 73.51 in the factory sector as a whole. It is essential that the unorganised agro industry sector should get preferential treatment in programmes of rural development, modernisation, etc. It is important because more than 52.75 per cent of total employment was generated by the rural non-factory sector against fixed assets valued at about 5 per cent of the total value of the same.

KVI Sector

In the category of village industries under the KVIC schedule, 17 can be classified as agro industries. They contributed 88.95 per cent of the total out put of the KVI sector and 91.43 per cent of employment (both full time and part time) in the year 1983-84. A compound growth rate of 16.53 per cent for production, 53.02 per cent for employment (full time) and 2.80 per cent for employment (part time) was observed during the last 10 years.

It is evident that agro industries have a high employment potential at a relatively low cost and are supposed to utilise local raw material. Due to seasonality and other related factors the units face problems in raw material procurement. Also due to infrastructure bottlenecks in the rural areas there is a tendency to start agro units in urban areas. Naturally this calls for resource mobilisation towards more social and infrastructural inputs coupled with policies to inject more capital specially to unorganised agro units in the rural areas.

Growth patterns and Rural-Urban differentials

To arrive at the rural urban differentials and to derive growth effects the census data was utilised. The objective is to see whether the rural areas have responded favourably to the national growth effect in terms of industrial composition and the regional shares. The decomposition of effects on employment between rural and urban, household and non-household and their concentration levels is expected to shed more light on growth reflections. For example in the total agro industries a positive change of about 20 lakh was observed between 1971-81 in employ-

ment generation in rural areas. About 2 lakh employment was lost to the rural area due to a negative industrial mix. The industry mix is very favourable to the urban area resulting in a positive gain of about 2 lakh employment, the actual change between 1971-81 was observed to be 21,29,326. Likewise in the rural household sector the change in employment was 4.47 lakhs. But if the national trends are to be superimposed on rural household sector the change in employment should have been 5.39 lakhs.

Here also the negative result is due to an unfavourable industrial mix. In the urban household sector there is a tremendous gain of 3.04 lakhs due to very favourable industry mix, whereas in terms of national growth trends the employment would have been only 1.93 lakhs.

In the rural non-household sector the change in employment between 1971-81 was observed to be 12.93 lakhs; it should have been only 11.63 lakhs according to national growth trends. A positive gain was observed in the rural non-household sector due to its effective regional share. In the urban area there is a negative change on the same account loosing employment of about nearly 2 lakh persons.

The results are presented in table 3. By way of illustration if we analyse item 20-21 it is found that food industries have grown more than the national average in the total agro industry sector (41.36 per cent and 39.10 per cent respectively in 1971-81). If the regional employment in food industry reflect the national growth rate the jobs created would have grown by 3,42,982 from 8,77,193 in 1971 to 12,20,175 in 1981. However, since the growth rate is high for agro industries the rural sector had a relative gain with 3,62,781 jobs created. The relative share of this group in the total agro industries is slightly higher in rural areas (15.73 per cent compared to 14.69 per cent in all India in 1971). These have increased to 16.43 and 16.12 respectively in 1981. The national growth effect and industry mix effect have a positive impact but as relative proportional share between national and rural area in 1971 and 1981 have declined in food industries (the difference in shares in 1971-81 being 1.04 and 0.41 respectively) it contributed to a decline of 91254 jobs. If the rural area had maintained the difference in its share of food industries, relative to the nation as a whole in 1981, it would have gained another 91,254 jobs.

If this situation is compared to food industries in urban areas it is found that 2,58,887 jobs in urban area can be attributed to an aerial reflection of growth in food industries. However, the actual change that occured between 1971 and 81 is much more-4,33,985 new jobs. The industry mix effect has contributed more significantly than the national growth effect and this advantage was lost to the rural area. If we consider agro industries as a whole the employment generation due to industry mix effect in urban areas is more positive. However, a near balance was struck between agro industrial employment in rural and urban areas.

Table 3 : Employment and Component of Employment Change, Rural and Urban Areas, 1971-1981
(Actual numbers employed)

NIC Code	Industry (Major group)	Employment 1971	Employment 1981	Change	Components of Employment Change: National Growth Effect (N)	Industry mix Effect (M)	Regional share Effect (S)
20-21	Manufacture of food products	8,77,193	12,39,974	3,62,781	3,42,982	1,11,05,363	–1,10,85,465
		(6,62,115)	(10,96,985)	(4,33,985)	(2,58,887)	(83,82,375)	–(82,07,277)
22	Beverages, Tobacco and Tobacco Products	8,52,276	11,87,525	3,35,249	3,33,240	–5,96,593	+5,98,602
		(4,62,665)	(6,32,353)	(1,69,688)	(1,80,902)	(3,23,865)	–(3,35,079)
23	Cotton Textiles	10,73,091	15,45,285	4,72,194	4,19,589	–6,33,123	6,85,738
		(16,93,808)	(22,87,143)	(5,93,335)	(6,62,279)	–(9,99,346)	(9,30,402)
24	Wool, Silk and Synthetic Fibre Textiles	1,10,941	1,34,763	23,822	43,378	7,21,117	–7,40,673
		(1,67,748)	(2,71,013)	(1,03,265)	(6,55,895)	(10,90,362)	–(16,42,992)
25	Jute, Hemp and Mesta textiles	80,411	92,746	12,335	31,441	–15,20,572	15,01,466
		(2,67,204)	(3,25,050)	(57,346)	(1,04,477)	–(50,52,827)	(50,06,196)
26	Manufacture of textile products including Weaving Apparel	9,90,640	14,17,613	4,26,973	3,87,340	1,58,89,865	–1,58,50,235
		(8,48,543)	(14,23,275)	(5,82,732)	(3,28,652)	(1,34,82,309)	–(1,32,28,229)
27	Wool and Wood Products, furniture and fixtures	12,69,003	16,83,814	4,14,811	4,96,180	–98,47,463	97,66,094
		(5,82,230)	(7,47,522)	(1,65292)	(2,27,652)	–(45,18,104)	(44,55,744)
29	Manufacture of Leather and Leather and Fur Products	3,24,029	2,44,660	-79,369	1,26,695	–(1,59,77,870)	(1,57,71,815)
		(2,26,221)	(2,49,404)	(23,183)	(88,452)	–(1,11,54,957)	(1,10,89,695)
	Total Agro Industries	55,77,584	75,46,380	19,68,796	21,80,835	–8,59,376	6,47,342
		(49,02,534)	(70,31,860)	(21,29,326)	(19,16,891)	(7,67,148)	–(5,54,713)

Figures in ( ) represent Urban Area

Employment possibility trends

To analyse the impact of agro industrial expansion on areal employment and to derive concentration/dispersal patterns multiplier analysis based on location quotient methodology was adopted. If LQ >1 the region is expected to be more specialised in that industry than the nation as a whole and vice-versa i.e., the regional export industry would be expected to have a LQ>1; and import industry LQ<1 and a local industry LQ = 1. Export industries due to regional specialisation constitute the economic base of the region and thus become the basic sector for that region. Utilising LQ, employment in each industry is split into basic and non-basic components (Walter Isard and Avron, Bendavid) and the multiplier arrived at. To avoid the time lag problem the change in basic employment compared to the change in actual employment over a period of time is considered for deriving the basic employment multiplier, area wise and industry wise. The basic multiplier of 3 means that when basic employment increases by 1 three new jobs including both basic and non-basic will be created. It was observed that the basic multiplier of food products, cotton textiles, silk and synthetic fibre textiles, jute, hemp and mesta and other textile products is negative in the rural area between 1971 and 1981. It appears that food products constituting the major segment of agro industrial structure could not leave its impact on the rural area, where as tobacco and tobacco products, wood and wood products, leather and leather products had a significant multiplier effect. On the other hand in the urban areas the impact of cotton textiles is significant and the basic multiplier coefficient increased from 15.17 to 37.19. Except tobacco, leather, and wood products all other major groups of industry had a positive impact on the urban area. A further analysis differentiating between household and non-household sectors in the rural area revealed certain interesting features. All the above mentioned products had a high employment multiplier in the household sector. Specially in the case of leather products the basic multiplier seemed to increase from 9.30 to 16.14. On the other hand in urban areas also leather and leather products showed an increasing impact in the household sector. As far as production of cotton textiles is concerned the urban areas showed a significant increase in basic multiplier in the non-household sector; it is negative in the household sector. A detailed product wise exercise has further revealeded in the rural area, grain mill produces khandasari gur etc., tea processing, cashewnut processing and production of starch recorded a high basic multiplier. Canning and preservation of fruits and vegetables, dairy products, edible oil and fats has a negative basic multiplier effect. In urban areas grain mill produces hydrogenated oils and products of starch, has shown a negative result. In the second group (NIC Code 22) production of country liquor and toddy and bidi manufacture had high basic employment multiplier. In the third group of industries cotton ginning and baling had a negative multiplier, although the position might have been significantly reduced by 1986. The basic multiplier for cotton spinning, weaving, finishing, has decreased from a very high positive value to a negative value in the urban area. Weaving, finishing of cotton, handlooms and powerlooms and charkas had a positive basic multiplier in the rural area and a negative multiplier in the urban area. The multiplier however is high for powerlooms in the urban area. As far as woollen textiles are concerned wool cleaning and pressing, spinning and weaving, printing, dyeing and bleaching had a positive multiplier in the rural area. Wool finishing in mills, dyeing and bleaching of woollen textiles, spinning, weaving and finishing of other textiles had a negative basic multiplier in rural areas. Except manufacture of jute bags, other jute textiles like processing and baling, spinning and weaving, dyeing, printing and bleaching, spinning, weaving and finishing showed a positive basic multiplier in the rural areas compared to urban areas.

Manufacture of all types of threads, nets and ropes, knitting mills, embroidery, lace, and textile garments had a negative basic multiplier in rural areas. In urban areas manufacture of all types of textile garments had a basic multiplier of 14.66 during 1971-81 period.

As far as wood products are concerned manufacture of wooden and cane boxes, baskets, etc., had a positive multiplier effect in the rural areas. Structural wooden goods had an urban bias though the basic multiplier seem to be declining in the recent past. Tanning, curing, finishing of leather, canning and bleaching of fur had a high multiplier effect between 1971-81. In the urban area all types of leather goods showed a positive multiplier effect. Based on the decomposition effects in employment the agro industries have been classified into high, medium, and relatively disadvantaged industries in terms of employment in both rural and urban areas. The details are presented in tables-4, 5 and 6.

For policy purposes it would be useful to encourage the industries under the third category and sustain their growth in the first category, so as to avoid their drift to the urban areas. Alternatively slow growth industries in urban areas should be discouraged to provide for their growth in the rural areas. As far as concentration and dispersal patterns are concerned table 7 is self explanatory.

Table 4 : Basic Multiplier of Employment by Industry Category/Region
(Major Industry Group)

NIC Code	Name of the Industry	Rural 1971-81	Urban 1971-81
All Agro Industries			
20-21	Manufacture of Food Products	– 0.47	0.78
22	Beverages, Tobacco and Tobacco Products	3.60	– 0.43
23	Cotton Textiles	– 0.56	15.17
24	Wool, Silk and Synthetic Fibre Textiles	– 0.21	2.72
25	Jute, Hemp and Mesta Textiles	– 0.05	3.05
26	Manufacture of Textile Products including Weaving Apparel	– 11.57	11.00
27	Wood and Wood products, Furniture and fixtures	2.93	– 0.23
29	Manufacture of Leather and Leather and Fur products	3.95	– 1.15
Household Sectors			
20-21	Manufacture of Food Products	– 0.12	– 1.12
22	Beverages, Tobacco and Tobacco products	22.75	– 6.11
23	Cotton Textiles	– 0.67	– 3.29
24	Wool, Silk and Synthetic Fibre Textiles	– 0.08	1.60
25	Jute, Hemp and Mesta Textiles	– 6.00	0
26	Manufacture of Textile Poducts including Weaving Apparel	– 0.25	5.83
27	Wood and Wood products, Furniture and Fixtures	7.82	– 0.20
29	Manufacture of Leather and Leather and Fur products	9.30	1.00
Non-household Sectors			
20-21	Manufacture of Food Products	– 7.00	– 1.54
22	Beverages, Tobacco and Tobacco products	9.00	– 0.22
23	Cotton Textiles	– 0.56	14.16
24	Wool, Silk and Synthetic Fibre Textiles	– 0.47	4.58
25	Jute, Hemp and Mesta Textiles	– 0.13	3.63
26	Manufacture of Textile Poducts including Weaving Apparel	11.67	– 7.51
27	Wood and Wood products, Furniture and Fixtures	3.14	– 0.95
29	Manufacture of Leather and Leather and Fur Products	- 0.52	3.80

Productivity

To identify and analyse the productive efficiency six broad Agro-industry groups have been identified and simple ratios calculated. The capital labour ratio provides an estimate of capital intensity. The lower the value of the capital labour ratio, the higher the labour intensity in relation to capital employed. The output-input ratio might be an index measuring input efficiency in between different categories. Value added to labour indicates the operative efficiency of labour employed and is a good measure of the resource efficiency also.

The available data is taken as indicative of the trends for the future, both in rural and urban areas. While some micro analysis with employment as a major focus has already been done in the preceding pages, the data deliberately has been chosen here of the non-factory manufacturing industries which has a greater bearing for agro based rural industrialisation. In terms of total non-factory manufacturing industries the percentage shares are as follows :

Percentage Distribution

Selected Indiicators	1968-69		1978-79	
	Rural	Urban	Rural	Urban
No. of Industries	76.62	23.38	76.64	23.36
Persons employed	71.15	28.25	68.92	31.08
Value of fixed assets	56.84	31.16	52.96	47.04
Value added	50.79	49.21	43.29	56.71

Source: Seminar on 'Rural industrialisation', Background papers, Planning Commission (Oct. 21-22, 1984).

Value added has shown a considerable decline in the urban area. The structural ratios showed positive trends. However, the capital and labour efficiency is better in urban areas, compared to rural areas as is evident from the table 8.

A trend analysis showed that the capital output ratio for all the industries had not changed much-values being 0.39 (1968-69) and 0.43 (1978-79) respectively. Value added per labour (a measure of labour productivity) has shown an upward trend from Rs. 431 in 1968-69 to Rs. 1039 in 1978-79. In a rural-urban senario, capital intensity and level of efficiency was less pronounced.

Policy evaluation : An over view

Several policy measures have been taken to promote agro industries within the broad frame work of small and cottage sector, as a means of promoting non farm employment of a widely dispersed pattern and to minimise regional imbalances by utilising local resources. The recent trends in the small and rural sector are in favour of agro industrial projects. However, they mostly belong to traditional category and have not resulted in high productive efficiency. Basic agro projects within the SSI Sector have tended to move to urban centres. The 7th Five Year Plan has laid emphasis on the measures necessary for implementation of anti-poverty programmes. Promotion of agro based industries in rural areas has been a necessary concomitant of this programme. Though there is no separate policy for agro industries the programme and incentive structures remain the same. Some agro industries like pickles, rice milling, dal, milling, bread, biscuits, pastry, confectionery including chocolates, toffees, chewing gums, rapeseed oil, mustard oil, sesame (except solvent extractions), groundnut oil (except solvent extractions), sweet and cashew nut products, poultry feed, spices, tapiaco sago, and flour, have been reserved for exclusive production in the small

Table 5 : Growth in Employment 1971-81 (Rural)

NIC Code	High Growth Industries	NIC Code	Medium Growth Industries	NIC Code	Relatively slow or Disadvantaged Industries
204	Grain Mill Products	217	Manufacture of Starch	201	Manufacture of Dairy Products
205	Manufacture of Bakery Products	229	Manufacture of Tobacco and Tobacco Products not elsewhere classified	202	Canning and Preservation of Fruits and Vegetables
209	Manufacture of Cocoa, Chocolate and Sugar Confectionery	241	Wool spinning, Weaving and Finishing in Mills and Finishing in Mills	207	Production of Indigenous Sugar, Boora, Khandsari, Gur etc. From Sugarcane and Palm Juice
210	Manufacture of hydrogenated oils, vanaspati ghee etc.	250	Jute and Mesta Pressing and Baling	211	Manufacture of other edible oils and fats etc.
219	Manufacture of food products not elsewhere classified	299*	Manufacture of leather and fur Products not elsewhere classified	212	Tea processing
226	Manufacture of bidi			213	Coffee currying roasting and grinding
231	Cotton spinning, weaving & finishing of cotton textiles in mills			214	Cashewnut processing like drying shelling roasting salting etc.
239	Cotton textiles not elsewhere classified			223	Production of country liquor & toddy
244	Manufacture of wool not elsewhere classified			225	Tobacco stemming, redrying and other operations
245	Spinning weaving and finishing of silk textiles			227	Manufacture of cigars, cigarettes, cheroot, and cigarette tobacco
247	Spinning weaving and finishing of other textiles, synthetic fibres etc.			228	Manufacture of chewing tobacco, jarda and snuff
259	Manufacture of Jute bags and other Jute Textiles, not elsewhere classified			230	Cotton ginning, cleaning and baling
262	Embroidery and making of crates, laces and fringes			232	Printing, dyeing and bleaching of cotton textiles
263	Weaving carpets, rugs & other similar textiles products.			233	Cotton spinning other than in mills (Charka)
269	Manufacture of textile not elsewhere classified			234	Production of Khadi
270	Manufacture of Veneer, plywood and their products			235	Weaving & finishing of cotton textiles in handlooms other than Khadi.
272	Manufacture of wooden and cane boxes, crates, drums,, barrels & other wooden containers, Baskets and other rattan, bamboo, reed and willow wares made entirely or mainly of cane, rattan, reed, bamboo and other willow.			236	Weaving & Finishing of Cotton Textiles in powerlooms
				240	Wool-cleaning, baling and pressing
				242	Wool spinning and weaving (other than in mills)
				243	Dyeing and bleaching of wooken textiles
				246	Printing, dyeing and bleaching of silk textiles
				249	Silk and synthetic fibre textiles not elsewhere classified.
				251	Jute and mesta spinning and weaving
				252	Dyeing, printing and breaching of jute textiles
				253	Preparing, spinning, weaving and finishing of hemp and other course fibres
				260	Knitting mills
				261	Manufacture of all types of threads, cordege, ropes, twines, nets etc.
				264	Manufacture of all types of textiles, garments including wearing apparel
				266	Manufacture of made up textiles goods such as curtains, mosquoto nets etc.
				268	Manufacture of coir and coir products
				271	Sawing and Planning of Wood (Other than plywood)
				273	Manufacture of structural wooden goods such as beams, posts, doors and windows.
				274	Manufacture of wooden industrial goods such as bobbins, blocks, handles, sadding and similar equipment and fixtures.
				276	Manufacture of wooden furniture & fixtures
				277	Manufacture of bamboo & cane furniture and fixtures
				279	Manufacture of wooden, Bamboo & cane products, not elsewhere classified
				290*	Tanning, Currying, Finishing, Embossing and Japanning of leather
				291*	Manufacture of footwear (excluding repairs) except vulcanised or moulded rubber or plastic footwear
				291*	Manufacture of wearing apparel like coats, gloves etc. of leather and substitutes of leather
				293*	Manufacture of leather consumer goods (Other than apparel and footwear)
				294*	Scrapping, Currying, Tanning, Bleaching and Dyeing of fur and other parts for the trade.

* Reference period for these industries is 1981-86.

Table 6 : Growth in Employment 1971-81 (Urban)

NIC Code	High Growth Industries	NIC Code	Medium Growth Industries	NIC Code	Relatively slow or Disadvantaged Industries
207	Production of indegeneous sugar, boora, Khandasari, gur etc. From sugarcane and palm juice	201	Manufacture of Dairy Products	202	Canning and preservation of fruits and vegetables
209	Manufacture of cocoa, chocolate and sugar confectionary	217	Manufacture of starch	204	Grain mill products
219	Manufacture of food Products not elsewhere classified	230	Cotton ginning, cleaning & balling	205	Manufacture of bakery products
226	Manufacture of bidi	231	Cotton spinning, weaving and finishing of cotton textiles in mills	210	Manufacture of hydrogenated oils, Vanaspati ghee etc.
228	Manufacture of chewing tobacco zarda and snuff	236	Weaving and finishing of cotton textiles in powerlooms	211	Manufacture of other edible oils and fats etc.
232	Printing, deying and bleaching of cotton textiles	240	Wool cleaning, baling and pressing	212	Tea processing
242	Wool spinning and weaving (other than in mills)	243	Dyeing and bleaching of woollen textiles	213	Coffee, Currying, Roasting & Grinding
245	Spinning, weaving and finishing of silk textiles	247	Spinning, Weaving and Finishing of other textiles	214	Cashewnut processing like drying, shelling, roasting, salting etc.
249	Silk & synthetic fibre textiles not elsewhere classified	261	Manufacture of all types of textiles, garments including weaving apparel	223	Productin of country liquor & toddy
251	Jute and mesta spinning and weaving	264	Manufacture of made up textile goods such as curtains, mosquito nets etc.	225	Tobacco stemming, redrying and other operations
252	Dyeing, printing and bleaching of jute textiles	266	Manufacture of wooden furniture and fixtures	227	Manufacture of cigars, cigarettes, cheroots and cigareete tobacco
262	Embroidery and making of crates, laces and fringes	276	Manufacture of wood, bamboo and cane products not elsewhere classified	229	Manufacture of tobacco and tobacco products not elsewhere classified
263	Weaving carpts, rugs and other similar textile products	279	Tanning, currying, finishing, embossing and Japanning of leather.	233	Cotton spinning other than in mills (Charka)
269	Manufacture of textiles not elsewhere classified	290	Manufacture of Dairy Products	234	Production of khadi
270	Manufacture of veneer, plywood and their products			235	Weaving and finishing of cotton textiles in handlooms other than khadi
272	Manufacture of wooden and cane boxes, crates, drums, barrels and other wooden containers, baskets and other rattan, bamboo, reed and willow wares made entirely or mainly of cane, rattan, reed bamboo and other willow.			239	Cotton Textiles not elsewhere classified
273	Manufacture of structureal wooden goods such as beams, posts, doors and windows			241	Wool spinning, weaving and finishing in mills
292	Manufacture of wearing apparel like coats, gloves etc. of leather and substitutes of leather			244	Manufacture of wool not elsewhere classified
293	Manufacture of leather consumer goods (other than a parel and footwear)			246	Printing, dyeing and bleaching of silk textiles
294	Scrapping, currying, Tanning Bleaching and Dyeing of fur and other pelts for the trade			250	Jute and Mesta pressing and baling.
299	Manufacture of leather and fur products not elsewhere classified.			253	Preparing, spinning, weaving and finishing of hemp and other course fibres
				259	Manufacture of jute bagss and other jute textiles, not elsewhere classified
				260	Knitting mills
				268	Manufacture of coir and coir products
				271	Sawing and planning of Wood (other than plywood)
				274	Manufacture of wooden industrial goods such as bobbins, blocks handles, sadding and similar equipment and fixtures
				277	Manufacture of bamboo & cane furniture and fixtures

Table 7 Location Quotient (of employment) By Industry Category/Region

NIC Code	Name of the Industry	1971		1981		1986	
		Rural	Urban	Rural	Urban	Rural	Urban
All Agro-Industries							
20-21	Manufacture of food products	10.71	9.20	1.03	0.97	0.32	0.32
22	Beverages, tobacco and tobacco products	1.22	0.75	1.26	0.72	1.28	0.70
23	Cotton textiles	0.73	1.31	0.78	1.24	0.81	1.20
24	Wool, silk and synthetic fibre textiles	0.75	1.29	0.64	1.38	0.59	1.44
25	Jute, Hemp and Mesta textiles	0.43	1.64	0.43	1.61	0.43	1.60
26	Manufacture of Textiles Products including weaving apparel	1.02	0.98	0.96	1.01	0.94	1.07
27	Wood and wood products, furniture & fixtures	1.29	0.67	1.34	0.64	1.36	0.62
29	Manufacture of leather and leather and fur products	1.11	0.88	0.96	1.05	0.89	1.14
Household Sectors							
20-21	Manufacture of food products	1.08	0.77	1.02	0.94	1.00	1.04
22	Beverages, tobacco and tobacco products	1.01	0.98	1.02	0.95	1.03	0.93
23	Cotton textiles	0.85	1.42	0.89	1.27	0.91	1.21
24	Wool, silk & synthetic fibre textiles	0.79	1.59	0.71	1.74	0.67	1.82
25	Jute, Hemp and Mesta textiles	1.21	0.42	1.20	0.50	1.19	0.55
26	Manufacture of Textiles Products including weaving apparel	0.98	1.05	0.97	1.07	0.97	1.08
27	Wood and wood products, furniture & fixtures	1.14	0.59	1.14	0.63	1.14	0.65
29	Manufacture of leather and leather and fur products	1.05	0.85	1.02	0.96	1.00	1.02
Non-Household Sectors							
20-21	Manufacture of food products	1.31	0.81	1.16	0.90	1.09	0.95
22	Beverages, tobacco and tobacco products	1.51	0.69	1.44	0.72	1.41	0.74
23	Cotton textiles	0.55	1.26	0.68	1.20	0.76	1.17
24	Wool, silk & synthetic fibre textiles	0.60	1.22	0.61	1.25	0.61	1.26
25	Jute, Hemp and Mesta textiles	0.48	1.30	0.49	1.32	0.50	1.33
26	Manufacture of Textiles Products including weaving apparel	1.04	0.97	1.07	0.96	1.08	0.95
27	Wood and wood products, furniture & fixtures	1.19	0.88	1.30	0.81	1.36	0.78
29	Manufacture of leather and leather and fur products	0.91	1.05	0.84	1.10	0.81	1.13

Table 8 : Structural Ratio's

	Capital/output 1978-79		Value Added/labour 1978-79		Capital/labour 1978-79		Output/input 1978-79	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Food Products	0.51	0.18	1040	3067	1933	3298	1.37	1.20
	(0.36)	(0.24)	(653)	(1339)	(704)	(1616)	(1.50)	(1.26)
Beverages etc.,	0.16	0.11	1383	2695	448	1556	2.01	1.25
	(0.27)	(0.11)	(357)	(1347)	(291)	(426)	(1.50)	(1.52)
Textile & Textile Products	0.38	0.17	975	2524	802	1276	1.85	1.52
	(0.47)	(0.33)	(349)	(1790)	(304)	(549)	(2.27)	(1.88)
Wood & Wooden Products	0.42	0.20	936	2973	573	1614	3.26	1.58
	(0.41)	(0.25)	(479)	(943)	(249)	(422)	(4.57)	(2.33)
Paper & Paper Products	0.71	0.39	1382	3726	2286	3815	1.75	1.61
	(0.56)	(0.41)	(357)	(1538)	(416)	(1764)	(1.92)	(1.56)
Leather & Fur Products	0.29	0.27	958	2522	585	1764	1.92	1.64
	(0.31)	(0.22)	(405)	(1026)	(258)	(471)	(1.93)	(1.91)
All Industries	0.43	0.23	1039	3046	1011	2009	1.78	1.46
	(0.39)	(0.25)	(431)	(1059)	(349)	(672)	(1.92)	(1.66)

Figures in brackets are for the year 1968-69.
All non-factory establishments, through various definitions and surveys available for the year 1978-79.

scale sector. Some years back certain agro industries have been delicenced to further their growth. These are (1) paper and pulp viz., writing, printing and wrapping from agricultural residue waste and bagassee and cotton seed linter pulp, (2) canned fruit and vegetable products, production and processing foods, vegetable paste, marine products and cattle feed, (3) Vegetable oils viz., solvent extraction of oils/oil cakes from minor seeds including cotton seeds, (4) roller flour milling. The delicencing was subject to the condition that (a) the industrial undertaking does not fall within the purview of MRTP Act or foreign exchange regulation act, (b) the article of manufacture is not reserved for small scale sector, (c) the industrial undertaking is not located or proposed to be located within standard urban limits of a city with a population of more than 10 lakhs or within the municipal limits of a city with a population of more than 5 lakhs as determined in 1981 census. A large number of registrations under the scheme of delicencing have come for manufacture of high productive soya based products-soya texture protein, soya protein isolate, soya protein concentrate under the specialised products and winterised deodorised

refined soya bean oil. Product banding has already been allowed in certain items like bread and biscuits, confectionery chocolate and soya products, so that the units can produce these items as per the market demand without any constraint for individual items. The soft drink industry- a major processed food item was treated as a priority industry and is being increasingly indigenised. Import duty on specific items of food packing/processing mostly and aseptic packaging has been reduced from 101 per cent to 50 percent. MODVAT has been extended to several processed food items. The extent of relief available to the consumers on account of MODVAT scheme in respect of fruit jams, tomato sauce, squashes and glucose was to the tune of 4.5 to 7.5 per cent. However, MODVAT credit was available to only those units where turnover was more than Rs. 1500 thousand. The small scale units with a turnover of Rs. 1500 thousand will not get any modavat credit on excise duty paid on various inputs, as they will not be paying excise duty on finished products.

Technological innovations promoted through field level organisations get disseminated through regional level organisations. These have not percolated down to the rural areas. Though the big units have some export orientation, the small village level units are left out of the incentive frame work especially in the export sector. There is still a vast potential for bringing the unorganised sector to cope up with the emerging demands.

There still exists gaps both at policy and implementation levels. Agro industries are constrained by timely availability of resources, working capital, and other support services specially in the rural areas. Agro industrial linkages have not been fully established for a majority of agro resources. The small sector has passed from an ordeal caused by infrastructure bottlenecks in the 70s to a structural crisis in which its role *vis-a-vis* the large industry seemed to be at stake. Agro industries need governmental attention in aspects relating to a structural rationalisation, technological upgradation, and quality improvement. A host of related measures in storage, package, and distribution need be augmented to enable the products to compete with urbanised industries. The pronounced policy statements for the small scale sector, including agro industries, in terms of reservation in production of certain items, reservation in procurement, excise and tax concessions etc., might have benefited the big units in the small scale sector leaving aside a vast majority of the rurally dispersed units.

One way of finding a solution to the problem of sick industries and cooperative organisations in the field of agro industries is to promote integrated products by utilising various developmental schemes, rather than treating industry as belonging to a particular department. As already identified in the text certain industries are found to be lagging in rural areas. The position of these needs to be carefully monitored and promotional measures effected so as to minimise their drift to urban centres. This can be possible if an integrated approach through institutional integration and project integration is adopted. The policy pronouncements are very favourable to the rural sector but the implementation gaps have resulted in their concentration in urban areas and that too in a few states. This requires attempts at dispersal and diversification, with suitable measures towards modernisation and quality control. Suitable policy measures in terms of availability of working capital, additional capital inputs, integrated market systems etc., need to be augmented for agro projects in the unorganised sector which has the highest potential for employment generation. Integrated development plans at the district level should include specified agro projects. For alleviation of poverty and unemployment at the rural levels special incentive schemes need to be announced for small and marginal farmers to enable them to take up the related agro non farm activities. Such type of activities promoted through an integrated framework would significantly contribute to higher incomes and utilisation of local level resources.

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Focus

Sectoral Diversification : Spatial Dimension

Amitabh Kundu

This paper attempts to assess the broad magnitude of change in the intersectoral distribution of workers in recent years with a focus on the shift from the rural areas. The author also analyses the sectoral distribution of the incremental non-agricultural employment to ascertain the development and productivity implication of the structural change in the work force. Lastly the paper investigates the regional dimension of the growth of non-agricultural employment and identify its socio-economic correlates at the state level.

Amitabh Kundu is a Faculty Member in the Centre for Study of Regional Development, Jawaharlal Nehru University, New Delhi-110 067.

Studies analysing changes in the inter-sectoral distribution of national income and workforce and their implications for relative productivities and well being of workers have led to serious controversies among scholars. While a section of them believes that the workforce structure has experienced dramatic changes in recent years, others have noted their absence as conspicuous. Opinion seems to be divided on the question of its desirability for economic growth and its impact on production and welfare of the workers. An attempt is made in the present paper, firstly, to assess the broad magnitude of change in the intersectoral distribution of workers in recent years with a focus on the shift away from the rural areas based on a review of literature and using aggregative data obtained from the population censuses and the National Sample Surveys (NSS). Secondly, sectoral distribution of the incremental non-agricultural employment has been analysed to ascertain the development and productivity implications of this "structural change". Finally, an attempt is made to investigate into the regional dimensions of the growth of non-agricultural employment and to identify its socio-economic correlates.

An Overview

Structurally, Indian Economy has experienced significant changes in terms of sectoral composition of income and relative labour productivities since Independence. The workforce structure, on the other hand, remained stable since 1901 (Sinha, 1982). However, certain changes in the participation rates and sectoral composition of workforce have been noted in recent years. The male workers dependent on agriculture, for example, have gone up from 76.9 per cent to 81.3 per cent in rural areas during the sixties[1]. The percentage of agricultural labourers to total workforce shooting up from 20.5 to 31.5 in the rural

1. The figures exclude Assam, for which Census could not be conducted in 1981, for all the years. The inclusion of this state makes a difference only in the second digit after the decimal point in 1961.

areas and from 28.4 to 47.5 in the urban areas during the decade has also been considered as significant. The Seventies, however, noted a significant departure from this pattern. The main (male) workers dependent on agriculture went down to 79.2 per cent in rural and 9.8 per cent in urban areas, the inclusion of marginal workers making little difference to the shares. The proportion of agricultural labourers to agricultural workers remained almost stationery, the figures being 30.3 and 47.3 per cent in the rural and urban areas respectively in 1981. It may further be noted that the proportions of (male) workers engaged in agriculture in 1981 are slightly higher than those in 1961, both for rural and urban areas. The increase in the proportion of agricultural workers in urban areas can be explained partially in terms of the emergence of a large number of new towns with predominatly rural economic base. The aggregate (rural+urban) figure at the national level, however, suggests a change in the opposite direction. This is obviously due to a large shift of population from rural to urban segment during 1961-81.

The figures noted above and the inferences drawn from them are not accepted by all the scholars. Several adjustments in the data have been proposed and carried out for making temporal comparisons. The most important adjustment is with regard to the workers engaged in (a) *service (not elsewhere classified)* (ISIC major group 89) and (b) *activities not adequately described)* (ISIC division 9). The two together account for about four per cent of the male workforce in 1961. They were clubbed somewhat inappropriately with the category "other services". When these are taken out of the latter category and distribution among (a) agricultural labourer, (b) construction workers and those in (c) other services on a pro-rata basis, as proposed by Krishnamurthy (1970), the percentage of agricultural workers in 1961 moves up from 76.9 to 79.7 per cent in rural areas and from 7.8 per cent to 8.3 per cent in urban areas (Basant and Kumar, 1988). Acceptance of this procedure would imply a decline in the dependence of workers on agriculture in the rural areas[2] as well as for the country as a whole during 1961-81.

A few agricultural labourers could indeed get included in the division 9 and major group 89, but their number is unlikely to be as large as obtained through the pro-rata adjustment. This procedure identifies as many as 3.2 million agricultural labourers out of the total of 5.36 million belonging to the above two categories. This undoubteldy is on a higher side. It is so because the definition of these unclassified categories of workers revelals certain non-agricultural bias. The major group 89, for example, includes "services rendered by organsiations or individuals not elsewhere classified" while division 9 comprise "activities not adequately specified or described including activities of such individuals who fail to provide sufficient information about their industrial affiliation to enable them to be classified". The problems of "classfication", or not providing "sufficient information about industrial affiliation" are likely to be less with regard to agricultural labourers than those in construction or tertiary activities. This would be more so because in the individual slip, the question whether one is working as a "cultivator" or an "agricultural labourer" was put with regard to every person before ascertaining the nature of his or her work in the 1961 census.

Adjustments for Unspecified Workers

Moreover, adjustments for unspecified workers would have to be made not only for 1961 Census but for the subsequent censuses as well. It is indeed true that the problem is less serious with 1971 or 1981 data as the persons in the above mentioned division and major group have declined significantly even in absolute terms.

The second adjustment suggested is due to certain minor groups (of the Indian Standard Industrial Classification which was used for the tabulation of the workforce data for the 1961 Census) being taken out of the industrial categories and merged with the agricultural workforce in 1961. The workers in sub-groups 000, 001, 002, 003, 004 and a part of 005 of the ISIC, were added to the cultivators and agricultural labourers. While one can give arguments for or against this scheme of tabulation, there is no doubt that the 1961 figures have been rendered non-comparable with the 1971 or 1981 census figures. It is unfortunate that an assessment of the degree of over-estimation of agricultural workforce in 1961 census or the necessary adjustments for ensuring temporal comparability cannot be made since the data on workers in these minor groups are not available.

Besides this, there is a possibility of "differential undercount" of agricultural workers in the 1981 Census as pointed out by Krishnamurthy (1984). He observes that the proportion of unspecified workers is small in 1971 but in 1981 its magnitude cannot be determined based on the available data. He, therefore, argues that the decline in the

2. Villages experiencing diversification in workforce structure often acquire urban status and consequently get excluded from the rural segment. One would, therefore, tend to underestimate the process of sectoral diversification or a shift away from agriculture within the rural areas if one analyses the workforce structure within the rural segment only, which is shrinking from Census to Census.

share of agriculture (in the workforce) in the rural areas during seventies "may not be real in states where decline is small". It is interesting that the Census participation rates for males above five years of age have gone down from 60.74 per cent to 58.85 per cent for the main workers and from 60.90 per cent to 60.02 per cent for main and marginal/secondary workers. Krishnamurthy (1984) suspects this result more because the age specific participation rates too have gone down for all the age groups in rural areas and for most groups in urban areas. The 27th and 32nd rounds of the NSS reveal an opposite trend in participation rates by usual status. This makes the Census participation rate all the more suspect. Now, if the proposition of underenumeration of total workforce in 1981 is accepted, the actual proportion of workers in agriculture would be on the lower side, since under-reporting tends to be larger in agriculture.

NSS Data

The definitional hazards affecting the workforce data from the Cenus may prompt one to look at the NSS, which is the only other source providing this information at national and regional levels. Following the recommendations of the Dantwala Committee (1970), NSS is giving detailed tabulation that permit temporal comparison of the workforce structure. The 27th, 32nd and 38th Rounds of the NSS, however, show a clear declining trend in the share of (male) agricultural workers both in rural as well as urban areas during seventies and early eighties. The percentage of male workers aged five and more in the primary sector comprising agriculture, hunting forestry, fishing, mining and quarrying has declined from 83.7 in the 27th round (1972-73) to 81.13 in the 32nd round (1977-78) and further to 78.10 in the 38th round (1983) in the rural areas. The corresponding estimates for the urban areas are 11.6, 11.5 and 11.4 respectively. The census estimates for the primary sector are, however, uniformly higher, the figures being 80.1[3], 84.2 and 82.2 per cent in the rural areas in 1961, 1971 and 1981. The figures would be significantly higher if people below five years of the age are excluded, to make these comparable with the NSS estimates. The same is true for the urban areas as well, the percentage of primary sector workers to population in all age groups working out as 11.1, 12.5 and 12.7 respectively (Basant and Kumar, 1983). It is indeed true that before the 38th round of the NSS data were made available, researchers and planners were much less confident and optimistic about the process of sectoral diversification in the country.

The task Force on Urban Development, set up by the Planning Commission has projected in 1983, the dependence of the primary sector to go down from 83 per cent in 1981 to 78 per cent in 2001 in the rural areas. The 38th round of the NSS, on the other hand, had estimated this figure to be less than 78 per cent in 1983 itself. In the case of the urban economy, the share of primary sector was held constant at 15 per cent during 1981-2001 by the Task Force while the actual figure in 1983 was 11.4 per cent only.

Changes in the Workforce Studied

Notwithstanding whether the shift from agriculture is substantial or not, scholars have tried to investigate into the factors responsible for it and, thereby, determine whether the change would be desirable in the context of productivity differentials in different sectors. Deshpande and Deshpande (1985) have attributed the shift to positive growth factors like changes in personal expenditures from food to non-food items and argued that "96 per cent of males are likely to be better-off by the change in the structure of employment". Krishnamurthy (1984), on the other hand, is generally pessimistic about the change since the decline in the share of agriculture has been associated with an increase in that of tertiary sector "which might be indicative of a less positive growth scene over the decade". He argues that since the component of casual labour has increased in agriculture during 1972-78, the declining share of agricultural workers "could reflect, at least in part, growing inability of agriculture to take on the increased numbers added to the work-force. This in turn could be not only demographic pressures but adverse trends in the agrarian sector". The increase in non-agricultural employment is thus explained, at least partially, in terms of progressive sub-division of land holdings and low land availability in per capita terms, a view which is shared by Visaria (1987) as well. Both the scholars believe that the former may reflect unemployment and under-employment in agriculture and a non-voluntary absorption of workers in traditional occupations with obsolete technology at a low level of labour productivity. Both, however, welcome the growth of manufacturing employment which they believe could be attributed to greater demand for non-food items, having high income elasticities, as a consequence of growth in per capita income.

Basant and Kumar (1988) are very cautious in drawing inferences regarding the desirability of the change in the workforce structure although they express no doubt with regard to the Census and NSS data indicating a shift away

3 The Census estimates for 1961 has been obtained without making adjustment as proposed by Krishnamurthy. These would be higher than what is noted also if the workers in agricultural services, clubbed with "other services" in 1961 (put with livestock, fishing, forestry etc. in 1971 and 1981) are included in the primary sector.

from agriculture. They recognise the growing importance of the tertiary sector (within the non-agricultural component) and a process of casualisation of the labour force, particularly in the rural economy that may not be healthy for the agrarian system, particularly since the non-agricultural activities show a low level of capital labour ratio and labour productivity. The casual nature of the employment would also pose immense problems in designing programmes of skill formation and technology upgrading, it is argued.

Dimensions of Casualisation

Basant and Kumar have highlighted the following important dimensions of the process of casualisation of the workforce.

a) Seasonality claims a high proportion of the total units in (1) Mining and Quarrying, Manufacturing and Repairs, (2) Electricity Gas and Water, (3) Construction and (4) Storage and Warehousing sectors in the rural areas. More than two thirds of the *establishments* and *own account enterprises* in the rural areas, working on a seasonal basis, are in the manufacturing and trading sectors.

b) The percentage of workers reporting secondary sector employment as their primary activity in rural areas has gone down but the share of workers reporting secondary employment outside agriculture has increased significantly.

c) It is essentially the casual and not the regular workers who report secondary employment, both among the agricultural as well as the non-agricultural workforce.

d) Non-agricultural employment is residual in nature. During the lean agricultural season, when rural unemployment rate is high, percentage of workers outside agriculture tends to go up. Much of the adjustment is thus made by the casual workers who move from agriculture to non-agriculture and report latter as their secondary occupation.

e) Participation of the households in non-agricultural work varies inversely with land ownership, the highest figure being reported by the landless labourers.

These empirical evidences when tied together, would suggest that the growth of non-agricultural workforce in rural areas in recent years need not be symptomatic of a healthy trend within the agrarian economy. It might reflect a "sustained squeezing of labour from agricultural sector rather than as a response to a vigorously growing non-agricultural sector". The increase in non-agricultural activities may, thus, be caused by agricultural growth or alternatively by its absence, in different regions. They conclude that "while agricultural development may provide the pull factor, a lack of it may push people out of the primary sector to undertake non-agricultural work".

Sharma (1988) supports the thesis of poverty induced growth of non-agricultural employment by demonstrating that the increase in the percentage of non-agricultural workers relates, (a) negatively with the growth rate in foodgrains output, (b) positively with the increase in unemployment rate and (c) positively with the increase in the share of casual workers among the total wage earnings during 1972-83. He, therefore, holds that a shift of workers away from agriculture is due to shrinking employment opportunities in this sector. He argues that the rural non-agriculture has become a residual sector wherein employment and unemployment are created as a result of a spillover of labourers from agriculture.

A study by Sen (1988) has brought out the absence of a relationship between the organised and unorganised sectors in the context of employment and income per workers. He uses NSS data to show that within the unorganised sector, growth of employment in non-agriculture has been much faster than in agriculture during 1960-84. Also, the growth in the number of wage earners is faster than that of the self-employed persons by daily, weekly and usual status definitions of employment. Unfortunately, however, growth of income per worker in these two fast growing categories has been negligible, as revealed by Sen's analysis of the data from National Income Statistics and Economic Surveys. Income in the organised sector has grown rapidly both for public and private enterprises but in the unorganised sector, the increase has been marginal. The lack of linkage between these two sectors has been suggested also by the fact that a substantial increase in income per worker occurred in the organised sector after 1977. Unfortunately, there has been no corresponding increase in the income levels of the workers in the unorganised sector. He, thus, concludes that the unorganised non-agricultural sector does not respond to the growth of the organised sector and that "much of the shift of workers to non-agriculture may be a result of marginalisation due to stagnant labour demand in agriculture rather than an indication of positive development".

In a paper analysing the latest NSS data, Visaria and Minhas (1990) show that the decline in the share of primary workers continued during 1983-88 as well. The percentage figures for males were 77.75 and 10.65 in rural areas in 1983 (these are lower than the figures from the 38th round mentioned earlier as the latter pertain to the population aged five and more) that went down to 74.5 and

9.1 respectively in 1987-88. Similarly the percentage figures for the females declined from 87.75 (rural) and 31.49 (urban) to 84.7 and 29.4 respectively. They however, attribute, at least a part of the decline, to "transcient factors". They argue that the fall in rural areas can be explained in terms of the death of animals in large numbers and a consequent decline in the livestock related activities, due to the drought in the year 1987-88. This would particularly affect the female workers. It is evident that such fluctuations can exist only in the short run and would not be reflected in the secular trend. The growth of non-agricultural employment during 1983-88, on the other hand, can be attributed to the upsurge of construction activities related to the famine relief work. This component was significant also during 1977-83 as 1983 too was a drought year. They, therefore, stress the need for analysing detailed sectoral data at the state and district levels before making a judgement regarding the desirability or otherwise of the recent changes in the employment structure.

The Regional Dimension

Studies on the spatial structure of industries in India reveal that it does not correspond very well with the distribution of resources.[4] Scholars have tried to explain the lack of correspondence in terms of the impact of the colonial rule (Ministry of Education and Social Welfare 1973), Dutt and Sundharam (1973) and the imposition of port city oriented settlement and transportation system, geared primarily to the objective of generation and expropriation of economic surpluses. The centripetal transport system, in particular, has been held responsible for the fast growth of a few port cities and their satellite towns which disrupted the symbiotic inter-dependency between the city and its hinterland and among settlements in different size classes (Davis, 1951; Raza, Hableb, Kundu and Aggarwal 1981). Colonial industries that were largely for processing of industrial raw-materials, and producing a few consumption goods, were concentrated in these few cities, whose location can be better explained in terms of historical accidents and easy access to the international market rather than their proximity to industrial resources. This resulted in a strong process of deindustrialisation, (Gadgil, 1944; Bagchi, 1976) which stunted the growth of a large number resource based towns and eliminated many others from the urban economic scene.

4 Mathur and Hashim (1969) have demonstrated, using a multi-sectoral multi-regional programming model that the spatial structure of industries, inherited from the colonial regime, was highly inoptimal in relation to the distribution of basic resources in the country.

Post Independence Industrial Development

The strategy of industrial development launched in the post-Independence period did not make any attempt to correct the regional imbalances or the distortions in the location pattern of industries. The concentration of industrial activities in a handful of large cities continued, although a few other state capitals and class I cities emerged on the national industrial map. Instead of being totally dependent on the international market, industries now acquired a national character. They drew raw-materials from and supplied output to places all over the country (Bhalla and Kundu, 1984). Most of the metropolises and class I cities, therefore, did not develop linkages with their immediate hinterlands. On the other hand, strong backwash effects were exerted by them on the regional economy. This resulted in significant deindustrialisation in rural areas and small and medium towns, coming under the shadow of these cities in the post-colonial period. Class I cities, that were producing goods and services mostly for the national market experienced on an average, a fast and relatively stable (low cross sectional variability) growth rate of population during the past three decades. The corresponding growth rates for small and medium towns, on the other hand, were low and unstable due to their linkages only with the regional economy (Kundu, 1983).

Industries belonging to different complexes requiring different types of raw-materials got attracted to the few large cities, as noted above and consequently their industrial composition became highly diversified. What attracted these industries was not the geographic proximity to the resources but the availability of infrastructure and marketing facilities. Well developed institutional structure and the transport linkages of these cities with the rest of the country, together with the pricing policy of raw-materials, freight rates tapering off sharply with distance etc. facilitated the concentration of industries away from the resource regions. Several scholars have, therefore, pointed out that the level and structure of industries in different states cannot be explained interms of regional resources or local demand patterns (Kundu and Thorat, 1990). The traditional models of city hinterland relationship or of diffusion of growth impulses from the city to its periphery had little relevance in explaining the process of industrialisation in the post-Independence period.

Analysing the spatial structure of industries during sixties and seventies based on the data tabulated for the NSS regions, Kundu and Raza (1982) have noted the existence of two distinct modes of industrialisation in the country. *Agglomerated industrialisation*, based on the growth of large and medium industries operating with

modern technology was the dominant component of industrialisation in the country. This was, however, restricted to select regions-around the metropolises and a handful of state capitals and class I cities. The process of *dispersed industrialisation*, on the other hand, was based on the survival and a modest growth of traditional and household based industries in small towns and rural areas. What, however, was important was that, the two processes were disjoint except in parts of Punjab and Gujarat. The second process, which was partially sponsored by the government, was dependent on the use of local resources. This unfortunately failed to get linked up with the agglomerated industrialisation and remained an insignificant component in the industrial development of the country.

Papola (1987) in his study has noted a similar phenomenon. He argues that "a major part of rural industrial structure in most of the states continues to consist of traditional industries catering to local consumption needs and to the small production requirements of agricultrue; these are carried out in the form of crafts based on artisan skills". He observes that the linkages between the rural industrial activities with the urban (organised) industries are generally weak except in certain regions of high agricultural growth like Punjab and Haryana. He argues that the states like Punjab, Haryana, Gujarat, Karnataka etc. that have experienced a high rate of agricultural growth (and also are at a high level of agricultural development) claim a smaller proportion of industries processing agricultural produce than the states with low agricultural growth like Bihar, West Bengal, Orissa. This is indicative of an absence of relationship between industrial base and regional or agricultural development. It also reveals the national character of the dominant industrial base located in the large cities of the country, as noted above. Papola argues further that a modest or even a fast growth in agriculture can only make a marginal impact on the industrial strcuture that too largely through the creation of demand for non-agricultural goods due to the incremental income in agriculture (and not through the demand for inputs in agriculture). His analysis, thus, supports the thesis of lack of dependence between rural industrialisation and agricultural development and also between the former and city based agglomerated industrialisation. Consequently, Papola pleads for an independent strategy for rural industrialisation instead of treating it as an adjunct or a bye-product of a general strategy of agricultural or industrial development.

Spatial Structure and Growth of Industries: Rural Urban Interdependency

It has been noted by several scholars that the decline in the employment share of the primary sector in the rural areas in the seventies and early eighties is associated with a rapid increase in that of the tertiary sector and a modest growth in the secondary sector. The percentage of male workers (main plus marginal aged five and above) in the tertiary sector (rural) went up from 8.94 per cent in 1972-73 to 12.39 in 1983. For the secondary sector comprising Manufacturing, Electricity, Gas and Water Supply and Construction, the corresponding figures were 7.39 and 9.99. Disaggregative data for workers in industries belonging to different NIC categories are available from the Population Censuses that reveal that the highest growth in rural employment during 1971-81 was recorded in *Services Incidental to Transport*, which would have a high component of informal employment. The tertiary activities experiencing high growth rates in rural areas are *Legal Services, Communication, Provident Fund and Insurance, Transport, Banking and Financial Institutions, Storage and Warehousing* etc., most of which can be explained in terms of governmental schemes for rural development and provision of basic infrastructural facilities. Within the Manufacturing component (Division 2 & 3) *Repairs* and *Construction* show very high growth in employment. This would probably be at a low level of labour productivity and income as much of the growth is in the unorganised sector. The possibility of poverty induced growth in employment in construction, transportation and repair services cannot, also be ruled out. Also, there are micro level evidences to suggest that a section of rural workforce is seeking absorption in traditional or other low productive occupations, often on a seasonal basis, due to its inability to eke out a living within agriculture. One may, therefore, attribute the growth of non-agricultural activities either to the expansion of low productive job opportunities or to the government sponsored minimum needs or other programmes which means a heavy cost to the exchequer for substaining in the long run. This, however, would be only a part of the story.

It is evident that there has been a shift in employment in favour of non-household manufacturing activities at the expense of household based activities in the rural areas. The explanations for this, provided in terms of push factors in agriculture and governmental schemes promoting rural industrialisation etc., are likely to be partial. A part of the growth in organised industries in the rural areas should be attributed to the process of limited industrial dispersal around the metropolitan and a few other large cities.

Table 1 gives the growth rates of employment in the household (HH) and non-household (NH) industries during 1971-81 by the two-digit level of National Industrial Classification (NIC). It is significant that the average growth rate is very high for the rural NH manufacturing industries viz. 77 percent, higher than its HH or urban counterparts. The corresponding growth rate for HH manufacturing in the rural areas is the lowest. This in case

Table 1 : Growth Rates of Male (Main) Workers in Manufacturing, Processing Servicing and Repairs by Household and Non-Households. Industries During-1971-81.

Major Group with NIC Code		Urban House-hold	Rural house-hold	Urban Non-HH	Rural Non-HH
(1)		(2)	(3)	(4)	(5)
1. Mnf. Food Products	(20-21)	48	–11	57	83
2. Mnf. Beverages etc.	(22)	19	11	–12	–42
3. Mnf. Cotton Textile Silk etc.	(23)	9	12	25	77
4. Mnf. Wool, silk etc.	(24)	56	8	157	77
5. Mnf. Jute, Hemp etc.	(25)	64	–28	24	30
6. Mnf. Tex. Prod.	(26)	5	–2	86	126
7. Mnf. Wood etc.	(27)	20	–2	44	74
8. Mnf. Paper etc.	(28)	42	–20	41	98
9. Mnf. Leather etc.	(29)	–14	–39	17	13
10. Mnf. Rubber etc.	(30)	127	–21	76	159
11. Mnf. Chemicals etc.	(31)	74	1	57	68
12. Mnf. Non-Metal etc.	(32)	25	–6	36	79
13. Mnf. Basic Metals	(33)	146	–51	79	104
14. Mnf. Metal Prod.	(34)	6	8	46	101
15. Mnf. Machinery	(35)	53	–47	68	47
16. Mnf. Elect. Machi.	(36)	38	–13	68	94
17. Mnf. Iron. Equip.	(37)	11	–25	39	43
18. Other Mnf. Ind.	(38)	10	–42	66	85
19. Repairs	(39)	669	515	87	144
Average of the Growth Rates		74	13	57	77

of half of the state works out as negative. Table 1 reveals that the growth rates of employment in HH manufacturing in rural areas are negative for all except a few categories.

NH industries were noted to have grown at the cost of HH industries during the colonial period. As a consequence, one observed a strong negative correlation between the levels of HH and NH employment in analyses based on district or town level data. The cities or districts with a high percentage of NH employment exhibited low shares in HH employment in 1961 and 1971. (Kundu and Raza, 1982; Kundu and Thorat, 1990). Interestingly this relationship is conspicuous by its absence at the state level both in 1971 and 1981. This can be explained in two ways. One, the conflict between HH and NH industries get blurred when one aggregates the data to the state level. Two, growth pattern in recent decades makes a departure from the past trend. The study by Kundu and Thorat (1988) lends empirical support to both these propositions. The district and town level analysis conducted by the study shows that the negative relationship holds valid even in 1981. However, a strong degree of spatial correspondence between the growth of these two sectors in recent years has weakened this negative relationship.

The national level data as presented in table 1 shows that the sectoral structure of growth in the NH and HH manufacturing activities is similar both in the rural, as well as manufacturing activities, the correlation coefficients being .35 and .30 respectively (table 2, both are significant at 5% level). With state level data on HH and NH industries-the correlation coefficients between the employment growth rates work out to be .20 and .50 for rural and urban areas the latter being significant at 1% level (tables 7 & 8).

The relationship between the indicators of non-agricultural development in rural areas with those in urban areas reveals an interesting pattern. The growth rates of workers during 1971-81 in various NIC categories in rural areas (table 1). exhibit a strong positive correlation with those in urban areas both for the HH and NH industries (table 3). Similar data by HH and NH categories are not available for the non-manufacturing non-agricultural activities and consequently one has to consider only the aggregative growth rates of tertiary employment as given in table 2. But here again the correlation coefficient (0.53) is positive and significant at 1 per cent level (table 3). This implies that the pattern of growth in non-agricultural employment in the rural and urban areas is not very different. One would infer that the process of growth of manufacturing, trading, transport and commercial activities in the rural areas is not unrelated to or independent of the corresponding growth in the urban areas. Rural economy is perhaps responding to the forces in the national market, the latter penetrating the former through the metropolises and other large cities, although in a limited way.

The industries that have experienced very high growth rates of employment in NH manufacturing (over eighty percent) during the seventies in the rural areas are (1) Rubber, Plastics, Petroleum and Coal Products, (2) Textiles Products, (3) Basic Metals and Alloy Industries, (4) Metal Products and Parts, (5) Paper Products, Printing, Publishing and Allied Industries, (6) Electrical Machinery, Apparatus, Appliances and Parts, (7) Other Industries, (8) Food Products and (9) Repairs. It would be difficult to argue that these industries are using local raw materials or catering to the limited regional market only, excepting perhaps in the case of Food Products and Repairs. These industries account for over fifty three percent of the NH manufacturing male employment in the rural areas in 1981. On the other hand, the traditional industries like (1) Beverages, Tobacco and Tobacco Products, (2) Jute, Hemp and Mesta Textiles (3) Leather, Leather and Fur Products and (4) Machinery, Machine Tools and Parts excepting Electrical Machinery have either stagnated or

Table 2. Growth Rates of Male (Main) Workers in Various Teritary Activities During 1971-81.

Major Group with NIC Code		Total	Urban	Rural
1. Electricity	(40)	81	70	88
2. Gas and Steam	(41)	53	57	39
3. Water Works & Supply	(42)	137	134	141
4. Construction	(50)	73	79	68
5. Actv. Allied to Construction	(51)	32	33	28
6. Wholesale (W) Trade in Food etc.	(60)	44	57	22
7. W. Trade in Fuel etc.	(61)	26	49	–25
8. W. Trade in Wood etc.	(62)	6	15	–12
9. W. Trade in Machinery	(63)	44	48	29
10. W. Trade in Misc. Mnf.	(64)	47	50	35
11. W. Trade in Food etc.	(65)	37	39	34
12. Retail (R) Trade in Textile	(66)	48	50	43
13. R. Trade in Fuel etc.	(67)	46	43	54
14. R. Trade in others	(68)	56	62	40
15. Restaurant & Hotels	(69)	40	36	46
16. Land Transport	(70)	43	33	69
17. Water Transport	(71)	1	2	–1
18. Air Transport	(72)	25	25	26
19. Service Incidental to Trans.	(73)	236	242	208
20. Storage & Warehousing	(74)	75	77	70
21. Communication	(75)	65	50	88
22. Banking	(80)	92	90	99
23. Prov. and Insurance	(81)	48	43	96
24. Real Estate	(82)	–8	–7	18
25. Legal Services	(83)	141	61	101
26. Pub. Admn. & Defence	(90)	15	28	–1
27. Sanitary Services	(91)	13	30	–22
28. Education and Research	(92)	34	37	32
29. Med. and Health	(93)	49	45	53
30. Community Services	(94)	26	36	17
31. Recreational Services	(95)	33	37	24
32. Personal Services	(96)	–12	2	–22
33. International Bodies	(98)	–84	–1	–590
34. Services not Classified	(99)	38	57	14
Average of the Growth Rates		49	52	37

Table 3. Correlations among the Growth Rates of Employment (Male) in Major Manufacturing and Tertiary Groups (NIC) During 1971-81.

	HH Rural	NH Rural	HH Urban	NH Urban
HH Rural	—	.35	.43	.23
NH Rural	.35	—	.12	.55
HH Urban	.43	.12	—	.30
NH Urban	.23	.55	.30	—
Correlation between Urban Tertiary and Rural Tertiary .53				

Note: For obtaining correlations for the manufacturing sector (Division 2 & 3), data on nineteen major groups, as given in table 1, have been taken into consideration. For the Tertiary Sector data on thrity-four major groups, as given in table 2, have been considered.

registered a decline in their share within the NH employment component during 1971-81.

The list remains more or less the same when one considers the growth in total manufacturing employment rather than the NH manufacturing only. The high growth industries show an employment growth rate of above 50 per cent excepting Metal Products & Parts (NIC code 34) and other Industries (NIC code 38) while one more industry namely Chemicals and Chemicals Products (NIC code 31) gets included in the list. These eight industries together cover about 40 per cent of the total (HH+NH) manufacturing employment in the rural areas in 1981. It is likely that these industries are coming up in rural areas as an extension or a spill over of growth in urban areas, as a result of various internal or external diseconomies. Some of these units may be located in the rural periphery of large cities to avoid Master Plan regulations, local taxes, problems of land scarcity etc.

The growth profile of employment in various tertiary activities in the rural areas shows a similar pattern. The activities showing a high growth rate during seventies (above seventy per cent) are Electricity, Water Works and supply, Services Incidental to transport, Banking and other Financial Institutions, Storage and Warehousing, Land Transport, Provident Fund and Life Insurance, Legal Services and Construction. These, however, explain about twenty six per cent of the total rural male employment in the tertiary sector while Construction alone claims about 10 per cent, in 1981. An important component of the growth in tertiary employment can, therefore, be attributed to the governmental investment as has been noted above. It may also be noted that about thirty per cent of the tertiary employment in the rural areas is claimed by (1) Public Administration and Defence Services, (2) Education, Scientific and Research Services, the former exhibiting a negative and the latter a modest positive growth in employment during seventies. Most of this employment is also in the public sector. If the government component of all the tertiary activities is separated out and aggregated, it would account for over half the tertiary employment in the rural areas.

To examine the spatial variation in the level and growth of agricultural activities and rural urban linkages, the percentages of workers dependent on various non-agricultural activities were computed. The six indicators of the level of non-agricultural employment are thus the following :

1. Percentage of workers in HH manufacturing
2. Percentage of workers in NH manufacturing
3. Percentage of workers in construction
4. Percentage of workers in trade and commerce
5. Percentage of workers in transport and storage
6. Percentage of workers in other services.

The indicators were constructed for urban and rural areas separately for 1971 and 1981 (in all 24 indicators) *taking only male workers into consideration.* The growth

rates for workers during 1971-81 in these six categories were computed separately for rural and urban areas (12 indicators). We thus constructed thirty-six indicators, the inter-dependencies among which were examined to get an insight into the process of sectoral diversification and rural urban linkages in recent years.

Interestingly, the indicators for 1971 exhibited strong and positive correlation with those of 1981, suggesting very little change in the spatial pattern during the decade. One would, therefore, infer that the process of growth has followed the base year pattern both in the rural as well as urban areas. Besides, the correlations between rural and urban indicators are generally positive and significant at five per cent level except for other services in 1981 (table 5). Similar inter-relations are noted in 1971 as well (table 6). Thus most of the indicators for the urban areas have a strong and positive correlation with the corresponding indicators for the rural areas (significant at 1 per cent level) at both the time points.

The growth indicators for rural areas for 1971-81 (table 8) do not show strong correlation with the corresponding indicators for urban areas excepting for construction ($r = 0.554$). Also, the growth of other services in rural areas seems to have been induced by or is associated with the growth of non-household industries, trade and commerce and transport and storage services in urban areas. It is also important that the growth of employment in the six non-agricultural activities in rural areas exhibits significant positive relationship among themselves (table 6). The same is true for the urban areas as well (table 7). This implies that there exists on interdependency among various components of non-agricultural activities in the process of growth within the rural or urban areas. The rural urban linkage, however, manifests only in the case of a few states which is responsible for the weak correlation values.

The apparent paradox in obtaining a positive correlation between urban and rural indicators for the levels of non-agricultural activities at the state level on the one hand and a negative correlation between these indicators at lower levels as suggested in section1, can be resolved without much difficulty. One would argue that the high non-agricultural employment in urban areas may bring in similar developments in rural areas at the aggregative level of the state but this would not happen for every town or district. Non-agricultural growth in rural areas is thus restricted to certain peripheral regions only. More disaggregative analysis with district level data reveals (Kundu

Table 4. Correlations Among State Level Indicators of Non-Agricultural Employment in Rural and Urban Areas 1971.

Urban	Rural					
	HH Manufacturing	NH Manufacturing	Construction	Trade & Commerce	Transport & Storage	Other Service
1. HH Manufacturing	.838	.206	−.427	.138	.635	−.442
2. NH Manufacturing	−.077	.970	−.382	.594	.512	−.723
3. Construction	−.159	−.689	.835	−.504	−.463	.586
4. Trade & Commerce	−.405	.491	−.212	.684	.306	−.262
5. Transport & Storage	−.026	.499	−.175	.330	.729	−.427
6. Other Services	−.381	−.807	.367	−.610	−.674	.981

Table 5. Correlations Among State Level Indicators of Non-Agricultural Employment in Rural and Urban Areas in 1981.

Urban	Rural					
	HH Manufacturing	NH Manufacturing	Construction	Trade & Commerce	Transport & Storage	Other Service
1. HH Manufacturing	.867	.241	−.018	.362	.230	−.583
2. NH Manufacturing	.264	.503	.039	.522	.303	−.424
3. Construction	.086	−.093	.935	−.037	.316	.394
4. Trade & Commerce	.277	.452	.041	.871	.431	−.315
5. Transport & Storage	.213	.492	.287	.491	.576	−.208
6. Other Services	−.601	−.294	.348	−.287	.138	.925

Table 6. Correlations among State Level Growth Rates of Non-Agricultural Employment in Different Categories During 1971-81 in Rural Areas.

Rural	Rural					
	HH Manufacturing	NH Manufacturing	Construction	Trade & Commerce	Transport & Storage	Other Service
1. HH Manufacturing	1.000	.205	.235	.014	−.077	.226
2. NH Manufacturing	.205	1.000	.245	.901	.557	.301
3. Construction	.235	.245	1.000	.158	.078	.583
4. Trade & Commerce	.014	.901	.158	1.000	.661	.139
5. Transport & Storage	−.077	.557	.078	.661	1.000	−.078
6. Other Services	.226	.301	.583	.139	−.078	1.000

Table 7. Correlations among State Level Growth Rates of Non-Agricultural Employment in Different Categories During 1971-81 in Urban Areas.

Urban	Urban					
	HH Manufacturing	NH Manufacturing	Construction	Trade & Commerce	Transport & Storage	Other Service
1. HH Manufacturing	1.000	.504	.142	.390	−.141	.343
2. NH Manufacturing	.504	1.000	.184	.558	−.011	.453
3. Construction	.142	.184	1.000	.212	.333	.145
4. Trade & Commerce	.390	.558	.212	1.000	.032	.450
5. Transport & Storage	−.141	−.011	.333	.032	1.000	−.0323
6. Other Services	.343	.453	.145	.450	−.323	1.000

Table 8. Correlations among State Level Growth Rates of Non-Agricultural Employment in Different Categories During 1971-81 in Rural Areas.

Urban	Rural					
	HH Manufacturing	NH Manufacturing	Construction	Trade & Commerce	Transport & Storage	Other Service
1. HH Manufacturing	–.090	.040	–.194	–.101	.351	.019
2. NH Manufacturing	.043	.170	–.223	.087	–.369	.591
3. Construction	–.036	–.099	.554	–.308	.042	.082
4. Trade & Commerce	.027	.201	–.169	.155	–.519	.724
5. Transport & Storage	–.127	–.033	.182	.158	–.161	.658
6. Other Services	–.285	–.160	–.090	–.596	–.228	–.084

and Sharma, 1984) that while many of the class I cities have exerted backwash effects in their rural peripheries, liquidating their non-agricultural base, a process of limited industrial dispersal has been initiated in recent years and around the metropolitan and a few other large cities. This should not be identified as a process of integration of rural industries with the national market. There is, however, no denial that the forces at the national level have penetrated the rural economy in a limited way in terms of dispersal of manufacturing and trading activities around a few large cities in the country.

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Focus

Size of Holdings, Agricultural Technology and Productivity

S.S. Khanna

While agricultural production has increased considerably during the last 42 years of planned development, the demand for agricultural output both on account of growing population and improvement in the quality of life, has been rising rapidly. Since the area under cultivation can be further increased only marginally this paper emphasises on the need for a concerted effort to harness all our resources in such a manner as to produce about 250 million tonnes of foodgrains by 2000 A.D. when our population would be reaching a level of 1 billion.

S.S. Khanna is Adviser (Agriculture) in the Planning Commission, New Delhi. 110001.

Agriculture has played and shall continue to play in the coming years a dominant role in the Indian economy absorbing nearly 2/3rds of the country's population. It is still the single highest contributor to the National income, even though its relative share has declined from over 59 per cent in 1949-51 to 32 per cent in 1988-89. While agricultural production has increased considerably during the last 42 years of planned development, the demand for agricultural production both on account of growing population and improvement in the quality of life has been rising rapidly.

The increase in agricultural production has been largely triggered off due to the increase in the use of inputs like irrigation, fertilisers and the seeds of high yeilding varieties. Since the area under cultivation cannot be further increased, the only alternative that remains is to enhance the productivity of various crops grown in different agroclimatic zones. It is with this view that the Planning Commission was given a mandate by the Prime Minister in 1988 to develop strategies of agricultural planning for each agro - climatic zone through a more scientific utilisation of available resources both natural and manmade. The potential for growth and diversification is to be fully exploited taking a holistic view of the climate, soil type, topography, water resources and irrigation facilities and socio-economic conditions of the people. The concept of planning based on regional potential has a longterm perspective but the aim shall be that the agricultural sector should provide (a) necessary food and clothing for all, (b) feed and fodder availability for livestock, poultry etc., (c) raw material for industries; (d) surpluses to meet the drought and unfavourable weather situation; (e) foreign exchange through agricultural exports; and (f) employment and income generation for rural and urban masses.

Thus, the objectives and priorities of agricultural planning which are being progressively evolved and implemented shall have to result in building a vibrant agricultural economy and in securing a better life for the rural masses. This would ultimately lead to efficient institutional mecha-

nism to fulfil goals of economic efficiency, ecological sustainability, employment generation and equity.

Land Reforms

The land reforms measures have been perceived as an integral part of the strategy of rural development with focus on disengaging the rural poor from exploitation of agrarian relations. The main objective of land reforms have been to restructure the agrarian society and establish an egalitarian system by abolishing all intermediary tenancy, regulation of tenancy arrangement and conferment of ownership right to the tiller of the soil, imposing ceilings on land holdings and distribution of holdings of surplus lands. The measures also include consolidation of land records. Redistributive land reform measures are being integrated with poverty alleviation programmes to enable rural poor to take up land based income generating activities and to increase productivity of lands cultivated by them.

Land Holding Size

Demographic pressure in the absence of adequate capital formation in agriculture inevitably has resulted in shrinkage of average size of holdings and the capital stock. The periodic agricultural census show a deterioration of the situation in all classes of holdings (table-1), in particular, the proportion of marginal farmers whose holdings is less than 1 ha. has increased over time. The data presented in table-1 indicate that the number of operational holdings was 54.6 per cent in 1976-77 which has increased to 58.1 per cent in 1985-86. Similarly the area operated by this category of farmers has increased from 10.7 per cent to 13.2 per cent of the total area. However the average size of holding of this category of farmers has remained around 0.39 ha. With respect to small farmers there has been a marginal increase in number of operational holdings but the holding area operated by this category of farmers has increased markedly from 12.8 per cent to 15.6 per cent. Both these categories of farmers constitute about 76.4 per cent of operational holdings but the area operated by them is only 28.8 per cent. Most of the small and marginal farms are economically unviable and it is only through diversification in agriculture and switch over to secondary/tertiary activities that they can enhance their income.

Table 1 : Distribution of Land Holdings All-India

No. of Holdings : '000 Nos.
Area '000 Ha.
Av. Size : Ha.

Category of Holdings	No. of Operational Holdings			Area Operated			Average Size of Operational Holdings		
	1976-77	1980-81	1985-86	1976-77	1980-81	1985-86	1976-77	1980-81	1985-86
Marginal (<1 Ha.)	44500 (54.6)	50122 (56.4)	56748 (58.1)	17500	19735 (12.1)	21606 (13.2)	0.39	0.39	0.38
Small (1.0-2.0 Ha.)	14700 (18.1)	10672 (18.1)	17881 (18.3)	20900	23169 (14.1)	25533 (15.6)	1.42	1.44	1.43
Semi-Mediums (2.0-4.0 Ha.)	11600 (14.2)	12455 (14.0)	13253 (13.5)	32400	34645 (21.2)	36579 (22.3)	2.79	2.78	2.76
Mediums (4.0-10.0 Ha.)	8200 (10.1)	8068 (9.1)	7920 (8.1)	49600	48543 (29.6)	47008 (28.7)	6.5	6.04	5.94
Large (10 and above)	2400 (3.0)	2166 (2.4)	1929 (2.0)	42800	37705 (23.0)	33187 (20.2)	17.83	17.41	17.2
All Holdings	81500	88883	97731	163100	163797	163913	2.00	1.84	1.68

The categories of farmers falling in semi-medium, medium and large holdings operate 71.2 per cent of the total area but the percentage of the farming community is only 23.6 per cent. The average size of operational holdings of these categories is decreasing in a similar fashion as their number. Thus it is obvious that further fragmentation of holdings is taking place.

Area Specific Programmes

In the recent past for improving the economic lot of small and marginal farmers more attention has been paid to see that the transfer of well proven technology takes place to this category of farmers at a faster pace. As such, lab to land programme was launched in 1979. To formulate the conceptual framework and organisational design of lab to land programme a National Workshop was organised at Hyderabad from 3rd-5th January, 1979. The Workshop made the following important recommendations:

i) The Lab-to-Land Programme may encompass 50,000 farm families belonging to the small and marginal farmers and landless agricultural labourers.

ii) While there could be full involvement of the Agricultural Universities and the ICAR Institutes and their various Regional Stations/Sub-Stations/Centres/ KVKs/All India Co-ordinated Research Projects/ NDPs/ORPs, etc., some of the selected voluntary organisations and affiliated agricultural colleges may also be involved in implementing this project.

iii) The Agricultural Universities and ICAR Research Institutes should provide technical expertise and

support to the voluntary organisations; and

iv) For implementing the programmes effectively, functional linkages with sister institutions/agencies may be fully established and utilised.

Mechanism of Implementation of Lab to Land Programme

For effective implementation and monitoring of the programme a three tier system was adopted by the ICAR. The whole country was divided into 8 zones on the basis of population, soil, climate, agro-eco system and demonstration set up. Four types of implementing agencies/institutions were involved in the programme-agricultural universities, ICAR institutes, the State Departments of Agriculture and some selected voluntary organisations.

Achievements of Lab to Land Programmes

With the continuous advancement in the evolution of the agricultural technology in the country it has been felt that the scope for making concerted efforts to see that it reaches the real clientele/farmer has increased many-fold. Since the scientists have been involved in the process of transfer of technology the benefits of research have gone to poor-small and marginal farmers through first line demonstration and also they are able to get a feed back on the effectiveness of the technology generated by them. For the sake of example only selected efforts made in this direction are discussed here.

Crop Production Programme

The Haryana Agricultural University adopted 1,400 families in 109 villages in Phase I and 2,800 families in 60 villages in Phase II spread over all the districts of the state. The programme was implemented through 12 Krishi Gyan Kendras and 3 Regional Research Stations of the University. The Sub-centre had adopted 100 families in Phase I spread over eight villages and 150 families in Phase II spread over three villages.

The adopted families were provided seeds of high yielding varieties of different crops and plant protection chemicals besides the technological back up including training. Under the programme of improvement of crop yield, improved varieties of bajra 'BJ 104', wheat 'WH 147' and 'WH291', mustard 'RH 30', sesamum 'No. 1' moong 'K 851', groundnut 'MH 2', onion 'Hissar 2, and 'Pusa Red' Carrot, 'Gurgaon Selection' tomato 'HS 101' and 'Pusa Ruby', brinjal 'BR 112', muskmelon 'Hara Madhu' and chillies 'Pusa Jwala' were introduced in the villages. The concept of balanced fertilisation, use of micronutrients like zinc, efficient use of irrigation water, seed treatment with fungicides like Thiram and Captan, control of aphid in mustard through insecticide spray and gap filling by transplantation in bajra were made popular in the village through demonstrations, training, personal contacts, etc. The impact in terms of increase in yield of some crops is given in table-2.

From the data given in table-3 it is evident that around 50 per cent increase in the yield of various crops took place on the farms of small and marginal farmers where the well proven technology was demonstrated. This also provided a chance for the scientists to spread the well proven varieties of various crops and varieties. The villages in the vicinity of the adopted ones also got advantage of the high yielding varieties of seeds as well as the farmers were able to get higher returns from their farms by selling the produce in the form of seed, eg. Haryana, Gujarat.

Table 2 : The Impact Lab-to-Land Programme

Crop	Phase I Yield (q/ha) Before LLP	Phase I Yield (q/ha) After LLP	Percentage increase in yield	Phase II yield (q/ha) Before LLP	Phase II yield (q/ha) After LLP	Percentage increase in yield
Bajra	8.00	12.50	56.20	6.50	8.50	30.80
Wheat	20.00	29.50	47.50	15.00	22.50	50.00
Gram	6.50	9.50	46.10	6.00	10.20	70.00
Mustard	3.50	6.00	71.40	8.00	12.60	57.50
Arhar	3.50	6.00	71.40	-	4.50	-
Moong	2.00	4.00	100.00	2.00	3.80	90.00
Groundnut	-	-	-	-	6.50	-
Tomato	100.00	150.00	50.00	125.00	175.00	36.00
Carrot	-	-	-	225.00	310.00	37.70
Onion	-	-	-	200.00	300.00	50.00
Bottle	90.00	140.00	55.50	125.00	180.00	44.00
Brinjal	125.00	175.00	33.30	150.00	225.00	50.00

The Lab-to-Land Sub-Centres also provided to the adopted families health cover, mineral mixture, and cattle feed for the dairy cattle. This helped in increasing cow milk

Table 3 : Increase in yield in Demonstration Farms

Crop	Average yield in q/ha Yield of the Area	Yield of Demonstration	Percentage increase
Maize	6.20	9.50	52.00
Bajra	6.00	9.00	50.00
Arhar	5.00	6.50	30.00
Guar	3.00	5.25	75.00
Castor	5.50	8.50	56.30
Wheat	12.00	16.50	37.50
Mustard	4.80	7.50	56.25
Tobacco	10.00	12.50	25.00
Cotton	8.00	9.50	18.75
Groundnut	8.00	11.00	37.50

by 36% and buffallo milk by 43%.

A number of enterprises from home science for rural women including tailoring, embroidery and preservation of fruits and vegetables were taken up in the adopted villages. In addition, smokeless chullahs were provided to many families which, in turn, reduced the drudgery of rural women.

Gujarat Agricultural University

The LLC adopted 4,000 families each in Phase I and Phase II. Besides the crop-production technology, LLC also offered animal husbandry and poultry development enterprises.

Crop-production technology including high-yielding varieties, chemical fertilisers, plant protection chemicals and other non-monetary inputs helped the adopted farmers to increase yields between 25 and 50%. New crops, like potato, tapioca and hybrid sorghum were successfully introduced in tribal areas of Dang district. Summer groundnut was introduced in Kheda and Panchmahal districts. Telephone system of hybrid cotton cultivation was made popular not only in adopted villages but also in a number of neighbouring villages.

Cotton (Digvijay H4) + arhar (local) was replaced with cotton (Hybrid 6) + arhar (15-15') resulting into a yield increase of about 7.5-10.0 q/ha. Digvijay' and 'H 4' showed susceptibility to Jassids whereas 'Hybrid 6' was comparatively tolerant. Similarly, arhar 615-15' was an improvement over the local. Ragi is an important food of tribals. In the low-lying areas with irrigation support rice ('IR 8') and wheat ('Sonalika') were introduced, in the upland areas ragi ('Nageli 1, 'Nageli 2') was introduced. Improved varieties of ragi gave yield of 3.2 q/ha as against 2.5 q/ha given by the local varieties. Hybrid sorghum and cigarette tobacco were introduced in tribal areas of Dang district as replacement of ragi for improving the economic conditions of the farmers.

Soft-wood grafting commonly known as 'nutan kalam paddhati' coupled with training programmes helped the farmers in converting thousands of country mango trees into improved grafted mangoes. Spraying of insecticide and pesticides for the control of mealy-bug in mango was also introduced to minimise the losses of mango fruits. Saplings of mango, guava, citrus and custard apple were also supplied to the adopted villages.

Under animal husbandry component, health cover received a high priority. Campaigns were organised for control of FMD in cattle, and vaccinations were done free of cost. Control of ticks in corrals of sheep and deworming for control of the internal parasites in goats and sheeps was provided to the adopted villages. Murrah male buffalo was given as a community input to Gram Panchayat to improve the local surti buffalo for milk production.

Mulberry plantation was introduced in small farm families for silk worm rearing. This enterprise proved successful. Farmers were able to grow 4-6 crops of silkworm in a year with profits of Rs. 1,600.

Gobar Gas plants were introduced and the number increased profusely in villages under Lab-to-Land Programme. This indicated a sign of prosperity.

Achievement of LLCs in 1988-89

The programme lays emphasis on low cost production technologies formulated to suit the social and economic needs of small, marginal and poor farmers as well as landless agricultural labourers, scheduled castes and backward communities.

Besides crop and animal production, adequate importance is given to poultry, piggery, goat keeping, rabbit rearing, bee keeping, sericulture, horticulture including vegetables and kitchen gardening. Special emphasis has been laid on the production of oil seeds pulses throughout the country.

The progress achieved under the programme has been briefly stated below under various enterprises:

(a) **Crop Production**

Region	Crop	% increase in yield
Tamil Nadu	Paddy	48
	Potato	189
	Black gram	200
Kerala	Cassava	66
	Cashew	100
Karnataka	Paddy	73
	Green grams	246.66
	Sunflower	109.18
	Castor	56.5
Madhya Pradesh Jabalpur	Wheat (irrigated)	56.28
Maharashtra		
Rahuri	Groundnut JL 24	24
Dapoli	Paddy	55
Uttar Pradesh	Summer Moong	112.21
	Groundnut	81.63
Assam		
North Lakhimpur	Potato	203
West Bengal	Sugarcane	

Region	Crop	% increase in yield
Haryana	Wheat	73
	Jowar (Fodder)	104
	Gram	107
	Cotton	58
	Hybrid Bajra	49
Andhra Pradesh (Dryland Agriculture)	Mustard	63
	Paddy	209
	Sorghum	48

(b) Animal Production

Region	Crop	% increase
Kerala	Piggery	60
	Poultry	60
	Homestead Fishculture	328
	Apiculture	87
		Range of additional income per family
Assam	Duckary	Rs. 1280
	Piggery	2000-4000
	Fishery	2500/tank (287 sqm)

(c) Horticulture

Region	Crop	% increase
Kerala	Banana	43
	Cashew	100
	Cassava	66
Tamil Nadu	Muscat Grapes	101
	Coconut	13
West Bengal	Watermelon	
	Banana	
	Cabbage	
	Tomato	

Himachal Pradesh	Average yield q /ha	Net return by the farmers (Rs.)
Potato	98.29	7550.85
Peas	27.13	3162.39
Cabbage	137.15	7919.84
Cauliflower	117.29	9655.53

		Range of Addl. Income/ha.
Assam	Winter Vegetables	Rs. 4000-17000
	Field pea	1250-1800
	Pineapple	11674.50

Productivity

Substantial advances have been made in agricultural research and technology contributing to quantum jumps in productivity and production in the 60s and early 70s, particularly in the case of rice and wheat (table-4). The area under rice has been around 40 million ha. during the last 15 years but the productivity has increased from about 1 tonne to the level of 1.7 tonne. The high yielding varieties of rice have been responsible for a quantum jump in the production and productivity which have been released by IRRI, Manila, and Indian Rice Research network.

Judging by the production performance of wheat there has been a dramatic increase during the last 40 years over productivity level which was 6.55 quintals per ha., in 1980-81 and has increased to a level of 21.17 quintals per ha. in 1989-90. The country used to produce only 6.39 million tonnes of wheat in 1949-50 while it is producing around 54 million tonnes now. Thus, there has been 8 times increase in the production and productivity in wheat and rice. The increase may be attributed to (a) increase in the percentage area under irrigation, (b) enhanced use of consumption of fertilisers (c) adoption of high yielding varieties, and (d) better economic returns to the farmers.

The productivity of jowar, bajra and maize has been increasing but certainly not at an impressive rate as 95% jowar bajra are grown in unirrigated areas. Thus their production and productivity varies with the fluctuations in monsoons. In the case of maize the production and productivity has increased substantially and would further increase as the irrigated area is around 20 per cent and the varieties developed are high yielding.

The production and productivity of pulses have not increased in the required manner and thus the per capita availability has declined from 69 gms. per day per person in 1961 to 40.4 gms. per day per person in 1989. The emphasis in recent years is to develop high yielding varieties of pigeon pea (Arhar) and encourage the farmers to grow it in a cropping sequence. The research efforts on gram (chick pea) have also been intensified and results are quite encouraging.

The production and productivity of oilseeds have increased during the last forty years, of course not to the required extent. The consumption of edible oils have increased from 2.5 kgs./annum per capita to a level of 5.2 kgs. Thus to meet the growing demands of the people it is important that the oil seeds production and productivity is increased substantially. Since oilseeds are grown mostly (around 82%) in unirrigated areas there is a limitation to enhance their productivity. Providing life saving irrigation is a must for increasing their production, which can only be achieved if water harvesting techniques are adopted.

Table 4. All India Area Production and Yield of Foodgrains

Year	Area (Million Hects)	Production (Million Tonnes)	Yield (Kgs/Hect)
1	2	3	4
TOTAL FOODGRAINS			
1950-51	97.32	50.82	522
1960-61	115.58	82.02	710
1970-71	124.32	108.42	872
1980-81	126.67	129.59	1023
1989-90	126.51	170.63	1349
RICE			
1950-51	30.81	20.58	668
1960-61	34.13	34.58	1013
1970-71	37.59	42.22	1123
1980-81	40.15	53.63	1336
1989-90	42.17	74.06	1756
WHEAT			
1950-51	9.75	6.46	633
1960-61	12.93	11.00	851
1970-71	18.24	23.83	1307
1980-81	22.28	36.31	1630
1989-90	23.46	49.65	2117
JOWAR			
1950-51	15.57	5.50	353
1960-61	18.41	9.81	533
1970-71	17.37	8.11	466
1980-81	15.81	10.43	660
1989-90	14.95	12.92	864
BAJRA			
1950-51	9.02	2.60	288
1960-61	11.47	3.28	286
1970-71	12.91	8.03	622
1980-81	11.66	5.34	458
1989-90	10.89	6.62	608
MAIZE			
1950-51	3.16	1.73	547
1960-61	4.41	4.08	926
1970-71	5.85	7.49	1279
1980-81	6.01	6.96	1159
1989-90	5.86	9.41	1606

Year	Area (Million Hects)	Production (Million Tonnes)	Yield (kgs/Hect)
1	2	3	4
GRAM			
1950-51	7.57	3.65	482
1960-61	9.28	6.25	674
1970-71	7.84	5.20	663
1980-81	6.58	4.33	657
1989-90	6.50	4.23	652
TOTAL PULSES			
1950-51	19.09	8.41	441
1960-61	23.56	12.70	539
1970-71	22.54	11.82	524
1980-81	22.46	10.63	473
1989-90	23.22	12.61	543
SUGARCANE (CANE)			
1950-51	1.71	57.05	33422
1960-61	2.42	110.00	45549
1970-71	2.62	126.37	48322
1980-81	2.67	154.25	57844
1989-90	3.40	222.62	65475
GROUNDNUT			
1950-51	4.49	3.48	368
1960-61	6.46	4.81	745
1970-71	7.33	6.11	834
1980-81	6.80	5.01	736
1989-90	8.70	8.08	928
RAPESEED & MUSTARD			
1950-51	2.07	0.76	368
1960-61	2.88	1.35	467
1970-71	3.32	1.98	594
1980-81	4.11	2.30	560
1989-90	4.98	4.12	827
NINE OILSEEDS			
1950-51	10.73	5.16	481
1960-61	13.77	6.98	507
1970-71	16.64	9.63	579
1980-81	17.60	9.37	532
1989-90	22.97	16.74	729

The sugarcane production in our country has increased four fold and the productivity has also doubled. Nevertheless the consumption level has also increased. In 1955-56 the sugar consumption was 5.0 kgs. per capita per annum which has increased to 12.2 kgs. per capita per annum in 1988-89. Emphasis has to be laid in the coming years on enhancing the productivity of sugarcane.

Conclusion

The productivity of most crops is lower in India as compared to the World and Asian averages. The rate of growth of foodgrains has to be enhanced much faster by making available the required inputs to the farmers. The area under irrigation has to be increased and conjunctive use of water has to be encouraged. The cropping intensity has to be increased particularly in unirrigated and assured rainfall areas. If we harness the resources in the desired manner it would be possible for us to produce 250 million tonnes of foodgrains by 2000 A.D. when our population reaches a level of 1 billion.

Since the likely population by 2050 A.D. is going to be 1.5 billion, the country would need 400-450 million tonnes of foodgrains. The expansion in area is going to be very marginal and thus the enhancement of productivity of all crops is the only answer.

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IRDP - What Next ?

Jag Pal Singh

Beginning from 1952, India witnessed a series of programmes for rural development and eradication of poverty. Each subsequent programme has been justified on the ground that the preceding one fell short of the requirements. In the process, the emphasis has been shifted from the larger objective of eliminating relative poverty to the telescopic scheme of 'helping the poorest among the poor'. What ails these schemes, in the ultimate analysis, is an acute shortage of resources; according to this paper.

Jagpal Singh is a Senior Scientific Officer in the Centre for Rural Development and Appropriate Technology in the Indian Institute of Technology, New Delhi - 110 006

In free India, the rural development programmes were started in 1952 with the launching of the Community Development Scheme in 55 community projects. The response to the projects was so substantial that from 1953 the programme was extended to all the blocks in the country. Community Development Programme has been described as a process of change from the traditional way of living to a method by which people can be assisted to develop themselves on their own capacity and resources [Planning Commission, 1951 : 5]. It aimed at promoting community living with active participation and initiative of the community itself. Thus, it was a process, a method and a programme.

A Barrage of Programmes

It can not be denied that the community development movement succeded in bringing the growth process closer to the people. The programme helped in creating awareness in the rural communities about the potential means of development which made quicker the adoption of major technological advances in agriculture in the mid 60s. [Ministry of Information and Broad-casting, 1987 : 361]. However, according to the Balvant Mehta Committee Report [Committee on Plan Projects, 1957 : 7] the Community Development and National Extension Service programme failed to evoke any popular initiative. Local bodies at a level higher than the panchayat had evinced little enthusiasm in the community development programmes and even the panchayats had not come in to the field of community development in any significant way. The deepening food crisis made it necessary to lay greater stress on agricultural production. This resulted in the launching of the Intensive Agriculture District Programme (IADP] in 1960 in selected districts - "areas of quick response" - followed by the Intensive Agriculture Area Programme [IAAP] and the High Yielding Varieties Programme [HYVP] in 1965 [Department of Rural Development, 1985 : 16]. The main concern of these programmes was to raise the agricultural production. The emphasis was on supplying modern and technological inputs to the farmers.

The new agricultural strategy, though resulted in substantial increase in agricultural production and productivity, has also resulted in its benefits acruing mainly to the already prosperous and well endowed areas and rich landed sections of the population. This has the natural implication of further widening the already existing economic disparities between the regions and groups. Illustrative examples of such widening gaps can be seen in the uneven impact of growth among various crops and regions in the country [e.g. wheat growing belts of Punjab, Haryana Western Uttar Pradesh *vis-a-vis* the millet and coarse grains belts covering Madhya Pradesh, Rajasthan, Gujarat etc.]. The swelling ranks of marginal and small farmers as well as increasing casualisation of agricultural labour can also be treated as the natural consequenceces of a 'production augumentation of food' strategy. It was in this context that special efforts became necessary in order to raise the living standards of the deprived sections comprising scheduled castes and scheduled tribes, small and marginal farmers and agricultural labourers. These programmes were mainly of two types : resource or problem based area development programmes and target-group oriented programmes. While the former consisted of such schemes as Drought Prone Area Programme [DPAP], Desert Development Programme [DDP], Hill Area Development Programme [HADP] and Command Area Development Programme [CADP], the latter included Small Farmers Development Agency [SFDA], Marginal Farmers and Agricultural Labourers Development Agency [MFAL] and Tribal Area Development Programme [TADP] [Kataria, 1987 : 8-9]. In order to give a greater thurst to the development of cottage and village industries, District Industries Centre [DIC] in each district was also created in the late seventies. In addition to these, there were a number of programmes for additional wage employment opportunities, such as, Crash Scheme for Rural Employment (CRESH), Food for Work Programme (FWP) and Minimum Needs Programme [MNP]. The objective of all these programmes was one and the same i.e to take care of those classes of people who happend to be by-passed during the development process.

IRDP Rationale

It should have been clear that, by the very nature and magnitude of the poverty problem, any strategy which does not lead to radical changes in the basic structure and production relations would not be sufficient enough to make any visible impact on the living standards of the masses. Instead, sops were sought to be provided by arranging for identification of the members of the target groups and providing assistance to them in terms of financial, technological, marketing and managerial inputs. Thus, a new programme, viz, IRDP was launched in 1978-79 initially in 2300 development blocks. In 1980 the programme was extended to all the 5011 blocks of the country. In addition to the major rural development programme of IRDP, there were others as well, such as, Training of Rural Youth for Self-Employment (TRYSEM), Jawahar Rojgar Yojna, Development of Women and Children in Rural Areas (DWCRA), Minimum Needs Programme (MNP) etc. The main aim of IRDP is to raise the living standards of the identified families upto the desired level. These families are provided financial assistance in the form of subsidies and bank credit alongwith technological and managerial skills through training porogrammes for initiating economically viable self-employment ventures.

As the IRDP has its main focus on raising families above the poverty line, the basisc criterion adopted for identifying the target group has been the income of the family. A cut-off line with an income of Rs.62/- per person per month in 1978-79 was adopted. On an average, a rural family has five members and thus those families having an annual income from all sources less than Rs. 3500/- was to be treated as living below the poverty line. As per the instructions, the families falling in the lowest income group were to be covered first for providing assistance under the IRDP (Ministry of Rural Reconstruction, 1980 :4). In 1988, the poverty line was revised from Rs.3500/- annual income per family to Rs. 6400/-. Presently the identified families are assisted to reach an annual income level of Rs. 6400/- . However, pitiably enough, the cut-off line for identification has been brought down to Rs. 4800/- annual income per family. These estimates of the poverty line were kept in the book shelves and as a 'bolt from blue' a new concept of 'poorest among the poor' was introduced for implementing the so called anti-poverty programmes. Thus, to ensure that the 'poorest of the poor' gets the assistance on a priority basis, families with an annual income of Rs. 3500 are to be assisted first. (Department of Rural Development, 1988 : 1).

According to the PEO study (1985) only 8 per cent among the poorest of the poor group, crossed the poverty line. RBI study [1984] pointed out that among the beneficiaries whose income registered an increase, only 17 per cent could be able to cross the poverty line after the incomes had been suitably discounted by the consumer price index for agricultural labour as on February 1984. NABARD study [1984] found that the programme had helped 47 per cent of the beneficiaries in crossing the poverty line. The study conducted by the Canara Bank

[1983] revealed that the income of the 75 per cent respondents registered an increase of Rs. 100/- per month per family . According to the SBI study [1983] out of the 100 beneficiaries only 19 have expressed satisfaction with the scheme. Dissatisfaction was due to the inadequate income generation. As per the Mid-term Apprasial of Seventh Five Year Plan (Planning commission, 1988 : 37) only 12 percent beneficiaries crossed the poverty line of Rs. 6400, though 54 percent crossed the income level of Rs. 3500.

National Development *Vis-a-Vis* Rural Development

On the basis of the emphasis and coverge of the rural development schemes initiated so far, the efforts can be broadly classified into four major approaches : (i) Multipurpose-approach (1952 to 1961); (ii) Target sector (agriculture) development approach (1961 to 1979); (iii) Target group/area development approach (1969 to 1979) and (iv) Reduced Target Group approach (1979 to till now). Multipurpose approach covers the First Two Five Year Plans; target sector approach covers the Third Five Year and Three Annual Plans; target group/area approach covers the Fourth and Fifth Five Year Plans. The Reduced Target Group Approach covers the Sixth and Seventh Five Year Plans. Considering the changes in objectives of the past seven five year plans and the corresponding emphasis in rural development programmes together, the efforts which have been initiated during the last four decades in the field of rural development could be evaluated from the point of view of poverty eradication.

During 1951 to 1969, the emphasis has been on achieving the objective of social justice through alleviating relative poverty from the rural areas by an integrated approach covering almost all aspects of human life. During 1969 to 1978, the emphasis shifted to removing absolute poverty through target group/area development apprach without defining a poverty line. From 1979 onwards, the preoccupation has been to helping the 'poorest among the poor' through a beneficiary oriented apprach. Every shift in the programme emphasis has been justified on the ground that the preceding programme could not help the poor and, therefore, a new programme is required. A number of officially sponsored studies have highlighted that, like other programmes IRDP has also fallen short of helping all the identified households. The decision to waive off IRDP loans upto Rs. 10000.00 confirms the findings of these studies.

Why all the programmes which have been tried in the field of rural development so far, have fallen short of the objective of eliminating poverty? The programmes which aim at eliminating poverty from the rural areas are supposed to channelise the capital stock and Gross Domestic Product [GDP] to the rural sector in proportion to its share in population. All the programmes for rural development were, in general, add- ons to the core planing models, and, therefore could not become their integral parts. In any case, channelising the investments and GDP in proportion to the share in population in rural areas had been beyond the capacity and capability of these programes. In the top-to-bottom approach to planning, a particular area gets the resources as per the interplay between the price-mechanism and choice of production techniques. Area/activity oriented programmes are formulated within the available resources. How the shifting of the emphasis in the planning of rural development has helped in reducing the magnitude of rural poverty so as to accommodate all the anti-poverty programmes within the available resources could be seen with the help of the data given in tables 1 to 3.

For the present purpose, the number of rural households/persons covered under the three approaches viz., 'relative poverty elimination', 'absolute poverty elimination' and 'helping the poorest among the poor' are based on the Census of India 1981 tables. Relative poverty has

Table 1 : Number of target persons/households according to three categories

Item	Numer of persons/households			
	1980 - 81		1988 - 89*	
	Number	Percentage	Number	Percentage
Total population of the country	66,52,87,848	100.00	78,23,78,509	100.00
Total households of the country	11,97,72,545	100.00	14,08,52,513	100.00
RELATIVE POVERTY				
Rural population	50,76.07,678	76.30	59,69,46,629	76.30
Rural households	9,08,66,596	75.90	10,68,59,117	75.90
ABSOLUTE POVERTY				
Population	23,85,75,609	47.00	22,08,70,252	37.00
Households	4,27,07,300	47.00	3,95,37,873	37.00
POOREST AMONG THE POOR				
i Identifed households	—		3,86,69,987	36.28
ii Assisted households	—		2,49,140	2.03

* Based on the average growth rate of 2.2 percent per annum.

been defined as those households/persons with a per capita GDP below the national average. For illustration purpose, the rural sector has been taken as a single block in which all the households/persons would be below the national average, if the total rural income is equally distributed among all the rural population. The number of households/persons under the apprach of 'absolute poverty elimination' has been estimated on the basis of their share in GDP of 47 per cent in 1980-81 and 37 per cent in 1988-89 [Planning Commission, 1983 : 8]. The number of households/ persons under the approach "helping te poorest among the poor" are based on the DRDA's reports of Faridabad and Mahendergarh districts of Haryana for the year 1988-89.

It may be observed from table 1 that in 1980-81, the number of target group of househols have been reduced from 90.86 millon [75.9 per cent] to 42.70 million (47.0 per cent) by shifting the emphasis from 'relative poverty elimination' to 'absolute poverty elimination'. The corresponding figures for 1988-89 are 106.8 million [75.9 per cent] and 39.53 million (37.00 per cent) respectively. On the basis of 'poorest among the poor', assisted house- holds have been reduced to a mere 2.49 million [2.03 percent]. The number of persons under all the three approaches also tell the same story. The magnitude of the poverty problem has thus been suppressed merely by changing the emphasis in the subsequent development Plans.

Table 2 presents the data on GDP of the total economy, rural sector and the portions of it which are required for eliminating 'relative poverty', 'absolute poverty and helping the 'poorest among the poor'. Information in respect of the first two aspects have been taken from the 'Economic Survey of India 1989-90' (Ministry of Finance 1989-90: S-5). The portion of GDP required for removing relative poverty has been computed on the basis of the per capita national average income and the rural population. At 1980-81 prices, the per capita national income in 1980-81 was of Rs. 1620 and in 1988-89 it was of Rs. 2082 (Ministry of Finance, 1989-90 : S-I). The portions of GDP which are sufficient for removing the absolute poverty and helping the poorest among the poor have been estimated on the basis of the poverty line multiplied by the number of total rural households and the 'poorest among the poor' respectively. AS per one estimate, at 1980-81 prices, an income of Rs. 76/- per person per month was adequate for crossing the poverty line (Datta, 1982 : 14]. Considering five members as the average size of the family, an annual income of Rs. 4560/- at 1980-81 prices was adequate in 1980-81 and in 1988-89 as well.

Table : 2 Available and required proportion of GDP

Item	1980-81		1988-89	
	Amount crore Rs.	Percen-tage	Amount crore Rs.	Percen-tage
Total GDP at 1980-81 factor cost	122226	100.00	188481	100.00
Actual share of rural sector (agriculture, forestry and logging, fishing mining and quaming)	48366	39.57	65639	34.82
Based on alleviating relative poverty criterion	82588	67.57	124284	65.85
Based on alleviating absolute poverty criterion	41435	33.91	48828	25.91
Based on helping the poorest among poor criterion				
(i) identified families	—	—	17633	9.35
(ii) assisted families	—	—	1137	0.60

According to the 1980-81 share of rural sector in population (67.57 per cent), the sector should have received the same share from the GDP. In reality, it has been reduced to a mere 39.57 per cent in 1980-81 and 34.92 per cent in 1988-89 through the interplay of a price-mechanism and the phenomenon of technological duality. This certainly is inadequate to eliminate the relative poverty from the rural India. Perhaps, this has forced the planners to dilute the magnitude of the poverty problem through changing the emphasis in the planning process. It is true that the present share of GDP is quite sufficient to remove the absolute poverty provided this is equally distributed among the rural population. The percentage of GDP required for alleviating relative poverty is not matching with the percentage of rural population, perhaps, because some persons alongwith their dependants engaged in agriculture, forestry and logging, fishing, mining and quarrging may be staying in the cities. Indian planners were, thus, faced with the unenviable task of reducing the magnitude of the poverty problem so that the resources' requirement of the rural sector can be met with the available portion of GDP. The magnitude of poverty problem has been reduced to such an extent that in 1988-89 all the anti poverty programmes could have been implemented with a mere 0.6 percent of GDP.

Table 3 presents the data in respect of the total capital stock accumulated during the past and its distribution into

Table 3 : Available and required capital stock

Item	1980-81 Amount crore Rs.	1980-81 Percentage crore Rs.	1988-89 Amount	1988-89 Percentage
Total capital stock at 1980—81 prices	380766	100.00	587168	100.00
Share of rural sector (Based on primary sector capital productivity)	91085	23.92	123614	21.06
For alleviating relative poverty				
a. Based on national level capital productivty	257283	67.57	387178	65.93
b. Based on primary sector capital productivity	155533	40.84	234056	39.86
For alleviating absolute poverty				
a. Based on national level capital productivity	129081	33.90	152112	25.90
b. Based on primary sector capital productivity	78032	20.49	91955	15.66
For helping the poorest among the poor (identified)				
a. Based on national level capital producitivy	—	—	54931	9.35
b. Based on primary sector capital productivity	—	—	33207	5.65
For helping the poorest among poor (assisted)				
a. Based on the national level capital productivity			3542	0.60
b. Based on primary sector level capital prodictivity			2141	0.36

rural and urban sectors. The amount of total capital stock and requied/available share of rural sector in it have been computed on the basis of the national level capital productiviy, primary sector capital productivity and the amount of GDP given in table 2. As per one study, the national level capital productivity is 0.321 whereas in the primary sector it is 0.531 (National Productivity Council, 1989 : 353). Through the allocation of resources the share of rural sector in capital stock has been reduced from the required 67.57 percent to 33.90 percent in 1980-81 and from 65.93 percent to 32.46 per cent in 1988-89. The shifting of emphasis in the planning proces has helped in reducing the magnitude of the poverty problem to the extent that only 0.6 per cent of the total capital stock would have been sufficient for investment in all the anti-poverty programmes. Technological duality has further reduced the requirement from 0.60 per cent to 0.36 per cent of the total capital stock in 1988-89.

Conclusions

The discussion presented inthe paper indicates that the interplay between 'price-mechanism' and 'technological duality' has proved very effective in reducing the share of the rural sector in capital stock and GDP significantly. It seems that, for the planners, there was no other way except to supress the magnitude of rural poverty so as to keep the resources requirement for this purpose within the available amount. Accordingly in 1988-89, the target households have been reduced from 75.9 per cent to 2.03 percent of the total households. This percentage is below the over all population growth rate and, therefore, the present position may remain unchanged for a long time to come, if no change in the development strategy is introduced.

Rural poverty is mainly an economic problem. Therefore, it needs economic solutions. The failure in eliminating rural poverty has been due to a dilution of the objectives of rural development in the Five Year Plans followed by the adoption of an investment plan derived from the existing technological duality and a price- mechanism favourable to the organised sector. The situation, thus, warrants a change in the development strategy towards evolving a price-mechanism and the production techniques with the objctive of seocial justice. Redressal of the damage requires that over 70 per cent of the total outlays must be made available to the rural sector atleast for a period of 50 years. This may also help in checking the migration of the people from rural areas to cities.

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Excuses, Excuses & More Excuses

The folowing excuses have been stifling change for years.

1. We've never done it before
2. Nobody else has ever done it.
3. It has never been tried before
4. We tried it before
5. Another company/person tried it before
6. We've been doing it this way for twenty-five years.
7. It won't work in a small company
8. It won't work in a large company
9. It won't work in our company
10. Why change? It's working okay
11. The boss will never buy it
12. It needs further investigation
13. Our competitors are not doing it
14. It's too much trouble to change
15. Our company is different
16. The ad department says It's impossible
17. The sales department says It's impossible
18. The service department won't like it
19. The janitor agrees with advertising, sales, and service
20. It can't be done (anyway)
21. We don't have the money
22. We don't have the personnel
23. We don't have the equipment
24. The union will scream
25. It's too visionary
26. You can't teach an old dog new tricks
27. It's too radical a change
28. It's beyond my responsibility
29. It's not my job
30. We don't have the time
31. It will make other procedures obsolete
32. Customers won't buy it
33. It's contrary to policy
34. It will increase overhead
35. The employees will never buy it
36. It's not our problem
37. I don't like it
38. You're right.....but
39. We're not ready for it
40. It needs more thought
41. Management won't accept it
42. We can't take the chance
43. We'd loss money on it
44. The payout is too far away
45. We're doing alright now
46. It needs committee study
47. The competition won't like it
48. It needs sleeping on
49. It won't work here
50. It's still impossible

Focus

Energy-Cum-Rural Technology Complexes in Uttar Pradesh

Binayak Rath

The Sixth Plan and the Technology Policy Statement, (1983) laid special emphasis on the rural energy problems. It was proposed to promote some of the non-conventional renewable energy sources in the rural areas along with appropriate rural technologies. Adhering to these approaches, in 1983, the Government of U.P. launched a pilot project, Energy-cum-rural technology complexes ,with a view to improve the economic conditions of the rural masses. In this paper an attempt has been made to examine the performance of two such complexes in U.P. in a social benefit - cost analysis framework. The study has observed that while the Kanpur complex is a failure, the Sultanpur Scheme has achieved partial success. The causes of their failure or success have also been investigated and some remedial measures suggested to overcome the problems.

Binayak Rath is Assistant Professor in the Department of Humanities and Social Sciences, Indian Institute of Technology, Kanpur-208016.

Although 80% of the population of India lives in the rural areas, they get less than 20% of the total energy resources, especially the scarce commercial resources. While nearly one-third of the plan investments are being made in the energy sector, the benefits from them do not reach the rural people who have to survive on the traditional sources of fuel like firewood, cowdung, leaves of plants, and agricultural wastes. Further, the consequent shortage of fuel in the rural sector, higher prices of commercial fuels, and the environmental degradation has induced the policy makers and planners to draw their attention to rural energy planning. Since 1970's, the rural energy needs have gradually entered into our planning process. From the Fifth Plan onwards, rural energy requirements have been envisaged to be tackled in an integrated manner. Since then, besides extending the rural electrification programme for villages[1] and energisation of pumpsets, the Government started emphasising on harnessing more of non-conventional renewable sources of energy in the rural sector, which in its turn, could help in conservation of the fast depleting commercial fuels.

By taking into account the energy problems in general and of the rural sector in particular, the Fuel Policy Committee (Government of India, 1975) had recommended the popularisation of biogas plants in rural areas. On the other hand, other Commissions and Committees of the Government advised for popularisation of non-conventional sources like solar energy and wind energy to meet the rural energy requirements, that was estimated to increase by over two to three times by 2004-05 AD. In order to popularise the use of these renewable sources of energy, the Government launched a number of programmes during the Sixth and Seventh Plan periods. One such pilot programme contemplated in 1983 was the Energy-cum-Rural Technology (ERT) Complex Development. A number of structural changes were introduced both at the Centre and

1. For instance, 64% of the villages were reported to be electrified upto the end of the Sixth Plan period and during Seventh Plan it was proposed to cover a target of 1-8 lakh more villages.

State Government levels for the execution and monitoring of such schemes. Uttar Pradesh was one of the pioneer states in undertaking such complexes. In the first phase, it had proposed to promote ten complexes in nine selected districts. In this paper an attempt has been made to undertake the post-evaluation of two such complexes with the help of both quantitative and qualitative criteria.

ERT Complexes in U.P.

The "Technology Policy Statement", issued in January 1983, laid special emphasis on the technology development with regard to food, health, housing, energy, and industry with a view to reduce the level of poverty in rural areas. Priority was accorded to development and use of renewable, non-conventional sources of energy like biogas, solar and wind energies under the guidance of Commission for Additional Sources of Energy (CASE) which was subsequently renamed as the Department of Non-Conventional Energy Sources (DNES). Special efforts were envisaged for the diffusion of technology use in an appropriate manner to all the beneficiaries who could employ them optimally. It was also proposed to evolve appropriate measures to facilitate technology diffusion and upgradation of traditional skills and capabilities in the rural areas. In order to achieve these objectives the Government not only introduced a number of structural changes at all levels, adequate financial resources were earmarked for these activities, and new roles were assigned to the technical, academic, and voluntary organisations for the success of these schemes. The Government of U.P. restructured its Department of Science and Technology, and reorganised its Council of Science and Technology (CST). With liberal financial grants from the DNES, the CST decided to establish the Energy-cum-Rural Technology Complex in almost each district of the State.

In the first phase, it proposed 10 pilot complexes in nine districts, viz. Sultanpur, Allahabad, Lucknow, Nainital, Raebareilly, Jaunpur, Bijnore, Roorkee and Kanpur (Dehat) in collaboration with some technical institutions or voluntary organisations. Such complexes were proposed to be developed in villages which were easily approachable by road and preferably not electrified and had a population of preferably 350 families so that the energy needs of the village could be met through a community biogas plant in the complex. In selecting such a village adequate care should be taken to involve the village youth who should be literate enough to understand the aims and objectives of such complexes and they should be motivated to adopt new techniques of science and technology for their upliftment. To avoid the ownership right problems in future, these complexes should be taken up in the Gram Sabha land, that would be transferred in the name of CST, UP by the District Administration. Such complexes were mainly aimed at covering two broad areas for live demonstration and their adoption by rural people and dissemination to neighbouring villages. The areas are :

i) Rural Energy Systems; and

ii) Rural Technology Systems.

When the Rural Energy System was aimed at demonstrating the use of non-conventional energy resources like biogas, solar energy, wind energy, and efficient burning systems of wood and cowdungs; the Rural Technology Systems were aimed at efficient method of production, and additional employment and income generation opportunities. The income and employment opportunities were expected to be created by utilising local skills and material potentials. For instance, the village people should be exposed to improve agricultural equipments, sanitation and environment systems, low cost housing, irrigation and drainage systems, and other domestic appliances.

Broad objectives of such ERT complexes were :

(a) to meet the energy requirements of the selected village for cooking either by bio-gas or by solar cookers or by supplying them smokeless ovens,

(b) to supply water through windmills or through solar energy devices,

(c) to provide devices like solar grain drivers for efficient drying of food items,

(d) to provide public sanitation systems,

(e) to provide income and employment generation by demonstrating those opportunities through application of science and technology,

(f) to generate a new awareness among the villagers regarding the scientific and technological developments in the country.

Initially, the technical as well as promotional help was sought by the CST from the technical or voluntary organisations for the development of such complexes in the pilot villages of the selected districts. To its credit, within two months the CST could identify such institutions for Sultanpur, Allahabad and Raebareilly districts and hence, the ERT complexes in these districts were taken up by February 1983. In the same month the Indian Institute of Technology, Kanpur was approached by the CST to promote one such complex in the Kanpur (Rural) district.

Case Studies

The post-evaluation results, based on a social benefit-cost analysis framework, play a significant role because these results would pave the way either for their continuance or otherwisse, and / or for their expansion on a large scale. We have decided to undertake the post-evaluation studies of two such complexes, which were taken up in its first phase. These complexes are :

1) The ERT complex in Kanpur (Dehat).

2) The ERT complex in Sultanpur district.

Although both these complexes were initially conceptualised by experts from the technical institutions, viz. the IIT Kanpur for Kanpur project, and Kamala Nehru Institute of Technology (KNIT), for the Sultanpur project, both of them have provided quite contrasting results. While the first complex has been a utter failure and thereby a severe drain on our limited financial resources, the second project has been a success to a great extent.

The causes of their failure or success in terms of their economic viability have been discussed separately. The problems at the stages of project planning, preparation of feasibility reports, execution, operation and maintenance have been examined. Both quantitative and qualitative criteria have been adopted with the help of secondary and primary data collected from the project sites. The involvement of the beneficiaries in the activities of the project and their perceptions about its success or failure have also been investigated.

The ERT Complex in Kanpur (Rural) District

Background of the Project : The CST (UP) approached IIT Kanpur to undertake the implementation of one such ERT complex in the Kanpur (Rural) District, for which the CST was willing to grant a sum of Rs. 12 lakhs. However, the CST had already identified the activities for which the funds could flow in a selected village. But before undertaking the task of promoting such a complex, IIT Kanpur constituted a committee of experts to study the feasibility of such a proposition. It was felt by the experts that, by taking into account the complexities involved in the implementation of the Government sponsored schemes in the rural areas in this part of the country, a cautious approach was required. The IIT entrusted some experts with the task of identification of a village, which should be in conformity with the guidelines of CST and further where there should be least inter-group rivalries. After a careful examination of the various socio-economic parameters existing in a number of villages of Kalianpur and Chaubepur blocks of the district, the village Mariani in Chaubepur block was selected for development of the ERT complex. The village is located on the GT road at a distance of 25 kms from Kanpur city. Further with a view to prepare the feasibility report of various activities in the project, based on the socio-economic data, a detailed household survey of the village was undertaken during April-May 1983. Adhering to the suggestions and guidelines of the CST, a technical feasibility report for the project, comprising the energy complex and the rural technology complex, was prepared by the technical experts of IIT Kanpur. Under the rural energy complex it was envisaged to undertake a community bio-gas plant that could provide gas for cooking and public lighting, windmills to pump water for irrigation; solar photovoltaic water pumping systems, solar water heating systems, solar cookers, solar driers and to supply smokeless ovens for increasing the efficiency in wood burning and also to reduce the drudgery of women. The rural technology complex also proposed to demonstrate the use of improved agricultural implements, material handling and transport systems, improved domestic appliances, simple and efficient water lifting devices, agro-processing equipments, and seed preservation and some improved grain-storage practices. Besides these two important activities, it was proposed to undertake some low-cost housing schemes for the scheduled caste households, construction of road and drainage system's in the village, and to construct some community latrines which could be subsequently hooked to the bio-gas system or separately used for generation of gas for public lighting.

Implementation of the Project : Before taking up the execution of the project, the experts decided to examine the economic viability of each of the proposed activities in the complex with the help of the survey data (1983). Since the experts found that some of the activities, particularly community bio-gas plant, windmills and bullock-driven pump sets, were not economically viable, they proposed some alternatives to be incorporated into the project report along with a research and development component. But the CST, which was the sponsoring agency of the Government, neither agreed to such alternative propositions nor appreciated the R&D components. Further, the CST insisted that work should immediately be started in the village, i.e. before the onset of the monsoon season. In view of these differences in approaches, the CST approached the JK Energy Centre, a private research body of the JK Group of industries, to take up the project which they readily agreed to. Funds were granted to the JK Energy Centre during June 1983 and the gram sabha land was transferred to them to undertake the appropriate industrial activities for generation of additional employ-

ment opportunities in the village. But unfortunately; after a year or so when the JK Energy Centre realised the real problems, which were earlier envisaged by IIT, they decided to withdraw from these activities and , refunded the grant to the Government. By that time as the Government of U.P. had created a new agency known as Non-Conventional Energy Development Agency (NEDA), the task of execution of the project was entrusted to them. The actual commencement of the construction of the project started by mid 1985 only. However, the NEDA undertook only a few of the activities mentioned in the project report like bio-gas generation and its supply, demonstration of solar cookers and wind energy devices, supply of smokeless ovens, energy plantations, and use of some improved agricultural implements. Presently the operation and maintenance of the complex is done by their own staff.

Our Post-Evaluation Results : This post-evaluation exercise was undertaken by making personal visits to the project site and by collecting the basic data from NEDA as well as from the beneficiaries. Since a large proportion of the funds in the complex was invested in the bio-gas system, (Rath & Pandey, 1990), examined the economic viability of the system in terms of social benefit-cost analysis. Their results have established that even at zero discount rate the social benefit-cost ratio (BCR) has been 0.74 and the net present value (NPV) a loss of Rs. 4.01 lakhs. The corresponding figures at 10% rate of discount have been 0.55 and a loss of Rs. 2.64 lakhs. Even the commercial analysis results have shown the BCR as less than one and the NPV negative. These results imply that the community bio-gas plant is a failure in the village.

It was further observed that the money invested in spreading pipelines to supply bio-gas to the individual households and also the gas-stoves supplied to them is a social waste. On investigation of the causes of failure of the plant, it was found that since adequate amount of gobar that is required was not available in the village, the NEDA had to depend on supply from outside. It was reported that even gobar was purchased from Kanpur city to put into the digester which worked for few days in supplying gas. Further, the public lighting provisions through bio-gas had become defunct. Of late, there has been a general tendency among the villagers not to part with their gobar, which most families use as manure and fuel (in the form of Kanda). Since the most important activity in the complex had failed, the villagers have developed an apathy towards the other activities of the complex and there is a growing disenchantment among the people. It was further noticed that the smokeless chullahs supplied to the households were not being used by them. The villagers are neither convinced about the benefits of these activities nor are they interested to adopt some of the improved rural technologies demonstrated in the complex. Finally it was observed that the complex is yet to generate any additional income and employment opportunities in the village. Among the other important factors which have been identified as the causes of failure of the complex are:

(a) The unrealistic assumptions used in preparation of the technical feasibility report as per the guidelines of CST. A detailed analysis of these aspects had been undertaken. It was observed that "the field application of any science and technology project would be bound to fail if the social realities were neglected at the stage of project planning" (Rath, 1988)

(b) There are managerial failures at different stages of the project starting from the approaches of the CST towards implementation of the project to its operation and maintenance. There is hardly any commitment on the part of the implementing agency to see that the schemes deliver the results for the benefit of the common man in the village.

(c) There was no room for participation of the people in the promotion of the complex in the village. As the aspirations and priorities of the people could not match with the activities of the complex, they have developed anthipathy towards the project. Gradually the few households who had agreed to supply gobar and to use the gas had withdrawn their participation.

(d) The solar cookers and other non-conventional energy devices had not generated any induced impact in the village due to their cost structures, which is still beyond the reach of any ordinary household due to their low income.

(e) There has been a lack of monitoring of the project by the Government of U.P. to improve its performance.

(f) The NEDA has hardly made any attempt to restructure the activities in the complex by consulting the various experts from the technical or R&D institutions.

The ERT Complex in Sultanpur

Background : Consequent upon the request from CST, this project was developed by the KNIT, Sultanpur. Unlike, the Kanpur project, this project's identification was a smooth one due to the initiative and interest of the then Director of their Institute. The newly created environment

of the Institute provided a committed group of faculty to work on the project. By adhering to the basic guidelines of the CST for selection of a project site, they choose a remote village in the Dhanpatganj block of the district, which was located at a distance of nearly 30 kms from their Institute. The village is located at a distance of 3 kms from the main road and was connected by the village road. There were neither electricity nor irrigation facilities available in the village. The major activities proposed in the complex had both the rural energy as well as the technology components. As a part of the energy system, it proposed to harness biogas from a community plant for cooking and lighting, to demonstrate the use of solar and wind energy for pumping water, the use of solar photovoltaic system to store energy for its use during nights, to light the streets and also for pumping water, to supply smokeless stoves, and to undertake energy plantations. Among the rural technology demonstration activities, it undertook the use of efficient agricultural implements, food processors, food driers, grinders, etc.

Implementation of the Project: The first phase execution of the complex was undertaken by the KNIT, Sultanpur in consultation with the CST and in collaboration with DRDA and other district level organisations. For the day-to-day execution and maintenance of the complex, the KNIT had hired some technical personnel and their work was closely monitored by the Director and other concerned faculty members of the organisation. The construction of the project commenced in 1983 and most of the activities were completed by 1985-86. Subsequently the complex was handed over to the NEDA for the day-to-day operation and maintenance. In accordance with the Seventh Plan strategies of rural housing and further strengthening of the use of non-conventional energy sources, the NEDA undertook a low-cost housing scheme for the poorest sections of the villagers, namely, the SC families. The housing complex was promoted on the Gram Sabha land and then handed over to the SC beneficiaries. In that complex, a large photovoltaic system was installed to pump water from the pond, and to supply energy for lighting, and further to operate the TV and Radio sets for community use.

Result: A Story of Success-In order to assess the performance of the complex, we visited the village during 1988 and collected the first-hand information from the people as well as from the staff of NEDA. However, the lack of adequate data particularly, the cost figures for different years made a quantitative analysis difficult. Thus, a qualitative analysis of the activities in terms of ones own value judgement was undertaken. Indeed, the views of the beneficiaries and NEDA officials were given due weightages in the analysis. Although the over-all performance of the complex was quite satisfactory, particular observations on each of the activities are as follows:

With regard to the performance of the bio-gas scheme, the floating-dome model of biogas used in the complex has proved to be a profitable venture. The gas formentation was adequate to those families who had agreed to participate in the scheme. The slurry of the plant was being dried at the complex and then a part of it was shared with the suppliers of gobar, and the rest was being sold in the open market. The users of the slurry have expressed that it increases productivity of their land.

Similarly, the solar energy devices promoted in the complex had shown satisfactory performance. The solar panel systems to heat water were being used to collect distilled water and the photovoltaic system was running satisfactorily to store energy for street lighting and pumping water for drinking purposes. The surplus water was also being used for irrigation of the plantations as well as the neighbouring plots. The solar systems were also used to run TV and radio for community use. The large system installed at the low-cost housing complex on the outskirts of the village was providing quite satisfactory results in terms of lifting water for drinking water supply and for irrigation purposes. In fact, the use of electricity for street lighting and other domestic uses had brought a new spirit and confidence among the SC households who were rehabilitated in the complex.

The low-cost housing design and the concept of providing some additional land for kitchen garden to the beneficiaries and the provision of sheds for animals had proved to be a success in the complex. Unlike our earlier negative observations regarding the low cost housing in the district, where the houses were taken by the beneficiaries but not used by them due to inadequate space for their families, in this complex, at least, everybody had occupied the houses, and the associated constructions. They raised vegetables etc. in their homestead land by using the water through the solar devices in the complex. The beneficiaries revealed that each of the household was happy over the performance of the system, and even opined that the facilities provided to them had become a luxury for them. Not only had their life styles changed, but each one of them had become confident about leading a decent living by augmenting the facilities available to them and by working as wage labourers outside also.

On the other hand, the rural technology activities pursued in the complex had achieved only a limited success in terms of their adaptability among the villagers. No doubt, some people had participated in the demonstration

sessions and occasionally used the facilities, but due to their low income levels they were not capable of using those facilities in a sustained manner. As regards the impact of these technologies among the villagers of the surrounding area, we cold not find any interest among them. Hence, the awareness generation in the area was the least. Thus, the additional income and employment generation objective of the technology complex had been limited to a few persons employed by the NEDA only. The indirect benefits had been partially generated in the village. Notwithstanding, these achievements, we had noticed the failure of the community toilet facilities, which were hardly being used by the villagers due to their locational and other social disadvantages. The windmills have become non-functional to lift water for irrigation. Further, it was observed that so long as the technical institution i.e. KNIT was involved in the project, the people were participating in the activities enthusiastically. But after the complex being handed over to the NEDA, they thought it was a routine matter to be managed by the Government machinery, and hence had shown apathy towards the activities in the complex. Of late, it had become difficult to get gobar for the bio-gas plant. Even they had started asking very high rates for gobar. On the other hand, the users of the bio-gas were not making payments for the gas used by them. The marketing of slurry had also become a difficult proposition.

Concluding Observations

The case studies of the ERT complexes discussed above have established that such complexes, no doubt, hold a good potential to meet our rural energy requirements. The failure of the complex in Kanpur does not imply that such projects should not be undertaken elsewhere. What has been observed from these case studies is that the success of such complexes primarily depends on:

* The involvement of the people at different stages, for which the role of a change agent either by a technical/ academic or voluntary organisation, is required.
* The preparation of a feasibility report should be based on proper investigation of the socio-economic factors, and no unrealistic assumptions should be made hastily.
* The success of the schemes should not be gauged in terms of the money spent on them. Instead, they should be measured in terms of social benefit-cost analysis, i.e. to what extent they have fulfilled their planned objectives.
* There should be continuous monitoring of these complexes by an independent agency to suggest the changes as and when required.
* There are, no doubt, managerial problems associated with the execution of most of the Government sponsored activities in our country, but attempt should be made to minimise these problems by involving outside agencies in execution, and operation & maintenance of the project.

In spite of these associated problems it needs to be emphasised that exceptionally attractive and relatively inexpensive renewable energy sources should be promoted in the rural areas with a missionary zeal for which there should be a political will, administrative commitment, involvement of the people (which is envisaged as a frontal strategy in the Draft Eighth Plan document) through spread of education and also through the mass media, and involvement of technical or voluntary organisations at each stage of project identification, execution, monitoring, and maintenance. It can be expected that such complexes would constitute a major component of our rural development efforts in future years to cope up with the growing energy crisis in the economy.

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Managing India's Water Resources

B.B. Vohra

Unless water is utilised to the best possible advantage for enhancing the country's productive capacity, our non-renewable resources of land will not only remain underutilised, but will also continue to suffer degradation and depletion. This would certainly lead to the incapability of alevating the country from the widespread poverty which can only be tackled by raising the agricultural production. There can be little hope for better water management so long as we adopt targets of production which are extremely low. It is essential to identify and tackle the challenges in the field of water management. This paper highlights the problems and suggests alternatives in order to make good use of our water resources.

B.B. Vohra is a former secretary to the Govt. of India and also the former Chairman of the Advisory Board on Energy. Currently he is Principal Adviser to the Indian National Trust for Art and Cultural Heritage (INTACH) 45 Lodi Estate, New Delhi-110 003.

The Setting

The need for achieving the highest possible standards in the management of India's water resources is self-evident. It arises from the fact that unless water is utilised to the best possible advantage for enhancing the country's productive capacity, our non-renewable resources of land will not only remian underutilised, and in certain circumstances even unutilised, but will also continue to suffer degradation and depletion. We shall thus be rendered increasingly incapable of making a dent in the most serious problem that confronts the nation, viz, alleviation of the wide-spread poverty which continues to dog us even after four decades of independence and which, in the ultimate analysis, can be tackled only by raising our agricultural production to the maximum possible extent.

It cannot be denied that the matter is one of great urgency. Although we have invested over Rs. 30,000 crores in surface irrigation projects since 1951, at least 50% of the potential created by them is still unutilised and the productivity of the lands served by them continues to be poor. While premature siltation is eating into the storage capacity of reservoirs, the fertility of substantial areas in their commands is being reduced by water-logging and salinisation of the soil. In many parts of the country, levels of ground water are falling at an alarming rate as recharge cannot keep pace with drawals.

Our record in respect of non-irrigated lands is even poorer. Our total land resource which have any potential for biotic production is around 266 million hectares (mh) of which only around 46 mh have access to irrigation. Of the remaining 220 mh which are entirely dependent on rainfall, only around 36 mh are in a position to make good use of the precipitation they receive. These are the areas which are still under good natural forests. The remaining 184 odd mh, which consist of around 94 mh of rainfed agricultural lands and around 90 mh of more or less denuded non-agricultural lands which fall under the general description of wastelands, are in urgent need of either

engineering or biotic treatment or both, in order to ensure that the rainfall they receive gets the maximum possible opportunity of infiltrating into the soil and, what is equally important, that no top soil is lost by erosion through excessive run-off. It needs to be appreciated that it is the degraded state of these lands which is largely responsible for their declining productivity as well as for the increasing incidence and severity of both floods and droughts and the premature siltation of reservoirs.

The net result of poor water management and therefore also poor soil management — in the country is there for all to see. Around 40% of our 850 million people exist below the line of poverty and we still figure among the dozen or so poorest countries of the world in terms of per capita GNP. Our per capita production of foodgrains is only around 200 kgs per annum as against over 300 in China. It is a sobering thought that if we were to match the Chinese achievement our harvest in 1988-89 would have had to be the order of 270 million tonnes (mt) instead of the 172 that we actually produced.

Complacency

One of major reasons why we are not able to give adequate attention to problems of water management is the feelling that all is well on the agricultural front. This feeling arises from the belief that the country has achieved self-sufficiency in food and that there can, therefore, be nothing much to bother about in this sector of the economy. The fact is that our claim to self-sufficiency in food is valid only in a very limited sense that the country is no longer significantly dependent upon food imports to keep its public distribution system going. This claim is, however, untenable if we take note of the fact that the nutritional needs of a large section of the people are not being fully met because they are too poor to be able to buy all the food that they need. There is no question that if this unsatisfied need could find expression in terms of market demand we would be seriously short of food.

There can be little hope for better water management so long as we remain complacent with regard to the central problem of poverty in the country and continue to adopt targets of production which are unrealistically low. It is necessary to remind ourselves that China produces around 360 mt of food grains from less than 100 mh of agricultural land while our best performance to date has been less than half this amount from some 140 mh of land. One sure way of snapping out of our self-induced smugness, would be to sharply raise the food production target for the year 2000 AD from 240 mt to say 300 mt, a figure which has in fact been already suggested by the PM's Scientific Advisory Council. Unless we can achieve a comparatively ambitious target of this order — ambitious, of course, only in the Indian context — we shall find ourselves in an almost impossible situation by the end of the century.

Too narrow a view

The biggest mistake we have made in the field of water management is to have taken too narrow a view of our responsibilities and imagined that the creation of surface irrigation potential, particularly through major and medium porjects was the greatest need of the country. In our preoccupation with this objective we did not give adequate attention to even the utilisation of the potential which was created at a heavy cost to the community, let alone appreciate or follow-up the many other opportunities that offered themselves for making good use of our total water resources.

To take a synoptic view of the country's water situation it is necessary to refer to a few basic statistics. Our total annual renewable water resources are of the order of some 350 million hectare metres (mhm) of which around 160 mhm find their way into the sea as river flows. Of the remaining 190 mhm we have so far succeeded in impounding around 17 mhm — 15 or so behind big dams and around 2 in minor irrigation tanks. This leaves a balance of around 173 mhm which are held within the land-mass as soil moisture (around 120 mhm) and as ground water (around 45 mhm) without involving the State in any expenditure on either their storage or their movement.

However, it is one thing to impound water and quite another to put it to proper use. Of the 15 mhm capacity created in the M&M sector only a little over half — or say 8 mhm — is being actually used for irrigation. And since on an average only around 50% of the water that is released from the headworks reaches the farmers' fields (the other half is lost enroute by evaporation and seepage) the water that is ultimately applied to the land is probably no more than 4 mhm. This is less than 1.25% of our total precipitation and only about one third of the amount of ground water that is extracted every year.

Another point worth considering is that while a net area of 14.8 mh was brought under ground water irrigation between 1951 & 1985 without involving the State in any direct expenditure, an investment of Rs. 15,026 crores had to be made in the M&M sector to irrigate 7.9 mh of net area during the same period. However, since the productivity of ground water irrigation is at least 100% more than

that of canal irrigation — mainly because the farmer with a tubewelll of his own can irrigate his crop exactly when, and to the extent to which, it needs water, whereas his counterpart in a canal command is entirely at the mercy of forces over which he has no control — the achievement of the M&M sector between 1951 and 1985 really amounted to only around 4 mh of net area in terms of ground water equivalent irrigation (GWEI). This was only a little more than a quarter of what was achieved in the ground water sector or irrigation and that too without involving the State in any direct outlays. This shows how wrong it is to permit M&M projects to loom larger than life in our formulations and to neglect our resources of soil moisture and ground water merely because they are free gifts of Nature. It would indeed surprise people to know that in the world as a whole 98.4% of all liquid sweet water resources that exist at any point of time are in the form of soil moisture and ground water — only the remaining 1.6% are to be found in the shape of rivers, lakes and swamps. Needless to say not all the ground water that exists is available at depths that can be tapped conveniently.

The single most important task before the country in the field of water management is to pay much greater attention to the management of the water which falls on our 184 odd mh of rainfed lands. We must ensure that this precipitation is put to proper use and prevented from damaging our irreplaceable soil resources. Success in such a venture will automatically result in a great accretion to our soil moisture and around water resources at no extra cost beyond what will be necessary to save the soil from erosion. It will also go a long way in moderating both droughts and floods and preventing siltation of reservoirs and tanks. It will naturally also result in a significant increase in the productivity of all rainfed lands.

It is also obvious that in any overall view of the country's water situation, the utilisation of the vast unused potential which already exists in the M&M sector must be accorded much higher priority than the creation of any additional potential. The enhancement and scientific management of the country's invaluable ground water resources is another matter which deserves urgent attention. The prevention and control of waterlogging and salinisation in canal irrigated lands is yet another area which has suffered from grievous neglect in the past and must be attended to without any further delay.

Run-off Losses

A situation in which proper use is not made of available water is bad enough. But what is infinitely worse is a situation in which water is not put to good use but is also permitted to damage the very resource it is meant to serve, namely, the soil which is an irreplaceable and non-renewable asset incalculable value. Yet this is exactly what is happening over large parts of the country as a result of our failure to manage our land resources properly.

Denuded and erosion-prone lands impose a fourfold penalty on the economy. Firstly, the continuing loss of the fertile top soil renders the affected areas increasingly unproductive. Secondly, the soil which is carried away along with the run-off, chokes rivers and causes floods. Thirdly excessive soil loss causes the premature sedimentation of storages and thus imperils the irrigation potential of the country. Finally, the excessive run-off losses which take place on denuded lands cause droughts as they reduce the amount of water which would otherwise have found its way into the soil and thereafter into ground water aquifers and springs and rivers. Better land management is thus an imperative not only for the sake of the soil but also in order to save both our surface irrigation potential and ground water resources from depletion.

It is indeed a pity that we have never cared to compute the losses which the economy suffers as a result of our neglect of the land. However, a few indicators show how colossal these losses must be. According to the Planning Commission, the annual average direct damages caused by floods amount of Rs 768 crores — the indirect losses must naturally be much greater. The demands which the states are making tor financial assistance for drought and flood reliefs are steadily rising — in the year 1985-86 such demands were of the order of Rs. 8,000 crores. The rates at which some of our important reservoirs are getting silted up are 4 to 16 times higher than those assumed at the stage of project formulation. In the case of smaller storages, sedimentation has played such a havoc that the net area irrigated by tanks came down from 5 mh in 1951 to 3.3 mh in 1985 in spite of the fact that some Rs. 4,000 crores were spent during the intervening years on building an additional potential of around 2.5 mh of net area. Again, in spite of the claim of Irrigation Departments to have protected some 13 million hectares against floods since 1951, the area which is classified as "flood prone" has increased from 25 mh in that year to 40 mh in 1990. There can be no manner of doubt that the country's economy is being bled white by avoidable soil and water losses and that it can have no future worth the name unless an end is put to this haemorrhage.

It is however not as if the picture is entirely bleak. Hope lies in the fact that under conditions of improved land management, both soil and water losses can be reduced by very substantial margins. There is a wealth of empirical data in the ICAR to show how the integrated treatment of micro catchments can result in a dramatic reduction of run-off and soil losses. Thus, the treatment of small watersheds in the ravines near Baroda resulted in the reduction

of run-off losses by almost 100% between 1961 and 1981. In the Agra region, such savings over a similar span of time were of the order of 86 to 98%. Studies conducted by the TVA in America also show how reforestation and the provision of improved plant cover in watersheds can increase the infiltration of water into the soil and reduce floods.

Ecological Degradation

We must resolve to meet the challenge of ecological degradation head-on and not wait till the point of no return is reached. We must aim at achieving zero soil loss (ZSL) as it is only when there is no loss of soil from a particular catchment that one can be sure that the precipitation which has taken place on it has had the fullest opportunity of being absorbed within the soil or held in surface storages which also act as silt traps and permit only such water to leave the catchment as is genuinely surplus to its requirements and even then in a silt-free state. The achievement of such an objective demands that all the land within a catchment — whether it is under non-agricultural or agricultural use should be effectively teated for soil and water loss in an integrated manner through both engineering and biotic means. The ideal unit for such work is a micro catchment which will have a pond of suitable size at its lower-most end which will act as a brake on the run-off, as well as a percolation tank and a source of small irrigation.

The economic benefits of such an ambitious programme are too obvious and manifold to need discussion. However, it will put an end to the loss of top soil which is taking place on an exponential scale today and has risen from an estimated 6,000 mt in 1972 to perhpas more than double this figure in 1990. It will also increase the amount of water held in the land mass of the country in a very significant way. Even if we assume, on a very conservative basis, that deforestation, denudation and poor land management have, over the last 40 years, caused an increase in run-off losses equivalent to no more than 10% of the total annual precipitation in the country, the volume of water which could be added to our soil moisture and ground water resources through better land management may very will be of the order of 30 to 35 mhm, and could easily be much higher.

A national programme for the achievement of ZLS needs to be taken up for completion within the shortest possible time — preferably not more than 10 years — if we wish to avoid disaster. Such a programme must indeed form the core of all our plans for rural development, poverty alleviation and employment generation in the rural sector, for it is only when the country's life-support systems have been placed on a proper footing that the rural economy can be rejuvenated. Such a programme needs to be taken up with as much seriousness in our arid areas as in wet areas. Although it may appear at first sight that there is little scope for conserving water in areas of very poor rainfall, the fact is that even our driest areas in Rajasthan receive very heavy rains once in every 7 or 8 years. At present we allow such precipitation to be lost as stream flows and floods along with a lot of top soil. However, there is no doubt that if such windfall rains could be conserved to the maximum possible extent as soil moisture and ground water as well as in countless small storages — ideally one in every single micro — catchment-the total water so stored would be enough to take the sting out of drought years.

The technology and the methodology of achieving ZSL are well-known. The unit of planning and operations must be a complete sub catchment, and attention must be paid first of all to those parts — usually situated in the higher reaches — which are under non-agricultural use and are therefore almost bereft of any permanent vegetal cover. Repeated experiments — the last of which was in the shape of the NWDB — have shown that man-made plantations are far too costly, too dilatory and too uncertain of survival to provide the vegetal cover needed by such areas and that the only answer lies in letting the land regenerate itself with whatever vegetation it can sustain.

For purposes of preventing soil and water loss, a good cover of grass is almost as effective as tree cover. Experience shows that such regeneration, which usually results in a mantle of grass within a single season, can take place at almost no cost to the community if only the land is given adequate protection against grazing and browsing animals. In areas which are highly degraded, the next step necessary to be taken is the construction of staggered contour trenches across the slopes and of dykes and bunds across drainage ways in order to reduce both run-off and soil losses. Plantations of such varieties of trees as are favoured by local communities can be resorted to only after these two preliminary steps have been taken, and even only on such limited areas as are fit to support trees.

Agricultural lands situated within the catchment must receive attention only after non-agricultural land have been attended to so that the work done on them is not undone by run-off from the higher reaches. The ways in which soil erosion on agricultural lands can be stopped are well-known — it is a different matter that these ways are often not followed by soil conservation departments in practice and that the latter have fallen into the rut of building subsidised bunds along field boundaries without reference to either contour lines or to what is happening in the remaining parts of the catchment. Finally one or more

small storages must be provided in the lowest reaches of every small catchment for the reasons which have been already mentioned.

As of today we are most ill-prepared to carry out a ZSL programme on any significant scale. All we have to show in this sector are about a dozen pilot integrated work-shed projects and a few success stories in villages like Sukho Majri and Ralegan Shindi. We have indeed up till now given almost no importance to land management and have concentrated on the M&M sector. Nothing illustrates the lopsideness of our past policies than the fact that while we spent some Rs. 15,026 crores between 1951 and 1985 on M&M projects to irrigate some 4 mh of net area in terms of GWEI, we spent only Rs. 2,723 crores on forestry and soil & water conservation programmes to serve the interests of around 184 mh of rainfed lands.

The problems which are likely to be faced by a ZSL programme do not have so much to do with technology as with sociology, administration and politics. The crux of the matter lies in educating and persuading village communities that this programme will be in their own interest and that they must restrain their animals from coming in the way of the natural regeneration of degraded non-agricultural lands. Villagers must also cooperate actively in levelling and bunding their agricultural lands along contour lines, even if this involves redrawing of field boundaries. Given the modern tools of communication that are available today this is not by any means impossible a task because it is an established fact that protected pastures yield 6 to 8 times as much grass as overgrazed lands and that properly treated rainfed lands improve rapidly in productivity once they are saved from soil and avoidable water losses. What will however be far more difficult will be to ensure that village communities which are today often ridden by factions and dominated by vested interests of various kinds are transformed into cohesive communities of which even the weakest members will be confident of receiving an equitable share in the additional production which would result from better land and water management. As Sukho Majri and Relegan Shindi have shown, it is only when such an assurance is forthcoming that the village community as a whole will participate enthusiastically in any programme for making optimum use of its natural resources.

While the fullest possible encouragement and opportunity must be given to local communities and panchayati institutions to play a key role in the ZSL programme, the responsibility of the district administration in ensuring its success should not be under-estimated. The fullest possible use must, in particular, be made of the enormous capacity and potential for leadership which the district collectors still possess, provided of course, they are chosen correctly and not shifted around too often for the wrong reasons.

Under-utilised potential of the M&M sector

According to the Ministry of Water Resources (MWR) the percentage utilisation of the potential created in the M&M sector stood as high as 86.3 in the year 1985. This claim is, however, untenable and misleading as it is based on a selective use of statistics, some of which are also of doubtful veracity. If we go by the figures quoted in the 7th Plan document, there was no gap between "potential created" and "potential utilised" prior to 1951. Statistics pertaining to this period should not however be taken into account because storage projects, as distinguished from run-of-the-river schemes, were built only after 1951. According to the MWR a potential of 20.8 mh of gross area was created between 1951 and 1985, of which 15.6 mh or 75% was utilised.

This claim is not supported by figures contained in the Land Use Statistics published by the Ministry of Agriculture. According to this source the net area which was brought under irrigation by the M&M sector between 1951 and 1985 was only around 7.9 mh, which corresponds to around 10.3 mh of gross area. If we accept the lower figure as more reliable than that provided by MWR the percentage of utilisation works out to only 49.5. The size of the gap also increases to 10.5 mh of gross areas which is more than double the MWR figure of 5.2 mh.

It makes no sense at all to spend over Rs. 26,000 crores in the 8th Plan to create an additional potential of 6.5 mh of gross area when a far larger potential — which, because of a further admitted slippage in utilisation of 0.4 mh during the 7th Plan, may well have increased to 10.9 mh of gross area in 1990 — is lying unutilised. The case for the creation of fresh potential becomes even weaker when we consider the great scope that exists for the better utilisation of the M&M potential which has already been put to use. According to the L.U.S., the extent of net area served in 1985 stood at 15.4 mh inclusive of the 7.5 mh of net potential which existed prior to 1951. In 1990 the cumulative total may perhaps have reached the level of 17 mh of net area. According to the 6th Plan document, the productivity of our irrigated areas as a whole is only around 1.7 tonnes per hectare as against the 4 or 5 tonnes which can be reasonably expected of them. However, considering that around 50% of our total irrigated area is served by ground water which has a productivity around 100% higher than that of canal irrigation, a little calculation will

show that the productivity of the latter is not likely to be more than about 1.2 tonnes per hectare. There is thus scope for improving the productivity of some 17 mh of net irrigated area in the M&M sector through intensified CAD programmes.

Costs of Irrigation

While a target of 4.3 mh of additional potential was fixed for the 7th Plan what was actually achieved was 2.9 mh of "potential created" and 2.6 mh of "potential utilised" in terms of gross areas. If the level of performance of the M&M sector continues to be the same as in the 7th Plan, it is reasonable to expect that as against the target of 6.5 mh of additional potential, it may achieve around 4.4 mh of "potential created" and around 3.4 mh of "pontential utilised" in terms of gross area. Since it is only the potential actually utilised which confers any benefits on the economy, it is only the latter figure that can be of any interest to us. If we go by this figure, the cost of bringing a gross hectare of land under canal irrigation in the 8th Plan will be around Rs. 80,000 This is equivalent to Rs. 160,000 per gross hectare of GWEI and around Rs. 200,000 per net hectare of GWEI. Even this figure is however an underestimate if we consider the fact that in all these calculations the cost of saving canal-fed lands from water-logging and salinisation has not been taken into account.

This last figure does appear to be unbelievably high but needs to be seen in the light of our past experience as well as the recent spurt in costs. We have invested over Rs. 26,000 crores on M&M projects between 1951 and 1990 to bring a net area of less than 10 mh under canal irrigation or around 5 mh of net area under GWEI. This represents an average cost of around Rs. 52,000 per net hectare of GWEI over a period of 40 years. However during the 7th Plan the cost of creating a potential of one net hectare of GWEI had already shot up to around Rs. 110,000.

There is also the question of social equity to be considered. How can we justify favouring the relatively small number of farmers who happen to be situated in the extremely limited canal commands of the future when the incomparably larger numbers who are located on our far more extensive rain-fed lands continue to be the victims of neglect ? Particularly when, rupee for rupee, investments in improved land management will yield far bigger returns than any further additions to the M&M potential that we have not been able to manage properly for the last 40 years?

In the light of the above discussion, the MWR should be asked to revise its 8th plan proposals so as to give pride of place in them to schemes aimed to putting existing unutilised potential to use and at making better use of the potential which is being already utilised though at a low level of efficiency.

MSI Sector

MSI projects — defined as projects with commands of less than 2000 hectares each — which existed in 1951 are reported to have had a potential of 6.4 mh of gross area (or about 5 mh of net area) which stood fully utilised in that year. According to the MWR, an additional potential of 3.3 mh of gross area was created in this sector between 1951 and 1985. Of the cumulative gross potential of 9.7 mh which existed in 1985, 9 mh are claimed to have been utilised. This represents a utilisation factor of almost 93% which can be considered to be very satisfactory indeed. The L.U.S. however have a totally different tale to tell. According to this source, the net area served by this sector has not only not increased but has in fact gone down steadily over the years, declining from 5 mh in 1951 to 3.3 mh in 1985. Since 3.3 mh of net area are equivalent to about 4.3 mh of gross area, the percentage of potential utilisation out of a total of 9.7 mh stood at only 44 in 1985.

The clue to this state of affairs lies in the premature siltation of tanks and the neglect of their maintenance. The Census of Minor Irrigation Works which is being carried out in the states has shown "that roughly 40% of surface water flow irrigation works have gone out of use." A recent study by the Institute of Management, Bangalore has also revealed that "over half of the estimated 43,000 odd tanks in Karnataka State have been found to be more or less completely silted up." So long as this state of affairs persists, investing in this sector is like trying to fill a bucket which has a hole in its bottom.

While no more funds should be invested on expanding this sector, there should be early decision as to how it should be handled. It would be unwise to sanction any funds even for the desilting and renovation of existing tanks if such work is going to be quickly undone by heavy soil erosion in their catchment areas. It would obviously be a far better use of available resources to spend on ZSL programmes in the catchments of MSI works till such time as the situation improves sufficiently to justify their restoration.

Water-logging and salinisation

It is not generally known that water-logging and salinisation of the soil can become major threats to the health of the land in such canal irrigated areas as are naturally poor in drainage. It has been estimated that in the world as a whole as much land is going out of production every year on account of water-logging and salinisation as in being brought under fresh irrigation. In our own country, the areas which are affected by these ailments have shown an alarming increase from 13 mh in 1980 to 17.6 mh in 1989, representing a rise of some 4.6 mh over a period of 9 years and a rate of degradation of about 0.5 mh per annum. The lands affected by water-logging alone have increased from around 6 mh to 8.5 mh during the same period. Although exact details of these figures are difficult to obtain it is known that a large part of the degraded areas lies in canal commands where the unregulated application of the water to the land, seepage from unlined canals and distributaries and the obstruction to natural drainage which is caused by roads and canals that are not adequately equipped with cross-drainage works all contribute to the trouble.

Under no circumstance can we afford to allow the soil, which is an irreplaceable asset, to be damaged by water, whether this damage takes place in the form of soil in rainfed areas or of water-logging in canal-fed areas. Not only was there no separate allocation for drainage and other ameliorative measures in the 7th Plan, but the proposals for even the 8th Plan do not contain any meaningful mention of this important matter. There should be an adequate provision in the 8th and subsequent plans firstly, for preventing vulnerable canal irrigated lands from getting water-logging — for prevention is always better than cure — and secondly, for reclaiming such lands as have already gone out of production. It is only appropriate that funds for such a programme which is estimated by the Ministry of Agriculture to cost around Rs. 10,000 per hectare for the M&M sector should be provided. It is also necessary to accord very high priority to such a programme because it is likely to result in very quick and high returns in terms of increased production.

Policy regarding floods.

According to the MWR, a sum of Rs. 2500 crores was spent from 1954 to 1989 to protect an area of around 13.5 mh against floods. However, these measures have not proved to be effective because in spite of this huge expenditure, the area which is described as "flood prone" has increased from around 25 mh in 1950 to around 40 mh in 1989. However, the time has come when we must ask whether such control measures are of any long-term benefit to the community so long as *effective flood prevention* measures are not taken in the catchments. It must be remembered that so long as soil erosion and run-off losses keep on increasing all expenditure on flood *protection* works is bound to be infructuous. The real answer to the flood menace lies in proper land management and afforestation in the hills and not in the construction of more dykes and embankments. The demand for Rs. 5,060 crores which has been made for flood control in the 8th Plan therefore needs to be scrutinised with great care and reduced to the barest minimum so that the resultant savings may be diverted to the ZSL programme.

Water management data base

Presentation of irrigation data in India is highly unscientific and generates unjustifiable complacency regarding its achievements. While this matter deserves a detailed study, mention can be made of some of the more glaring deficiencies in the present system:

(i) The practice of reporting figures of "potential created" is misleading in the extreme as the layman confuses it with the potential actually utilised. Since by its very definition potential is of no practical relevance till such time as it has been put to use, there is no reason why "potential created" figures should be quoted at all.

(ii) Since, as we have already seen, there are serious discrepancies between figures of "potential utilised" as claimed by irrigation authorities and those published in the L.U.S., all publication of the MWR should in future carry the latter figure along with their own, till such time as it becomes possible to arrive at an agreed set of figures.

(iii) MWR never gives figures of net area irrigated but always quote gross areas while describing the "potential created" and "potential utilised". For the net area one has invariably to refer to the L.U.S. Since figures of gross areas are around 30% higher than those for net area, they create a wrong impression regarding our achievements in the field of irrigation on the mind of the reader.

(iv) In view of the fate that has overtaken minor surface irrigation, and the emergence of ground water as the most successful and important source of irrigation, it is undesirable lumping to continue the latter

resources under the head "minor irrigation" for statistical purposes, and thus create unnecessary confusion in an important field. It would be desirable from all points of view to present statistics under the two broad heads of "surface water" and "ground water" and to make a distinction, within the former head, between "M&M projects" and "minor projects".

(v) The practice of aggregating areas served by surface irrigation and ground water to show the total potential created or utilised is unscientific and misleading beasue the productivity of lands served by surface irrigation is around 50% of those served by ground water. Figures of irrigation by the two sources should therefore be always given separately. If aggregate figures are to be given at all these should invariably be in terms of GWEI — derived by dividing surface irrigation figures by a factor of 2 — so as to take into account the relative productivity of ground irrigation.

Ground Water as a Source of Irrigation

According to the L.U.S., ground water served 21 mh of net irrigated area in 1987, as against 22 mh served by surface water. Ground water has, however, since surpassed surface water in respect of the area served. Since the productivity of ground water irrigation is around double that of surface irrigation, this resource has become the most important source of irrigation today. The pace of ground water development however promises to be even faster in the years to come. It is necessary to understand the reasons behind this success story. In the first place, ground water is eminently capable of being developed by the individual farmer with his own resources — supplemented if necessary by credit from a bank — and does not have to depend upon a cumbersome state machinery for its exploitation. This is so because the cost of a tubewell is fairly modest — depending on its capacity and the type of strata involved, it may vary from just a few thousand rupees in alluvial areas to a lakh in the more difficult hard-rock areas. The gestation period for ground water development is almost nil as a tubewell can be developed within a period of weeks if not days. Once a tubewell has been installed the farmer knows exactly what to do with the water source that has come under his control. By contrast, big surface projects belong to the State sector, take years and often decades to plan and execute through excessively large bureaucracies, cost hundreds and sometimes thousands of crores to complete and even thereafter are not able to provide an effiicient irrigation service to the farmers in their commands.

The M&M sector suffers from certain serious inherent disabilities which, even with the best will in the world, are extremely difficult to overcome. There are, to start with, the endless delays and high financial costs associated with the acquisition of valuable lands for submergence and for distribution systems as well as for the rehabilitation of displaced populations. Such acquisitions however also involve extremely high environmental and human costs. Another important factor is the crippling losses suffered by the impounded waters before they reach the farmers' fields — it is estimated that due to seepage and evaporation, such losses on an average amount to about 50% of the water released at the headworks. Quite obviously, no system which is subject to such heavy losses can operate in an efficient and cost-effective manner. It may be mentioned in this connection that the Israelis, who know the value of water, store as much of their surface water as possible in ground water aquifers and use pipes rather than open canals to transport it in order to avoid seepage and evaporation losses. Again, seepage from distributaries, combined with seepages from fields to which irrigation water is applied in an unregulated manner, also cause damage to the soil by way of water-logging and salinisation if adequate drainage is not provided. Even though this problem is not being attended to at present, it will have to be tackled sooner or later and the cost of doing so will not be small. Another inherent disability that M&M projects suffer from concerns the need to carry out extensive CAD works before their waters can be used efficiently. Finally the sheer size of the projects coupled with the inefficiency of functionaries who have to operate them makes it extremely difficult to ensure their irrigation water can be supplied to all parts of their commands in adequate quantities, and at the right time. It is a common complaint that influential farmers can get away with more than their share of water and that lands situated in the tail-ends of distribution systems do not get adequate supplies.

In the circumstances, the surface irrigation sector has a very dim future indeed. It has realy no option today but to give up all its dreams of further expansion till such time as it has been able to consolidate the gains it has already made by way of creation of potential. This places on our ground water resources an increasing responsibility to meet the future irrigation and water needs of the country. Fortunately there are indications that these resources will live up to the expectations placed on them provided, of course, that we take timely steps to put an end to our neglect of the land. It is relevant to mention in this connection that MWR has recently revised its estimates of the country's ground water potential from 40 mh to 80 mh

of gross area. If this revision is proved to be justified the ultimate potential for irrigation in the country will be of the order of 115 mh of gross GWEI, of which 80 will be provided by ground water, 27 mh by the M&M sector and about 8 mh by the minor surface irrigation sector. These figures underline the growing role which ground water is undoubtedly destined to play in future years.

Since ground water is a dynamic resource, which will incrase or decrease in accordance with the level of land management that we can achieve, it is necessary to stress that even the figure 80 mh may well be exceeded if we can effectively reduce run-off losses through a successful ZSL programme. On the other hand, even the present potential of 40 mh of gross area may not be capable of achievement if run-off losses continue to mount. The best service we can render to reasource that we have so far more or less taken for granted — merely because we have not had to spend anything on its storage or distribution—is therefore to ensure that the ZSL programme is implemented effectively.

However there are also certain other steps which will need to be taken to ensure that our ground water resources are used to the best advantage. Among them are the following:

(i) State ground water organisation should be suitably strengthened and equipped so that they may be able to carry out scientific investigations into the exact nature of aquifers as well as into the extent and areas of their recharge, so that it may be possible to keep drawals within the limit of recharge and avoid permanent damage to aquifers, particularly those situated in the proximity of saline waters. It is relevant to mention in this connection the great damage which has been caused to villages on the cost of Saurashtra by the over-exploitation of the sweet water aquifers which underlay them.

(ii) State governments must empower themselves to impose, wherever necessary, effective restrictions on ground water exploitation by individual farmers in the interests of the health of this resource and of agriculatural production generally.

(iii) State ground water organisations should be equipped to give competent technical advice to farmers regarding the kind of tubewells and pumpsets they should install in their holdings so that there is no avoidable wastage of either scarce materials or even scarcer energy resources.

(iv) State governments should ensure that installed pumping capacities are not under-utilised for lack of either electricity or diesel.

(v) State governments should take up time-bound programme for the consolidation of holdings because this is one of the surest ways of helping agriculatural production and encouraging ground water development particularly in ground water rich areas.

(vi) It should be recognised that the experiment of State tubewells has, by and large, been a costly failure and should be given up in favour of a cooperative approach.

Water use efficiency

Considering that our population is projected to double its present size before it stops growing and that we are still in the comparatively initial stages of urban and industrial development, it is clear that the demand for water will always outstrip supply even after the country's water resources have been conserved to the maximum possible extent. The solution lies in using water with the utmost economy in all situations, preventing all forms of wastage and loss and recycling it to the maximum possible extent. In all these matter there is a very great deal to be learnt from Israel. Israel has not only discovered and adopted extremely economical ways of irrigation but has also learnt to use brackish water for this purpose. It guards its limited water resources from loss by evaporation and seepage and recycles, after due treatment, all municipal and industrial effluents for irrigation and other comparatively less demanding purposes. It also charges for all water on a volumetric basis though at different rates for different uses and different qualities of water. It has an effective system of incentives for the efficient use of water for various purposes, and disincentives for wasteful use. A long term programme for emulating Israel's example is obviously necessary to be drawn up and implemented in India.

Some Organisational Imperatives

The very first thing that needs to be done is to create an authority at the Centre which will be poweful enough to discharge two major responsibilities. Firstly, to effect a thorough-going reorientation, estructuring and reform of the MWR (as well as of course of its various ponderous appendages) in order to make it capable of delivering the goods in respect of all the tasks except those connected with the run-off losses. Secondly, to create conditions in which the run off losses could be eliminated on a time-bound basis within a period of say not more than 10 years. Considering the scope and nature of the work involved, such an authority can, in today's circumstances, only be a Cabinet Committee on Ecological Affairs (CCEA), the

creation of which is in any case overdue from many other points of view also. Needless to say, this Committee should be presided over by the Prime Minister and have among its members the Ministers of Finance, Agriculture and Planning. Such a Committee will need to be serviced by an Advisory Council consisting of persons of eminence who are familiar with various aspects of water management in the country. This arrangement can be reviewed after a few years by which time it would, hopefully, have set the water management movement on the right track. By far the most difficult problem that the CCEA will have to tackle will concern the multiplicity of jurisdiction over land that comes in the way of watershed management programmes at the field level. There are today three different authorities which have to work very closely together if these programmes are to be implemented sucessfully. The first of these are the State Forest Departments which claim jurisdiction over some 70 mh of land and are extremely reluctant to part with any of their rights over it even though they have failed in keeping more than half of it under adequate tree cover. (It may be mentioned in passing that it was this reluctance which was partly responsible for the failure of the NWDB experiment.) Then there are State Agriculture Departments that have been charged with the responsibility for treating rain-fed agricultural lands for soil conservation and have traditionally carried out this work without, however, ensuring that the upper reaches of the catchments in which they are situated are also simultaneously treated against soil erosion. Since these upper reaches consist almost invariably of denuded forest lands, the uncontrolled run-off from them very often washes away the subsidised soil conservation bunds that are built along field boundarises — and not along contours — of the agricultural lands in the lower reaches of catchments. This fatal flaw in the present system which is responsible for the fact that soil conservation programmes for agricultural lands have proved our efforts to be more or less infructuous. The third agency is represented by State Revenue Departments which normally control revenue and other community-owned lands in the villages-lands which are as a rule so badly over-grazed that they are almost completely denuded.

As already mentioned, the success of the proposed ZSL programme will depen upon the simultaneous and scientific treatment of all erosion-prone lands on a sub-catchment basis. However, the engineering and/or biotic treatment of such lands must be preceded by the exclusion of all grazing and browsing animals from non-agricultural lands so that natural regeneration can play its due role in the programme. Since such protection can be given only by village communities acting in the pursuit of their own perceived interests and since soil and water conservation works are proposed to be carried out in the future through local panchayat institutions it is necessary that the latter must be given adequate powers fo the treatment of all community and forest lands along with agricultural lands. Such an arrangement will be possible only if the present confusion regarding watershed mangement progammes is removed and responsibility for them is placed squarely on a single department. This, in the circumstances, can only be the State Rural Development Departments, which are in charge not only of panchayati institutions but also of integrated rural development, including rural employment generation and poverty alleviation programmes, none of which can be implemented successfully unless this department can be given adequate jurisdiction over all local land and water resoures. This can be best done by transferring the State Forest Department as well as the Soil Conservation wing of the Agriculture Department to the Rural Development Department.

For obvious reasons, a similar reform will also need to be carried out at the Central level, where responsibility for the closely inter-linked programmes for natural regeneration, afforestation, soil conservation, watershed management and wasteland reclamation lies hopelessly divided between the Ministry of Environment and Forests, the Department of Agriculture and the Department of Rural Development. This state of affairs can be ended only by making the Department of Rural Development responsible for all the above-mentioned aspects of land management and renaming it as the Department of Rural Development and Land Resources (DRDLR).

One of the biggest mistakes that we have made in the past was to have treated irrigation as an end in itself rather than as only a means to the end of greater productivity from the soil irrigation progammes. Irrigation programmes became more or less synonymous with the mere creation of potential in the M&M sector and considerations relating to the end-use of water were almost completely ignored. In order to leave no scope for such mistake to be repeated in the future it would be eminently desirable to bring together, in due course, the reformed MWR and the proposed DRDLR to create an integrated Ministry of Rural Development and Natural Resources. Such a step should however be taken only after the proposed DRDLR has been able to launch the ZSL programme sucessfully and only after things have settled down in the reformed MWR.

□

Feature

Human Resource Accounting in India

D. Prabhakara Rao

In this paper, the human resource valuation practices of Indian companies have been critically examined. While analysing the human resource value data of some of the Indian enterprises, the author argues that 'Net Economic Value Added by the employees', is a superior measure to 'Payments made to the employees', for computing the Human Asset Value. The paper also discusses the empirical evidences on and applications of Human Resource Accounting.

D. Prabhakara Rao is a Reader in the Department of Commerce and Management Studies, Andhra University, Vishakhapatnam-530003.

The philosophy of Human Resource Accounting (HRA) is based on the belief that people are the most important asset of an organisation. Therefore, there is the need for finding out and including the monetary worth of human assets in the accounting system. In this paper, an attempt has been made to present the theory and practice of HRA in India. The rationale and need for HRA, empirical evidences and decision applications are also pondered upon along with the presentation of Indian practices of HRA.

Several reforms have been introduced in companies to identify people as an organisational resource. The last quarter of the 20th century is the most important era of human concern. Very recently the idea of accounting for human resources attracted the minds of many management scholars. But for human resources all the physical and financial resources, including modern computers that an undertaking uses are unproductive (Likert, 1967). The total resource productivity is descried to have been vitaly influenced by the productivity of human resource (Rao, 1982). Human Resource Accounting is advocated to improve human resource planning and control (Sivayya, 1981). HRA can be defined as the process of recognising, measuring and communicating useful information concerning human resources to the policy makers. (AAA, 1973). Woodruff Jr., defined HRA as "the identification, accumulation and dissemination of information about human resources in dollar terms" (Brummet et. al., 1968).

Rationale and Need for HRA

The notion of treating people as assets is rather logical. It is to be pointed out that treating people as assets should not be considered as lowering the status of human dignity as in the case of 'Slave trade' where quite readily people were bought, sold and owned. However, the 'legal ownership' is too narrow an interpretation to consider a factor of production as an asset. An appropriate criterion is the consideration of 'operational right' to receive services of people in a given period of time. A more lucid

expression of an asset is 'the right to receive future economic benefits' (Caplan and Landekich, 1974).

Human resource value would indicate a very good picture of the employees as organisational assets (Rao, 1981). Walter Oi, (1962) stated that labour should be viewed as a quasi-fixed factor comprising both investment and revenue costs. Pyle (1970) advanced a strong case for treating human beings as assets, when an enterprise invests heavily in creating human capabilities.

While the regular payments like salary/wage are identified as revenue items, the costs of recruitment and training of a new employee and the opportunity costs associated with on-the-job experience of the existing workforce are recognised as investment items (Holt et. al. 1960). Becker established a rate of return on schooling (Backer, 1960), to disclose the efficiency of human resource investments - the investment in specific and general training (Becker, 1962 and 1964). Thus some of the items of expenditure on people are investments and logically they must be treated as assets.

The modern thinking is that all the assets of the company including the human assets must be properly treated, analysed and reported by an accounting system in view of the long-term interests of the organisation. The areas of resource allocation and utilisation are mainly governed by the information furnished by the accounting system. On the other hand, the executives in an organisation are familiar with the accounting language and its use in decision making. Similarly, it will be convenient for them to use information on human assets, if the accounting system is designed to produce such an information also. Human resource accounting is needed in this context to provide information relating to the development, maintenance and utilisation of human resource. The policy makers of an enterprise will be in a better position to understand and predict the aspects relating to the management of human resource, if a system of human resource accounting is designed suitably and implemented carefully.

The productivity of a company's investment is known from the rate of return it gives. So far, these rates are considered in respect of physical asset investment only. To find out the productivity of investment in human beings, there is every need for human resource accounting. There is also an urgent need for HRA in labour intensive units to achieve maximum output for a given human input (Rao, 1983 & 1987). Woodruff Jr. (1970) argues that HRA data have many applications in improving, planning and controlling of human resource investments. The necessary investments needed to meet the expected human resource requirements, the rate of return on such investments and the decisions relating to allocation of human resources for most profitable areas of operation, will be guided by the information generated from a system of human resource accounting. Investment allocation decisions on human and non-human activities can be examined in the light of relative efficiency. The decisions on employee turnover may be investigated with the help of turnover analysis provided by human resources accounting (Woodruff Jr. 1973).

Empirical Evidence

The empirical evidence on human resource accounting is mostly based on control/experimental group-behavioural observations. A study on the effects of human resource cost data and value data on personnel allocation decision, revealed significant differences (Flamholtz, 1976). The impact of learning costs on productivity also showed good correlation (Flamholtz, 1973). Tomassini (1977) made a study to assess the impact of human resource accounting on managerial decision preferences and established a relationship between human resource accounting cost estimates and the related managerial preferences in a personnel lay-off decision. William Pyle (1970) described the use of human resource accounting as an improved managerial artisanship in the sense that, the system would unfold many hidden facts involved to develop or otherwise of the human capabilities and their utilisation. In a field the experiment to study the influence of human resource accounting on investment decisions, Elias (1972) tried to measure the relationship between the absence or presence of human resource accounting data and the investor's choice in a firm. Due to lack of familiarity with the human resource accounting data, many of the respondents in Elias's study could not give their favourable choice. As a result, the study could not find any significant relationship between the use of HRA data and its influence on investors' preferences. Hendricks (1976) conducted a similar study and established a significant statistical correlation between human resource accounting data and investors' decision preferences but failed to explain the causes of differences in personality variables. Schwann (1976) studied the effects of HRA cost measures on the decisions of a banker and found that the inclusion of human resource accounting data resulted in improved managerial preparedness to meet future challenges and opportunities.

Barry Corporation of United States implemented HRA for the first time. In 1966, the company contacted Dr. Likert of the Institute of Social Reseach, University of Michigan

to discuss the possibility of introducing HRA. Headed by Pyle, a team of researchers of the University of Michigan and the managers of Barry working together for a period of 15 months, developed a system of HRA. They capitalised the direct and indirect costs of personnel recruitment, training and development as the basic framework of systems' design. The company developed a proforma Balance Sheet in which human resource investments are reported during the period of its operation starting from 1969. Barry Company developed and implemented HRA during 1968-73 under the guidance of Likert and Pyle. The Company reported Net Human Resource Investments of $986,084 in 1969; $942,194 in 1970; $1,561,264 in 1971; $1,779,950 in 1972 and $1,964,243 in 1973 as exhibited in table-1. In 1974, Barry Corporation discarded the system. The Vice-President, in-charge of human resources observed that the benefits of the system were not encouraging when compared to the costs of the system. The President of the company also commented that the maintenance of the system costs heavily for a company of their size. It is needless to point out that the HRA system was not economical to Barry by the time, the management discarded the system.

HRA Practices in India

Rao (1983 a) developed a system of Human Resource Accounting and illustrated its application in a transport equipment manufacturing concern. He has designed the system based on the input/output control mechanism. The output variables of the system are described to be the indicators of human resource development and utilisation. The human resource investments are measured through human resource investment subsystem. To identify the human resource investments, a distinction is made between human resource current costs and human resource investments. All the human resource costs, whose benefits are expected to effect in future periods, are treated as investments. Then the annual human resource investments are adjusted to the tune of changes due to intake or separation or natural deterioration. The intake of people results in addition of human resource investments while separation necessitates writing off of human resource investments. The human resource deterioration is either due to lapse of time or due to utilisation. It is measured and adjusted through specific rates of amortisation in each year under study.

The human resource value subsystem is devoted for the computation of human resource value and to judge the relative efficiency of a firm's human assets in the industry. The generally accepted accounting practice is to show the asset value at the price paid for it. The same logic is applied to find out the value of human resources. The price paid for the human assets is the amount of salary/wage and other benefits. A case for human resource value is established by capitalising this amount during the employees' tenure with the organisation. The relative efficiency of the human resource is calculated with the help of weighted average production capital ratio (WAPC) of the unit under study. The variations in this ratio would indicate the changes in efficiency levels from period to period. This is the indicator of the firm's stand in the industry.

It is quite pleasant to note the endeavours of Indian corporate world in making experimental efforts to publish unaudited information based on the theory of Human Resource Accounting. The following Indian companies presented information relating to human resource accounting in their annual reports:

1. Bharat Heavy Electricals Limited;
2. Minerals and Metals Trading Corporation;
3. Associated Cement Companies;
4. Southern Petro-Chemicals Limited;
5. Projects and Equipment Corporation;
6. Steel Authority of India Limited;
7. Madras Refineries Limited;
8. Cement Corporation of India.

By and large, the Indian companies followed Lev. and Schwartz model with a few modifications, in some cases. According to Lev. & Schwartz (1971 and 1972), the value of human capital is the present value of the future payments to employees till retirement. The Indian managers find it convenient to report human resource value rather than human resource investment. Some managers are of the opinion that the investment approach needs lot of groundwork in accumulating and adjusting the costs of recruitment, selection, orientation, training, development, absenteeism, turnover, transfer etc., They also report that the adaptation of investment approach demands not only time and resources but also a change and some times a kind of disturbance to the normal operation of the existing accounting systems. They claim an advantage in favour of Human Resource Valuation model as it can be easily tuned to their computer systems, once the variables of the model are clearly identified and defined. Most Managers fancy reporting human resource value with a few related indices as additional information in their annual reports. The Indian academicians as well as professionals in accounting field, consider annual reports with additional features like human resource accounting, inflation accounting, social accounting etc., as more sophisticated than those, which do not contain such information. This has eventually made the corporate accountants more

Table 1. Conventional vs Human Resource Accounts
R.G. Barry Corporation (USA) 1969-1973

	1969 (A)	1969 (B)	1970 (A)	1970 (B)	1971 (A)	1971(B)	1972 (A)	1972 (B)	1973 (A)	1973 (B)
Assets										
Total current Assets	10003628	10003628	10944693	10944693	12810346	109444693	16408620	16408620	18311713	18311713
Net Property, Plant and Equipment	1770717	1770717	1682357	1682357	3343379	3343379	3371943	3371943	3500227	3500227
Excess of Purchase Price of Subsidiaries over Net Assets Acquired	1188704	1188704	1188704	1188704	1291079	1291079	1288454	1288454	1285829	1285829
Deferred financing costs	—	—	—	—	—	—	183152	183152	173278	173278
Net investments in HUman Resources	986094	—	942194	—	1561264	—	1779950	—	1964243	—
Other Assets	106783	106783	166417	166417	209419	209419	232264	232264	213500	213500
	14055926	13069832	14924365	13982171	19215487	17654223	23264383	21484433	25448790	23484547
Liabilities and Stockholders Equity										
Total Current Liabilities	5715708	5715708	3651573	3651573	3060576	3060576	3218204	3218204	3909083	3909083
Long Term Debt. Excluding Current instalments	1935500	1935500	2179000	2179000	5095000	5095000	7285000	7285000	6970000	6970000
Deferred Compensation	62380	62380	77491	77491	95252	95252	116533	116533	143150	143150
Deferred Federal Income Tax Based Upon Full Tax Deduction for Human Resource Costs	493047	—	471097	—	780632	—	889975	—	982122	—
Stockholders' Equity										
Capital Stock	879116	879116	1087211	1087211	1209301	1209301	1818780	1818780	1902347	1902347
Additional Capital in Excess of bar value	1736253	1736253	3951843	3951843	5645224	5645224	5047480	5047480	5676549	5676549
Retained Earnings :										
Financial	2740875	2740875	3035053	3035053	2548870	2548870	3998436	3998436	4883418	4883418
Appropriation for Human Resources	993047	—	471097	—	780632	—	889975	—	98121	—
Total Stockholders' Equity	5849291	5356244	8545204	8074107	10184027	9403395	11754671	10864696	1344435	12462314
	14055926	13069832	1492435	13982171	19215487	17654223	23264383	21484433	25448790	23484547
Statement of Income										
Net Sales	25310588	25310588	28164181	2816418	34123202	34123202	39162301	39162301	43161564	43161564
Cost of Sales	16275876	16275876	18252181	18252181	21918942	21918942	25667737	25667737	28621050	28621050
Gross Profit	9034712	9034712	991200	12204260	12204260	13494564	13494564	14540514	14540514	
Selling, General and Administrative Epenses	6737313	6737313	7546118	7546118	9417933	9417933	10190773	10190773	10783922	10783922
Operating Income	2297399	2297399	2365882	2365882	2786327	2786327	3303791	3303791	3756592	3756592
Interest Expense, Other deduction Net	953177	953177	250412	250412	383174	383174	549225	549225	598846	598846
Income before Federal Income Taxes	1344222	1344222	2115470	2115470	2403153	2403153	2754566	2754566	3157746	3157746
Human Resource expenses applicable to future period	173569	—	43900	—	137700	—	21686	—	184293	—
Adjusted Income before Federal Income Taxes	1517791	1344222	2071570	2115470	2540853	2403153	2973252	2754566	3342039	3157746
Federal Income Taxes	730785	644000	1008050	1030000	1197850	1129000	1414343	1414343	1615147	1523000
Net Income	787006	700222	1063520	1085470	1343003	1274153	1558909	1449566	1726892	1634746

A = Conventional and Human Resource; B = Conventional only
Source : R.G. Barry Corporation, Reprints from Annual Reports, 1969-1974, Ohio (U.S.A.)

competitive in adapting recent techniques like human resource accounting in corporate reports.

Table-2 reveals the human resource values disclosed by Steel Authority of India Limited (SAIL); Minerals & Metals Trading Corporation of India (MMTC); and Southern Petrochemicals India Limited (SPIC) from 1984-85 to 1987-88 based on the Lev and Schwartz (1971) equation :

$$E(Vc) = \sum_{t=c}^{T} Pc(t+1) \sum_{i=c}^{t} Ii/(1+r)\ ^t - c$$

where E(Vc) is the Value of Human Capital of an individual c years old; I(t) is the individual's annual earnings until retirement; T is the age of retirement; Pc(t) is the probability of an individual of age c dying in year t.

MMTC and SPIC have stated that they followed Lev and Schwartz model while SAIL reported inclusion of certain additional features from Flamholtz model and Jaggi Lau model, along with Lev and Schwartz model. BHEL also observed Lev and Schwartz model.

In practice, all the enterprises observed the basic theme of Lev and Schwartz model in the sense that they have computed the present value of future direct and indirect payments to their employees as a measure of their human resource value. While doing so, the common assumptions set by the above companies are the pattern of employee compensation, normal career growth and weightage for efficiency. MMTC has taken 12%; SPIC has considered the rate of return which is used for evaluating the company's capital expenditure proposals, while SAIL has applied 14% to arrive at the present value of human capital. BHEL also reported human resource value with similar model using 12% discount factor on the future earnings of its employees.

Table 2. Human Resource Values disclosed by selected Indian Companies

(Value in Rs. Crores)

Year	SAIL		MMTC		SPIC	
	Number	Value	Number	Value	Number	Value
1984-85	206414	9581.13	3638	96.07	2446	78.77
1985-86	206198	9588.49	3760	120.51	2467	80.07
1986-87	203292	10827.67	3830	140.37	2495	90.66
1987-88	197296	12012.54	3862	158.14	2605	104.74

Source : Annual Reports of the respective Companies for the relevant years.

Note : The figures relating to SPIC pertain to the Calendar Years 1985 to 1988.

The analysis of human resource value reported by BHEL during 1986-87 to 1988-89 is presented in table-3. BHEL has worked out the comparative ratios on human assets, non-human assets and total assets to present the relative productivity analysis.

As stated earlier, the Indian companies focussed their attention on the present value of employee earnings as a substitute to human capital. A critical look at the logic of human capital approach, raises a bit of doubt, as far as human resource value to the organisation is concerned. It may be nearer to truth, when viewed from the employees' perspective. But may not probably hold good, from the employers' angle.

In the Indian context, more particularly in the public sector, the payments made to the employees are not directly linked to productivity. The relationship between the wage/salary bill and the value of production may be some times inverse. The fluctuations in the value of employees' contribution to the organisation are hardly proportional to the changes in the payments to employees. Under the Lev and Schwartz model, the value of human resources will be more or less increasing, even if the organisation continuously incurs losses. Whether the attitude and morale of the employees is favourable or not; whether the employees contribute in proportion to the payments made to them or not; and such other factors are out of the purview of Lev and Schwartz model of human resource valuation.

Table 3. Human Resource Value in BHEL

(Rs. in millions)

	1988-89	1987-88	1986-87
Value of human assets	21834	18265	15883
Fixed assets (net) at Current Cost	20023	17716	15390
Investments	1599	1171	640
Net current assets at Current Cost	4563	2966	3860
Total Resources at Current Cost	48019	40118	35777
Turnover	26200	23193	19939
Value added	9203	8925	7922
	Times	Times	Times
Turnover/Human Resources	1.20	1.27	1.26
Turnover/Fixed assets at Current Cost	1.31	1.31	1.30
Turnover/Total Resources	0.55	0.58	0.56
Value Added/Human Resources	0.42	0.49	0.50
Value added/Fixed Assets	0.46	0.50	0.51
Value added/Total Resources	0.19	0.22	0.22
Human Resources/Total Resources	0.45	0.46	0.44

Source : BHEL, Annual Reports, 1986-87 to 1988-89.

Therefore, the Indian companies may consider a Human Resource Value model based on employees' net

contribution to the orgnisation. Eric Flamholtz (1971) has advocated a model for Human Resource Valuation based on Stochastic Process with Service Rewards. A general statement of this model is presented below :

$$E(S) = S1(PS1) + S2(PS2) + \ldots\ldots\ldots Sn(PSn)$$

$$\text{i.e., } E(S) = \sum_{i=1}^{n} SiP(Si)$$

where E(S) is the total quantity of services, the individual E is expected to render to the organisation; Si is the quantity of services; P(Si) is the probability of occurrence of Si.

The above equation may be presented in the following form by incorporating the discount factor for arriving at the present value :

$$HRV = \sum_{t=1}^{n} \left\{ \sum_{i=1}^{m} (Ri.P)/(1+r)^{t} \right\}$$

where HRV is the Human Resource Value; i is the service position; Ri is the value of the service position; P is the probability of remaining in the service position i; t is the time period; n represents the number of time periods; r is the discount rate; and m is the state of exit (a person may reach the state of exit either by death, or by leaving the organisation for betterment or by voluntary retirement while serving in the present position or after occupying a few or all of the subsequent service positions in the organisation).

The basis for the above model is the value of the service positions (Ri). Rao (1983a) has used the payments to the employees as a substitute for the value of service positions. But this has the same weakness of Lev and Schwartz model as described earlier. If the net economic value by the employee is used as Ri, in the above equation, the model may serve the purpose better. Caplan and Landekich (1974) have presented Lester Witte & Company's case based on the net economic value.

The aforesaid Stochastic Process Model may be further modified to suit the Indian conditions. One such modification may be considered to attach a more realistic 'flow value' to the Net Economic Value variable of the model. A weighted average net value added may be adjusted with certain additional variables like experience, skill formation or skill obsolescence, human organisational score etc., to arrive at a realistic flow value.

Decision-Applications of HRA

A decision-oriented design of HRA is suggested for implementation at the enterprise level by Rao, (1989). The operation and reporting by HRA system should enable the users to make decisions more efficiently. The long run success of HRA will depend upon its practical utility. Although, we can estimate the stock of human capital at a point of time by discounting the future wages, the present value of the expected net value added seems to be more appropriate to evaluate the value of the company's human resources.

HRA would aid decision-making in a variety of ways (Rao, 1989a). We can broadly classify the decision applications of HRA into (i) Internal and (ii) External. A few of the HRA applications are listed below :

1. Decisions on cost reduction programmes (Likert & Seashore, 1963) employee attitude building (Likert, 1973) and participative management (Albrook, 1967).
2. Decisions relating to recruitment and selection.
3. Decisions on training and management development.
4. Decisions on competitive biding (Hekimian & Jones, 1967) and efficient tenure placement.
5. Decisions on turnover and absenteeism (Woodruff Jr., 1973);
6. Decisions on lay off (Tomassini, 1977) and lock-out;
7. Formulation of long term and short term strategies relating to manpower planning and control (Tomassini, 1979)
8. Decisions relating to resource allocation particularly on allocation decisions between human and non-human resources.

Some of the external applications are :

1. Aid in stockholders (Hendricks, 1976) and lenders decisions
2. Decisions relating to valuation of goodwill and firm for purposes of amalgamations and absorptions etc. and
3. Aid to policy making bodies at the government level etc.

Ample Scope for Further Research

Research in the area of Human Resource Accounting is still in infancy stage in India. The areas for further

research are: (i) the formulation of human resource development and performance standards in the light of corporate goals; (ii) the development of usable systems and procedures of human resource accounting; and (iii) the adaptation of Human Resource Accounting to the administration of incentive systems and productivity techniques. The operational problems can be studied, when the system is considered for full-fledged implementation.

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Feature

Productivity Management : A Programme for Implementation

G.D. Sardana & Prem Vrat

Productivity management is a formal and an integrated approach. It is an ongoing programme in an organisation and has predetermined objectives to achieve. Productivity improvement is the ultimate objective and to achieve these ends the process of prouductivity management follows a 'closed loop cycle' of several steps. This paper examines the concept of productivity and productivity management in perspective of an organisation as a system with multiple objectives.

G.D. Sardana is a Chief Executive (Works) with the Usha Rectifier Corporation, New Delhi. Prem Vrat is Professor and Chairman of Industrial Engg. and Management Division, Asian Institute of Technology, Bangkok.

To a large number of organisations productivity is synonymous with more and better output from work force at shop floor level or higher rate of output from plant and machinery. Productivity is visualised as a subject of concern confined to manufacturing activity. Productivity management in this context is seen as management of output from labour, more work from labour and management of machines. It is in this context that the inadequacies and inaccuracies inherent in the concept of productivity have to be recognised. Sink (1983) rightly mentions that productivity is an emerging discipline and there is a need for its syntheses, clarification, definition and/or generic conceptualisation.

Productivity Management and Systems Approach

The classical theories, as also the traditional and behavioural approaches of organisation theory lay stress on functional approach to organisation. It describes proess of management as the functional process of planning, organising, directing and control. The emphasis under these approaches is to optimise the functional outputs from inputs such as labour, capital, materials etc. The difference between one model and another is in areas of treatment and measurements of inputs and outputs. The traditional inputs are considered to be working independently and in isolation to each other. But in practice, activity of any part (or component) of an organisation affects the activity of other parts. Interdependence is a vital factor in the performance of an organisation. As a matter of fact very often the performance of one component is at the cost of performance of another component. Productivity of labour can be increased through introduction of a higher degree of automated plant or by using raw materials with higher degree of fabrication ; but this will bring down the productivity of capital, as both plant and raw materials would be more costly. A radically different approach is therefore needed for productivity management.

As per the systems approach, an organisation works as a system interacting with and dependent on its environ-

ment. It emphasizes on 'wholeness' of the organisation. The organisation as a system comprises components whiich work as sub-systems (and sub-sub systems) which interact with and influence each other to produce a total performance. The behaviour of a system (or its sub system) cannot be studied in isolation. The output of a system (and sub-system) can be different and sometimes greater than the sum of performances of each of the components. The sub-systems are inter-related so as to form a unitary whole.

The concept of productivity in the context of systems approach acquires a broader meaning. It is a measure of the overall performance of the system (or its sub-systems). It is the system productivity which is required to be measured and managed. The outputs are the end performance of the system. These include tangibles as well as intangibles. The acquisition, deployment and usage of traditional inputs are only menas to achieve ends.

Formally productivity under this approach can be defiined according to Sardana & Prem Vrat (1987) as,

> "Productivity as an index of system (sub-system) performance indicates the extent of actual accomplishment of performance objectives in relation to the attainable level in a given external environment".

Productivity management should be viewed as a formal integrated process. Edosomwan (1988) defines it as an integrated process involving both management and employees with the ultimate goal of managing the design, development, production, transfer and the use of various types of products or services in both the work environment and the market place. Productivity management, under the systems approach also assumes a broader perspective. Sumanth (1981) defines it as a formal management process involving all levels of management and employees. Productivity management calls for a planned, systematic and a formally structured approach in planning, deployment and usage of several resources to achieve system performance. It calls for systematic evaluation so as to identify areas for improvement and a control to monitor progress of implementation programmes to achieve improvements in identified areas.

An organisation is considered to be a system encompassing several sub-systems. Each of the sub-systems (or sub-sub systems in case of large sub-systems) can be considered to have Key Performance Areas (KPA's). Each of KPA's has a number of performance objectives to achieve.

A programme on productivity management comprises five steps which form a closed loop in a sequential order:

1. Productivity Planning
2. Productivity Measurement
3. Productivity Evaluation
4. Productivity Improvement
5. Implementation and Control.

At the end of the fifth step, it is the start of a new cycle to step one. It, therefore, becomes a continuous exercise of implementation, achieving results of enhanced productivity and setting new values of performance objectives. It is an ongoing programme with a well defined purpose, approach and strategy.

Productivity Planning

This is the cornerstone of the programme on productivity management and is crucial for its success. At this stage all factors which affect an organisation are considered, the strengths and weaknesses taken into account and consensus arrived at in selecting the performance objectives. The exercise comprises arriving at the achievable values of performance objectives which become targets for performance. These objectives have to be realisatic, representative of the system productivity as a whole and should project the potential performance of the organisation.

An organisation will have more than one sub-system, each sub-system will have many KPAs (Key Performance Area) and each KPA in turn will comprise multi-objectives. All these will not be equal; prioritisation or ranking will be another exercise in this step. The allocation of resources to achieve the objectives is also carried out under planning. The identification, value fixation and ranking of the performance objectives is carried out under several substeps briefly described as under:

Identification of sub-systems : The components that make up the system are called sub-systems. Burns and Stalker (1961) suggest that a system (and a sub-system) has five basic characteristics :

(a) central objectives
(b) its environment
(c) its resources
(d) its components, and
(e) its management.

An organisation can have functional sub-systems as well as management sub-systems. Sometimes management sub-systems may be embedded in other sub-systems. The selection of the sub-systems is a crucial step. These should be such that the wholeness of the organisation should get reflected ; interdependency should be ap-

parent. The activity of one sub-system affects the activity of other sub-systems, the relationship amongst the sub-systems determines the characteristics of the system. For an engineering multiproduct large organisation, Sardana and Prem Vrat (1987), recommended seven sub-systems :

1. Production sub-system
2. Technical sub-system
3. Materials sub-system
4. Human Resource sub-system
5. Financial sub-system
6. Marketing sub-system
7. Goals and values sub-system.

Identification of key performance areas : Key performance areas, as in Management by Objectives (MBO), deal with positive performance and are areas where management is interested to achieve results. As McConkey (1983) describes, there are high priority, critical or target areas which require attention, monitoring and control so as to achieve overall goals of the organisation. KPA's can be in one or more of the areas: quantity, quality, timeliness and cost. Two considerations are vital while identifying KPA's. The KPA's identified should be effectively associated with the sub-system. There would be overlaps; some areas would appear to be belonging to more than one sub-system. However, it is the sub-system which controls the deployment of inputs and has the responsibility of function/objectives, that the KPA's should belong to. Besides, the KPA's identified should have a basis and relevance to the organisational goals. As the organisational objectives can vary from one organisation to another, so would be the relative importance of the KPA's. Business budgets, planning and product strategies of a sub-system have priority over its operational responsibilities. KPA's must subordinate to the sub-system.

Identification of Performances Objectives : A performance objective is a statement or a set of statements setting targets for accomplishment in a KPA. It, therefore, provides information as to what is required to be achived in relation to the capacity and capability of the system (or its sub-systems). The exercise, therefore, begins with establishing, first, the overall/objectives and priorities of the system for the target period under consideration. The emphasis is on three dimensions: overall objective of the organisation, priorities and the target period. The performance objectives identified should be consistent with policies and plans and should be expressed in clear and concise terms. These should be within the competence of the KPA. The overall responsibility and controllability must exist within the sub-system concerned although there will be overlaps of occurance with other sub-systems. These should have a singular occurance and not get repeated in other KPA's. Performance objectives can be both quantitative as well as qualitative; quantifiable as well as otherwise. Both tangible as well as intangible objectives are to be included.

Ranking and Weighting of sub-systems, KPA's and Performance Objectives : All the sub-systems (or sub-sub systems), KPA's of sub-system as well as performance objectives within a KPA are not equal in importance. The sub-systems and the KPA's would have their own relative importance and priorities. The importance will vary depending upon the stress an organisation wishes to lay to achieve particular targets in an area. Sub-systems/KPA's and performance objectives are, therefore, required to be ranked in priority and weightages assigned to identify their relative importance. There are a number of techniques available to carry out the exercise in an objective manner. Method of direct scaling, setting of hierarchy, method of paired comparisons are some of the techniques, the application of which has been reviewed upon by Sardana (1986).

Determination of Objectivated Output : There exist four fundamental scales of measurement which can be applied to all objects or events of measurement : Nominal scale is used where equality is required to be determined. Ordinal is a scale of comparison of the attribute under consideration, such as length etc. In the interval scale, two objects having values are differentiated to the extent of interval between the two units of measurement. Ratio scale has a specific unit of measurement such as mm, secs. etc. The attributes of productivity do not make it suitable for nominal, interval or ratio scale. Ordinal scale based on the principle of comparisons is a possible solution.

As per Allard et. al. (1971), comparisons can be made (a) with a historical base performance which implies conversion of data of performance to the same level or period, an exercise beset with problem use of appropriate factors of inflation/deflation; (b) between entities, which means that comparison must take place between likes in the same period; (c) with a target performance. The last approach is to be preferred as it helps in not only revealing whether actual performance is improving or deteriorating against the target, but also it enables to judge if the actual performance can be considered adequate or satisfactory (and how much).

The exercise, however, calls for determination of a target performance which is the potential output for the organisation. In a multi-objective environment, many of the

performance objectives can be seen to conflict with each-other. The performance objectives, therefore, require integration and conciliation so as to obtain a set of performance objectives which are aligned to each other, are possible to be accomplished together and are no longer in isolation with each-other. This calls for determination of an acceptable level of performance of the objectives after resolving the conflict and incompatibility amongst the various objectives for satisfying the goals of the organisation. The target performance so determined is the 'Objectivated Output' which represents the attainable optimal level of output by a system (sub-system) under the given constraints of input resources.

The determination of 'Objectivated Output' should be carried out in a rational and objective manner. Misconceived satisfaction or despondency may set in if the values arrived are low and high respectively. Goal programming provides a powerful tool to determine the Objectivated Output in the presence of conflicting and competing multiple objectives. Besides, various incompatible and incommensurate objectives can also be included in the formulation.

Productivity Measurement

PO-P approach as developed and formulated by Sardana and Prem Vrat (1983) forcesees determination of a productivity index for the system, to be built up in stages from the productivity indices of the sub-systems. Productivity index of a sub-system is in turn built in from the productivity indices of the KPA's of that sub system. Productivity index (PI) of a systems, is arrived as,

$$P.I = \sum_{u=1} W_u (P.I)_u, \text{ where}$$

$$\sum_{u=1} W_u = 1,$$

W_u is the weightage of sub-system u.
Productivity Index $(P.I)_u$ is determined as

$$(P.I)_u = \sum_{v=1} W_{vu} (P.I)_{vu}, \text{ where}$$

$$\sum_{v=1} W_{vu} = 1 \text{ for all u.}$$

W_{vu} is the weightage of key performance area v of sub-system u. Productivity Index $(PI)_{vu}$ of key performance area v of sub-system u is calculated as :

$$(P.I)_{vu} = \sum_{y=1} W_{yvu} \frac{O_{yvu}}{O_{yvu}^*}, \text{ where}$$

$$\sum_{y=1} W_{yvu} = 1 \text{ for all u and v, and}$$

Wyuv is the weightage of performance objective y of key performance area v of sub-system u.

Oyvu is the actual value of performance objective y of key performance area v of sub-system u.

Oyvu* is the objectivated value of performance objective y of key performance area v of sub-system u.

After having arrived at the Objectivated Output values of the performance objectives and knowing the values of the actual performance, productivity index of each of the KPA's is arrived as a first step. The productivity index of the sub-system is calculated in the second stage and the productivity index of the system determined in the third stage. In case of a very large system, it can become necessary to have further sub-divisions of a sub-system in the form of sub-sub systems thus necessitating one more stage. In general any number of hierarchies of sub-systems can be included in the structure of the system and methodology extended.

Productivity Evaluation

The purpose of this step is to evaluate-the results of productivity measurement and to draw up the programme for productivity improvement.

The exercise, of evaluation is not limited to identification of KPA's with low performance. It is to be extended to cover individuals, groups, departments and organisational levels. Very often the indices may not offer a conclusive evidence of low productivity. There might have occured extraneous causes both within the organisation or in the external environment leaving an impact on the productivity. In such situations the impact has to be discounted. It is better to consider, alongside, the values of the productivity indices of the past periods. A positive indication of low productivity is reflected in the declining trend of the value of the index.

The constraints on the availability of the resources may not permit to adopt improvement programmes in all the cases of the indices with low values. In that case, a consensus on prioritisation has to be arrived at.

The PO-P model to measure productivity, as briefly explained has a unique characteristics of a built-in system of identifying areas of poor or non acceptable productivity. The exercise of productivity evaluation comprises identifying sub-systems, KPA's and the performance objectives with low productivity and having a high bearing on the

system productivity so that improvement plans can be worked out.

From the productivity indices thus arrived at, sub-systems with low PI can be identified. The product of sub-system PI and its weightage will determine its bearing towards-system PI. The highest value determines the first priority of the sub-system requiring an improvement plan. In similar exercises KPA's and the performance objectives with low productivities can be identified and the priorities for improvement plans can be drawn up.

As a second step, it is helpful to compute the gap between the actual and desired values of productivity indices at all the three stages. At the level of performance objectives, the difference in the values of Objectivated Output and the actual performance determines the improvement opportunity available.

The third step of evaluation comprises grouping the identified performance objectives and key performance areas as per functional areas of control, such as personnel management, design and development, materials planning etc.

Productivity Improvement

Productivity management implies bringing about improvement in productivity. The various steps in a programme on productivity management have to be structured and integrated towards improvement strategies. Successful productivity management programmes are concerned with improvement actions.

The basic exercise comprises identifying causes for the low productivity. Three basic key factors which can be the focus of most improvement strategies are, the organisational factor, the human factor, and the technology factor.

The Organisational factor : The success of improvement programmes largely depends on the strong commitment of the organisation. The commitment has to come in the form of a corporate policy, structured organisation to take charge of productivity programmes and management practices to create proper environment for productivity.

Corporate policy on productivity should be a written document emphasizing in clear and precise terms :

1. Commitment to achieve specified continuous growth in productivity.
2. Short and long term goals/levels of productivity for the organisation.
3. Encouragement to those who become instrumental or play a major role in increasing productivity.
4. A reward/recognisation scheme for those who achieve higher productivity.
5. Creation of a participative motivated environment congenial to growth of productivity.
6. A philosophy of non-acceptance of low productivity at any time.
7. A continuous search for new approaches, techniques and methodologies to plan, measure, evaluate, implement and monitor productivity management programmes.
8. Creation of information and data bank, detailed process specifications, productivity check lists, etc.

Organisation structure should suggest that culture of productivity permeates through all levels of hierarchy and is not confined to worker committees and shop floor operators. The structure should incorporate a provision of a senior peson at the corporate level with singular responsibility of monitoring the productivity and the progress against action programmes to bring about the improvements. The management practices should encourage in establishing an environment congenial to the growth of productivity, elimination of defects and an encouragement to those who help to achieve higher productivity. Recognition and rewards should be instant for those who achieve the objectives. Another dimension in the management practices relates to communication within the organisation. The practices should encourage creation of a data base and its storage and its easy access to the users. The management information system should provide a feed back to employees engaged in productivity efforts. The practices should help in facilitating open communication between the various functional departments and sections.

A productivity oriented management has a clear mission, objectives and strategies, a structure and a system tailored towards achieving a growth in productivity.

Human Factor : In a recent survey conducted by the National Productivity Council, according to Suri and Kumar (1989), inefficient utilisation of human resources constitutes the single largest factor (36.3 per cent) for low level of productivity in Indian companies. The role of human resource in productivity has been well recognised by a host of other authors and researchers. It has been pointed that the successful organisations are essentially people oriented. The human resource includes employees at all levels ; executives, engineers, blue and white collar workers. The key element is therefore, human resource devel-

opment to achieve improvements in productivity. A number of techniques have been suggested. Sumanth (1984) has listed several employee based techniqes: financial incentives, fringe benefits, promotions, job enrichment, enlargement, rotation, participation, skill enhancement, management by objectives, learning curve, communication, working condition improvement, training, education, role perception, supervision, recognition, punishment, quality circles, zero defects etc.

The essence to human resource development is that the human resource should be motivated and developed to handle the tasks entrusted. The subject of motivation has received attention of behavioural scientists and a number of motivation techniques proposed in the last four decades. These include financial incentives, division of work, needs fulfilment, job satisfaction, opportunities for achievement etc. These techniques have been successfully employed in organisations after taking into account the level and the skills of the employees involved. One of the important approaches to seek motivation of employees is through the active, efficient and effective involvement of employees. The endeavours towards improvement of productivity must be perceived by employees as common goals whereby both the organisation and the employees stand to benefit. All the stages of productivity management programme should ensure participation of employees to the extent possible.

Training and development of human resource plays an equally important role in improving productivity. It implies preparing executives and managers for a future role, by exposing them to the science and practice of management, new emerging precepts on managing resources, knowledge about the external & internal environment, expectations of the customers, suppliers, shareholders and the society. The skill of a practicing manager requires to be continuous by updated. Engineers, technicians and scientists require development in their own fields. Changing, technologies, product designs, new processing techniques, methods and job design are some of the areas where engineers require exposure through participation in seminars, exhibitions, training courses and encouragement to pursue studies. With the rapid introduction of CAD, CA, automation computer graphics, computer aided data processing, many an engineering personnel, otherwise capable in their fields, have found themselves at sea and suffered inferiority complex as they could not get exposure to these techniques. Training and development of the workers is vital so as to prepare them for deployment on new processes, manufacturing plants and technologies. A more intense knowledge about these imbibes in them a spirit of confidence and pride. Exposure to the law of the land, rules and regulations makes them a disciplined force, conscious of their responsibilities towards productivity and the organisation. Availability of skilled, trained and experienced manpower is a vital factor to enhance productivity.

Technology factor: It is well known as to why many organisations in Indian engineering or the textile sector became sick and had to be taken over as public sector undertakings ; or as to why many an organiation is not able to complete in the international market, inspite of availability of comparatively cheap labour. The reason lies in the non introduction of new cost effective technologies in the plants, thus rendering the plants as unviable. Many plants have continued with old machinery, which is less efficient, has a low rate of output and goes into repeated breakdowns. No modernisation has been introduced in the form of replacement of old plant with machinery capable of generating higher output better quality and less rejections. Technology is the single factor having significant impact on productivity. Morrison and Mckee (1978) have carried out a survey of the views expressed by well known contributors to the science of productivity and reported that technology has an impact of 72%, as per Kedrick ; 62% as per Denison ; 44% as per Christenson, Cummings and Jorgenson. Edosomwan reviews that introduction of computor aided devices, ro botics has increased productivity by 53% and 47% respectively.

Technology encompasses several areas. It represents the knowledge, techniques and the methodology to carry-out the process of transformation in a production or service process. Technology can lead to more production in the same time, same production in lesser time, generation of leser defects, errors or rejections, increased plant life with reduced expense on breakdowns repairs and maintenance, consistency and repeatability in process, reduced wastages, reduced fatigue to operators and others engaged in the production process.

Foremost, technology is represented in the selection of appropriate plant and machinery. Automation brings in increased rate of production. Computer aided devices have helped in increased productivity and reduction in rejections. The total impact is reduced cost of production. Technology also encompasses use of appropriate process of manufacturing methods, engineering, production planning and control, production scheduling, tools engineering etc.

Technology factor also cover use of appropriate techniques in areas of inventory management, materials plan-

ning, quality control, value analysis, and in selection of appropriate inputs of raw materials. Technology factor is relevant in the selection of a product design or in carrying out product research. The product design has an impact on the life of the machine tools or processing machinery, cost of production, the rejection rate, generation of wastages and productivity.

Very often, alternate technologies are also available. The new technology to be selected has to be evaluated against several criteria, such as the rate of return on investment, the net present value, rate of defect generation, the maintenance cost, the employment level etc. It is not always the latest technology to be selected but very often it is the appropriate technology which is to be chosen in the interest of societal goals.

Implementation and Control : Having identified the sub-systems and the KPA's for structured organisation, there is a requirement of representation of productivity management in the organisational structure at the corporate level (sytem), functional levels (sub-sub-systems)and at the departmental or section levels (sub-sub-systems). At the corporate level, the productivity management must be headed by a senior ranking executive, reporting to the Chief Executive, responsible for monitoring and control of the sub-system improvement programmes. Aided by staff well versed in the science of productivity, he is also responsible for the creation of data bank, productivity information system, measurement and evaluation of productivity. The productivity managers at the functional levels are responsible for overseeing the productivity programmes at the levels of sub-systems. At the third level, productivity officers can be designated and made responsible for monitoring the productivity programmes. More levels can be necessary if the size of the organisation so needs. It has been already brought out that a successful productivity management programme utilizes participative approaches very extensively. The modern day approaches recommend the application of group processes such as Nominal Group technique, Delphi, etc. in both planning as well as at the measurement stage. In the measurement technique identification of KPA's, performance objectives, the ranking and weightages are more efectively carried out through the application of group processes. Organisationally, therefore, it is also pertinent to create productivity committees, circles and groups and involve as many concerned employees as possible.

Each of the performance objectives requiring improvement and identified on the basis of the evaluation should be converted into an 'action programme' for improvement. This action programme identifies (a) stages of implementation (b) time schedule of completion of each stage (c) responsibility of completion of each stage (d) sections or departments involved to extend help, which should once again get specified with a time schedule (e) the support required from highest hierarchies of management including sanctions of additional resources such as capital, manpower etc. The exercise is required to be done without leaving any ambiguities and tasks assigned to individuals or a group of individuals with a clear target time of completion. A regular monitoring and review of the progress made should be carried out by the level made responsible for overseeing. The review will also help identify any supports required to be extended and difficulties to be resolved. Besides it will also help establish recognition of the task if carried out satisfactorily.

The completion of the action programme and the review is the beginning of the next cycle of the productivity management programme: setting of new values of performance objectives, determination of new values of Objectivated Output, productivity measurement, evaluation and improvement.

The new values of performance objectives are set after taking into account the corporate goals of growth, expansion and diversification, the market conditions and the present levels of productivity achieved. Once again it would be necessary to establish reconciled and compatible values of Objectivated Output and resolve the conflicts through goal programming.

Conclusions

Productivity management is not a one time exercise. It is an ongoing exercise, and a continuous process. It is also dymanic in characteristics. Cognisance has to be taken of changes in the external environment , such as competition, demand and supply conditions, Govt rules and regulations, statutory requirements, availability of resources etc. Similary the changes in the internal environment of the organisation have to be considered on a continuous basis while drawing up the programme for productivity management. It is a full time exercise and calls for a proper structure of the organisation within which productivity management occupies a defined place. Corporate policy must declare that the organisation is committed to the philosophy of achieving a continuous growth in productivity at all levels and at all times. Technology plays an important role in bringing down costs of production, upgrading quality and service and improving productivity. What is required is appropriate technology for the organ-

ployed or underemployed are likely to demonstrate characteristics different from those of persons who obtain jobs successfully. It would be interesting and important to clarify these characteristics. For example, the prestige accorded to university is considered to represent the quality and the ability of its students, and there is a corresponding pattern between the graduates of prestigious universities and public-sector and large companies, and those of less prestigious universities and medium-and small-sized companies.

Pace of Development of Economy and Education

Although economic development brings about expansion of employment and range of work, it does not always develop at the same pace as educational development. The rate of educational development generally exceeds that of economic development.

Two major factors attribute to increasing the number of highly educated workers in industry. One is the expansion of industry itself. If the scale of industry is expanded, the number of highly educated people increases even if the ratio of such workers to total workers in the relevant industry remains unchanged. The demand for highly educated workers increases, especially when they compose a high proportion of the whole labour force in the industry. The other is sophistication of work. When tasks are sophisticated in industry, the number of highly educated workers increases without expansion of the scale of industry. While the distribution of workers by educational level differs among industries, the ratio of highly educated workers tends to increase in general. One of the reasons explaining this tendency is that the development of industries increases jobs suitable for highly educated workers. The interrelationship between job and educational level is obvious. Many university, college, and upper secondary school graduates obtain managerial, administrative, professional, and technical, or clerical posts. The number of highly educated workers increases along with the increase of the ratio of this kind of work in industry. Along with economic development, the demand for specialists and technicians, most of whom are highly educated, becomes greater. Many problems arise if the scale of industries does not expand and the sophistication of work is delayed.

National governments make great efforts to develop the scale of the economy and expand education. However, economic development is for more difficult for the government to control compared with educational expansion and does not take place according to schemes designed by government. On the contrary, education can be expanded relatively easily by government efforts by establishing new schools, increasing enrolment quotas, subsidizing educational costs, or accepting all applicants. Today, the pace of educational development exceeds that of economic development in general. Economic development largely contributes to increased enrolment rates in universities and upper secondary schools, and thus there is a possibility that the more an economy develops, the more highly educated workers are likely to be oversupplied for a short term (Muta, 1988).

Economic Cycle and Stability of Education

Human resource development is time intensive and the educational system cannot adapt to new circumstances quickly by maintaining a balance between supply and demand because the demand for labour changes along with business activities while the supply of highly educated workers is relatively constant.

When business is depressed, the industrial world is immediately affected and the demand for new labour decreases, but the number of new graduates who are to be sent to industries cannot be changed in a short period. In other words, the educational system is not so designed as to adjust the volume of labour force entrants according to short business fluctuations.

It is impossible to adjust the number of graduates to meet the demand of the labour market because even if the number of students enrolled is changed according to fluctuations in the economy, it takes two or four years for the students to graduate. The supply of and demand for the highly edcuated cannot always be balanced if the economic situation keeps changing while schools continue to produce graduates at a constant rate. The imbalance between supply and demand is sure to occur even if only periodically, as the worldwide depression has affected employment in various countries.

Mismatch

The specific knowledge and skills required by industry are not always well matched with those of highly educated graduates. While the labour market demands workers with scientific and engineering backgrounds, the majority of university graduates study humanities and social sciences, largely because such courses are less expensive for universities to offer.

Education is a time-consuming task. Even when manpower development plans are made based on prospects for the economic situation in the future, it is difficult for people who are educated according to the plans to find

jobs in which their education can be utilized, because technological development takes place at a rapid pace. If the educational system is centralized, which is typical in developing countries, it is hard to alter a nationwide curriculum frequently. It is especially difficult to design science and engineering programmes that reflect rapidly changing technology because school education cannot be quickly adjusted to those changes. Not only because of such mismatches but also because of the quality and level of education, most workers are not equipped with the skills and knowledge actually demanded by industry. Subject matter is diversified and specialized in natural sciences and engineering. This results in the number of workers with backgrounds in new technology, where there are insufficient numbers of teachers and courses, being smaller than demanded. Information on the labour market is not directly reflected in the organization of subjects or curricula.

Difficulty of Estimation

It is relatively easy to design long-term plans to develop medical doctors, teachers, or other specialists because their future demand can be estimated somewhat easily. However, it is difficult to design natural science and engineering programmes which should reflect rapidly changing technology. By design, school education is a long-term process that cannot always deal with short-term needs. Vocational schools may have the capacity to reflect market conditions in their curricula. Yet education at such schools is rapidly outdated because the introduction of new technology requires new knowledge and skills to make use of it. It is therefore necessary for workers to be provided with training to develop their skills, knowledge, and abilities after they obtain employment.

Insufficient Information on Employment Opportunities

Information concerning employment opportunities is not sufficiently distributed, guidance offered at schools is still insufficient, and graduates generally find jobs with help from their parents and relatives. Reliable information concerning job opportunities and methods of obtaining work is not available.

A study conducted in West Bengal indicated that over half of university graduates received employment information informally from their parents, relatives, and teachers (Bose et. al., 1983). According to a survey conducted in Thailand, some 10% of the unemployed mentioned a lack of employment information as the cause of unemployment.

Increase in Labour Force

The labour force is expanding due to the increase in population and increased life expectancy. In most Asian countries the rate of increase in population is still high, and the average age is increasing, both of which contribute to the rapid increase in the labour force.

Increase in Female Labour Force Participation

The number of women entering the labour force is increasing due to the decrease in the birth rate. There is a tendency for the birth rate to decrease along with the development of the economy. This helps to increase the labour participation rate of women. For example, the number of children per woman, which was 6.3 in 1964/1965, decreased drastically to 4.9 in 1973/1974 and 3.9 in 1981 in Thailand. The expansion of educational opportunities has caused an increase in the rate of female upper secondary school graduates going on to college while the number of women willing to enter the labour market has increased. As a result the unemployment rate for female university graduates has risen sharply and become twice as high as that for male graduates. In Japan, the number of female workers has been increasing since 1976, partly due to an increase in the female population, but mainly due to an increase in the proportion of women willing to work. The reasons for this are : 1) fewer women quit working when they get married or have children; 2) the average age of marriage is becoming higher; and 3) the period spent on raising children has shortened because of the low birth rate and the availability of daycare facilities.

Pressure Groups

Various social pressures influence the expansion of higher education other than economic development. All would want to receive education if it were beneficial, yet many people find value in study for its own sake, regardless of its results. Also, the idea of equal opportunity in education contributes to the expansion of education. It is natural for government based upon democratic vote to make efforts to satisfy social demand. In actuality people who can receive good education and take advantage of it are from high and middle socio-economic classes, whose opinions are influential in politics. Education may be expanded even when economic conditions do not warrant it.

ever, this measure may convert unemployment into underemployment.

Encouragement of Informal Sector: Even when the number and kinds of job opportunities offered by companies are not enough to satisfy all of those who are seeking jobs, it is always possible for them to create businesses of their own, which will create job opportunities for other people when they become profitable. Governments should take measures to support the informal sector such as the self-employed or small business because their social status is still low. Since self-employment calls for specially oriented programmes, governments should set policies on higher education for self-employment.

Measures to Decrease Labour Supply

Reduction of Population: Reduction of population growth through measures such as lowering the birth rate is the most basic social policy to decrease the labour supply, although such measures will yield results only after a long period.

Education Enrolment: Several ways to decrease enrolment quotas are described below, but all are difficult to implement because priority is given to factors other than economic theory in education policy. Also, reduction of enrolment quotas for higher education will make the competition in entrance examinations even more fierce and increase the unemployment of the upper secondary school graduates.

Control Over entrance quotas: To restrict the number of entrants by law, or to raise the accreditation standards for universities to restrict their expansion will serve to produce the number of graduates relevant to the amount of manpower demanded by the market and to improve the quality of education. In the ROK, college enrolment quotas have been set by government initiative by considering both manpower demand by industries and students' demand for higher education (social demand). However, there were many obstacles to overcome in setting an appropriate enrolment level capable of meeting simultaneously the need for manpower and students' demand. From one opinion survey, university teachers seemed to support the policy of reducing higher education student quotas.

Improvement of examination systems and increased fees: Social demand can be controlled by giving proper entrance examinations or raising fees closer to actual costs. Unrealistic tuition fees have resulted from heavy subsidies by government, and have motivated people to study more, thus increasing the demand for higher education. To remedy this problem, tuition fees should be raised to reflect the true cost of education, and to encourage the private sector to invest more in education. If such a policy is implemented, the gap between the social rate of return and the private rate of return will be decreased. However, since this is counter to the policy of equal opportunity in education, this measure must be accompanied by other measures to realize equal opportunity, such as improving the scholarship system.

Wage System: In the long run, the wage system should be a flexible one in which the conditions of the labour market can be reflected. This will result in cooling the zeal for higher education to create a system in which university graduates' wages are decreased when they are in oversupply. If wage gaps among workers with different educational levels are not widened too much, the unemployment of the highly educated will not be serious for a long period.

One of the reasons why unemployment of the highly educated is not a serious problem in Japan is that wages do not differ much according to occupation or educational background. Yet the problem of worker frustration caused by underemployment will continue to exist at the latent level. It is necessary to pay attention to this and to work out counter measures. In Japan, the supply and demand relationship of the labour force is well reflected in wages, and thus nonvoluntary unemployment caused by the rigidness of the wage system is seldom observed. This will continue to be true in Japan, where a majority of university graduates work in the private sector, so the supply and demand balance of the labour force is reflected properly in starting salaries.

The wages of government officials, which are set according to educational level in the present system, should particularly reflect labour market conditions, productivity, and social commitment of workers. Some recommendations are as follows: 1) upper secondary school graduates with five years of experience should be entitled to receive wages commensurate with the initial wage level of college graduates; 2) efforts should be made to narrow the existing wage gap between male and female workers; 3) policy priority should be given to reforming discriminative legal provisions and practices in hiring, wage setting, and promotion; and 4) reform and improve the personnel management and labour force management systems.

If wage gaps by educational level become too narrow and make people less inclined to complete higher education, each individual's desire for achievement, which has been considered to be a prime mover of national growth, will adversely affect economic development.

Adjustment of Labour Supply and Demand

The supply of and demand for labour are in imbalance in terms of quality and quantity. Although the unemployment of the highly educated is serious in general, pesonnel in certain professions such as medical doctors and system engineers are in undersupply. Or, in some cases, the quality of workers is not satisfactory although their quantity is. This aspect must be dealt with through enrichment of not only school education but also of other types of vocational training facilities.

Location of Educational Institutions : The distribution of highly edcuated people differs from one region to another in a country. Hence the supply of and demand for labour should take region specific factors into account to avoid a skewed form of distribution. The unemployment rate of the highly educated varies substantially depending on the region. Relocation of institutions of higher education, which are overly centralized in big cities, will serve to redistribute manpower. In making this adjustment, it is important for companies to hire graduates from universities in their regions. Employment agencies can also play an important role in easing this problem.

Occupation and Educational Level : Governments should set a corresponding pattern between occupation and educational level to restrict underemployment so that the trend of preferring higher credentials will be lessened. At the same time, a rule under which only a certain percentage of new employees can be hired from the same university should be made so that certain universities will not enjoy too much advantage in terms of the employment of their graduates.

Alteration of Perceptions : It is necessary to make students understand that the advantages of continuing to study are limited, and change the conventional image of university graduates through mass media and school education. Efforts must be made to improve present social attitudes towards skilled work. More social recognition and honour should be given to people who work for their communities rather than for status or money. Many students take general education courses only to secure white-collar jobs. In developing countries, even graduates who major in engineering want to be government officials and hestiate to work in factories or at construction sites. It is difficult to make them understand the fact that university graduates also have to take labour-oriented jobs, but some graduates do so, like it or not, because of underemployment. If such cases increase, it will gradually change the perceptions of the correspondence between job and educational level.

Career Guidance : The percentage of people who do not obtain appropriate jobs because of a lack of information is fairy large. Employment information and career guidance should be provided more extensively. Institutions of education and training should put more emphasis on career guidance to provide students with updated employment information. This will enable students to focus on the skills and knowledge required in their work in the future, and facilitate their decision making and realistic perceptions of employment possibilities. It is also necessary to expand employment exchange services at public institutions.

Education and Work : There is a gap between what is taught in schools and what is required in work, and it is necessary to develop measures to link the two. Educational institutions must make efforts in this regard. More emphasis should be placed on quality improvement, not on quantitative expansion of education, in development plans. The following are some policy issues to be considered in adjusting the gap.

Teaching vocational subjects at schools : The demands of society should be reflected in school education. Practical knowledge, useful skills, and techniques necessary in work should be taught at schools along with conventional subjects. To meet the needs of society it is necessary to design curricula in which work-related subjects, such as computer-related courses, are taught. Education through labour experience should also be offered, since this is an effective way of linking education and work in a visible manner (CERI, 1983).

Development of basic scholastic ability at school : Although vocationalization in education may ensure the generation of specific skills, it may still fail to reduce the mismatch between the type of skills generated and those required. It will always be difficult to bridge this gap through the formal educational system, because it takes a long period. The skills demanded change in their nature faster than they can be generated. Thus, schools should emphasize the development of basic skills and knowledge, no matter which courses students may take in future, leaving the specific skills and limited knowledge required in work to be acquired at the work place. The length of time people spend at the work place is far longer than that they spend at schools. Since technological innovation is advancing rapidly, education, especially up to the lower secondary level, should be basic knowledge-and study skills-oriented rather than oriented towards specific practical skills. This will help students acquire the ability to cope with changes in society. Even at upper secondary school or higher educational levels, the development of basic scholastic abilities necessary to pursue further study should be emphasized. This idea is prevalent in Japan in both

Communication

Towards a "World Budget"

The present tax systems of virtually all the countries in the world are extremely biased. They penalize the input of labour and capital, and they encourage resource depletion and environmental pollution. For instance, the tax volume of the OECD countries amounts to an average of 40 percent of aggregate gross national product; more than two-thirds of this comes from taxes on wages and income, trade and production. These taxes are levied within national borders and allocated through national budgets. There is not yet such a thing as a world budget in the real sense of the word. The 0.7—percent rule with respect to development assistance was conceived not as a global tax but rather as a voluntary commitment of the industrial countries—and, correspondingly, is not universally adhered to.

Taking the Brundtland Report's definition of "sustainable development" literally, it becomes immediately clear that the world economy is on a collision course with nature. Many products and technologies are not sustainable in the long run; environmental destruction is conditioned both by wealth and poverty, and international trade is by no means neutral towards the environment. Theoretically, continued growth in production is conceivable when the consumption of energy and raw materials are declining both in relative and absolute terms. Practically, however, these two possibilities run up against a wall of hard facts. Besides continued population growth, the major three are:

— debt: a development burden

— the balance of payment crisis: a perverted transfer of capital

— export pressure: an unfavourable forced sale

These facts produce a sort of economic-ecological vicious circle. The poor countries overuse their resource base and thereby their natural environment; the sale of raw materials on oversaturated markets leads to falling prices, which in turn reduces net proceeds, etc. Because of such conditions, appeals to protect the environment are ignored or even met with derision.

A further factor must be added to this. A large share of fossil fuels and minerals are produced in the developing countries. This production is often in and of itself extremely destructive to the environment. Processing of these raw materials, however, mainly takes place in the industrial countries; it is their technology and products that have been shaped by cheap energy and raw material prices for decades; and this specific history conditions the continuing high levels of energy and raw materials consumption.

Though there is in no case a fixed relationship between economic growth and the consumption of energy and raw materials, decoupling was never a real political objective; at best it just happened. Put another way: the energy and resource efficiency of the "industrial world model" is highly insufficient, it does not guarantee sustainable development.

The conflict between the industrial countries' ongoing economic growth and the developing countries undisputed need for growth on the one hand and the negative environmental effects of energy and raw material-intensive production on the other cannot be solved within the present framework. There is an under-supply of environmental quality as a public good, and there is an oversupply of environmental destruction as a public bad. No single factor has sufficient incentive or the chance to change the situation (the" free-rider problem" or "the prisoner's dilemma"). Basically, there are two alternatives available.

(a) international cooperation (*agreements and conventions*), (b) supra-national sanctions (*negative and positive incentives*).

With the "Montreal Protocol on Substances that Deplete the Ozone Layer", we have a model for cooperation by which a group of air pollutants (CFCs) is to be reduced in percentage terms through voluntary commitments (*quantity solution*). It is a notable model of global diplomacy because it enables decisions to be made in spite of insufficient evidence (motto: "Politics is good decisions on the basis of inadequate knowledge"). Without changes or improvements, however, this model can scarcely be imitated.

In the current negotiations on reducing carbon dioxide ("Climate Convention"), aimed at establishing (regionally

differentiated) agreements on emission per person (CO_2 in tons) or on maximum levels of concentration (CO_2 content of the atmosphere), an additional climate fund (*fund solution*) is envisaged. For this fund the industrial countries are to pay a charge on their CO_2 emissions (current emissions and/or accumulated emissions), and the funds raised shall be used to finance restructuring in the developing countries, especially in the area of energy (*charge solution*). For the actual implementation of a climate convention, a gradual procedure (supplementary protocols on other greenhouse gases), amendments (rain forest programme) and verification methods (monitoring) are being proposed.

While these proposals on a climate convention proceed and hopefully are brought to a good end by 1992, a world resource tax is not yet on the agenda. This situation of non-discussion must be overcome. What is the rationale of such a suggestion?

With the introduction of a *world resource tax*, i.e. a tax on the use of fossil fuels and on-renewable minerals, resources will be tied to the environmental damage caused by their use (*global polluter-pays-principle*), with the aim of a financial net transfer from the North to the South. In this way, the vicious circle between the resource depletion brought about by poverty in the developing countries and the waste of energy and raw materials in the industrial countries will be broken (*tax solution*).

A world resource tax offers at one and the same time incentives and sanctions through the induced changes in relative prices in the economy; incentives for developing efficient technologies and products and for using renewable resources, and sanctions against the existing energy- and raw material-intensive production structure. The tax can be, but need not be, levied and budgeted by a special agency (*ITF-International Taxation Fund*). The tax revenue should predominantly, not exclusively, be used to replace other taxes which directly or indirectly lead to environmental pollution and resource depletion. This world resource tax thus would lead to a change in thestructure of the tax system as well as to a net increase in tax revenue for the developing countries (*international resource transfer*).

A part of the funds raised from the resource tax could be used directly to reduce the debt burden of the developing countries. A certain linking of the funds to environmental protection activities or to the promotion of environmentally sound technologies would be conceivable, but might become unnecessary when the preventive ecological effects of the altered tax structure were strongly marked. To ease anticipated adaptation problems, the tax should be introduced in stages.

The object of taxation could be the entire *or* a limited number of the relevant non-renewable energy resources and raw materials. The second best solution would be the taxation of the internationally traded energy sources and raw materials. The tax rates must be high enough to induce a rapid and drastic decoupling between economic growth (GNP) and the consumption of energy and raw materials. The necessary volume of taxation, the various tax categories and the specific rates of taxation can only be speculated on here. Too little research has so far been invested in these questions. However, a fraction of the research activities devoted to a "reform of the world monetary system" would suffice to reach the necessary clarifications.

To solve the existing dilemma between environment and development, there are, as was shown, good reasons for introducing a world resource tax. A *tax solution*, however, requires the adherence to certain rules. The proposal can only work if there are sufficient incentives to encourage countries to follow it. For the *developing countries*, a particular incentive might be to end the ruinous exploitation of resources by achieving greater returns and a longer period of utilization on this natural capital. There would be higher costs for the *industrial countries*, but significant savings in the curative environmental protection activities; there would also be considerable technological innovation. For the *natural environment*, positive effects would immediately be noticeable. In sum, a world resource tax could set a positive-sum game in motion. A lot depends, however, on the details of its design and implementation.

An additional secondary factor is that the partial loss of national sovereignty (*tax autonomy*) associated with the proposal should be balanced by a simple levying and allocation mechanism and a clear verification procedure. To avoid unnecessary bureaucracy, a semi-automatic levying and allocation should be developed. This requires some serious scientific work as well as global diplomacy, and also—similarly to the "Montreal Protocol"—enough flexibility to allow for subsequent changes and improvements.

Udo E. Simonis
Professor, Science Centre Berlin
Reichpiatschufer 50,
D-1000 Berlin 30,

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The Organization: A Living Organism

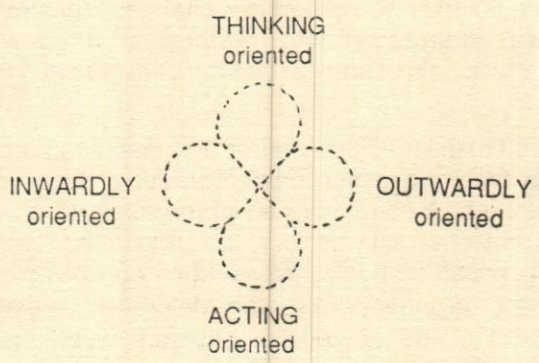
It is not quite common to think of processes of Organization Development in a qualitative sense. There exists many quantitative growth indicators: figures of turnover, profit, return on investment and all kinds of analytical ratios. And of course, these reflect aspects of realities. But they are not the reality: an organisation does not trade "figures". Reading the figures and knowing why there is something wrong calls for the quantitative judgement to be matched by a qualitative diagnosis. From there will emerge the proper direction for a renewing and not merely a number of alternative scenarios. This article provides a conceptual framework for qualitatively diagnosing one's own organisation (or part of it) and suggests ways and methods for conducting a renewing process on the basis there of.

Not so long ago, a major public-owned company in the Netherlands called in the help of a group of management consultants. The company was suffering from a number of problems, such as low standard of service, a lack of cost control and large scale organizational malfunctioning. In fact, the way of working had become rather bureaucratic: for example it took over one year for a client to have his address corrected on the bills he received. Furthermore the bills were often incorrect. For the clients it was hard to get a proper access to the organisation, even by telephone. Bills outstanding were of a huge amount. There were many levels of hierarchy, which all but paralysed its management. Internal communication was frustrated to a high degree, everybody wrote memos to everybody, hardly ever getting an appropriate answer. Small "kingdoms" were vigorously defended. This was done mainly by blaming everybody else when something had gone wrong. In their report, the consultants suggested to adopt a new legal structure and to switch from public-owned to privately-owned. This had become possible through a change in government legislation. Also a new organisation structure was proposed: fewer hierarchical levels, broader tasks and responsibilities for the employees. Furthermore a system of professional budgetting had to be introduced. In their advice however it was emphasized that the proposed measures alone would not solve the problem: because these problems were rooted in the thinking and acting of the employees, and in their attitude. And any so-called rational problem-analysis and problem-solving method would fail if they did not take this aspect into consideration. A plea was held to have the structural technocratic problem-solving approach accompanied by a process of renewing the employees' "way of thinking and acting", and their attitude. Because unless the abilities of the employees would increase, any organisation structure would at the best change the nature of the problem but not its underlying causes. And in their report they called among other things for 3 major changes in the company culture:

- act more client-oriented and improve the internal work-processes accordingly, on a very basic level
- encourage the initiative taking instead of only following orders and procedures
- increase the quality of internal communication and management.

These vital renewing aspects are of a qualitative nature. And the question arises how to manage this qualitative renewing process. But let's look at diagnosing the organisation qualitatively first: how to proceed? Here we introduce one possible way of approaching this question:

When looking at an organization from a qualitative point of view, a distinction can be made of two polarities, two sets of opposites. *Thinking oriented* and *acting oriented* on the one hand and *inwardly* and *outwardly oriented* on the other hand. Ideally these polarities are in constant dialogue so as to prevent a disequilibrium. But of course in day to day life, many factors threaten to disturb this equilibrium.



The dotted lines reflect the perpetual dialogue.

All these orientations are absolutely necessary in an organisation. You cannot do without them. The danger is only when one gets overemphasized and starts to structurally dominate the other.

The basic thought behind this concept is that an organization is a living organism because it is living in and through people. The organization as a whole has an identity and is most likely to move towards its destination when the dialogue between thinking oriented and acting oriented, and between inwardly oriented and outwardly oriented is kept alive and is as unhampered as possible.

Now what is this thinking and acting orientation? The level of thinking of an organization is, for instance, the level where goals and policy are formulated, handbook. These elements live in the realm of thinking. It is the world of ideas and plans. But how healthy this thinking is for actual day to day working processes of the people. Does this thinking support or complement the working process? Or does it work against reality? For example: are the rules, that exist, useful for and related to day to day practice? Are managers who are responsible for a department entitled to make their own purchases for this department in order that it can function well? Or do they have to ask permission every time they need to hire somebody or to buy an essential piece of equipment? The more rules, procedures and goals exist that do not support or complement the work in practice, the more the realm of thinking tends to become a sphere of its own: more reports, more plans, more perfect ideas, more measures to control which in the end have less to do with practice, but will nevertheless be imposed upon practice.

The people who design and complement this thinking more and more are often in the danger of drifting away from ordinary reality, practice, and start to manage on the basis of abstractions: reports and figures. They are no longer interested in reality, but only in their self-imagined world of thoughts. And the functioning of the organization becomes endangered. Theory starts to try and rule reality.

Now let's look at the counterpart of this polarity: The level of acting is the level of day to day activities: primary work-processes, selling, producing, but also the work of the supporting departments like personnel affairs. It is the realm of doing and acting. Of activity and dynamics. There the word goes: no talking, let's do something. Let's realize the mission of this organization here and now. And how healthy this realm of acting is, depends on its connection and dialogue with the realm of thinking: goals and policy. Because if the acting is not carried out in communication with other departments, chaos will increase. "I cannot buy a personal computer if I need one, when I do not take in to consideration the company's policy in this respect." "And I cannot make a special discount-deal with a client if this does not form a part of our pricing policy." The more the acting becomes an individual impulse-decision without taking into account the company policy, the more differentiated the company will become. And in the end it threatens to fall apart in various "kingdoms" who have less and less inner connection with each other. The living dialogue between thinking and acting depends on the mutual communication between exchange of views, vision and facts from practice. The quality of this communication depends on the skills of the people involved, but can be dramatically improved. And by bringing about this dialogue, the organisation can become more healthy: the lifestream of the organisation will connect the "top" and the "floor" of the organisation.

And what about the inwardly and outwardly orientation? The basic problem is the same. The organisation needs to be quite aware of its strength, skills, and of its uniqueness. It should be proud of what it has developed in the past, and is able to do now. If it really is unique in some important aspects of this work, then there lies its reason for being there, the justification of its existence. But this awareness of its uniqueness can be so strong that it turns into arrogance as an attitude, a monopolist's behaviour. The clients should go at great length to deserve the company's attention. And the client will do so, as long as he has found no real alternative. If he does find one, he will immediately turn his back on the company and work out alternatives himself, if pressed hard enough. When, therefore, the inward orientation is too strong, it neglects the real dialogue with the outside world, with the clients. It merely focusses on its hobbies and tries to perfect them, whether that is asked for or not. An example is an engineer who is constantly trying to improve his creation, let's assume a machine of some kind, even if this improving is not necessary and increases costs, and takes up a lot of time. And to this engineer, the client really is a nuisance. This client, does not understand his "creation", has all kinds of irrelevant requirements and even dares to ask for a simpler version ! All because of such a trivial thing as money ! Clearly this attitude will chase clients away as soon as they have an alternative. The dialogue with "the outside world" is neglected. The company only tries to press itself on the market without real interest in the client's questions and needs.

But the outward orientation means exactly this attention for the client's needs: marketing is the name of this game. What are the clients' needs ? What are the target groups? Strategic pricing means that the company is doing its utmost to be of service to its clients. To give them what they need and thereby making a healthy profit. But this orientation can also become one-sided: when a company

never says "no" to clients. When the company promises more than they can live up to! Then they no longer build on their strength but let themselves be seduced by clients to offer what they cannot do: too short delivery times, too low prices or a specially designed new product. They promised it out of fear to loose a client, but instead they loose themselves. When you try to be everything for everybody, you end up being nothing for nobody. So here also the dialogue, the attunement is important; between what the organisation stands for, its strength, and the needs of the client. And one-sidedness here destroys itself in the end. Too much emphasis on the *thinking* aspect and too little connection with practice leads to a theoretical approach of problems and many wrong decisions. In the end, for every problem new rules will be invented, which in turn evoke new problems. Too much emphasis on the *acting* aspect, on the "doing instead of talking" and too little connection with company policy leads to individual unpredictable decisions. The organization is confronted with the irrevocable consequences of this behaviour and chaos takes over. Too much emphasis on the *inward orientation* leads to people who are more busy with their hobbies, improving quality where it is not really asked for; striving for perfection. And clients will slowly stand up to turn their back on the company.

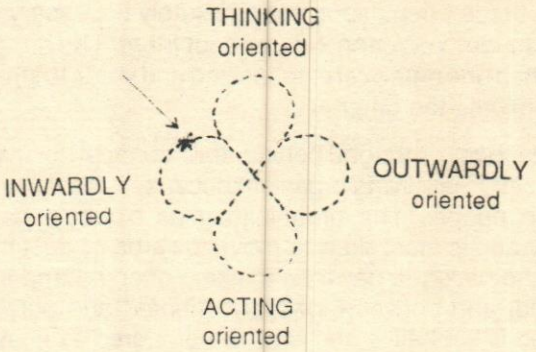
On the other side, too much emphasis on the *outward orientation* makes the company forget what it stands for and what it really is equipped to do. It starts to build on weakness rather than on strength, and will find itself doing what others can do better or refuse to do. The company will wear out its resources, its lifestream.

In the example of the energy-supplying company, the qualitative diagnosis turned out to be the following :

The emphasis as may be graphically seen was more thinking oriented and inwardly oriented than acting oriented and outwardly oriented. Mainly this was reflected in the fact that the customer had been lost out of sight, reflected in many aspects, and that problems had the tendency to drift upwards, so that only at the top, decisions had to be made and policy established. This reflected the general weakness of middle and lower management to make decisions and take initiatives for their own account. A sort of paralysis governed; managers became uncertain on what to do and chose, in case of doubt, to do nothing at all. Also top management for years did not recognise the symptoms and played the game along until the day they found their organisation paralysed.

Renewing yes, but how?

As can also be seen in medicine, diagnosing is the easiest part of curing. It is not sufficient to simply tell



management to become more client-oriented and to take more decisions and initiatives; you don't change an organisation culture by telling people to act differently, but top management itself must start to live up to it ! To be more precise: they must reward decision taking by middlemanagement and disapprove too much asking for advice. Even if in the eyes of top management the decision was not the best possible : don't go for perfectionism; that would be disastrous, because people's self confidence will be hurt. No wonder a top manager would have taken a better decision: therefore he is no middle-manager but a top manager. The proper question here is: is the decision good enough? Or if mistakes were made: have we all learned from it? Because if we did, we gained from it: people's capabilities have increased, however, little. No mistakes: no learning ! And fear for mistakes is one of the biggest threats to corporate success.

Furthermore, top management has to reward all decisions that improve the client-orientation of the company as well as serve the company's own interest. But how exactly to achieve this, they must leave this question to the middlemanagers: they have to be made responsibile for implementing these new policies and design action programmes. So top management should stop doing the job for them, and instead create conditions, take a standpoint where the qualitative emphasis should be and evaluate the actions from a point of view of learning.

A useful means to bring these ideas to life in the lower regions of the organisation, where in the end the new behaviour has to come to life, can be to organise working conferences of at least two hierarchical levels together. The theme of this example is client-orientation. The question is: how to substantially improve this in the next 12 months. And the goal of the conference: at the end of the conference a set of actions has been agreed upon the people have been made responsible for them. And agreement has been reached on when and how to evaluate them. Working this way, the process of stimulating decision-making lower in the oganisation automatically takes place.

To describe however how to proceed in such working conferences could be the contents of yet another article. Let me just say here that a training and organisation department can play an important role here, but always in cooperation with top management.

Renewing an organisation really comes down to renewing the skills of people, from top to bottom, to refresh all patterns of thinking, judging and acting, to improve knowledge and skills and to refresh people's attitude. But it should be realised that those who do so can only achieve this by demonstrating the new attitude in their own behaviour.

Some of the people we, as NPI Consultants, meet during our consultancy are conspicuous not by their words, but by their deeds. Mr Van der Kooi* is one of these. In his capacity as manager in charge he created a cultural breakthrough. He guided people in such a way that they were challenged to think about their work and shape the future from that viewpoint. In this interview he illustrates his methods.

"I wanted to develop a dynamic company, where people would no longer have to ask themselves which procedures they should follow. The work had to be client-oriented, so that every employee would ask himself: "How can I assist this client in the best way?" My employees had to grow accustomed to this way of thinking. Someone would sit and look at me and ask himself: "Isn't that what Van der Kooi is for?" But it doesn't work that way. I said: "In a year's time you will be the new manager and then you will have to know how to deal with the situation yourself, and how to solve the problems." A company only works well if the people who work there have insight into the complete organisation.

Everything was centralised, there were many different Central departments. When I arrived here the blueprint for decentralisation was ready. Four new "client-friendly" offices would be established. As far as I am concerned you can be as client-friendly as you like as long as it doesn't cost any money. What is important to me is that the employees should ask themselves: "How can I assist this client in the best way?"

My first step was to recruit four new managers, one for each office. I was looking for people who were prepared to make changes, and who were specifically interested in client-contact. These people were each responsible for a specific office. With this group, we worked out everything that takes place in the office, the primary process. We made a list of all the processes that take place: what happens at the reception desk, what happens when people move, what happens during an inspection. They had to work this out for themselves. Since they had to look at this so closely, they also realised where improvements could be made. That was an important turning-point. This method provided the insight which later enabled them to distinguish important from less important matters. Then we had to look for a location. I asked the four managers to do this themselves. They all got on their bikes and when they found something they thought suitable, they took care of the details. This gave them the feeling that they had built the new office with their own hands.

In the next phase, we asked all the co-workers which office they would prefer. In this way everyone knew six months ahead of time to which office they would go. Afterwards they became aware of which colleagues would be going where. Then I asked the NPI for their support of the teams created in this way. Ferd got them to start their own planning. They saw the future as a "black hole". This changed, the people were challenged to make an inventory of things which still had to be done before the office could be opened.

The rest of the organisation did not understand this kind of change. I was in the process of dismantling a number of procedures, and the Accounts Department would have preferred to have it all in black-and-white. This created tension. Probably I gave the impression of being self-willed, but I did not want them to bother me with all kinds of formal matters. Fortunately I could soon produce results. From one day to the next, the number of complaints decreased significantly. We had a large number of accounts outstanding with customers amounting to about Df 1 60 million. This has been reduced to a mere Df1 15 million. Work is being done more efficiently, the staff numbers have been reduced by 15%. My reply to the departments was by way of showing them these figures.

The problem is now that people who said three years ago "Do I have to go to that office?" cannot be budged from it now. I have continually encouraged them to accept their responsibilities. I have been consistent in this point of view. In this way their fear of the "black hole" disappeared and people discovered: "Hey, I can make my own decisions".

Ferd van Koolwijk,
Senior Consultant NPI,
Institute voor Organisatie Ontwikkeling
Valekenbosehlaan,
Postbus 299, 3700, AG Zeist
Holland

□

* Ir A. van der Kooi, Bedrijfsdirecteur sector Verbruikerserelaties, NV Gemeenschappelijke Energiebedrijf Zuid-Holland West. (Company Director User Relations Sector, United Energy Company, South Holland)

R.A.P: A Reverse Approach to Strategic Objectives

Accomplishing the strategic objectives within an organization is essential to obtaining and sustaining competitive advantage. Many organizations conduct massive campaigns directed to this end. And more often than not, they are disappointed by the lack of results. One reason organizations don't reach these goals can be stated in the following paradox: They don't reach their goals because they focus their attention on reaching them. But, what else can they do? A more effective approach is a reverse one: to focus their attention on removing the *barriers* to the goals. This is accomplished through R.A.P.

The letters R.A.P. represent three concepts: Restraining Forces, Alignment, and Principles. They are the antithesis of the driving forces reflected in most strategic initiatives. R.A.P. is the key to effective, long-term organizational change, whether it is directed towards quality, productivity, or anything else. An example will help illustrate:

If someone wanted to make a higher quality car—one that is more fuel efficient, faster, more powerful, smoother, etc., they could approach the task in two different ways. First, they could work on such things as bigger, more powerful engines, higher octane fuels, improved transmissions, and so forth. They could simply develop a larger, more powerful machine.

But this is only part of the problem. By considering only these factors, they would be working only on those things which *drive* towards what they want. The other half of the problem consists of restraining forces —things which keep the car from being more fuel efficient, from travelling at higher speeds, and from having more power in the first place. By asking the questions:

- "What are the restraints?"
- "Why won't it go faster?"
- "Why doesn't it run more smoothly?"
- "Why isn't it more fuel efficient?"
- "Why isn't it more powerful?"

A totally different class of items are identified. These are the *restraining forces*. Some restraining forces related to the car might be:

- wind resistance
- overall weight
- friction

By focussing on and reducing or eliminating these restraining forces, the original car—with the same engine, the same fuel, and the same transmission—will achieve much of what was wanted in the better car.

If, for example, leaders want to improve quality in their organization—not just as a passing fad, but as a serious undertaking—they usually develop and implement a series of *strategic initiatives*-programs, campaigns, training, workshops, slogans, statistical controls and various measurement methods. Through these initiatives they might achieve a degree of what they are after. But they often miss the larger success they had targeted. The reason they don't achieve the higher success is because they focus their attention on the *strategic initiatives*—the driving forces—to achieve their goals. And in doing so they miss the power of the R.A.P. reverse approach.

Two Sides of the Equation:

There are two sides to any problem: driving forces and restraining forces. As much progress can be made by reducing restraining forces as by increasing driving forces. Often more. Yet, the tendency is to focus only on the driving forces and "make it happen", instead of on the restraining forces which "let it happen".

Reducing restraining forces generally requires one to balance or align the various factors involved. For example, the engine must be aligned with the size and weight of the automobile. The fuel must be appropriate for the engine. The aerodynamics must be designed according to the other components of the automobile and the environment in which it operates. Quality components that are mismatched do not produce quality results. Everything must be aligned.

The key to balancing or aligning the various components is an understanding of the underlying principles involved. For example, some of the underlying principles in building a better automobile center around the science of physics. These include items such as:

- aerodynamics
- mechanical engineering
- combustion engines
- chemical fuels
- construction materials

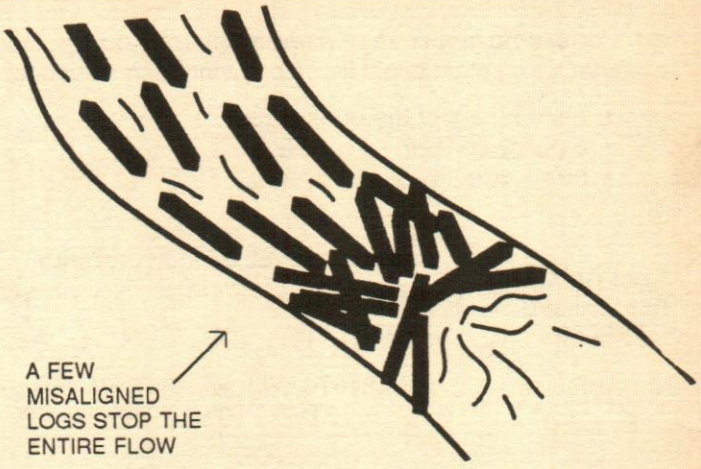
By understanding the underlying principles of these sciences, one could align the various components and thus significantly reduce the restraining forces. By doing so, even the driving forces would have a greater and longer lasting effect.

These three items, Restraining Forces, Alignment and Principles (R.A.P.), can help accomplish strategic objectives throughout an organization. As stated earlier, one of the reasons organizations don't reach their goals is because they focus their attention on reaching their goals. Instead they could focus their attention on removing the restraining forces. And, if an organization succeeds at reducing or eliminating the restraining forces, then fewer driving forces are required to achieve the desired goals. But here's the catch:

> **Restraining forces are usually found in the misalignments of the various parts of the organization. And *restraining forces* and *misalignments* can be found and removed only by understanding and applying basic fundamental principles of human and organizational interaction.**

I once heard a story about a group of novice loggers in the northwest part of the U.S.A. As they were attempting to guide a flotilla of logs down the water way, some of the logs became jammed. As more logs hit the small jam, they too began to back up. In order to get the logs moving again, the novice loggers began to throw logs over the top of the jam. But it was hopeless. More and more logs kept piling up quicker than they could clear them. Fortunately, an experienced logger came to the rescue. He quickly identified the original logs that were causing the jam. He then skillfully realigned the jammed logs so that they broke free. Almost immediately the whole jam broke free and the logs began to float smoothly down the river again. The problem was not in all the logs; it was only in those few that were misaligned and had caused the jam in the first place. When they were realigned, everything worked better.

Similarly, by identifying the primary restraining forces in organizations—those forces which are resisting efforts to change—and realigning them so that they are moving towards the objectives rather than hindering them, the objectives can be achieved much more easily. And the results will be more permanent.



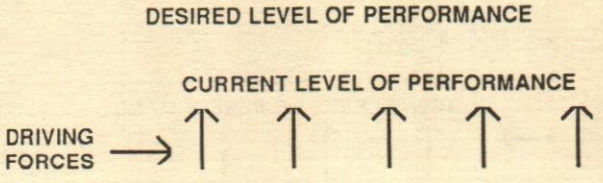
If the restraining forces are not removed or reduced, increasing the driving forces won't work, or will *at best* produce only temporary improvement.

Restraining forces are *symptoms* of misalignments. And misalignments are almost always the result of violated principles. Once the underlying principles are understood, they can be used to better align everything and thus reduce or even remove the restraining forces.

Restraining Forces

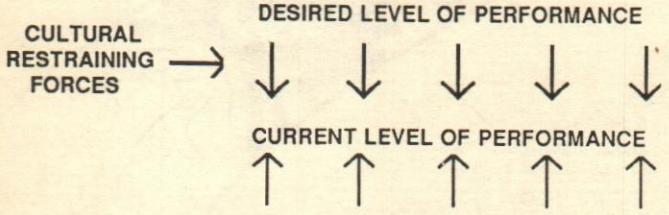
In any organization there usually exists a desired level of performance towards which the organization is moving, be it quality, productivity, or something else. There is also a current level of performance—where the organization is now. Most strategic objectives are attempts to move the organization from the current level of performance to the desired level of performance. In order to make this move, executives usually develop and implement strategic initiatives or driving forces. These might involve policies, procedures, promotions, training, programs, etc. Driving forces usually cost money, are logical, rational, sequential, and so forth.

As these change efforts are initated, they are greeted by a counter action of restraining forces. These restraining forces tend to be illogical, irrational, emotional, and centred around attitudes, assumptions, and paradigms of people within the ogranization. Thus, we refer to them as *cultural restraining forces.*



For example, a change effort to improve quality at a manufacturing plant might involve driving forces such as:

- a statement of the quality goal
- a policy concerning quality
- new inspection techniques



- the introduction of new procedures and processes
- training to teach the new procedures and processes
- programs and campaigns to encourage quality performance

And so forth.

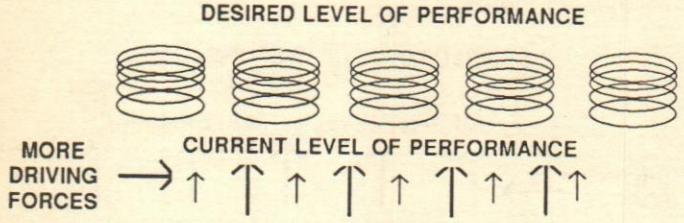
These might be met by a set of restraining forces. These restraining forces might include:

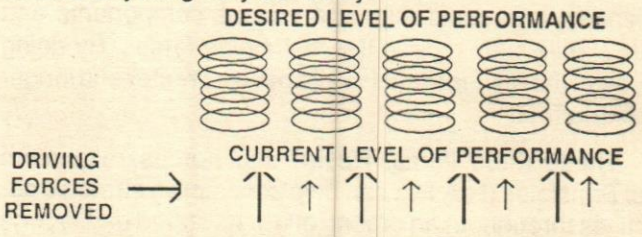
- general resistance to change
- feelings that performance is adequate
- fear of having to learn new processes
- general resistance to training
- lack of trust between people
- fear of high demands being made

And so forth. When the driving forces meet the restraining forces, progress is slowed down or even stopped. When this happens, a normal reaction of management is to *add more driving forces*—to try to force the performance to a higher level. By sustaining enough driving forces over a sufficient period of time, the performance level can often be raised. However, restraining forces (when they are not specifically addressed) do not disappear. Instead, they tend to recoil like springs. Still, continual driving will compress them even further.

When progress towards the desired level is thought to be sufficient, management accepts it as "good enough". Then they redeploy the driving forces toward a new strategic initiative. When this happens, the recoiled restraining forces rebound and performance drops back to where it was before.

This process is then repeated on a new initiative. The results are temporary, short-term improvements—and the cynicism that comes from programs that have no long term effect. A significant side result is that employees begin to doubt that any program is going to make a difference. They believe that if they endure it for the short term the program will be replaced by another one. They have little motivation to take anything very seriously.





Thus, identifying restraining forces and taking action to reduce or remove them is the key to significant, permanent, long term change in an organization.

An organization must look specifically for restraining forces if it is to begin the process of reducing or eliminating them. This can best be done by looking for areas that are out of alignment.

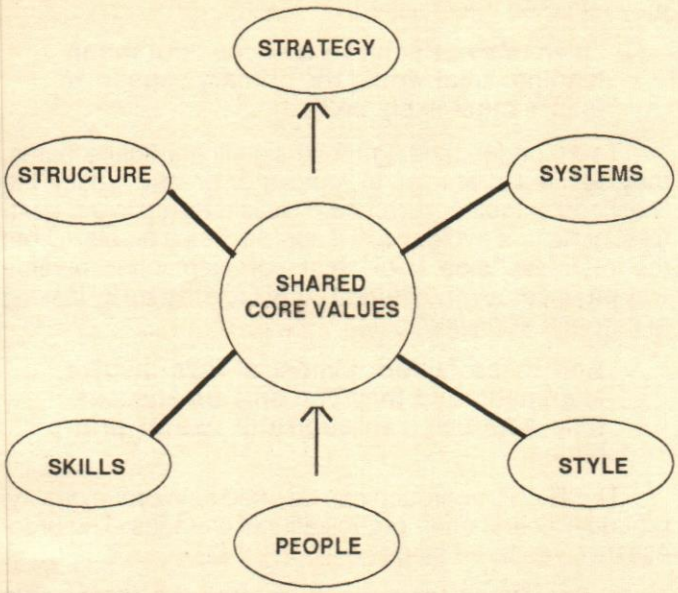
Alignment

Alignment is the key to finding, reducing, and eliminating restraining forces. Going back to the log jam analogy, the reason the logs jammed in the first place was the misalignment of a few of the logs. Similarly, cultural restraining forces, by themselves, are only symptoms of misalignments within the organization. Multitudes of potential misalignments exist in every organization. However, most of them can be understood by looking at the six following potential misalignments.

The key here is whether or not the various components of the organization—the strategy, the structure, the systems, the styles, skills, people, and so forth—are aligned with the central mission or values of the organization. If they are, then the primary restraining forces, dissonance and misalignment, can be eliminated. And this is done only by understanding and correcting violated principles. Working only on the surface with techniques and practices seldom eliminates the problems.

The primary anchor for alignment is the core values of the organization. If an organization has no core values, or if these values are not sufficiently shared, then alignment around them will be diffiicult. Thus, a prerequisite to organizational alignment is to assure that the core organizational values exist and are widely shared within the organization. With core values as an anchor, we can look at the six key alignments.

The first is STRATEGY. The key question to ask is



"Does the strategy reflect the values of the organization?" If it does not, then there will be a log jam there. A second possible misalignment is the STRUCTURE—the way people are organized to work together. "Does the organizational structure help embody the values that the organization holds?" A third is the SYSTEMS. The recruiting, the promoting, the compensation, the decision making process, etc. are all part of the systems. "Do they reflect and help embody and support the values of the organization?" SKILLS, STYLES, and PEOPLE can also be checked against the core values in the same way.

Of course, alignment among the outer factors is also necessary. (STRUCTURE with SYSTEMS, SKILLS with STYLES, etc.) But, if each is aligned to the values of the organization, then there is a great likelihood that each will also be aligned with the others.

Principles

As restraining forces are symptoms of misalignments, so misalignments are usually the result of violated principles. Without going all the way to principles, attempts at correcting misalignments are dependent upon crude trial and error, hit and miss methods. The use of principles takes one quickly to the heart of the problem and its solution. For example, as the logs float down the river, they act according to basic physical laws of nature. A certain turn in the river will cause the logs to move in one way. Outgrowths of vegetation, shallow water, rocks etc; will cause the logs to move in another way. By understanding this, one can predict where and how the logs might jam and take action to prevent it. If we try to get them to go down the river knowing that the water is moving in a certain way and that there are obstacles, then we would be going against basic principles or laws of nature. But these basic principles or laws will work for us as well as against us if we understand and use them. For example, we could remove some of the barriers, we could keep the logs moving straight, or we could move them only when the water is high. We might even choose a different water way—whatever it takes to assure that the principles are working for us instead of against us.

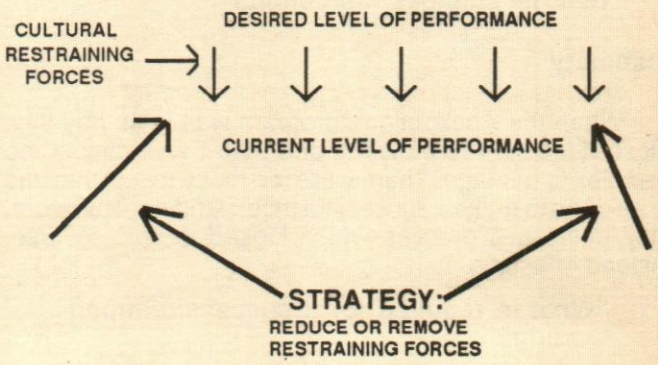
> **When the focus of an organization is on practices and techniques rather than on understanding and using fundamental principles, it is like applying more driving forces rather than removing the misaligned restraining forces. It doesn't work.**

The Japanese use a concept called "going straight around the circle". This means to set the goals and then, rather than working directly at achieving them, identify the main restraining forces—things that are interfering with the achievement of the goals—and focus the strategy on reducing or eliminating those restraints. This approach allows an organization to not only achieve the goals with less effort, but also helps ensure that the achievement will be more permanent, even when the driving forces are removed or redeployed to another initiative. It's a way of achieving the goal by not focusing on it. And it is at the heart of accomplishing the desired strategic objectives.

Four Levels of Implementation

Principles have the power to transform organizations. But, in order to have such an impact, principles must operate at four levels. The first and foundational level is that of *personal.* The personal qualities that lead to an effective organization are centered around trustworthiness. Competency is one aspect of trustworthiness. But there are many other aspects as well. Good interpersonal relationships are often the most important reflection of trustworthiness. Faulty of flawed relationships often constitute the most significant restraining forces in an organization.

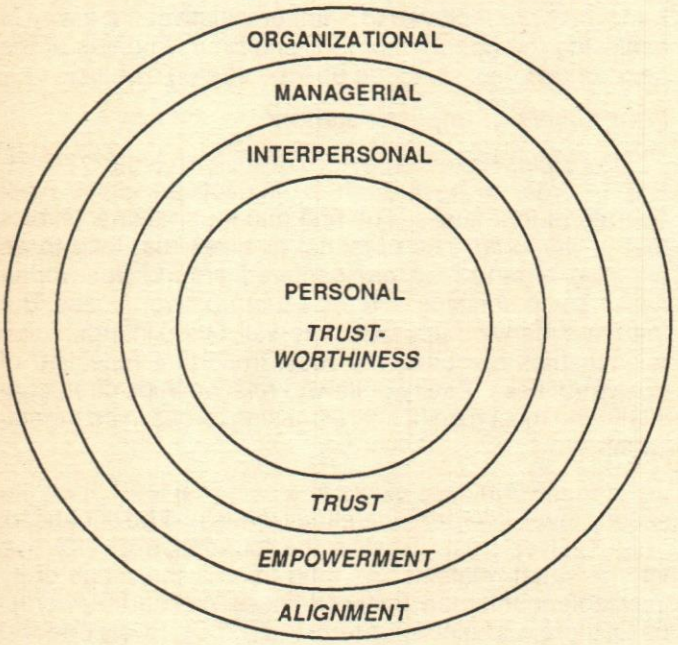
If trustworthiness exists at a personal level, then the second level, *interpersonal* effectiveness will be enhanced. This involves trust. Trust is the foundation of effective interpersonal relationships, and trust is the result of its inevitable counterpart, trustworthiness. Without trustworthiness, there will be no long-term trust. Thus, levels one and two are inseparably connected together.



These first two levels of effectiveness lead to the third level, that of *managerial* effectiveness. Managerial effectiveness is based on the principle of empowerment. Because true managerial empowerment must be based on trust and trustworthiness, this third level of application is tied directly to the first two.

At the final level, *organizational*, the key to effectiveness is alignment. Going back to the alignment diagram, if the various components of an organization are aligned with the values, then they will most likely be aligned with each other. Alignment, in and of itself, will help significantly to reduce many of the restraining forces.

If organizational intervention does not occur at all four of these levels, including organizational alignment, the results may be an even higher level of frustration, disappointment, and disillusionment among people, and may even result in greater restraints. If the organization does not support the changes taking place in individuals and work groups, there is little chance that the changes will continue.



Summary

When the Apollo moon program was in its hay day, those directing the project found that it was almost too complex to manage. There were too many things that had to be done to make a successful moon landing. Therefore, they devised a process which looked at it in reverse. Instead of asking :

"What is required for a successful moon landing?"

they reversed it and asked :

"If we do not achieve a successful moon landing, what would the primary causes of failure most likely be?"

Then, understanding those significant failure paths, they devised strategies to remove or greatly reduce the likelihood of their occurrence. This is referred to as "fault-free" or "failure avoidance". It approaches a problem from the "restraints" side. Looking at a problem in this reverse way produces a very different set of factors than by looking at it from the "driving" side.

And these factors almost always involve alignment, and they can only be successfully addressed through the use of principles.

The R.A.P. approach can be used to improve quality, productivity and other organizational changes. The process involves three steps :

1. **Determine the primary restraining forces that are interfering with the achievement of the strategic objectives. These are the *symptoms* of underlying misalignments.**
2. **Identify the key misalignments. This is most easily done by checking the key factors of strategy, structure, systems, people, skills, and style against the core values of the organization. Only when the key misalignments are discovered can the next step be taken.**
3. **Repair the misalignments through the use of principle-based processes at all four levels. Because misalignments are almost always caused by violated principles, learning correct principles will empower people at all levels of an organization to correct the misalignments and reduce the restraints. But to be effective, the principles must be implemented at the personal, interpersonal, managerial, and organizational levels.**

Implementing the R.A.P. philosophy in an organization accomplishes what removing the jammed logs accomplished for the loggers; misalignments are corrected, restraining forces are reduced, fewer driving forces are required, and the goals of quality, productivity, and other desired strategic objectives are more easily and permanently achieved.

D.H. (Dee) Groberg
Director (Int'l Programme)
Covey Leadership Centre
3507, North University Avenu
Suite 100, Provo,
Utah 84604, USA.

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Indian Tea Industry: Strategic Implications for 90's

V.S. Pai

This paper analyses the tea industry in the country with particular emphasis on its performance during the 80's and the implications for the 90's. The stress has been on the area of production and marketing. The problem of quantity versus quality has been investigated. Besides, the issue of how to step up exports keeping in mind the continued increase in domestic demand has also been studied. Suitable remedial measures have also been put forth to help evolve an appropriate strategy for the 90's.

V.S. Pai is Assistant Professor in the Deptt. of Commerce, Manipur University. Imphal 795001.

Tea came to India in the year 1779 through a consignment of tea seeds from China. Sir John Banks foresaw the possibilities and potential of this new crop in the subcontinent. His pioneering effort brought Indian tea to the London Market and thus into the international areas of the tea market. In 1839 the Assam Tea Co. came into existence and since then India has been dominating the production and market in this product.

The Indian tea industry has come a long way and today it enjoys a multitude of firsts-India's largest organised agro industry, India's largest organised employer (estimated work force 1.1 million), India's largest consistent exporter (export in 1989 was Rs. 800 crores in an overseas offtake of 210 million kgs.) and India's most highly taxed industry (average rate of all India taxation over 65 per cent in 1989-90). (Dalal Street Journal, Vol. 5, 1990).

Production of Tea

Ever since the planting of tea in India, its production has by and large maintained an upward trend. From about 321.0 million kg. in 1960, it rose to 419.0 M.kg. in 1970 and further to 569.2 M. kg. in 1980 and finally reached the 700 m. kg. mark in 1988 (table 1). If the 8th Plan Working Group's projections are any thing to go by, then India will

Table 1. Production and Retention of Tea (million kg).

Year (A)	Production (B)	Retention (C)	(C) as a %age of (B) (D)
1960	321.0	128.0	39.9
1970	419.0	222.5	53.1
1980	569.2	346.0	60.8
1981	560.4	319.4	57.0
1982	560.6	370.6	66.4
1983	581.5	373.0	64.1
1984	639.9	423.0	66.1
1985	656.2	442.2	67.2
1986	624.8	421.8	67.5
1987	674.3	465.1	69.0
1988	701.0	479.5	68.4
1989	684.0	461.0	67.4

Source : The Economic Times, 'Mid-week Review', July 26, 1990, p.1.

be producing nearly 900. M. kg. of tea by the middle of 1990. (table 2).

Table 2. Target Production of 8th Plan Working Group

(million kgs)

Year	Production
1990-91	770
1991-92	800
1992-93	832
1993-94	866
1994-95	900

India, unlike many of the new tea producing nations who have ample resources of virgin soil available for growing tea, has to rely heavily on better farm management. While area under tea cultivation has gone up by only 8.4 per cent over the last decade, tea production during the same period has grown by 20 per cent. But as further land available for tea plantation is increasingly becoming difficult, the only alternative is to raise production by improved farming and agricultural practices, infilling and replantation of old, low yielding areas. There is an urgent need to develop tea plantations in non-traditional areas. However, the results so far in this area have not been satisfactory.

It is an important point to note that, though the national yield per hectare at present is 1600 kg, the variation from region to region is extremely high. Average productivity is as low as 495 kg. in Kurseong sub-division of Darjeeling while it is more than 2600 kg. in Coimbatore district of Tamil Nadu. In fact the yield has exceeded the 3000 kg. per hectare mark in certain areas of Tamil Nadu. Further, a review of the Indian tea industry reveals that nearly 52 percent of India's tea bushes are over 40 years old and another 25 per cent are over 65 years old (table 3). This adversely affects productivity. Scientific management of young gardens is extremely necessary, keeping in mind the projection of demand over the years. A conscientious planter can uproot and replant an old area (productivity 1,500 kg. per hectare) and can hope to regain the previous yield in the 3rd year of planting, reaching 5000 kg. in the next 5 years by following the Toklai Package practice. But unfortunately it is not being implemented.

Table 3. Age wise Distribution of Tea Bushes 1990

Years	Percentage
Below 5Years	06.3
5-10 Years	08.5
11-20 Years	11.4
21-30 Years	12.6
31-40 Years	09.2
41-50 Years	08.1
Over 50Years	43.9

Source : The Economic Times, 'Mid-week Review', July 26, 1990, p. 2.

In general, it has been found that South Indian Tea estates are performing much better. During the past 3 decades area under tea cultivation has been around 77,000 hectares which has remained constant whereas production has risen from around 115 M. kg. in 1958 to 178 M. kg in 1988. This has primarily been achieved through a better management of pesticides,improved agricultural practices, colonal planting and polycolonal seeds, as also increased mechanisation.

Over the years the consumption of this favourite beverage has outplaced the growth in production by a wide margin. The growing mis-match between demand and supply has accentuated over the years. It gathered momentum during 1989 when output plunged to 684 M.kg compared to 701 M. kg. during the previous year, while the target was around 720 M. kg. Further, it has been observed that even a slight setback in a year can have a disastrous effect on prices. Every year an additional output of 15-20 M. kg. is required to maintain the same level of consumption. During the past 30 years, tea output had grown only at 2.5 per cent annually as against a 4.5 per cent growth in consumption during the same period.

By the turn of the century it is projected that demand for Indian tea will be approx 1100 M. kg. and the present land under tea cultivation is a little over 4,00,000 hectares. This is bound to bring about a severe demand-supply imbalance. This situation has to be proactively met. Land originally allotted to the tea sector under the Tea Grant was reclaimed by various states under the aegis of the land ceiling Acts with the intention of distribution to the poor and landless. As a result, land available for tea plantation was considerably reduced. Now there is an urgent need for a multi pronged approach to tackle the situation before it takes the form of a crisis.

An attempt was made to correlate the retention of tea for domestic consumption with the total production of tea. The underlying idea was to find out whether the domestic retention was dependent or not on the total production. The correlation coefficient was + 0.937 which indicates a high degree of positive correlation i.e. domestic consumption of tea had a direct link with the production of tea. Increase in production is most likely to bring about increase in consumption. Hence, if the objective is to increase or even maintain the present level of exports, measures will have to be taken to make popular substitutes for tea.

To further clarify this fact the 't' test was done and the calculated value of 't' was found to be18 degrees of freedom and at 0.05 level of significance.

Table 4. Exports of Tea

(million kg)

Year	Volume	Value (Rs. Crores)	Unit Value (Rs./kg.)
1960	193.0	120.0	6.2
1970	196.5	140.0	7.1
1980	224.0	229.0	10.2
1981	241.0	434.0	18.0
1982	190.0	355.6	18.7
1983	208.5	516.8	24.8
1984	216.9	740.5	34.1
1985	214.0	695.0	32.5
1986	203.0	590.0	29.1
1987	209.2	638.8	30.5
1988	221.5	645.0	29.3
1989	223.0	800.0	35.9

Ref : The Eco. Times, Mid-week Review, July 26, 1990, p. 1.

Marketing of Tea

India's share in the world market of tea has been steadily shrinking down to approximately 22% currently, (table 5) compared to 28% in 1976, 33% in 1966, 45% in 1956 and a dominant 49% in 1946. However, even now with a 35.7% share in the total world area under tea cultivation, 29.6% share in the total world production and 22% in the total world export of tea, India is still the leader. The reasons for the overall decline in India's tea exports are :

1. India is the only country where excise duty is levied on tea.
2. The domestic consumption of tea in India has been rising steadily and it is drunk by all sections of the population.

Table 5. World Demand for Tea and Indias' share in it

(in million kgs)

Year	World Imports	Actual Indian Exports	Actual share %	Share at 23%	Share at 25%	Share at 27%
1981-82	826	224	27.1			
1982-83	844	194	23.0			
1983-84	862	202	23.4			
1984-85	880	217	24.7			
1985-86	898	214	23.8			
1986-87	916	196	21.4			
1987-88	934	208	22.3			
1988-89	952	220	23.1			
1989-90	970	210		223	243	262
1990-91	988			227	247	267
1991-92	1006			231	252	272
1992-93	1024			236	256	276
1993-94	1042			240	261	281
1994-95	1060			244	265	286

Source : Kumar Narendra, "Initiatives in the context of 8th Plan and Emerging Challenges", Economic Times Survey of Tea Industry 1990, p. 7.

3. Inspite of 'friendly relationship' with third world countries they are not willing to buy Indian tea owing to high price differential for example, Sri Lankan tea is priced lower up to Rs. 7 per kg.
4. Lack of awareness amongst the international consumers about the quality of Indian tea. Only recently the Darjeeling logo has been properly advertised in the international media.
5. Nothing is being done to determine the factors responsible for loss of market share over the years to competitors and to evolve strategies to recapture the same.
6. Excessive paperwork and too much interference by the bureaucrats has become quite an irksome practice.
7. There is no clear-cut export policy and as a result exporters fail to decipher whether to rely on quality, getting more revenue even at the cost of loosing market share or on quantity, to maintain and improve market share by selling inferior teas.

Tea exports also suffer from a handicap compared to others, in as much as there is no cash compensatory support or duty drawback on export of tea similar to other commodities. Export of tea is now becoming more and more competitive and except for some markets like Russia, where bilateral trade agreements are finalised at the government levels, it requires intensive marketing efforts. Countries like Sri Lanka, Kenya, Indonesia and others are offering intense competition to our tea and in order to enable our industry to maintain and augment its share of the export market, it would be necessary to allow suitable benefits in the form of cash compensatory support and duty drawback, etc. (Economic Times Survey of Tea Industry, 1990).

Viewing the increasing domestic demand and also the enhanced export pressures, there is definitely an inherent contradiction and the immediate solution will be to look at total export earnings in terms of hundreds of crores of rupees worth of foreign exchange earned, rather than the quantum of weight of tea exported. In other words, the Government and the producers should put much greater stress on value-added high quality expensive tea so that we can earn Rs. 700 to Rs. 800 crores of rupees by exporting even less than 200 million kgs. This is being suggested only as an interim step, till the long term planning increases the overall production (Dalal Street Journal 1990)

On the whole, the task indeed is to get people to prefer Indian tea and pay a higher price. The West Asian countries have the potential. A well-designed promotional

campaign should be started in these markets. The economies of East European Countries are undergoing changes. It is quite likely that our value-added tea will have good prospects in these markets too. The tea industry must gear itself before the western multi-national companies get in. The Soviet market is also experiencing change and appropriate promotional strategies for this market have to be devised. Japan is another country which should be given attention, though at the moment they may be in the high value low volume market (The Economic Times, Mid-week Review, July 1990).

An attempt was made to correlate the Indian exports of tea with the world imports demand. The basic idea was to establish whether the world imports demand was dependent or not on the Indian exports of tea. The correlation coefficient was + 0.809 which indicates a high degree of positive correlation i.e. world imports demand had a direct link with the Indian exports of tea. Implying that if the export of Indian tea is increased it will certainly be absorbed by the tea importing countries, provided of course, other factors like price, quality etc. are maintained.

To further clarify this fact the 't' test was done and the calculated value of 't' was found to be 40.27 which is much higher than the table value of 't' at 16 degrees of freedom and at 0.05 level of significance.

Research and Development

The tea industry has kept up sustained R & D efforts and that is why we continue to be world leaders with regard to production and quality of tea. However, the quantum of money spent and the quality of research done is still far from satisfactory.

Through R & D inputs the industry has learnt better methods, of soil utilization, pruning, shading, irrigation and drainage, etc. The major organisations doing research in this area are the Tea Research Association (TRA) in North India and United Planters Association of South India (UPASI-TRI). The total amount of money spent on tea research by these co-operative organisations during the last 5 years is given in table 6.

In developed countries, on an average, industries spend more than one per cent of their sales turnover on R & D. In India, in the early seventies private industries used to spend about 0.1 per cent of sales turnover on R & D. With the incentives given by the government for R & D through income tax benefits, the situation has changed considerably during the last two decades. Towards the end of the eighties expenditure in this area of private industries represented nearly 0.7 per cent of sales turnover.

Table 6. Expenditure on Tea Reserch.

(Rs. in lakhs)

Agnecy	1984-85	1985-86	1986-87	1987-88	1988-89
TRA	242	341	326	378	403
UPASI	40	44	45	64	59
Total	282	385	371	442	462

Source : The Economic Times, Survey of Tea Industry 1990, p. 34.

It is rather unfortunate that the total expenditure on R & D for the tea industry, which has a turnover of nearly Rs. 2,800 crores pa., has been of the order of only Rs. 5 to 6 crores. Thus, tea industry's R & D expenditure has increased from 0.1 per cent to 0.2 per cent in two decades. It may be interesting to mention at this juncture that while the tea industry earns foreign exchange to the order of Rs. 700 crores per year, contribution to its R & D from the State exchequer is of the order of only Rs. 1.5 crores in a year.

Conclusion

It is very satisfying to find that the price of tea in the domestic market has been reasonably stable as compared to other commodities. It has been observed that between 1983 and 1989, the price of tea went up by only 22 per cent, whereas the prices of wheat, Dal and Rice went up by 48 per cent, 118 per cent and 28 per cent respectively. However, compared to the tea sold by some of the other tea exporting countries our tea prices in the international market are relatively higher and hence we have lost many of our earlier customers or at least their share of purchase has considerably reduced.

Both the industry management and the Government have to arrive at a consensus regarding the production and export of tea. R & D has to be improved as it is of vital importance. Better calibre scientists have to be encouraged to join this profession by giving them more attractive pay and promotional avenues. Advertisement at the international level has to be undertaken more vigurously and more areas have to be brought under the cultivation of tea. The heavy burden of tax (nearly 83 per cent in case of Assam) has to be reduced to make price more competitive.

A proactive approach can see India continue to be the leading producer and exporter of tea in the years to come, selling tea not only at reasonably competitive prices but also maintaining the quality would be important. Dilly-dallying in initiating and implementing action can bring about a situation which will be neither conducive to the industry nor desirable for the nation.

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Industry Review

Computer Peripherals Industry in India: Storage Devices

Directorate General of Technical Development

During recent years office automation has been undergoing massive changes and improvements across the world. India has also been witnessing major changes in this sector. In this report, the existing technology in the computer peripherals has been studied in terms of quality 0f design and manufacturing techniques vis-a-vis the present international scenario. Technology gaps has been identified so that the long term and short term technology goals for upgradation can be arrived at. This is the second installment in the series.

Excerpts from a recent Report by the DGTD.

FLOPPY DISK DRIVES

IBM developed most of the basic technology used in flexible disk drives but has failed to introduce a successful new floppy drive since the 2 sided 8 inch drive brought out in 1976. In 1985 IBM announced that it would phase out production of floppy drives but production has continued at a low level. In the late 1970s, Shugart shrank IBM's original technology down to 5.25 inch format. The floppy formats which have created the most impact in recent years are the NTT's. 1.6 MB version of the 5.25 inch drive and Sony's 3.5 inch micro floppy. IBM endorsed both these products through its use in its products. Recently the leading edge in floppy drive innovation has shifted to two areas : Decreasing height and increasing capacity. The vertical form factor for the newest 3.5 inch drives has decreased to 0.75 inch, spurred by the requirement of notebook and laptop system producers while production has commenced for drives with capacities in excess of 20 MB.

International Scenario

Table 1 gives the world wide net (non-captive) ship-

Table 1. Floppy Disk Drives : 1988 World wide Net Shipments ('000)

Company	Mini Floppy Drives (5.25")	Micro Floppy Drives (3.5")	Total Floppy Drives	%
Sony	—	4344	4344	13.65
Matsushita	2767	1378	4145	13.02
Mitsubishi	1655	1770	3425	10.76
Teac	2255	785	3040	9.55
Alps	1300	1360	2660	8.35
Seiko-Epson	850	1040	1890	5.94
Toshiba	692	1131	1823	5.72
Y-E Data	1150	590	1740	5.47
NEC	691	792	1483	4.66
Citizen	—	1120	1120	3.52
Chinon	910	—	910	2.85
Mitsumi	800	—	800	2.51
Fujitsu	727	—	727	2.28
Canon	525	—	525	1.65
Other mfrs	984	2212	3196	10.07
Total	15306	16522	31828	100.00

ments of Floppy disk drives by various manufacturers in 1988. Figure 1 gives the changing world trends vis-a-vis product mix. Table 2 gives the projected worldwide demand for various sizes of floppy drives.

Table 2. Projected world wide Demand for Size of Floppy Drives

Qty. in Mn. Nos.
Value in US $ Mn.

Category	1990		1991		1992	
	Qty	Value	Qty	Value	Qty	Value
8 "Drives	0.14	61	0.07	29	0.03	13
5.25 "Drives	12.00	851	10.00	660	8.00	512
3.5 "Drives	25.00	1512	28.00	1616	31.00	1695
>5 MB Dr.	0.22	99	0.42	124	0.82	170
Total	37.50	2523	38.50	2429	40.00	2400

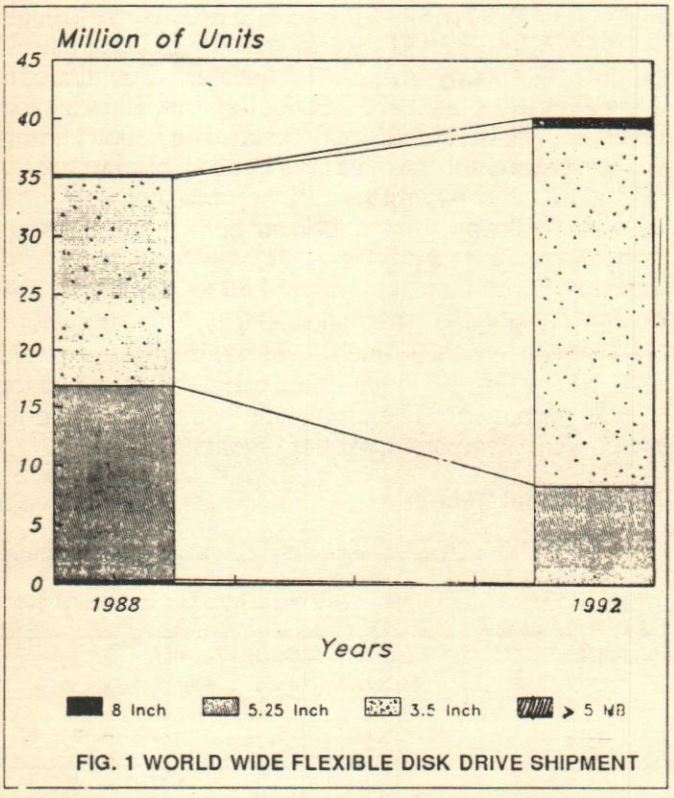


FIG. 1 WORLD WIDE FLEXIBLE DISK DRIVE SHIPMENT

8 "drive is expected to be almost phased out by 1992. 5.25" drives are expected to decline at an average rate of 16% per year in the 1989-92 period. This rate of decline is not as severe as might be expected for most disk drives which have been superseded by newer technology. It also reflects IBM's inability to arbitarily change the industry's direction in personal computers on a short notice. Even though the current shipment levels for high capacity floppy drives over 5 MB are weak, high growth rates are expected for this product group as new 3.5 inch drives become available.

Indian Scenario

Demand for floppy disk drives during the next five year period 1990-91 to 1994-95 is forecast based on computer systems expected to be manufactured during this period.

All figures in Nos.*

	1990-91	1991-92	1992-93	1993-94	1994-95
For use in computers of all types	120,000	165,000	210,000	300,000	400,000

* Demand projections & growth rates projected here may be influenced by the degree of success of ET & T initiated low cost PC project.

During 1989-90, the demand for floppy drives was approximately 90,000 nos. Of this requirement, local manufacture accounted for roughly 65,000 nos. The balance quantity of 25,000 nos. was imported into the country.

Major manufacturers of floppy drives in India are :

Company	Collaborator
L & T	Y-E Data, Japan
Mitgart	—
Sujata	TEAC, Japan
Satya	Omex, USA
Tandon	Tandon, USA

So far, the market was predominantly for the 5.25 inch drives. But in the coming years, there will be a distinct trend of moving towards micro-floppy drives with a 3.5 inch form factor. This is because of the fact that the world trend is towards micro-floppy drives. In addition, 3.5 inch floppy drives offer the following advantages :

— Lower power consumption
— Fully covered media & hence more protected
— Smaller footprint of the machine
— Higher capacity

It is expected that the demand for 3.5 inch drives would grow significantly in about a year's time from now. Selected companies have already started offering computer systems with 3.5 inch drives. Some other companies offer this product against customer's request.

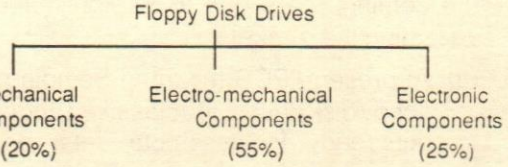
Local production of media for 3.5 inch drives is expected to reach reasonable volumes in another year and this will also spur increased usage of 3.5 inch drives. As of date, there are no local manufacturers of 3.5 inch drives. It is understood that major manufacturers have plans to introduce 3.5 inch floppy drives by mid-1991. Standardisation also seems to have taken place in the 3.5 inch drive arena, the most commonly used models having capacities of 2 MB Unformatted (1.44 MB formatted capacity). Another off-shoot of the 3.5 inch drives is the slim height

drives. While conventional 3.5 inch drives have a height of 1 inch, the slim line drive have a height of 0.7 inches. These drives are positioned keeping in mind the laptop markets. As of date, there is hardly any market in India for laptop computers. It is felt that the market for laptop computers may develop after another two years. From this point of view, the demand for slim-line drives is expected to build-up only after another three to four years.

Localisation & Indigenisation of Components

Floppy disk drives are essentially electro-mechanical products. Given below is a cost break-up of components going into a floppy drive :

Percentage Material Cost break-up of Floppy Disk Drives



As can be seen from above chart, electromechanical components account for major portion of the cost of Floppy drives. Electromechanical components consist of the following items :

- — Stepper motor
- — Spindle motor (DC Micromotor)
- — Read/write head/element

Extensive indigenisation has already taken place. The only major imported components are the electromechanical components in addition to Integrated circuits. Imports are taking place because these components are not manufactured by the local component sector. Though at first glance it appears that substantial indigenisation has not taken place, it is not true. This is because these components form a major portion of the drive cost (typically 50% of the CIF value of the drive).

World over, these components are standard bought out items and except for some select companies, no peripheral manufacturer manufactures these components. It would just not be economically viable for an Indian manufacturer to vertically integrate his production to manufacture these components, which really belong to the component sector of the electronics industry.

Pricing : International vs Local

Table below gives a comparison of international prices with respect to the prevailing local prices.

Size	Capacity	Local Price at OEM Qty.*	Intl. Price at OEM qty.*
5.25"	0.5 MB	Rs. 1700-1900	US $ 44#
	1.6 MB	Rs. 2100-2300	US $ 54#
3.5"	1.5/2.0 MB	—	US $ 60#

*OEM quantity of 1000 nos. is considered here.

These prices are based on current Yen-Dollar parity rates.

From the above, it could be seen that the price of locally manufactured FDDs are quite comparable to international prices if we adjust for the 'Import duty factor'.

However, it should be mentioned here that the above achievement is despite the heavy burden of higher input cost in local materials/components as enumerated below.

Higher Material Input costs

A table given below indicates the prices of raw materials and components in the Indian market as against their international prices.

Commodity	Ratio of Local Price to International Price
Steel	1.5 times
ABS-Plastic	1.85 times
Plain acetals/Nylon	1.67 times
SAN (Acrylic)	1.63 times
Aluminium	2 times
2 layer PCBs	2.10 times
Locally procured passive, and active electronic components such as diodes, SMD components, ICs & the like	2 to 2.5 times

Unfavourable Econmies of Scale

Compared to international manufacturers, volumes of peripherals that we manufacture in India are lower by an order of 50 to 100. Due to lower volumes, we cannot get raw materials and components at rates similar to what is obtained by international manufacturers. This results in increased cost of the product.

From the experience of a manufacturer, the typical amortisation costs specially for tools are as follows :

For 5.25" FDD :

Total Tooling Cost	: Rs. 80 Lacs
Amortisation period	: 2 Years
Quantity over which tooling cost is amortised	: 15,000 Nos.
Amortisation burden per drive	: Rs. 533/-

For 3.5" FDD :

Estimated tooling cost	: Rs. 50 Lacs
Amortisation period	: 2 Years
Quantity over which tooling cost is amortised	: 60,000 Nos.
Amortisation burden per drive	: Rs. 83/-

* The quantities have been arrived based on the following assumptions :

- Quantities for the years 1991-92 & 1992-93 totals to approx. 450,000 nos.
- There would be a total of 4 serious players sharing the above market equally.
- 3.5" drives will account for roughly 55% of the above market, the balance being catered to by 5.25" drives.

From the above it is clear that quantities play a very major role in the cost of floppy disk drive. In case of world players, this amortisation burden becomes insignificant in view of their quantities being several orders higher than ours.

High cost of capital

Cost of capital is yet another important factor in increasing the product cost. While Japan has an interest rate of 4-6%, Singapore 6-8%, and USA 8-10%, Indian rates of interest are around 16-18%. Further, inventory holding in India for electronics industry is generally high which ties down expensive working capital.

Higher raw material & component inventory holdings can be attributed to two main factors:

1. Inordinate delays on the part of Government agencies in issue of licences, opening L/Cs, Customs Clearances and the like.
2. Refusal on part of overseas suppliers to supply small quantities.

Inadequate development of component sector

Component sector is not well developed leading to import of key components such as stepper motor, drive motor, read/write/erase heads, SMD components, Integrated circuits etc.

Goals and Strategies

Keeping in mind the growth potential of this industry, we would like to recommend the following:

1. Adequate licence capacity already exists to meet the country s requirement. Licensing of new manufacturers will only cause further splintering of capacities thereby leading to uneconomic scales of operations and adversely affecting cost of production and selling prices. Hence better strategy would be to encourage existing units to increase production volumes. If required, genuine manufacturers may be licenced judiciously keeping the above factor in mind.
2. No fresh approvals for foreign collaboration be given for 5.25 inch drives and existing units should be encouraged to go for manufacture of 3.5 inch drives thereby optimising utilisation of installed capacity. Existing 5.25" drive manufacturers can cater to the export niche markets which will exist in the coming years due to foreign manufacturers vaccating the markets.
3. (a) At present, PCB mounted Spindle motors for floppy disk drives, are classified under the head "kits/ready to assemble sets, assemblies, modules and combination thereof consisting of electronic items (excluding those mentioned elsewhere in the policy.)" - Appendiix II Part B item 176 of the Import Export policy 1990-93.

   As of now these motors are not manufactured in India so all our requirements have to be imported from foreign suppliers. Therefore it is suggested that "PCB Mounted Integrated Spindle Motors for Floppy Disc Drives and Hard DISC DRIVE" be specifically included in OGL-Appendix 6, List 8.

Such an amendment will not alter the scope of Item 176 of Appendix II Part B, as the entries listed elsewhere are specifically excluded therein. At the same time this would benefit the manufacturers of HDDs, FDDs and by way of simplified and a speedier procedure for import of their requirements of these items.

(b) "Magnetic Heads" are allowed to be imported under OGL. {Appendix 6 List 8 Part I Item 786 (10}. As a measure of introducing clarity, it is recommended that this entry be modified to the following :

"Magnetic heads including those used in Floppy disk drives, Hard disk drives and Cartridge tape drives with or without flexible PCB assembly."

Further, it is proposed that the components required for manufacture of these items be allowed for imports at a nominal duty of 10%. This will provide the manufacturers a necessary incentive to indigenise the carriage assembly and would result in net foreign exchange savings for the country.

To reduce foreign exchange outflow, the degree of indigenisation in the industry should be pushed up faster by encouraging existing companies & other independent component manufacturers to produce :

- Stepper motors
- Drive motors
- Read write elements

To give a shot in the arm for such a thrust, the following is recommended.

A. Capital Goods required for manufacture of these components, as listed below, be included in OGL and a specific Notification be issued to allow the import of these equipment at a concessional duty of 25%.

List of Capital Goods required for manufacture of spindle/stepper motors Read/Write head assembly :

a. Adhesive dispenser for magnet and rotor hub assembly.
b. Rotor magnetizing equipment,
c. Motor assembly fixure for soldering of stator core pin and assembly,
d. Automatic coil winding machine for tiny electrical assemblies,
e. Stator core pin insertion machine along with air press,
f. Shield plate crimping machine,
g. Automatic Test Equipment for testing Torque/Spee characteristic and measurement of stepping angle,
h. Pulley fixing machine,
i. Electric Screw Drives,
j. Coil turn tester,
k. Azimuth microscope with magnifying power upto 4000, with/without video monitor display,
l. UV glue curing machine,
m. Tester set for aligning head carriage,
n. LCR meter with/without interface for automatic testing,
o. Spring testing machine for tiny springs with/without spring pressure amplifier &
p. Die bonding machine for lead wires.

B. Critical components needed for manufacture of stepper motors, drive/spindle motors (as enumerated in the Table given below) and read/write head elements be allowed at a concessional rate of duty say 10% for a period of 3 years.

Parts/sub-assemblies for Spindle motor and Stepper motor

Description	Chapter	Notification	Current duty rate (%)
Rotor Hub	84.73	349/86	60
Magnet	84.73	349/86	60
Spindle Assembly	84.73	349/86	60
Stator core	84.73	349/86	60
Stator coil/windings	85.04.31	-	155
ICs	85.41	91/89	80
Rotor assy/laminations	84.73	349/86	60
Former	85.04.31	-	155
End flanges	84.73	349/86	60
Connectors	85.36.69	91/89	80
Surface mount components			
Other fabricated plastic/ metallic parts unique for spindle/stepper motors.	84.73	349/86	60

This duty can be revised upwards thereafter. There will be two spin offs due to this :

(a) Independent manufacturers of such products would come up. Thereby country also acquires technology for manufacture of such products.

(b) Net saving in foreign exchange outgo, which is the national requirement at this hour.

5. Indigenisation of select electronic components particularly Integrated Circuits, chip mount components. Since GOI has separately appointed committee to look into development of Microelectronics and that the policy pronouncements are expected shortly, this is not being dealt with here.

6. Development of critical technology : All the major components that are imported have the following common-link:**"MAGNETICS".** It is necessarty that a national agency be setup for developing magnetics technology as applied to the computer peripheral industry, in India. This will reduce dependence on imports as also enable us to develop our own products based on indigenously developed components.

7. A major thrust should be given to export of floppy disk drives.

HARD DISK DRIVES

Hard disk drives represent the most rapidly growing segment of the Computer peripherals market and are also among the most difficult ones to manufacture in terms of technology and processes involved. Hard disk drives are essentially random access memory storage devices and typically come in capacities ranging from 20 MB to 600 MB. There are of course high end drives with capacities going

upto 1 GB. Though they come in different frame sizes, the most commonly and popularly used HDDs come in 3.5 inch and 5.25 inch form factors. 3.5 inch drives generally have capacities in the range of 20 to 150 MB and 5.25 inch drives from 20 to 600 MB.

The percentages of world wide shipments of hard disk drives of various capacities, projected for 1992 for various applications are given in table 3.

International Scenerio

Ever since IBM introduced the first hard magnetic disk drives, drive technology has continually been improved by contributions from other firms as well as IBM. Until recently, IBM contributions have been outstripped by a legion of aggressive competitors, especially in the area of small diameter drives. 1989 product introductions have seen a resurgence in innovations such as IBM's 320 Megabyte 3.5 inch drive, with more to follow shortly.

Major players in the international arena are as listed in Tables 4. Figure 2 depicts the changing world trends vis-

Table 3 would hide shipments of hard disk Drives

Application area	<60 MB	60-100 MB	100-300 MB
Mainframe/Supermini General Purpose	-	-	0.1
Minicomputers and Multiuser Micro	2.8	6.0	30.5
Personal Computers	87.3	83.4	47.8
Office Systems & Workstations	2.5	4.1	1.8
Non-office systems like technical, CAD, medical, process controls etc.	5.4	6.0	19.5
Cunsumer & Hobby Computers	1.8	0.4	0.2
Others	0.2	0.1	0.1
Total (%)	100.0	100.0	100.0

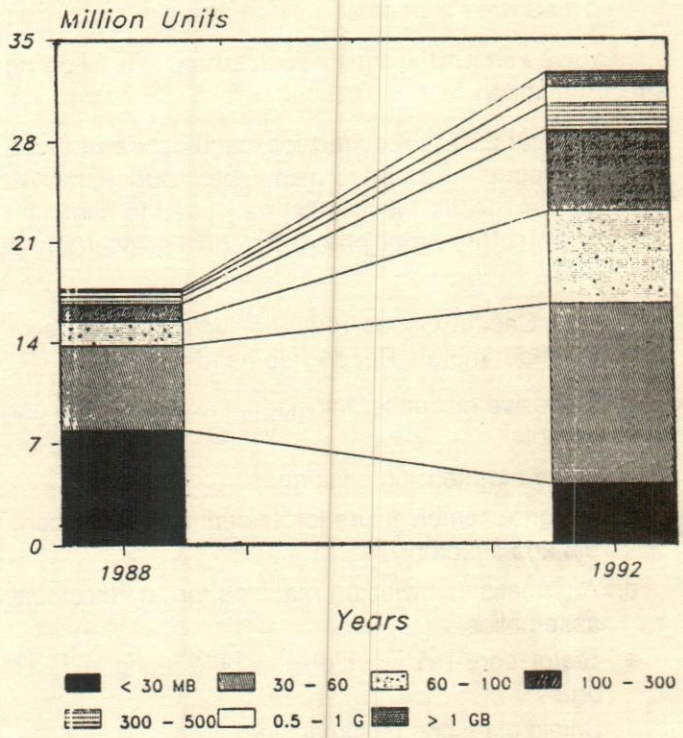


FIG. 2 WORLDWIDE HDD SHIPMENT

Table 4. Worldwide Net Shipments of Hard Drives (.000 Units)

Company	Less than 60 MB (1989) Total Production	% Share of Mkt.	5.25"	3.5"	60 MB to 100 MB (1988) Total Production	% Share of Mkt.	5.25"	3.5"	100 MB to 300 MB (1988) Total Production	% Share of Mkt.
Seagate	5,500	42.88	396	—	396	36.3	224	5	229	26.9
Miniscribe	1,900	14.81	104	—	104	9.6	—	—	—	—
Western Digital	1,205	9.40	—	—	—	—	—	—	—	—
Conner Peripherals	1,054	8.22	—	—	—	—	—	77	77	9.0
NEC	700	5.46	—	—	—	—	—	—	—	—
Kyocera	436	3.40	—	—	—	—	—	—	—	—
Microscience	350	2.73	34	—	34	3.1	—	—	—	—
JVC	243	1.89	—	—	—	—	—	—	—	—
Fujitsu	200	1.56	58	—	58	5.3	24	5	29	3.4
Rodime	181	8.23	—	—	—	—	43	19	62	7.2
Micropolis	—	—	173	—	173	15.9	171	—	171	20.0
Quantum	—	—	130	21	151	13.9	—	—	—	—
Prima	—	—	53	—	53	4.8	27	—	27	3.2
Maxtor	—	—	—	—	—	—	156	4	160	18.8
Hitachi	—	—	—	—	—	—	43	—	43	5.0
Others	1,056	8.23	92	29	121	11.1	56	1	57	6.5
Total	12,825	100.00	1,040	50	1,090	100.0	744	111	855	100.0

a-vis product mix. Table 5 gives the projected world-wide demand for various capacities of hard disk drives.

Table 5 Projected world-wide Demand for Hard Disk Drive.

Qty. in Mn. Nos. & Value in US $ Mn.

Category	1990		1991		1992	
	Qty.	Value	Qty.	Value	Qty.	Value
<30 MB	6.1	1385	5.2	1083	4.1	801
30-60 MB	10.0	3365	11.4	3574	12.4	3570
60-100 MB	3.4	2157	4.9	2785	6.5	3348
100-300 MB	2.8	2842	4.0	3608	5.6	4556
300-500 MB	1.2	2805	1.5	2914	1.8	3025
500-1 GB	0.7	4120	0.9	3826	1.1	3399
>1 GB	0.5	10037	0.7	12556	1.1	13535
Total	24.7	26711	28.6	30346	32.6	32234

The tide has now turned unfavourably for the very low-end hard disk drives which provided so much of the industry's growth in unit shipments for several years. Shipments of hard disk drives of less than 30 MB peaked in 1988 at 7.9 Million and are expected to decline to 4 million in 1972. The main application for low end drives is the personal computer markets and while there is enough overall growth in PCs to sustain significant shipments for this group, higher capacity drives are faring better due to greater software complexity and heightened user sophistication. Other groups of hard drives are expected to continue a healthy growth pattern through 1992. In 1989, shipment leadership passed to the 30-60 MB range stimulated by rapidly growing sales of 286/386 personal computers. This product group is expected to remain the largest of all groups in unit shipment with 12.4 Million forecasted for 1992. Underlying the growth in total shipments for all the product groups below 500 MB is the vitality of the industry's 3.5 inch product lines. Within these capacity levels, 3.5 inch will have captured the lead in all product groups by 1992.

However, it should not forgotten that high end drives provide a major part of the industry's revenue–with drives over 500 MB expected to generate over half of the total revenues through 1992 and almost half of the total drive capacity shipped during the same period. In these product groups, 5.25 inch drives will be the shipment leaders within a few years and a by-product of that development will be the slower revenue growth due to the lower average prices the smaller drives will command.

Another important aspect to be considered is the falling OEM prices for drives. The prices of 20, 40 and 80 MB drives seems to have more or less hardened whereas substantial drop in prices is well on the cards for drives with higher capacity.

The third important phenomenon taking place in the industry is the replacement of 5.25 inch form factor drives with the 3.5 inch form factor drives. The main advantages of using 3.5 inch drives are as follows :

- Lower power consumption
- Higher reliability
- Lower foot print space/cubic space requirement
- Much more lighter

Concomitantly, these drives are replacing 5.25 inch drives in areas like personal computing, laptops, medical instrumentation, process control & industrial instruments and the like. As of date, 3.5 inch disk drives are about 10% more expensive compared to their 5.25 inch counterparts but it is only a matter of time before 3.5 inch drives are available at prices equal to or lower than 5.25 inch drives with similar capacities. From the point of view of manufacturing, 3.5 inch drives are more difficult and sophisticated. Mechanical components call for more critical tolerances compared to those of 5.25 inch drives. The printed circuit board of a typical 5.25 inch drive normally uses leaded components but the 3.5 inch drive PCBs use surface mount components. Concomitantly, the power requirement is lower, space occupied is less and the drive has a higher reliability.

Indian Scenario

Demand for Hard disk drives are expected from the following quarters

a. Growth of micro/minicomputer market segment
b. Advent of laptop computers
c. Upgradation and replacement of older drives.

Growth of Micro/Mini Computer market : Annual growth rate of this segment is expected to be over 30% upto the year 1991-92 and then expected to stabilise at 25%. Also, stuff ratio of microcomputers will increase from 0.8 to 0.9 and this will lead to an increased demand for Hard disk drives.

Advent of Laptop computers : It is possible though not in the near future, a new market for the 20 MB 3.5 inch drive will be created by the advent of the laptop computers. It is expected that the laptop computer/notebook computer will become increasingly popular and soon find its way into the home computer segment. Demand for laptops will grow at a much higher rate than that for mini & microcomputers in the corresponding years. After another five to seven years, one would expect that 20 MB drive would be replaced by a 40 MB drive thus leading to a declining usage of 20 MB drives.

Upgradation and replacement for older drives : Microcomputers made their entry into the Indian market only after

1982. Even during the period 1982-86, most of the computers sold in the Indian market had a configuration of 2 floppy drives or one floppy drive and a 5/10 MB winchester drive. Assuming that 5/10 MB drives are on road to obsolescence and that a typical drive would have a working life of 6 to 7 years, one would expect all these drives to come up for replacement over the next 3 to 4 years. This will also contribute to an increased demand for hard disk drives.

Taking into consideration all the above mentioned factors, the Indian demand for hard disk drives over the next five years is as given in table 6.

Table-6. Projected Indian Demand for Hard Disk Drives

Capacity	90-91	91-92	92-93	93-94	94-95
– 20 MB	32	26	22	18	15
– 40 MB	33	55	73	86	95
– 80 MB	7	14	25	46	84
> 80 MB	6	9	12	20	35
Total	78	104	132	169	229

Department of Electronics has projected a requirement (in value terms) of Rs. 620 Crores for the Eighth Plan Period 1990-91 to 1994-95. As of date, there are no local manufacturers of Hard disk drives and the entire requirement of the country is met by imports. It is hence absolutely necessary that Government encourages companies with good track record that are willing to take up manufacture of this product so that the country can save valuable foreign exchange.

Localisation of Components

Hard disk drive is essentially an electro-mechanical product. Some of the major components going into a hard disk drive are as follows :

- Rigid platter
- Spindle motor
- Stepper motor/Voice coil actuator
- Read/Write head element
- SMD electronic components

As can be seen, none of the above components are manufactured by the local component industry and hence would have to be imported till such time local component industry comes of age. As already mentioned in the report on floppy drives, these components have a common thread linking them and that is "Magnetics". There is hence all the more reason that Government starts thinking of setting up an institution for doing basic/applied research on magnetics. May be a formation of "CENTER FOR DEVELOPMENT OF ADVANCED MAGNETICS (CAMAG)". It is only then that we can shake off our shackles from imports and start our own product development. This in turn will help reduce the foreign exchange outflow.

Goals and Strategies

Keeping in mind the growth potential of this industry, we would like to suggest the following :

1. Since the entire requirement of the country is met by imports, it is absolutely necessary that Government encourages local manufacture of the product. Import of technology is imperative. The hard disk technology is predominantly American and the technology is held close to the chest. It is indeed very difficult to get a reputed collaborator and all the more difficult to get state-of-the-art product. Government should bear these points in mind while granting foreign collaboration approvals.

2. At present the foreign exchange drain on account of total imports of hard disk drives is enormous. It is necessary to encourage competent manufacturers with proven track record to get into manufacture of Hard disk drives with appropriate foreign know-how and without loss of further time. To accelerate the process of local production Government should even consider permitting import of sealed units (HDA or bubble) in the first year consistent with healthy Phased Manufacturing Programme (PMP) requirements.

3. (i) The product is high tech. & manufacture is capital intensive. It is suggested that number of licenses/foreign colloboration that may be granted should be some what selective & restictive to avoid splintering of capacities leading to uneconomic scales of operations.

   (ii) Internationally the 40 MB capacity model is the most demanded product in volume terms as of now & it is expected to be so atleast for next 3 to 4 years before a large shift takes place towards 80 MB capacity drives. The Indian trend is also expected to follow the same. The Committee felt during the deliberations on 18-05-90 that 80 MB capacity model is a difficult proposition as far as manufacturing complexities go, viz. yield rates, Taxing learning curves etc. Moreover there is an increasing tendency to adopt Voice coil technology for capacities of 80

MB and upwards to offer faster access times & the technology is not easily obtainable as of now. Hence it was recommended that any foreign colloboration proposal should necessarily be for 40 MB, and inclusion of 80 MB at this stage should not be insisted upon. However it is desirable that Indian manufacturers seek foreign colloboration from companies having 80 MB capacity drives in their range and whose technology can be transferred at a later date.

4. The trend all over the world is to go in for 3.5 inch format drives for lower capacities (upto 80 MB) and 5.25 inch drives for capacity higher than 80 MB. Government, in principle, should not grant approvals for manufacture of 5.25 inch drives for capacities less than 80 MB. In case this is not followed, country would only end up expending foreign exchange for acquiring near obsolete 5.25 inch technology. This needs to be avoided at all costs.

5. (a) At present, PCB mounted Spindle motors for floppy disk drives, are classified under the head "kits/ready to assemble sets, assemblies, modules and combination thereof consisting of electronic items (excluding those mentioned elsewhere in the policy.)".–Appendix II Part B Item 176 of the Import Export policy 1990-93.

   As of now these motors are not manufactured in India so all our requirements have to be imported from foreign suppliers. Therefore it is suggested that "PCB MOUNTED INTEGRATED SPINDLE MOTORS FOR FLOPPY DISC DRIVES AND HARD DISC DRIVES ." be specifically included in OGL-Appendix 6, List 8.

   (b) "Magnetic Heads" are allowed to be imported under OGL. {Appendix 6 List 8 Part I Item 786 (10}. As measure of introducing a clarity. It is recommended that this entry be modified to the following : "Magnetic heads including those used in Floppy disk drives, Hard disk drives and Cartridge tape drives, with or without flexible PCB assembly".

   Further, it is proposed that the components required for manufacture of these items be allowed for imports at a nominal duty of 10%. This will provide the manufactures a necessary incentive to indigenise the carriage assembly and would result in net foreign exchange savings for the country.

6. To reduce foreign exchange outlfow, the degree of indigenisation in the industry should be pushed up faster by encouraging existing companies & other independent component manufacurers to produce:

   — Stepper motors
   — Drive motors
   — Read write elements
   — Hard disk platter

To give a shot in the arm for such a thrust, the following is recommended.

Critical components needed for manufacture of stepper motors, drive/spindle motors be allowed at a concessional rate of duty say 10% for a period of 3 years. This duty can be revised upwards thereafter. There will be two spin-offs due to this :

(a) Independent manufacturers of such products would come up. Thereby country also acquires technology for manufacture of such products.

(b) Net saving in foreign exchange out go, which is the national requirement at this hour.

7. Hard disk platters account for roughly 15% of the material cost of the hard disk drive. It is proposed that a specific notification is issued to include "DISC PLATTER/FIXED DISC MEDIA FOR HARD DISC DRIVES" in OGl Category (under Apendix 6 List 8 part I). Also it is proposed that a special Notification granting a concessional customs duty of 10% for this item be isued. This will reduce the cost of indigenous peripherals to a considerable extent.

8. A major thrust should be given to export of hard disk drives.

COMPUTER TAPE DRIVES

With the increase in storage capacities of fixed disk drives, low and mid-range computer users have become aware of the value of their data and consequent need for backup. The trend towards paper-less offices and the large volume of data that is stored in computers also reinforces the need to have the protection of a backup device. Backup insures against any form of data loss due to hazards like accidental/deliberate erasure, fire, computer virus etc. Data backup is also needed for archival purposes and software distribution. Tape drives have gained popularity over floppy drives due to their significantly higher capacities, faster transfer rates and lower cost/megabyte. Also the fact that the reliability of floppy backup is poorer and has high possibility of damage to media has made the tape drive the preferred backup tool. The floppy drive is no longer considered an effective backup tool for high volume data. Endorsements by IBM of

tape products for the low and mid-range systems have heightened this new user awareness. Other factors are the increasing popularity of ANS and standardization efforts by the industry.

Technology Trends

The world market for the tape technologies are analyzed. Three capacity ranges have been taken for study and the estimates for the next four years are given. (tables 7 & 8)

Table 7. World Shipments of tape drives (000 units)

Tech \ Year	1989	1990	1991	1992	1993
D/CAS	145.0	143.0	138.8	134.0	120.7
Mini-CTD	557.0	710.1	908.0	1013.3	1091.3
CTD	753.8	793.0	817.0	851.0	857.0
HSD	64.9	134.2	266.5	402.6	567.0

Table 8. World-wide shipments of Tape drives by capacity (000 Units)

Capacity \ Year	1989	1990	1991	1992	1993
<100 MB	937.0	955.0	977	969	874.8
100-300 MB	368.0	465.3	554	591	563.5
> 300 MB	5.8	82.8	194	340	510.0

Reel-to-reel tape drives: The tape drives based on this technology were introduced in the market in 1930's. Large size, high cost and less capacity affected the growth of this technology. However the drives based on this technology will survive for some more time because of its downward compatibility with the existing installed base of around 500 million. The installed base of reel-to-reel tape drives is being replaced with products of newer technologies and in about three years time, this technology is likely to become defunct.

HI/TC: This technology encompasses a number of products and media which have no similar characteristics. The IBM 3480 product announced in 1984 becomes the interchange standard for large IBM systems. This technology has failed to gain popularity because of the unique cartridge design and lack of standards.

D/CAS : This technology, though comparable with cartridge tape drives, in terms of capacity, transfer rate and size, has not been popularized to a very large extent because the OE support for this has been very less. This could be due to the fact that there is only one manufacturer catering to nearly 90% of the market. TEAC, a non-USA company has been the only company offering D/CAS drives. Table 9 gives an estimate of the market for cassette drives for the next four years. The demand for the cassette drives in the low capacity segment is steadily decreasing. However the requirement in the > 100 MB segment is being catered to, by D/CAS drives. The growth rate for D/CAS drives, faced with stiff competition from alternate technologies like mini-CTDs and DATs show a pronounced decline around 1992.

Table 9. World-wide shipments of D/CAS drives (000 Units)

Capacity \ Year	1989	1990	1991	1992	1993
<100 MB	124.0	107.0	86.0	68.0	53.0
100-300 MB	21.0	35.0	45.0	51.5	54.6
> 300 MB	0.0	0.6	7.0	15.0	23.1

Cartridge Tape Drives : The world market for CTDs falls into two tape drives categories i.e. DC-600 and DC-2000 drives, based on the type of media used. Drives using the DC-2000 media are usually of 3.5" form-factor and are referred to as mini-CTDs. The DC-600 based drives, on the other hand, use a 5.25 "mechanism and are known as cartridge drives.

Mini-CTDs : The growth rate for capacities less than 100 MB shows a negative trend after 1992 but the volumes are still sufficiently large. For the higher capacity segment, the mini-CTDs show a very encouraging growth rate possibly due to continuous product improvements. As the largest manufacturer of tape media, 3M corporation has constantly been upgrading the capacity of the tape media, (table 10).

Table 10. World-wide shipments of mini-CTDs (DC-2000 class) (000 units)

Capacity \ Year	1989	1990	1991	1992	1993
<100 MB	155.1	188.6	209.1	204.4	176.0
100-300 MB	0.9	9.4	25.0	41.8	57.5
> 300 MB	0.0	0.3	10.4	22.9	34.4

CTDs (DC-600) : In the low capacity segment, DC-600 drives are losing ground to drives of smaller form-factors like the mini-CTDs. In the capacity range 100-300 MB, DC-600 are the most preferred drives, although the trend shows a negative growth rate after 1992. In emerging market for high capacity type drives, DC-600 drives show a very healthy growth rate (table 11).

Table 11. World-wide shipments of CTDs (DC-600 class) (000 Units)

Capacity \ Year	1989	1990	1991	1992	1993
<100 MB	383.0	277	187	141	112.8
100-300 MB	365.0	434	465	438	341.6
> 300 MB	5.8	82	165	272	402.6

HSDs : The impact of helical scan technology on the market for the three market segments is analyzed. It is found that these products offer capacities to meet the high capacity segment (table 12).

Table 12. World-wide shipments of Helicat Scan Drives (000 Units)

Tech \ Year	1989	1990	1991	1992	1993
VHS	1.9	2.3	2.5	2.7	2.5
8 mm	45.0	57.0	65.0	60.0	55.0
4 mm DAT	18.0	75.0	199.0	340.0	510.0

VHS drives : The drive is based on the Video House System mechanism (VHS). In spite of offering very high capacities, the demand for these drives is very low because of the lack of standardization. Currently, there are no major manufacturers adopting this technology for type storage.

8 mm drives : The demand for this class of drives, based on the video mechanism, is expected to peak during 1991 and fall off subsequently. This is primarily due to availability of 4 mm DAT drives with comparable capacities, more compact size and at a lower cost.

4 mm DAT : These drives are based on the popular Digital audio tape (DAT) mechanism. This technology is currently promoted by large Japanese manufacturers of consumer electronic goods. Since DAT manufacturers would over have adopted a common standard, popularized by HP and Sony, the growth of DAT drives promises to be excellent.

International Technology Trends

Broadly, the tape drives can be classified into five categories closely following the technologies used. They are:

- Reel-to-Reel tape drives-600 ft. or 2400 ft.
- Half-inch cartridge tape drives IBM 3480 (1000 ft.)
- Data cassette tape drives (DCAS)
- Cartridge tape drives (CTD)-0.25" wide.
  – Cartridge tape drives-DC600 (600/1000 ft).
  – Mini-Cartridge drives-DC2000 (205/307 ft).
- Helical scan tape drives.

  VHS helical scan tape drive
  8 mm helical scan tape drive
  4 mm Digital Audio Tape (DAT)

The most important features of tape drives are :

- Storage capacity-amount of data that can be stored, expressed in Mega Bytes. This detends on the type of media used and the number of tracks.
- The data transfer rate-the time required to backup data expressed as KBytes per second. It is determined by the tape speed (inches per second) and the recording density of the media (flux-reversals-per inch).

The core technology areas for type drives are :

1. Tape media
2. Read/write head
3. DC micro-motors (for tape & head positioning)

D/CAS drives : Cassette tape, was developed by NV Phillips of Holland in the 1960's using technology similar to that found in audio tapes. Initial application for this product was the replacement for paper tapes used in computers. With improvements in capacity and data integrity, data cassettes gained market acceptance as a backup device.

Traditional usage of data cassette drives (DCAS) have been in instrumentation, data logging and point of sale terminals. Drives with capacities upto 600 MB have found use in personal computers. Data cassettes are governed by the DCAS standards, an industry committee sponsored by TEAC, Japan. The total world-wide sales of data cassette drives were 147,700 in 1988 and is expected to be 134,000 in 1994. All these drives are expected to be only drives with capacities greater than 80 megabytes. No major OEM has endorsed DCAS drives for their systems.

There are seven manufactuers world-wide and the top three manufacturers of these tape drives ranked based on their revenues are, TEAC (73%), PHI Technologies (12%) and Braemar (6%). TEAC in the only manufacturer of data cassette drives in the 80 to 160 MB range.

Future Directions : Improvements in capacities through the use of longer length tapes (600 ft), higher oersted media (600 Oe), higher transfer rates (250 kb/s) and lower error rates (10-12) are some of the areas being contemplated by the DCAS standards group. Use of SCSI interface and floppy emulation are also being contemplated to effectively compete with other tape drives.

CTDs : Quarter Inch Cartridge (QIC) tapes were first available in 1971 with the introduction of the DC-300 media by 3 M. The DC-300 tape drive had a capacity of 2.8 MB on 300 ft. tape, based on four track, 1600 BPI recording density. In 1975 HP introduced the DC-100 mini cartridge which had only 140 ft. of tape with a tape width of 0.15". The 0.15" tape is now non-existent and only 0.25" cartridge tapes are available.

The cartridge shells offer good media protection, due to their metal base plate and hard plastic encasement. This protection makes the cartridges an attractive storage

Table 13. Typical Product Features Summary in 1990

Features	D-CAS	CTD		DAT
		DC-600	DC-2000	
Capacity (MB)	600	525	128	1.3 GB
Transfer rate (KB/sec.)	240	187	125	180.
Backup time for 1 GB	161	105	135	93
Interface	D/CAS-15/ SCSI	QIC-02/ SCSI	FLOPPY/ SCSI	SCSI
Form-factor	3.5"	5.25"	3.5"	5.25"
Unit price (US$)	350	500	300	2300
Media price (US$)	35	44	25	9

Note : 1. 1 GB is one thousand megabytes
2. Drive prices are for OEM quantities of 500. Media prices are one-off retail prices.

Table 14. Summary of Data Cassette Drive Characteristics

Characteristic	less than 10 MB	10 - 80 MB	more than 80 MB
Capacity (MB)	0.68 - 1.08	10 - 60	160 & 600
Transfer rate (KB/sec)	4	90	116
Operating mode	start/stop	streaming	streaming
Recording mode	serpentine	serpentine	serpentine
Interface	8 bit parallel	DCAS/SCSI	DCAS/SCSI

medium for harsh and rugged environments. Cartridge tape drives today are available in two formats, the DC-600 cartridge and the DC-2000 mini-cartridge formats. The DC-600 cartridge is 6" x 4" x 0.65" in dimension and contains 600 ft. of tape. The tape drives using this cartridge cannot be fit into a drive with form factor less than 5.25". The DC 2000 cartridge is 3.2" x 2.4" x 0.57" and drives using this cartridge can fit into 3.5" form-factor. The DC 600 class CTD's are generally streaming tape drives and the DC 2000 class of CTD's are near random access tape drives and can operate in both streaming and start/stop modes.

Cartridge tape drives have been typically used for fixed disk back up applications, archival of data and for programm distribution. These tape drives are presently available with capacities ranging from 20 MB to in excess of 300 MB. This class of tape drives are governed by the Quarter Inch Catridge (QIC) standards. Table 15 for characteristics of cartridge tape drives).

QIC is a consortium of 10 full time and 28 associate members. The members are manufacturers of drives, media and heads. TVS Electronics, India, is an associate member of this standards group. There are 29 manufactuers world-wide. The top 3 manufacturers ranked on the basis of revenue are, Archieve (25%), Wangtek (21%) and Tandberg (12%).

4 mm DATs: 4 mm DAT (Digital Audio Tape) drives offer high capacities in a small form-factor at a very low cost-

Table 15. Summary of Cartridge Tape Drive Characteristics

Characteristics	Mini-Cartridge		Cartridge	
MB	30-70	>70	<300	>300
Capacity (MB)	60	128	150	525
Transfer rate (KB/sec)	31	125	90	187
Backup rate MB/min	2	4	5.4	10.8
Interface	Floppy QIC-10 SCSI	Floppy QIC-103 SCSI	Floppy QIC-02 SCSI	QIC-02 SCSI
Recording	QIC-40 QIC-100	QIC-80 QIC-128	QIC-24	QIC-150 QIC-525
Operating mode	STR	STR	STR	STR
Form-factor	3.5"	3.5"	5.25"	5.25"

Note: STR is streaming mode. QIC-40/80 drives are near random access drives and also can operate in start/stop mode.

per-byte. These products can be considered to be in the development phase. Growth/popularity of these drives is affected by the two diverse recording formats being proposed. Recently the HP/SONY DDS format has been accepted as the standard. Currently available products have low transfer rates for such high capacity drives. The reliability of this drive has also not been established. The most favorable factors are the media cost and the large capacity. 8 mm DAT drives offer the highest capacity among all tape drives. Capacities in excess of 2.3 GB and transfer rates better than that of the proposed higher capacity CTD's make them a competitor. With the present configuration these drives cannot be accommodated in the 3.5" form-factor. Large form-factor and the lack of standards is expected to inhibit growth of this product. High capacity floppy drives have the advantage of random access, relatively low cost media and low cost system integration. The main disadvantage is the small capacity, less than 30 MB, for backup applications, lack of standards and lack of inter changeability with the current media. Another negative factor is the reliability of the media.

Reliability is poor due to the contact recording/reading employed and susceptible to damage. Removable cartridge disks today have capacities up to 50 MB. Like the FDD this capacity is small for backup applications and is not cost effective in terms of media cost. The main advantage of these drives is the fast random access and the high data transfer rates. IBM's endorsement of this product for some of its product lines may make this product a competitor. Re-writable optical disks have the potential of replacing tape drives as a backup device.

The wide spread use/acceptance of ODD's has been hampered by the following factors :

1. High cost of the drives
2. Availability, due to low production yields

3. Conflicting physical and recording standards preventing media inter-change.
4. Large access time due to large mass of the laser heads.
5. Slow and inefficient error detection and correction.

The erasable ODD's using magneto-optical technology offer the promise of higher performance, due to lower laser power requirements to write a bit. Consequently the drive can have higher rpm's, reducing latency and increased data transfer rates. The choice of ODDs as a backup device will depend on reliability, standardization, cost and transfer rates. It is expected that the new class of cartridge tape drives being proposed, will inhibit/reduce the challenge of the ODD's as a backup device.

Short term trends : The short term trends in cartridge tape drives have been in the reduction of form-factor to 3.5" and standardization of interfaces and recording formats. The standardization efforts are actively promoted by the QIC committee. Floppy & SCSI interfaces are becoming standard. Higher capacity drives of 380 MB plus are in the process of being standardized. Improvements in error correction techniques (ECC) are pushing error rates down to 1 in 10-14.

Indian Scenario

Backup of computer data is an emerging concept in India. It has been used till recently only on mainframes and large installations of micros. The backup application mainly was for archival purposes. The tape backup device used are mainly reel to reel streamers. With wide spread use of PC's, the ned for backup as a protection against data loss is being felt by users. At present only two companies in India are manufacturing mini-cartridge tape drives. The data cassette, cartridge and helical scan tape drives are not made in the country. The two companies are:

1. Apcom Computers QIC-40 tape drives, 40-60 MB
2. TVS Electronics QIC-100 tape drives, 40-60 MB
   QIC-40 tape drives, 40-120 MB
   QIC-80 tape drives, 120-240 MB
   (introduction in end '90)

Memory expansion application is relevant to only the very low end of the PC market segment. This application area is to increase the capacity of the hard disk in the PC by storing infrequently used data on to a tape backup device, thus freeing valuable hard disk space. An important aspect of the Indian requirements is the need for data interchange across machines, PC's & micros and across operating systems, DOS & Xenix/Unix. (table 16)

Table 16. Typical market requirements

SPECS	PCXT/AT	PC386/486	PC-LAN	MINIS
Capacity, MB*	40	150	300	500
Backup rate MB/min	2	5	5-10	5-10
Interface	PC Bus	SCSI	SCSI	SCSI

* Capacity refers to the typical tape-media capacity.

Market Size: No accurate forecasts are available for the Indian market. The current market demand is estimated at about 8000 units for the year 1990-91 and is expected to grow at the rate of 5 to 10% annually. Of these 8000 units, approximately 6000 units is the demand for the DC-2000 class of mini-cartridge tape drives and 2000 units for the DC-600 class of cartridge tape drives (table 17).

Table 17. Tape drive market in India (000 Units).

Year	1990	1991	1992	1993	1994
Units	11	13.9	21.8	27.5	34.3

Some OEM's offer data cassette drives along with their PC's. These drives form a very small portion of the total market. Generally, it can be said that DC-2000 class of drives are used in PC's and DC-600 class of drives are used in micro and minis. Some high end PC's also use DC-600 drives. The choice of the tape drive on PC's seems to be dependent on the total cost of the system.

Requirements of DC-2000 drives are mainly met by the two Indian manufacturers. The quantity of imports of this class is not clearly known. The entire requirements of the DC-600 drives are met by imports. The main suppliers of these drives are Archive and Wangtek. The market penetrations of tape backup devices especially in the PC-AT and the PC-386 segment in the Indian market is much less than what are observed in US/ Europe. The penetration of tape drives in those markets are estimated at around 15 to 20%. The concept of the need to protect against data loss is not felt strongly as yet, by the end users in India and the market demand for backup device is limited to a very small segment of users.

The market penetration for tape drives in India is given below :

1. PC-XT & PC-AT-5%, 10% after 1992
2. PC 386/486-90%
3. Mini's -90%

Gaps : It is seen that the Indian market requirements in tems of capacity is largely met. The gaps are in terms of transfer rate and the interface requirements specific to some of the market segments. These are the segments

which are being currently met by the imported DC600 tape drives (table 18)

Table 18 : PC Market and Tape Drive Demand Estimates

Description	'91-92	'9091	'92-93	'93-94	'94-95
PC's	94.0	75.0	117.0	146.0	180.0
PC-XT & PC-AT	67.7	54.0	84.2	105.1	129.6
C 386/486	7.5	6.0	9.4	11.7	14.4
Mini Computers	4.3	3.2	5.5	7.2	9.3
Tape Drives	13.9	11.0	21.8	27.5	34.3

Note : All figures are in thousands.

DC-600 drives are used in micros and minis mainly due to their having SCSI interface. It is technically possible for the DC2000 drives also to have SCSI interface. This is the direction in which the industry worldwide is moving. If the Indian manufacturers can provide this SCSI interface, the total requirements of tape drives can be met indigenously by the DC2000 tape drives. TVS Electronics plans to introduce a 120/240 MB SCSI tape drive by the end '90.

Technology in India

It is clearly seen that the Data Cassette tape drive market is stagnant. A combined growth rate of around 6% is predicted for the Cartridge & Mini-cartridge tape drives. The CTD market is growing at slower rates and the min-CTD growth is 14% Indian manufactuers offer mini-CTD's with specifications comparable to those available in the world market. The investments made by the Indian companies in mini-CTD should be adequate to meet the Indian requirements atleast for the next two to three years Products currently available have capacities of 40 to 120 MB and data backup rates of upto 2 MB/min. The latest technology of increasing capacity using data compression techniques is also available in the country. One company is also offering its tape drives in 3.5" form-factor. The production capacity of mini-CTD's in the country is around 12,000 units per annum, which is well above the demand of 8000 units in 1990-91. TVS Electronics makes its tape drives with technical collaboration of Tallgrass Technologies & Colorado Memory Systems, USA and Apcom in collaboration with Alloy, USA. TVS Electronics plans to introduce 120/240 MB tape drives with both SCSI and floppy interface in end 1990. These drives when available should satisfy the demands for SCSI drives currently being met by imports.

Indigenisation

All the parts which go to make drive, except Read/Write heads, capston motors, stepper motors and integrated circuits have already been indegnised by the industry. These components form about 40 to 60% of the BOM cost of the tape drive. No indigenous manufacturers exist for these components. The approximate CIF cost split up for these components as a percentage of the BOM cost is given in Table 19.

Table 19. Cost break-up-CTDs

Component	% of BOM
Electronics	30
Mechanical parts	25
R/W head	20
Capstan motor	15
Stepper motor	10

Note : These percentages have been worked out on the basis that the entire BOM is imported.

At the current international prices, total import of tape drives in the year 1989-90 would have resulted in the drain of foreign exchange to the tune of around US $ 2.5 million (appx. 8,000 units).

The Indian CTD manufacturers have saved the country nearly US $ 1.0 million (net) by offering indigenous products at competitive prices.

Prices

The prices for the tape drives today matches or marginally exceeds the landed cost of the imported drives. Reduction in prices could be possible if, further indigenisation of the drive in the areas of R/W heads & motors are taken up.

The electronics consists mostly of custom integrated circuits (ASIC's) and a few standard bought out components like micro processors and other glue logic. ASIC's are needed due to the need small form factor. The OEM prices for the drives are in the range of Rs. 7,000 to 10,000 depending on the capacity of the drive.

Consumables

Consumable cost contributes a significant portion of the ownership cost, often expressed in cost/MB. In the case of tape drives, tape media is the only consumable.

Reel-to-reel tape drives are no longer very popular in India. These drives use tape spools that of companies like 3 M Corporation, BASF and Memorex. The installed base of drives and the limited storage capacity of the tape spool constitutes a steady demand for this media. However, there is no manufacturer in India offering tape spool and hence the total demand is met through imports.

Accurate data on the quantities being imported is not available. Cartridge tape drives use a special media with a patented design from 3M Corporation. Two of the most popular cartridges are the DC-600 and DC-2000 series. Apart from 3M, a company called Carlisle Memory Prod-

ucts (DEI) manufactuers these media in large quantities. In the 4 mm DAT drives, digital audio tapes are used as storage media. Digital audio tapes are manufactured by Sony, JVC and other Japanese companies. The specifications in brief for the cartridge and the digital audio tape media and indicative prices are given in tables 20 and 21.

Table 20. Competing Technology Media Pricing

Media Type	Formatted Capacity	Tape Length	Magnetic Coating	Retail Qty. 1 ($)	Cost Per GB ($)
8MM	2.3 GB	346 FT	MePart	6.65	2.89
4 MM DAT	1.3 GB	197 FT	MePart	9.25	7.12
D/CAS	150 MB	600 FT	gFe_2O_3	35.00	233
DC 2000	80 MB	205 FT	gFe_2O_3	30.00	375
	110 MB				273
DC 2000+	120 MB	300 FT	gFe_2O_3	37.00	308
	165 MB				224
DC 600 XTD	150 MB	600 FT	gFe_2O_3	35.00	233
	320 MB			44.00	138
DC 600 XTD+	250/500 MB	1000 FT	gFe_2O_3	N/A	N/A
1/2" REEL	146 MB	2400 FT	gFe_2O_3	20.00	143
	220 MB	3600 FT		30.00	136
MID-3480	200 MB	540 FT	CrO_2	7.00	35
HI/TC	240 MB	540 FT	CrO_2	7.00	29
	360 MB	540 FT	CrO_2	7.00	19
	720 MB	540 FT	CrO_2	7.00	9.72

Table 21. Competing Technology Drive Characteristics and Pricing

Product Glass	Formatted Capacity	Transfer Rate	Form Factor	Avg. Access Time	Backup Time 1GB	OEM Qty. 500 ($)
8 MM	2.3 GB	246 KBS	51/4"	484 sec	70 min	2,500
DATA DAT	1.3 GB	180 KBS	51/4"	20 sec	93 min	2,300
D/CAS	150 MB	110 KBS	31/2"	40 sec	161 min	350
Mini CTD	80 MB	62 KBS	31/2"	29 sec	278 min	300
	110 MB	240 KBS	31/2"	20 sec	100 min	480
CTD	150 MB	90 KBS	51/4"	40 sec	220 min	500
	320 MB	240 KBS	51/4"	30 sec	88 min	650
1/2" :						
HI/TC	240 MB	250 KBS	51/4"	44 sec	76.9 min	2,000
	360 MB	375 KBS	51/4"	44 sec	51 min	2,500
	720 MB	375 KBS	51/4"	44 sec	49 min	3,000
Mid-3480	200 MB	1.5-3.0	8.0"	24 sec	11.6 min	16,000
	400 MB	MBS	Cabinet"	24 sec		

There is a good market for DC-2000 cartridges in India as a result of the mini-CTDs being the most commonly used drives. The foreign exchange outflow due to the import of tape media is estimated to be around 12.7 million USD, over the next five years. Media manufacturers in India should look at the possibility of manufacturing tape cartridges.

Recommendations

1. Awareness of the need for data backup should be promoted.

Due to hazards like disk crash, accidental erasure, sabotage, fire and computer viruses. Data is also backed up for archival storage and distribution. Public interest organisations like CSI, MAIT and CEI and financial institutions such as Insurance corporations, banks etc., should actively promote the awareness and usage of data backup through seminars, publications and workshops.

2. Encouragement should be given to the existing manufacturers of cartridge tape drives. The current manufacturing capacity in India is adequate to meet the tape drive requirements of the terminal year of the VIII Five year plan. Cartridge tape drive market in India is less than 0.5% of the world market imposing high over heads on tape drive manufacturers. Over 50% of all the tape drives sold are in the PC and Supermicro market and the prices and features offered by the Indian manufacturers compare favourably with the globaltrends. Incentives should be given to computer manufacturers to procure indigeneous cartridge tape drives.

3. The Quarter Inch Cartridge tape drive technology is recommended for the Indian market. Tape drives based on quarter inch technology are currently teh most popular in the world. Tape drives manufactured in India are based on the QIC technology only.

   The advantages in following the QIC standards are as follows :

   - Inter-changeability of data across various manufacturers' drives can be established.
   - It covers wide range of tape capacities (40 MB to 5 GB).
   - The trends indicate continuing popularity of QIC standards.

   In view of their overwhelming popularity, QIC standards can also be adapted as Indian standards by BIS. Further, this will facilitate export of tape drives manufactured in India.

4. Existing Indian manufacturers should be allowed to introduce latest technology through foreign collaboration (s). The cartridge tape drive market in India is less than 0.5% of the world market. With the economies of scale being poor, it is not viable for Indian manufacturers to invest in basic research in the design and development of new technologies for tape drives. However, Indian manufacturers can add value by focussing their technical expertise on product development and improvement efforts like:

   - Providing extensive support for indigenisation efforts.

- Improving, modifying and developing the controller/electronics of the drive, to make it operate in different host environments.
- Writing device drivers to support the drive in various operating systems/computers.
- In view of the above, upgradation of technology adhering to the QIC standards, by the existing Indian manufacturers should be allowed through foreign collaborations.

5. Indigenous manufacture of micro motors should be taken up immediately by the components industry.
   - Capstan motors (Brushless DC motors) are used in tape drives to move the tape because of the better reliability offered in a small size. Around 65,000 drives are going to be manufactured over the next five years. The landed cost of a motor being 17 USD, the indigenisation of the same would result in saving 1,000,000 USD in foreign currency.
   - Stepper motors of the permanent magnet type used in tape drives are used in a number of other peripherals like printers, floppy drives etc. Taking the same figure of 65,000 manufactured drives over the next five years and the landed cost of a stepper motor being 2 USD, the indigenisation of the same would result in saving 130,000 USD in foreign exchange.

From the above figures, the conclusion is that indigenisation of micro motors would save about 1.13 million USD in foreign exchange. Stepper motors and capstan motors need to be tailored for various peripherals, requiring matching of performance of the torque-speed characteristics. Therefore, until the requirements of all peripheral manufacturers are precisely met by the indigeneous source, stepper motor and capstan motors the manufacturers should be allowed to import them.

6. Indigenous manufacture of tape media should be encouraged. The technology of the tape media used in data storage is similar to the video cassette media. Video cassettes are already being manufactured in India. However for data storage applications, the defect density has to be controlled. The demand for data cartridges in India for the next five years will be around 510,000. The landed cost of a tape media is around 25 USD. In the absence of indigenisation of data tape cartridge, the foreign exchange outflow will be 12.7 million USD.
7. DAT technology trends should be carefully monitored and reviewed.

Digital Audio Tape technology is an emerging technology of nineties. This is because :

DAT has the lowest cost per Mega Byte among all tape drives-0.7 cents.

DAT drives offer high storage capacities (2.3 GB) and high transfer rate 245 KBs.

A common standard promoted by Hewlett Packard and Sony called Digital Data Storage (DDS) has emerged as the accepted industry standard.

On the host interface side, DAT has already adopted the SCSI.

The major concern on DAT tape drive is its reliability. Data reliability in tape drives, being the most critical factor, users do not procure tape drives unless they are convinced about the technology with market data.

In this context, DAT drive is yet to prove itself and DAT manufacturers world-wide are working to offer higher reliabilities. Indian manufacturers should review the progress of DAT against QIC technology. If DAT products prove to be more reliable and cost effective than QIC drives, they should consider introducing the same in India.

8. Indian manufacturers of cartridge tape drives should offer SCSI interface on their tape drives. Minicomputer manufacturers have been using QIC-02 interfaces on VME bus, Multibus II and other proprietery interface buses for supporting tape drives. Small comptuers system interface (SCSI) has emerged as a unified standard for all storage peripherals and is now being offered by most of the mini computer manufacturers.

The common command set (CCS) for SCSI enables easy development of drivers, thereby supporting tape drives across various systems.

9. Nodal agency for core research in magnetics is required.

Motors are used across a wide range of peripherals like tape drives, floppy drives, winchester drives and printers. Magnetics runs as a common core technology through these products.

Tape head is another core component where expertise in magnetics technology is essential.

Expertise in this core area needs to be developed. A nodal agency should be designated to carry out core research in magnetics and disseminate the technology to user industries.

□

Industry Review

Productivity in Indian Cement Industry

NPC Research Division

Being a construction material, cement forms a strategic sector in the Indian economy. In 1990-91, the industry has an installed capacity of 60 million tonnes with a production of 48 million tonnes. The industry is poised for a capacity growth to about 100 million tonnes by 2,000 A.D. *The present study attempts to analyse the productivity and performance ratios of the industry with a view to identifying the major problem areas and the prospects of solving them.*

Prepared by a team consisting of N.K.Nair, Director (Research), Manju Kalra, Assistant Director (Research), National Productivity Council and K.D. Kohli, Management Consultant.

In India, cement was first manufactured in 1904 by the South India Industries which had a capacity of 30 tonnes per day. This plant which used sea-shells as rawmaterial was however closed down after a short period of operation. By 1913 three other units, with a total capaity of about 75,000 tonnes per annum came into being. A year later a fourth unit, Indian Cement Company Ltd., was established adding a capacity of 1000 tonnes of cement per year. By 1924, with the addition of another six cement plants, the total cement capacity rose to 5.6 lakh tonnes per annum. Soon however, the industry began to face problems of unutilized capacity due to severe competion from the cement exporting companies in Europe. As the use of cement in India has not still been very popular, largescale promotion efforts were undertaken by the cement industry to make its use widespread. Despite this the performance of the local cement comapnies remained subdued largely due to internecine price quarrels and continued competition from European companies. It was then that the govt. referred the case of the Indian cement industry for tariff protection. Cement Manufacturers Association (CMA) was also formed at about the same time. In 1936 ten of the then existing cement companies merged together to form the Associated Cement Companies Ltd. The total annual installed capacity of the cement industry then amounted to 1.1 million tonnes. Next year another group, Dalmia Jain, entered the cement arena with five cement units having a total installed capacity of 5.75 lakh tonnes per annum. With a few more units joining a little later, the price war once again took hold of the cement companies, which continued till the end of the Second World War.

Era of Planned Growth

Table 1 shows the growth of cement industry from the commencement of the First Plan. Between 1950-51 and 1973-74 the compound annual rate of growth for installed capacity and production was 8.1 and 7.3 percent respectively. This however dropped to 3.6 and 3.0 percent between 1973-74 and 1979-80. It again picked up and

Table 1 Post Independence Growth of Cement Industry (Million-Tonnes)

Year	No. of Units	Capacity Installed	% Growth	Production	% Growth
1950-51	24	3.2	48.4	2.2	-
1951-52	24	3.8	15.8	3.3	50.0
1952-53	25	4.0	5.2	3.6	9.1
1953-54	26	4.4	10.0	4.0	11.1
1954-55	27	4.6	4.5	4.4	10.0
1955-56	27	5.0	8.7	4.6	4.5
1956-57	28	5.8	16.0	5.2	13.0
1957-58	30	7.0	20.7	6.0	15.4
1958-59	32	7.9	12.9	6.1	1.7
1959-60	32	8.5	7.6	7.3	19.7
1960-61	34	9.3	9.4	8.0	9.6
1961-62	34	9.5	2.2	8.3	3.8
1962-63	36	10.0	5.3	8.9	7.2
1963-64	37	10.5	5.0	9.4	5.6
1964-65	38	11.2	6.7	9.8	4.2
1965-66	40	12.0	7.1	10.8	10.2
1966-67	41	12.6	5.0	11.1	2.8
1967-68	44	13.8	9.5	11.5	3.6
1968-69	45	15.0	8.7	12.2	6.1
1969-70	50	16.0	6.7	13.8	13.1
1970-71	50	17.6	10.0	14.4	4.3
1971-72	51	19.6	11.4	15.1	4.9
1972-73	51	19.8	1.0	15.6	3.3
1973-74	51	19.8	-	14.7	(-)5.8
1974-75	54	20.1	1.5	14.8	0.7
1975-76	54	21.2	0.5	17.3	16.9
1976-77	55	21.5	1.4	18.9	9.2
1977-78	55	21.9	1.9	19.4	2.6
1978-79	55	22.6	3.2	19.4	-
1979-80	56	24.3	7.5	17.7	(-)8.8
1980-81	55	27.9	14.8	18.7	5.6
1981-82	56	29.3	5.0	21.0	12.2
1982-83	62	33.2	13.3	23.2	10.4
1983-84	83	35.1	5.7	26.7	15.1
1984-85	104@	40.6	15.7	29.6	10.9
1985-86	106@	42.3	4.2	32.1	8.4
1986-87	189@	52.3	23.6	34.8	8.4
1987-88	94	54.4	4.0	37.4	7.5
1988-89	NA**	54.9	0.9	41.8	11.8
1989-90	96**	56.4	3.3	42.9*	2.6
1990-91	97**	59.6	5.7	45.8*	4.9

Source : NPC (1978), IDBI (1987)
CMA, Cement Statistics (for large units)
ACC, Data on Cement Industry (1989)
* Provisional, ** Large Units only
@ includes some mini units also

peaked at 12.0 and 11.4 percent respectively between 1979-80 and 1984-85. Between 1982, the year of partial decontrol and 1989 the year of total decontrol, the compound growth in capacity remained at 11.45 percent. Table 2 shows the achievement in both capacity and production against the targets set by the successive five year plans. With the exception of the Sixth Plan, the achievements have been usually falling short of targets. These shortfalls have been attributed to varying reasons, the major ones being shortage of coal, power and infrastructural constraints. Following partial decontrol in 1982, the growth in the cement sector has been quite substantial, the capacity having been more than doubled from 29.3 million tonnes per annum to 54.9 million tonnes per annum in 1988-89. During the same period cement production rose from 23.2 million tonnes to 41.8 million tonnes. In fact, the very first year after decontrol saw a rise of 15 percent in production, although the expansions and additions of capacity then in process had begun to materialize only a year later. During 1990-91, the production achieved is 48.6 MT against a target of 49 M.T.

Table 2 : Performance of Cement Industry during 1st to 7th Plan

Plan Period	Installed Capacity Target (end of plan period)	Actual	Achievement %	Production Target (end of plan period)	Actual	Achiement %
1st Plan (1951-56)	5.31	5.02	94.5	4.8	4.6	96.0
2nd Plan (1956-61)	16.00	9.30	58.0	13.0	8.0	61.5
3rd Plan (1961-66)	15.00	12.00	80.0	13.0	11.0	85.0
4th Plan* (1969-74)	Not fixed	19.76	-	18.0	14.7	82.0
5th Plan (1974-79)	23.5	22.58	96.0	20.8	19.4	93.0
6th Plan (1980-85)	43.0	41.2	96.0	32.5	30.2	93.0
7th Plan (1985-90)	62.78	58.02	92.4	49.0	44.8	91.4

* During 1967-70 the plan was on annual basis
Source : Kotharis (1990), Monthly Commentory, June (1990)
Cement Manufacturers Association
Installed capacity and production relates only to large mills

Demand-Supply Gaps

The demand and supply equation had also undergone a change during this period (1982 to 1989) as can be seen from table 3. Although the gap between supply and

Table 3 : Demand and availability of Cement (Million Tonnes)

Year	Demand	Prodn	Gap	Percent short fall	Imports	Availability	Short fall %
1978-79	24.0	19.4	4.6	19.2	1.7	21.1	12.1
1979-80	25.9	17.7	8.2	31.7	1.5	19.2	25.8
1980-81	28.0	18.7	9.3	33.2	2.0	20.7	26.1
1981-82	30.2	21.0	9.2	30.5	1.6	22.6	25.2
1982-83	32.6	23.2	9.4	28.8	1.5	24.7	24.2
1983-84	35.6	26.7	8.9	25.0	2.5	29.2	18.0
1984-85	38.1	29.6	8.5	22.3	0.4	30.0	21.3
1985-86	39.3	32.1	7.2	18.3	3.4	33.4	15.0
1986-87	41.7	34.8	6.9	16.5	2.4	36.8	1.8
1987-88	44.2	37.4	6.8	15.4	2.2	39.6	10.4
1988-89	46.9	41.8	5.1	10.8	2.2	44.0	6.2
1989-90	49.0	42.9	6.1	12.4	7.1	50.0	-

Source : ACC Data on Cement Industry 1989
PNB Monthly Review (1990)
CMA Cement Statistics (Large units)

demand has not as yet disappeared completely the availability position of cement has eased a great deal. While prior to 1981-82 the gap had been steadily going up year after year this has since narrowed down considerably. However, with the demand growing at a faster rate than production is likely to, because of the lead time required for building additional capacity, we may not reach a stage of production being ahead of or even equal to the rising demand for at least some more time. According to one estimate the demand for cement is expected to grow at 7 to 8 percent annually. Somewhat similar projections have been made by ICICI, DCCI & CMA also placing the demand around 65.0 million tonnes in the year 1994-95, and at about 92.0 million tonnes by the turn of the century.

Consumption

India is the fifth largest producer of cement after USA, Japan, USSR and China. However, its per capita consumption is woefully low - a mere 48 kgs. as against the world average of 200 Kgs. (ICR, 1989). Of course, the per capita consumption has come a long way from a figure of 7 Kgs. in 1950, but there is scope for further improvement. At present we compare poorly even with some of the Asian Countries; e.g. Japan (561 Kgs.), Korea (533 Kgs.), Malaysia (268 kgs.) and China (135 kgs.). The reasons for low per capita consumption are not far to seek. Cement demand being highly income elastic, slow rise in consumption can be attributed to the country's slow development in those areas such as housing both urban and rural; roads and other social welfare activities like education, medical care etc. Government still remains the largest single consumer of cement, about 40-45 per cent of the total annual output of cement (table 4) . It is, therefore, apparent that per capita consumption in the future will improve in proportion to any quantum increase that may take place in the use of cement in government works and projects, the main avenues of cement utilization. The industry is also trying to promote concrete roads, cement lining of irrigation canals and other urban and rural developmental projects for which cement is a major infrastructural material. Currently the consumption pattern is somewhat lopsided; as about 80% of the output is consumed in urban areas and a mere 17% being in rural activities.

Table 4 : Cement Consumption by Central & State Govts: (million tonnes)

Year	Consumption			Production	Govt. Consumption to Production (%)
	Central Govt.	State Govt.	Total Govt.		
1981	3.66	7.09	10.75	-	-
1982	3.40	6.27	9.67	22.54	42.9
1983	3.32	7.48	10.80	25.42	42.5
1984	3.35	7.81	11.16	29.16	38.3
1985	3.53	7.40	10.93	31.14	35.1
1986	3.25	7.12	10.37	33.67	30.8
1987	2.49	5.82	8.31	36.98	22.5

Source : PNB Monthly Review, 1990 (Based on Levy Cement Supplies)

Employment Prospects

Cement manufacture is a highly capital intensive industry and as such the scope for employment is significantly lower than in many other industries. There are 182 cement units in operation at present (Answer to LS unstarred Qn. No.6340) with a total licensed capacity of 60.15 million tonnes, employing about 90,000 persons directly and sustaining another 10 lakhs persons for marketing, sales, maintenance and other services. With the current trend towards modern technology and process controls, direct employment character of the industry has also undergone a change. While older units with wet process provide employment to a larger number of unskilled workers, the newer units with dry process/pre-calciner technology, employ more of skilled personnel. According to one estimate employment potential of a modern cement plant of 2000 - 3000 tpd capacity is about 520 persons (both skilled and unskilled), whereas in a mini cement plant the employment potential is much higher. This contention is also supported by the following manpower data of the cement industry (Holderbank, 1987) :

* A toal of around 87,000 persons are employed in the Indian cement industry.
* Around 72 per cent of cement workers are employed in 51 plants built before 1971.
* More than 50% of unskilled workers in the cement industry are employed in the wet process plants.
* Employment potential of smaller capacity plants is higher than those of higher capacity plants.
* 85 percent of plants built after 1982 employ less than 800 persons.
* 80 per cent of cement plants of 1948 vintage or older employ less than 1600 persons.
* 12% of plants with a rated capacity of 5 lakh tonnes per year employ more than 2000 persons.
* 75% of plants with a rated capacity of 1 lakh tonnes per year employ less than 1600 persons.
* 90% of the dry process plants employ less than 1200 persons, while only 43% of wet process plants employ the same number.
* Average plant across the industry employs around 1,064 persons.
* 35 per cent of the manpower in the industry is working in dry process plants.
* Nearly 50% of the manpower is engaged by wet process plants.
* Larger cement plants (2000 tpd) employ 113 persons per lakh tonnes/year.

* Medium cement plants (1000 & 2000 tpd) employ 214 persons per lakh tonnes/year.
* Smaller cement plants (below 1000 tpd) employ 437 persons per lakh tonnes/year.

Financial Performance

In the early 70s, the cement industry was said to have run into financial difficulties largely because of the controls

Table-5 : Percentage of Net Profit (after tax) on Net Worth in Cement Units (Rs. Crores)

Company	Year	Net Worth	Profit	% Return	Company	Year	Net Worth	Profit	% Return
	1990	145.24	17.40	12.0		1990	124.52	16.91	13.0
	1989 (8m)	137.26	(-) 19.04	(-) 13.9		1989 (15m)	117.34	11.39	9.0
ACC	1988	161.17	2.10	1.3	JAIPRAKASH	1987	116.84	1.82	1.0
	1987	147.45	(-) 0.84	(-) 0.6		1986	120.03	35.97	30.0
	1990	180.17	3.13	1.7		1990	16.98	1.24	7.3
	1989	188.36	10.08	5.4		1989 (15m)	15.74	(-) 7.23	(-) 46.0
BIRLA	1988	164.13	(-) 1.34	0.8	MADRAS	1987	22.64	(-) 4.85	(-) 21.0
	1987	173.79	7.18	4.1		1986	26.69	4.28	16.0
	1990	(-) 0.76	(-) 13.66	-		1989 (18m)	7.59	0.63	8.3
	1989 (9m)	12.90	(-) 5.59	(-) 43.3		1988	7.25	0.72	9.9
CHETTINAD	1988	15.68	2.66	17.0	DECCAN	1987	6.34	0.37	5.8
	1987	13.56	2.10	15.5		1986	5.96	1.10	18.5
	1990	66.30	1.64	2.5		1990	41.31	1.93	4.7
	1989	58.83	1.06	1.8		1989 (15m)	41.94	3.64	8.7
DALMIA	1988	45.11	1.30	2.9	MANGLAM	1987	18.30	1.67	9.1
	1987	43.70	3.73	8.5		1986	17.69	2.09	11.8
	1990	35.07	14.33	40.9		1990 (15m)	117.63	(-) 8.24	(-) 7.0
	1989	25.57	3.10	12.1		1988 (18m)	52.13	1.92	3.7
GACL	1988	24.00	4.14	17.3	MYSORE	1987	30.63	1.15	3.8
	1987	21.96	1.55	7.1		1986	32.36	1.51	4.7
	1990	48.70	1.95	4.0		1990	52.85	0.14	0.3
	1989	48.68	(-) 4.89	(-) 10.0		1989 (15m)	55.76	(-) 2.68	(-) 4.8
INDIA CEMENT	1988	51.82	1.79	3.5	ORISSA	1987	60.69	3.92	6.4
	1987	52.75	1.71	3.2		1986	64.97	8.41	13.0
	1990	(-) 1.27	(-) 1.01	(79.5)		1989 (15m)	33.68	(-) 4.42	(-)13.0
	1989 (18m)	(-) 0.27	(-) 2.03	-		1989	54.77	(-) 13.06	(-)23.8
HEMADRI	1987	1.76	2.36	134.0	DIGVIJAY	1988	64.66	(-) 7.17	(-) 11.0
	1986	2.22	(-) 0.58	(-) 26.1		1987	72.34	(-) 4.97	(-) 6.8
	1989	19.16	(-) 0.59	(-) 3.0		1990	7.45	0.31	4.2
	1988	19.77	3.44	17.4		1989 (15m)	6.04	1.11	18.4
TAMILNADU	1987	16.79	4.13	24.6	NCL	1987	5.43	0.87	16.0
	1986	8.03	(-) 2.55	(-) 31.7		1986	4.89	2.00	41.0
	1989	11.65	(-) 29.15	-		1990	6.99	0.52	7.4
	1988	9.25	(-) 14.28	-		1989 (9m)	6.86	0.06	1.0
ANDHRA	1987	21.06	(-) 0.82	(-) 3.19	KAKATIYA	1988	6.96	0.72	10.3
	1986	21.32	2.18	10.2		1987	6.51	0.38	5.8
	1989	192.54	(-) 47.75	(-) 24.8		1989 (11m)	0.80	(-) 9.64	-
	1988	207.04	(-) 43.00	(-) 20.7		1988	10.44	(-) 1.92	(-) 18.4
CCI	1987	206.64	(-) 19.12	(-) 9.3	SAURASHTRA	1987	12.25	(-) 0.17	(-) 1.4
	1986	201.30	(-) 11.33	(-) 5.6		1986 (16m)	9.00	4.58	51.0
	1990	113.67	(-) 1.78	(-) 1.6		1990	- 40.08	(-) 9.40	(-) 23.4
	1989	107.61	(-) 4.08	(-) 3.8		1989 (15m)	- 30.81	(-) 16.14	(-) 52.4
KESORAM	1988	114.70	1.43	1.2	NARMDA	1987	- 24.88	(-) 3.96	(-) 15.9
	1987	128.42	2.04	1.6		1986	-20.85	(-) 10.44	(-) 50.0
	1989 (9m)	37.0	6.03	16.3		1990	- 11.54	(-) 5.16	(-) 44.7
	1988	31.81	1.04	3.3		1989 (15m)	- 7.38	(-) 7.93	-
KCP	1987	28.21	2.23	7.9	PANYAM	1987	- 0.65	(-) 4.94	-
	1986	29.47	2.75	9.3		1986 (16m)	6.12	(-) 0.58	9.5
						1990	416.65	38.46	9.2
						1989 (18m)	354.92	42.02	11.8
					L & T	1987	292.33	27.47	9.4
						1986	280.01	28.16	10.0

SOURCE : Basic data from CMIE, 'Key financial data on larger Business Units' Jan. 1991 & Nov. 1990.
Abnormal %ages in a few cases have been omitted.
m = months

on prices and distribution of cement. The growth of installed capacity was negligible, capacity utilization was low, availability of cement was poor and units were even threatened with the prospects of closure or liquidation. It was in this context, that the Government took a series of retention price improvement measures in order to assure a 12 per cent post tax profit on its net worth. The industry's demands for concessions from the government even now continue to revolve around this assurance, despite the removal of control measures. We have worked out post tax returns on networth for 25 cement companies over the past four years. The results are presented in table 5. While there are some companies (GACL, JP1, Deccan, Manglam, KCP, NCL etc.) with exceptionally good performance, there are a few cases of consistently poor financial record as well (eg. Digvijay, CCI, Narmada and Panyam). In a few cases, there is a sudden rise in the reserves and surpluses (hence in networth) with a correspondingly heavy decline in profits. The current financial results of many cement companies have considerably improved, mainly as a result of higher price realization after the removal of decontrol on cement prices from 1989 onwards. It appears, some of the new cement companies, (eg. GACL, NCL and Deccan), have managed their performance better than the others.

Some of the cement companies compare favourably with the trend obtaining in the industrial sector in general and with that of the manufacturing industry in particular (CMIE, 1991). In fact most cement companies have begun to do well and wiped out their past cumulative losses. The index of cement shares tracked by the Economic Times (14th Feb 1991) has advanced by 7.02 points over a week and the signals indicate that the industry is on the upswing. One only hopes the industry in the ensuing good days will remember to play fair by the consumer also. A recent study (PNB, Nov. 1990) has also tried to assess the financial performance of the cement indusry (18 companies) over the past two years and compared it with the performance of 397 private sector companies. The results obtained are presented in table 6.

Capacity Utilization

Cement Industry's past and current record of capacity utilization is somewhat unimpressive (table 7). Except in the year 1954, its performance is characterized by a declining trend with occasional spurts now and then. Apparently partial decontrol measures effected in 1982 have had little impact on capacity utilization which after an initial rise declined to 72% in 1985. The industry just reached a figure of 76% in 1988, suggesting perhaps that prolonged control had extensively crippled the industry and it is yet to spring back to health.

Table 6: Profitability ratios in Cement industry

Profitability ratio	Cement Industry		Others (Pvt.Sector)|	
	1987-88	1988-89	1987-88	1988-89
Current Ratio	1.63	1.61	2.07	2.09
Gross Profit to net sales %	6.85	7.36	9.24	9.83
Profit after tax to net worth %	—3.07	5.07	8.19	11.02
Gross profit to capital employed %	5.85	6.18	13.35	14.35
Profit after tax to net sales %	—1.31	1.96	2.75	3.56
Net Sales to capital employed %	85.43	84.08	144.48	45.97
No of companies	23	18	397	397

Source : PNB Monthly Review (Nov. 1990)

Table 7 : Capacity Utilization in Cement Industry 1954-1990

Year	Capacity Utilization %	Year	Capacity Utilization %
1954	100.4	1973	77.8
1955	92.6	1974	72.0
1956	83.9	1975	77.0
1957	88.3	1976	87.0
1958	81.4	1977	90.0
1959	81.8	1978	90.0
1960	86.5	1979	82.0
1961	87.1	1980	73.0
1962	88.3	1981	78.0
1963	92.7	1982	76.0
1964	90.3	1983	77.0
1965	91.1	1984	79.0
1966	88.5	1985	72.0
1967	88.9	1986	73.0
1968	80.9	1987	73.3
1969	87.3	1988	76.4
1970	80.4	1989	80.0
1971	76.0	1990	83.4
1972	81.0		

Source : NPC (1978), CMA Cement Statistics various years

It is important to note that there are several individual units which have consistantly performed well, notwithstanding controls (table 8). The data in table 8 relates to 25 randomly selected companies. They include both new and old units, large and mini plants, with old and new process technology and belonging to private and public sectors. While some units are operating at or above 100% capacity (Dalmia, GACL,. Jaypee, Deccan, Mysore, Orissa and Kakatiya), there are others whose utilization is even below 50% (Panyam and Madras) or just around 60-70%. Such a wide variation in capacity utilization is indicative of some basic problems peculiar to a particular unit, which may be of locational, technological or of managerial origin. However ,one major factor on which the industry has blamed its low capacity utilization in the past was the

Table 8 : Capacity Utilisation in Selected Cement Companies - latest year

Company	Capacity (Lakh tonnes)	Production	Capacity Utilisation %	Company	Capacity (Lakh tonnes)	Production	Capacity Utilisation %
ACC (9 Units)	85.3	74.39	87.2	DIGVIJAY	13.25	11.19	84.5
BIRLA JUTE (4 Units)	24.5	2.74	88.7	TAMIL NADU	9.0	6.22	69.1
CHETTINAD	6.0	3.76	62.6	ANDHRA	12.4	7.86	65.5
DALMIA	5.91	6.63	112.0	CCI	37.45	24.77	66.1
GACL	7.0	9.07	129.5	KESORAM	13.26	11.18	84.3
INIDA CEMENT	13.95	10.39	74.5	KCP	2.54	1.37	54.0
HEMADRI	0.99	0.85	86.0	NARMDA	10.0	7.66	76.6
JAYPEE	10.0	10.43	104.3	PANYAM	5.31	1.91	36.0
MADRAS	11.62	4.71	40.5	L & T	22.18	18.79	84.7
DECCAN	1.48	1.64	11.0	NCL	1.07	0.8	74.8
MANGLAM	4.0	3.71	92.8	KAKATIYA	0.66	0.85	128.8
MYSORE	15.95	17.32	108.6	SAURASHTRA	8.63	6.02	69.7
ORISSA	5.25	6.04	115.0	VIIKRAM	5.0	5.88	117.6

SOURCE : CMIE, Nov. 1990 and Jan. 1991

controls on the sale prices of cement. After full decontrol in 1989, the blame has now been shifted to the inadequacy of the govt. controlled infrastructure facilities like power, coal and rail wagons. Besides, there are a host of other causes which can be said to be responsibile for low capacity utilization. Most of these are within the control of the plant management. Some of the more important ones are:

* Plant maintenance problems
* Poor industrial relations
* Raw material shortages
* Operational inefficiency
* Technological limitations
* Managerial Competene

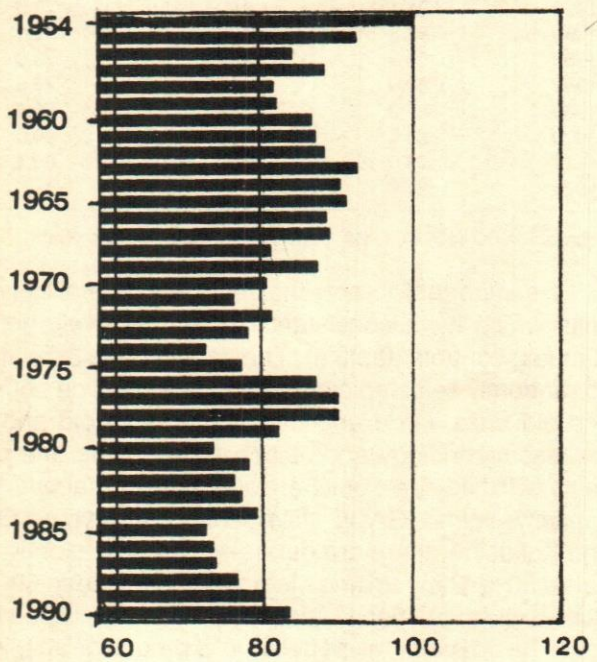


FIG. 1. CAPACITY UTILISATION IN CEMENT INDUSTRY 1954-1990

While the inadequacy of infrastructure facilities accounts for a major portion of the production loss, there is no controverting the fact that other factors within the organizational control of the companies also contribute substantially to reduced utilisation. The figures for eighties show that, by far, the biggest contributor to loss of production has been the 'Miscellaneous' factor (Table 9). The production loss on this account has jumped from a low of 13.3 lakh tonnes in 1985 to 77.5 lakh tonnes in 1989 and then declined a little to 68.1 lakh tonnes in 1989-90. It is not unlikely that the causes hidden under the cloak of 'miscellaneous' might be the more serious ones hindering cement production. These would therefore seem to call for the industry's attention more than anything else. It will be worthwhile for the industry to look deeply into the so called 'miscellaneous causes', as of late, they seem to be contributing more than 60 percent of the total loss of production. In some cases it is believed that there may be either hidden capacity or mixing of pozzolanic materials to achieve higher figures of cement production (UNI, 1985). In 1986, at a seminar on cement industry's problems, the participants including those from the industry had unanimously agreed to undertake a self monitoring exercise of all cement units to improve efficiency. Such an exercise it seems has not yet materialized although its importance was and is even today fully realized by all.

Technology and Modernization

Cement is a mixture of complex compounds finely ground into a powder. When mixed with water, it sets into a hard mass - the setting and hardening being the result of the hydration of the constituant compounds. Portland cement contains calcium silicate, calcium aluminate and other compounds in certain fixed proportions. Special cements with differing properties are manufactured by varying the proportion of raw materials, by adjusting process controls such as the clinkering temperature and the rate of cooling etc. Typical range of special portland

Table-9 Loss of Cement Production Caused by different factors (Lakh Tonnes)

Factors affecting Cement Production	1982	1983	1984	1985	1986	1987	1988	1989	1989-90
	(100% Capacity Utilization)			(85% Capacity Utilization)					
Mechanical Problems	2.3	2.6	2.5	30.8	30.6	23.9	23.4	14.9	17.9
Coal Shortage	0.2	2.6	0.3	0.5	0.4	0.5	3.9	2.2	3.2
Powercuts/Breakdowns	38.2	40.0	30.7	47.8	17.7	24.4	41.5	23.1	25.5
Wagons Short Supply	1.0	0.2	2.9	5.4	2.9	2.8	6.1	4.6	-
Raw material shortages	-	-	-	0.9	0.88	2.8	1.1	0.5	4.1
Industrial Relations	1.0	3.5	5.6	4.9	4.8	10.5	2.0	0.9	1.0
Teething Troubles (New Units)	-	-	-	7.0	7.3	18.4	3.6	-	0.8
Natural Causes	-	-	-	0.2	0.1	0.1	1.2	0.1	0.1
Clinker Shortage	-	-	-	3.4	4.4	5.5	4.6	0.1	0.9
Miscellaneous	37.6* (46.8)	50.8* (51.0)	60.6* (59.1)	13.3 (14.8)	14.9 (17.7)	20.8 (15.7)	36.5 (29.4)	77.5 (62.5)	68.1 (56.0)
Total	80.3	99.7	102.6	89.7	84.2	132.4	124.1	124..1	121.60

Figures in brackets are percentages to total loss of production.
* Includes also those on account of all other factors mentioned in the table for which separate figures are not available.
Source : CMA, Cement Statistics various issues

Table-10 : Typical Composition of some Portland Cements

	C_3S %	C_2S %	C_3A %	C_4AF %
Ordinary Portland	35-55	20-40	8-17	5-17
High Strength O.P.C.	45-60	15-25	8-15	6-15
Rapid Hardening P.C.	50-65	10-25	8-15	6-15
Low heat P.C.	20-30	50-55	5-8	8-15
Sulphate resisting P.C.	45-60	15-40	0-3	10-14
White Portland Cement	30-50	15-35	11-17	0.7-1.5

Note: C_3S = Tricalcium Silicate, C_2S = Dicalcium Silicate
C_3A = Tricalcium Aluminate, C_4F = Tetra calcium Aluminaferrite
Source : ICR Aug. 1990

cements and their compound percentages are given in table 10. Most of these cements are being produced in the country in varying quantities according to the market demand. Apart from special portland cements, the country also produces other cements such as Slag cement, Pozzolana cement etc. While pozzolana cement possesses certain qualities which make it better than ordinary portland cement under certain conditions, slag cement can be used only for limited types of construction. Other types of cements are mostly special purpose and as such have limited use.

The manufacture of portland cement involves four stages:

* Crushing & grinding of raw materials
* Blending the materials in the required proportion.
* Burning the prepared mix to form clinker
* Grinding the clinker with gypsum to make cement

The three widely known manufacturing processes are Dry, Wet or Semi-dry. In the case of Wet process the raw materials are ground wet and then fed into the kilns as a slurry. In the dry process raw materials are ground dry and fed as dry powder into the kiln. The semi-dry process, involves dry grinding of raw materials then moistening these to form nodules before being burnt in the kiln. It is now wellknown that the outmoded wet process is less economical because of higher energy requirements. It has therefore been largely replaced by the dry process all over the world. In India, 91 cement plants (56%) out of a total of 163 units are still employing the uneconomical wet technology , of which sixty three (69%) were over 25 years old (Kothari 1990). Of the remaining dry technology plants the average age is about 12 years. Since the wet process consumes more energy, this obsolete process caused a wastage of over 2.5 million tonnes of coal and 800 million units of electric power (for 33 million tonnes of cement produced) culminating in a colosal wastage of resources to the tune of about Rs. 200 crores. Another area where the wet process seems to be more wasteful is the manpower requirements. For an annual output of one million tonnes of cement, the wet process technology employs 2,500 - 4000 persons whereas the newer dry technology plants of a similar capacity require only 650 - 800 employees. In fact, in Japan, Europe and USA., the labour requirements for corresponding level of cement production are no more than 150 - 200 (Kothari, 1990).

The latest pre-calcinator technology made its entry in Japan and Europe in the early seventies when the cement industry in India was almost entirely wet-process based. Incidently it was also around this time that the first Oil shock shook the World. India's cement industry has since undergone a sea change particularly during the 80s after the shackles of controls started to be loosened. The wet process plants comprising 46.6% of total capacity in 1981 came down to almost 21.2% in 1989, most of the remaining having already become too old for economical conversion.

Modernisation of the entire cement industry, it is estimted, would call for an investment of about Rs.1500 crores. The industry has reluctently spent about Rs.963 crores on process upgradation (including expansion) so far. To help the industry generate funds for modernization and growth the government had adopted a policy of

Purchased Services (PS) to Total Earnings (TE)

The five years' averages show a fairly uniform set of ratios generally in the range of 0.6 to 0.8 for most companies except for Deccan which tops the list with a ratio of 0.4. This suggests that the company has kept its expenditure on purchased services strictly under check by monitoring it regularly. Some units (ACC, Madras, Digvijay, Kesoram, NCL etc.) whose PS to TE ratio were well controlled earlier have let these deteriorate progressively. Barring one company (GACL) whose ratio has come down in 1990 to 0.5, most of the others still continue to figure between 0.6 and 0.8 with eleven (out of 20) having achieved the intermediate figure of 0.7. It appears from these ratios that the purchased services costs are higher in the cement indusry and therefore call for stricter control. That it can be done is clearly shown by GACL and to some extent by ACC, NCL & Orissa Cement.

Wages & Salaries to Sales

Out of the 26 sample companies there are atleast seven (ACC, Birla, India Cement, Digvijay, Kesoram, Panyam and L & T) which are spending Rs. 11 to 15 for every hundred rupees of sales. On the other hand there are companies like GACL, Deccan, Hemadri, Narmada, Vikram & Kaktiya in whose case this expenditure is much less, below Rs. 6. In fact the lowest ratio is that of GACL, a mere Rs. 2.9. In the high ratio segment there has been a fair amount of uniformity over the years, whereas in most other cases (except GACL, Madras, Deccan and Orissa), the ratios have shown a rising tendecy all through suggesting a slackening of attitude towards wages and salaries in these companies.

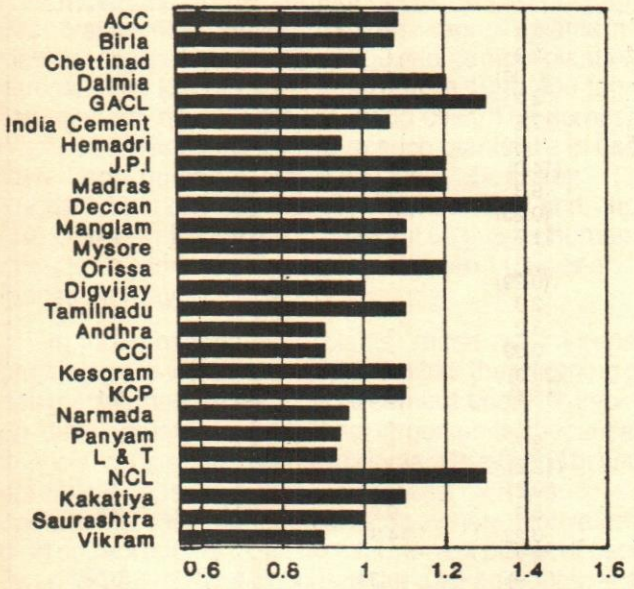


FIG. 2. TOTAL EARNINGS TO CONVERSION COST

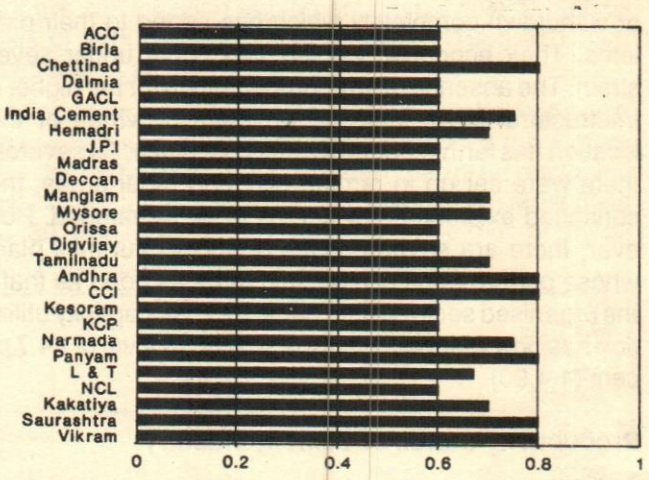


FIG. 3. PURCHASED SERVICES TO TOTAL EARNINGS

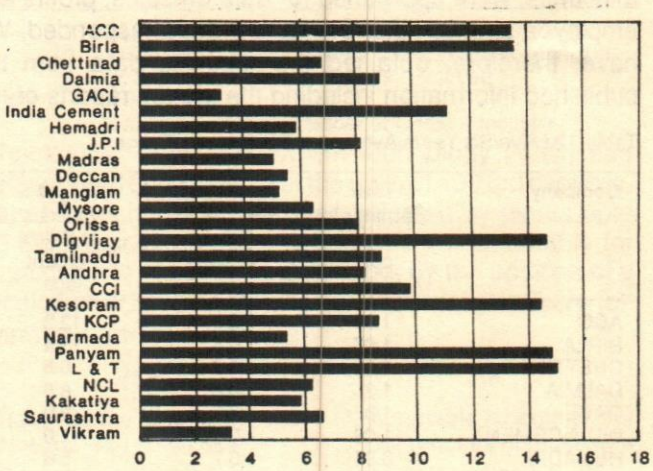


FIG. 4. WAGES & SALARIES TO SALES PERCENTAGE

Profit Performance

Of the 26 companies examined atleast eleven have shown losses, with four of them (CCI, Narmada, Vikram & Panyam) having remained in the red over the entire period. Most other companies except Dalmia, Jai Prakash, Deccan, Manglam, KCP, L&T, NCL have incurred losses in one or more years. Of the 8 companies which have kept themselves afloat, atleast three have diversified production activities other than cement.There are only two companies (NCL & Deccan) which have, on an average, achieved a fairly good profit ratio, being 22 paise for every

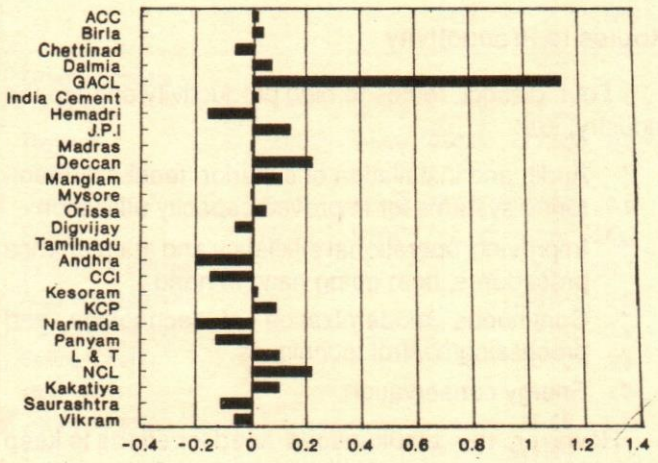


FIG. 5. PROFIT TO CONVERSION COST-RATIO

rupee of the total costs incurred.It disproves the view that the entire cement industry is on the down trail. Despite full decontrol in 1989, the profits of cement companies have shown little improvement except for one company GACL whose profit to conversion cost ratio in 1990 outbeats all others including established giants like the ACC and the Birlas. In fact, out of the twenty companies results of which are available for 1990, atleast in nine companies this ratio has shown a further decline. The need for gearing up to improve productivity in the cement industry could not have been more urgent than it is today.

The percentage of profits to sales shows a slightly different and a somewhat better picture. The highest profit, Rs. 14.3, generated for every hundred rupees of sales goes to the credit of NCL, a mini-cement company. At the other end, the dubious distinction of incurring the highest loss of Rs. 20.2 per 100 rupee of sales goes to Andhra Cement Co. Amongst the profit generating companies, Tamilnadu's ratio of 0.09 is a danger signal calling for greater managerial vigilance and the imperative need for a constant watch on its performance in relation to sales. Profit generation in relation to sales in several companies (eight out of 16) is not quite upto the mark and, therefore, demands efforts to arrest the persistent downtrend. Although NCL's average ratio is the highest, it has slipped to a low of 4.6 percent in 1990 with GACL jumping to the top with a profit generation of Rs. 14.4 for every hundred rupees of sales. Chettinad on the other hand has joined the loss makers with as high a loss as Rs. 38.5 for every hundred rupees of sales in 1990. Throughout the six year period there is hardly any case where this ratio has shown a tendency to improve (except GACL) which is somewhat parodoxical considering that the toal decontrol on cement prices should normally have led to increased profitability. Perhaps the full impact of decontrol will show in the next year's accounts.

Employee Productivity

Profit per employee shows two of the six companies earning negative figures and the others barely scraping through. Sales per employee ranges between a low of Rs. 1.14 lakhs in L&T and a high of Rs. 10.2 lakhs in the case of Vikram. In the matter of value added too the ratios are

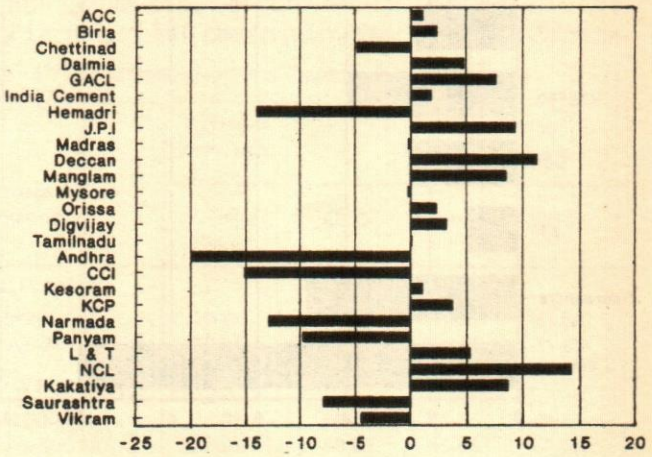


FIG. 6. PROFIT TO SALES PERCENTAGE

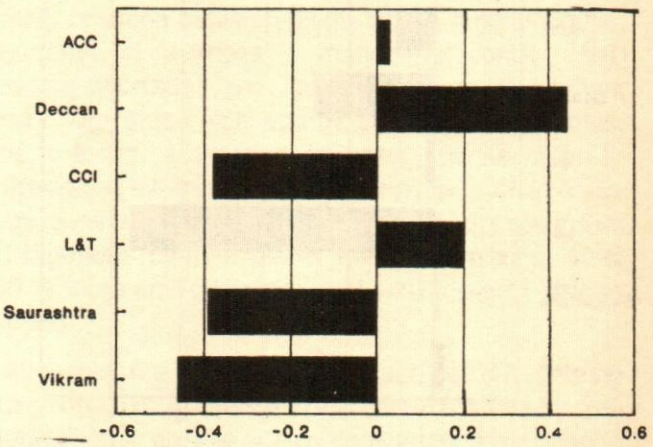


FIG. 7. PROFIT PER EMPLOYEE (RS. LAKHS)

Table 15 : Average Energy Consumption in Cement Industry

Type of Energy	Unit	India	World	% Variation
Electric Power	KWH			
Wet process	per tonne	110-120	90	19-25
Dry process	"	110-155	110	0-29
Thermal	K.Cal per Kg.			
Wet process	"	1600-1700	1250	22-26
Dry process	"	950-1050	770	19-27

Source: Holtec Engineers (Undated)

conservation strategy may be as under:

1st Step - Launch an awareness campaign about the importance of energy conservation throughout the plant to bring about energy consciousness at all levels.

2nd Step - Agree on conservation goals to be achieved over a predetermined period.

3rd Step - Select and set up a group with adequate authority to achieve the agreed goals.

4th Step - Conduct a full analysis of the entire plant with the help of specialists, to pinpoint areas of energy usages, energy losses, energy recovery etc.

5th Step - Based on the above analysis, prepare an action plan after prioritising areas according to the potenial of each area for energy savings.

6th Step - Sub-divide the action plan into immediate/ short term/long term measures

7th Step - Commence implementation of the action plan

8th Step - Involve direct staff & workers (of the plant) to ensure their co-operation in implementation of conservation measures.

9th Step - Decide on incentives for specific achievements

10th Step - Monitor/ review the progress/results regularly.

To give a further impetus to plant level energy conservation efforts, the cement industry can consider introducing a few incentives in the form of rewards to be presented to individual plants achieving specific savings. This could then be given wider publicity to motivate others to emulate the award winners. Energy conservation efforts may take different forms but the ones that are likely to yield best results are the simple and inexpensive management dispensations like turning off idle running equipment, guarding leakages, seeking and obtaining employee co-operation etc.. The scope for energy conservation is vast. By way of illustration few suggested areas where energy saving efforts are likely to meet better success are:

* Reduction in number of kiln stops.
* Improving thermal/combustion efficiency of kilns
* Improving cooler efficiency.
* Reduction of false air in the system
* Large capacity fans utilization
* ESPs and dust collecting equipments
* Cement Mill System
* Raw meal and cement transportation
* Plant maintenance techniques.
* Soft solutions through managerial caveats
* Modernizing process technology and equipment where applicable.
* Replacement/updating of boilers, furnaces, motors etc.
* Blending of low grade coals with high grade coal/lignite etc.
* Wase heat recovery and power generation
* Preventing surface heat losses through the use of better refractories/insulation

Pollution and its Control

Cement plants in India are one of the major contributors to air pollution and as such constitute a direct threat to the environmental safety along with other pollutant emitting chemical industries. While the pollution caused by the cement industry has not assumed devastating dimensions yet, it has reached fairly serious proportions to attract the attention (Ramanan,1984). The main pollutant emanating from a cement plant is the particulate matter. Based on wet or dry process technology, the sources of air pollution in a cement plant are the following:

i) **Grinding and homogenization of raw materials:**

The dust arisings during the process are high and call for the use of special equipment for control.

ii) **Burning/ clinkering in rotary kilns:**

The waste gases emanating from the kilns contain lime dust, gases like So_2, Co_2,No_x etc.

iii) **Clinker cooling:**

The air quenching of clinker from kilns causes emission of dust laden air into the atmosphere leading to its pollution.

iv) **Pulverisation, conveying, packing and loading:**

Sizeable quantity of dust is generated at different stages, a good part of which goes into the atmosphere. Leakages from packing machines or filled jute bags during their handling, stacking and transportation also leads to a lot of fugitive emission.

v) **Coal handling and coal crushing:**

This is another major source of air pollution. The entire coal mills area bears a constant fall of air borne coal dust causing health hazards to those who live or work nearyby .

Air pollution in and around cement plants, is undoubtedly a nuisance. There is no stage in the cement manufacturing process which is free from dust generation and particulate emissions. The workers in the cement plant breath constantly polluted air which cannot be but injurious to their health. To counteract the pollutants discharged into the air several devices have been developed for dust collection and filteration. The collectors based on filteration principles use fabric filters. However, the commonly used effective device for dust collection is the electrostatic precipitators (ESP) and bag houses. They are however, rather expensive to install. A typical ESP may cost anything from one to one and a half crores rupees which many plant managements consider an unproductive expenditure. Scrubbers, using liquid for scrubbing, though of limited utility, are also in use for special applications. Table 16 shows different types of dust collection devices which can and are being used in the cement industry. Most of the devices have their operational limitations which need to be borne in mind when selecting a particular equipment for installation.

a) Wet scrubbers used for coal dedusting suffer from the drawback of liquid effluent disposal. These have therefore been largely replaced by other types of dust collectors.

b) Cyclones and multicyclones have the disadvantage of poor dust collection efficiency.

c) ESP's are comparatively highly efficient though expensive devices. However, to obtain full operational efficiency ESPs must be regularly maintained.

d) Bag filters have a high installation cost and also require, like ESPs, constant maintenance. Choking of bags is also a problem likely to be encountered.

Table-16 Devices used for different dust emission sources

Source of Emission	Type of Dust Particles	Tye of suitable Device
Limestone Crushing	Limestone	Cyclone, Dust suppression spray Fabric filter
Raw material Milling & Drying	Limestone	ESP, Fabric filter
Coal handling & Crushing	Coal	Dust suppression spray & Fabric filter
Coal Pulverisation	Coal	ESP, Fabric filter
Kiln Exhaust	Partially Calcined	ESP, Fabric filter
Clinker Cooling	Cement Clinker	ESP, Cyclone, Fabric filter & Gravel bed filter
Clinker Conveying & Storage	Cement Clinker	Fabric filter Dust suppression sprays
Cement Mill	Cement	ESP and Fabric filter
Cement Transport & Storage	Cement	Fabric filter
Cement packing & loading	Cement	Fabric filter

Source : FICCI (1986)

The emission standards laid down under the Air Prevention and Control of Pollution Acts 1981 and 1986 from stack chimney of dry and wet process cement plants are shown below:-

Plant capacity	Protected area	Other areas
200 TPD and less (Rotary Kilns)	250 mg/NM^3	400 mg NM^3
Above 200 TPD	150 mg/NM^3	250 mg/NM^3

Some feel the above standards are somewhat more stringent than or at least as stringent as the emission limits fixed for kilns in some of the developed countries except Switzerland, USA & Japan. This contention is not however valid as particulate emission standards for some of European countries are far more stringent which will be clear from the following:

Germany 10 - 30 mg/NM^3

Other European countries - upto 100mg/Nm^3

From time to time, the industry has expressed difficulties in maintaining these standards and even suggested their relaxation. The main difficulties which render the current standards unattainable are:-

i) The actual operating conditions are usually very different from the design conditions due to a variety of reasons. Hence the ESPs do not perform at the designed efficiency level.

ii) Irregular power supply and voltage fluctuations cause frequent interruptions in the operation of dust collecting devices.

iii) High maintanance cost of pollution control equipment such as ESP adds to the cost of production.

v) Difficulties in obtaining spares at times.

vi) Inadequate water supply required for operating certain types of pollution control equipment.

None of the above problems can be regarded as of a permanent nature or beyond resolution. The industry's plea for relaxation of pollution standards would, therefore, seem to be somewhat exceptionable. Despite the concern expressed from time to time by the industry, visible efforts towards pollution control are nothing much to speak of. Several units have taken recourse to law courts for avoid-

Table 23 : Cement Traffic by Rail (million tonnes)

Year	Cement Prodn.	Rail movement	% age
1970-71	14.4	11.0	76
1980-81	18.6	10.3	55
1985-86	33.1	17.5	53
1986-87	36.2	18.47	51
1987-88	38.66	22.01	52
1988-89	41.69	23.44	56
1989-90	42.97	24.65	57
1990-91 (upto Dec.90)	32.80	17.00	52

Source : ICR Annual 1989, CMA (1991)

age of raw materials have to be moved by rail. Since the large size deposits of limestone are found in six states - MP. AP, TN, Karnaaka, Gujarat & Rajasthan, about 70% of the cement plants are concentrated in these states placing a heavy load on the railways particularly serving these states. About 70% cement traffic normally moves by rail as transportation beyond 220 Kms. is economical only by rail. By 1994-95, it is estimated, cement traffic by rail will be around 44 million tonnes which will further increase to about 56 million tonnes by the year 2000. To this extent the railways will have to plan for increased traffic during the 8th plan as it is unlikely that the road transport will expand substantiatlly to be able to cope with the expected higher cement output.

Railways will no doubt prefer bulk movement of cement. This would call for modifications to the existing loading/unloading facilities, and also changes in the design of wagons and adoption of appropriate storage and distribution methods. With the expected growth in cement production, planning for new types of bulk packaging in preference to current system of bagged movement has to commence right now. If cement despatches do not keep pace with higher output planned during 8th & 9th plans this may become a major bottleneck for which no quick alternative will be readily available to ease the situation. The cement industry has tied up with the World Bank for setting up a pilot bulk handling facility in New Bombay for movement and discharge of cement in bulk (Kapur,1990). The government is also participating in the project along with four of the leading cement producing companies. It is hoped this will prove to be the harbinger of similar set ups elsewhere to help the industry overcome or at least ease this bottleneck.

Government policies

Excise duty on cement currently accounts for about 17 per cent of the cost of a bag of cement. The industry would like to reduce the incidence of this levy and has been pleading for this all along. Government, however, feels that such a reduction if allowed, may not reach the consumer. Cement industry has also submitted a memorandum asking for an appropriate subsidy to compensate for the likely loss on the export of cement. Government has not found it possible to go all the way but has agreed to a cash compensatory support of 10 percent. Although the industry feels exports will cause a loss of about Rs.297 per tonne on direct cost, it is going ahead with its proposal to step up exports in order to capture new markets. To coordinate and promote exports, the industry is also planning to set up an Association of Cement Export & Marketing.

Cement Machinery Sector

Cement plant manufacturers whose fortunes are linked to those of the cement industry, believe that they have a major role cut out for them in the future. They are expecting an annual growth rate of 7% in the cement industry - from a base of 46 mtpa in 1990 to 65.5 mtpa in 1995 i.e. about 25 million tonnes in the next five years. According to them 13 mtpa is already in the pipeline. 36 percent of additional capacity to be created will be greenfield projects and 61% as capaciy expansion projects, the balance being in the form of conversion. Cement machinery manufacturers will have to gear up their resources and look for improved technologies to cater to the challenges of the future. According to one estimate, for every 12 mtpa capacity, equipment worth Rs.700 crores will be needed. The cement machinery manufacturers are planning to provide low power consumption high thermal effective and low emission plants. One only hopes this consciousness to innovate and improve plants trickles down to all areas so that the challenges of the future can be met adequately.

Abbreviations

ACC	-	Associated Cement Companies
BICP	-	Bureau of Industrial Costs and Prices
CCI	-	Cement Corporation of India
CCS	-	Cash Compensatory Support
CMA	-	Cement Manufacturers Association
CMIE	-	Centre for Monitoring Indian Economy
DCCI	-	Development Council for Cement Industry
FICCI	-	Federation of Indian Chambers of Commerce and Industry
GACL	-	Gujarat Ambuja Cements Limited
ICICI	-	Industrial Credit and Investment Corporation of India
ICR	-	Indian Cement Review
IDBI	-	Industrial Development Bank of India
JPI	-	Jaiprakash Industries
L & T	-	Larsen and Toubro

MTPA	-	Million tonnes per annum
NCAER	-	National Council for Applied Economic Research
NCB	-	National Council for Building materials
NPC	-	National Productivity Council
PCB	-	Pollution Control Board
PNB	-	Punjab National Bank
RK	-	Rotary Kiln
TPD	-	Tonnes Per Day
UNI	-	United News of India
VSK	-	Vertical Shaft Kiln

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Appendix-4 : Ratio of Profit to Conversion Cost

UNIT	1985	1986	1987	1988	1989	1990	Remarks
ACC	0.05	0.03	(0.003)	0.005	0.06 (8m)	0.04	9 Units
BIRLA	0.07	0.12	0.05	(0.007)	0.05	0.01	4 Units
CHETTINAD	0.1	0.09	0.08	0.07	(0.26) (9m)	(0.47)	
DALMIA	0.13 (15m)	0.17	0.09	0.03	0.02	0.03	5 Units
GACL	-	(0.005)	0.05	0.09	0.06	0.25	
INDIA CEMENT	0.07	0.08	0.02	0.02	(0.05)	0.02	3 Units
HEMADRI	(0.06)	(0.04)	0.4	-	(0.3) (18m)	(0.2)	
J.P.I.	-	0.6	0.02	-	0.09 (15m)	0.08	
MADRAS	0.04	0.23	(0.16)	-	0.11 (15m)	0.02	2 Units
DECCAN	0.43	0.48	0.14	0.18	0.10 (18m)	-	
MANGLAM	0.15	0.10	0.09	-	0.13 (15m)	0.08	
MYSORE	0.06	0.04	0.02	0.02 (18m)	-	(0.07)	3 Units
ORISSA	0.09	0.2	0.08	-	0.04 (15m)	0.002	2 Units
DIGVIJAY	0.04	(0.07)	(0.01)	-	(0.09)	-	4 Units
TAMILNADU	(0.11)	(0.08)	0.12	0.08	(0.01)	-	2 Units
ANDHRA	0.06	0.06	(0.02)	(0.36)	(0.53)	-	3 Units
CCI	(0.03)	(0.11)	(0.16)	(0.27)	(0.23)	-	9 Units
KESORAM	0.09	0.08	0.02	0.02	(0.04)	(0.01)	7 Units
KCP	0.09	0.08	0.07	0.03	0.23 (9m)	-	3 Units
NARMADA	(0.09)	(0.31)	(0.1)	-	(0.26) (15m)	(0.2)	2 Units
PANYAM	(0.06)	(0.01)	(0.21)	-	(0.31) (15m)	(0.14)	3 Units
L & T	0.15	0.13	0.10	-	0.08 (18m)	0.08	7 Units
NCL	0.35	0.40	0.18	-	0.16 (15m)	0.06	
KAKTIYA	0.24	0.13	0.06	(0.10)	0.01 (9m)	0.06	
SAURASHTRA	(0.11) (16m)	0.18	(0.006)	(0.07)	(0.28) (11m)	(0.21)	
VIKRAM	-	(0.11)	(0.14)	(0.03)	(0.01)	(0.04)	

m = month

Appendix-5 : Profit To Sales Percentage

UNIT	1985	1986	1987	1988	1989	1990	Remarks
ACC	2.3	1.3	(0.14)	0.3	(4.0) (8m)	2.1	9 Units
BIRLA	3.1	5.7	2.9	(0.45)	2.8	0.75	4 Units
CHETTINAD	7.0	7.6	6.4	5.8	(23.8)	(38.5)	
DALMIA	7.8 (15m)	10.1	5.9	2.1	1.4	2.0	5 Units
GACL	-	(0.19)	4.2	5.4	3.8	14.4	
INDIA CEMENT	4.8	5.9	1.6	1.7	(4.6)	1.6	3 Units
HEMADRI	(85.3)	(47.8)	31.1	-	(22.2) (15m)	(15.9)	
J.P.I.	-	32.0	1.7	-	5.8 (15m)	5.8	
MADRAS	17.8	12.6	(10.7)	-	(7.2) (15m)	1.2	2 Units
DECCAN	20.4	22.9	7.3	8.8	5.2 (18m)	-	
MANGLAM	11.3	7.4	7.1	-	9.4 (15m)	5.9	
MYSORE	3.4	2.3	1.7	1.7 (18m)		(5.0) (15m)	3 Units
ORISSA	4.0	8.6	3.5	-	6.4 (15m)	-	2 Units
DIGVIJAY	1.6	(3.9)	(5.4)	-	(6.4) (15m)	-	4 Units
TAMILNADU	(8.4)	(4.5)	6.2	4.4	(0.9)	-	2 Units
ANDHRA	5.8	4.2	(1.6)	(36.3)	(52.6)	-	3 Units
CCI	(1.7)	(8.2)	(13.1)	(23.2)	(22.9)	-	9 Units
KESORAM	4.9	4.1	1.3	1.0	(2.7)	(0.96)	7 Units
KCP	3.5	3.5	2.7	1.2	8.2 (9m)	-	3 Units
NARMADA	(4.2)	(19.5)	(6.6)	-	(19.3) (15m)	(12.7)	2 Units
PANYAM	(3.9)	(1.1)	(16.2)	-	(22.9) (15m)	(10.9)	3 Units
L & T	7.2	6.5	51.8	-	4.4 (18m)	4.6	7 Units
NCL	19.4	23.4	11.8	-	11.5 (15m)	4.6	
KAKTIYA	18.1	10.2	4.9	9.1	0.95 (9m)	5.7	
SAURASHTRA	(7.7) (16m)	10.2	(0.4)	(4.7)	(23.6) (11m)	(16.2)	
VIKRAM	-	(10.0)	(9.5)	(2.4)	(1.2)	(3.5)	

m = month

Appendix-6 : Profit Per Employee (Rs. Lakh)

UNIT	1985	1986	1987	1988	1989	1990
ACC	0.05	0.028	(0.003)	-	-	-
DECCAN	0.59	0.65	0.25	0.37	0.32 (15m)	-
CCI	(0.036)	(0.172)	(0.291)	(0.642)	(0.72)	-
L & T	0.2	0.18	0.17	-	0.25 (18m)	0.21
SAURASHTRA	(0.29) (16m)	0.46	(0.02)	(0.23)	1.13 (11m)	1.04
VIKRAM	-	(0.64)	(0.89)	(0.25)	(0.13)	(0.45)

m = month

Appendix-7 : Sales per Employee (Rs. Lakh)

UNIT	1985	1986	1987	1988	1989	1990
ACC	2.07	2.14	2.39	-	-	-
DECCAN	2.9	2.8	3.4	4.2	6.3 (15m)	-
CCI	2.24	2.11	2.22	2.76	3.13	-
L & T	2.75	2.78	2.99	-	5.69 (18m)	4.61
SAURASHTRA	3.76 (16m)	4.52	4.91	4.79	4.79 (11m)	6.41
VIKRAM	-	6.39	9.35	10.56	11.43	12.74

m = month

Appendix-8 : Value Added per Employee (Rs. Lakhs)

UNIT	1985	1986	1987	1988	1989	1990
ACC	0.46	0.44	0.45	-	-	-
DECCAN	1.24	1.25	1.23	1.36	2.04 (15m)	-
CCI	0.29	0.16	0.07	(0.074)	(0.024)	-
L & T	0.88	0.86	0.98	-	1.61 (18m)	1.31
SAURASHTRA	0.03 (16m)	0.71	0.28	0.01	(0.79) (11m)	(0.64)
VIKRAM	-	(0.42)	0.62	0.06	0.24	0.04

m = month

Energy Productivity in Indian Manufacturing Industries

NPC Research Division

In a previous study, we had arrived at energy intensity ratios in the Indian economy for all the broad energy consuming sectors during all the years from 1953-54 to 1988-89 (Productivity, 31,4)*. In the present study an attempt has been made to arrive at energy productivity ratios for the detailed industry groups in the manufacturing sector, based on the National Industrial Classification (NIC). A total of 46 industries were selected based on their importance in terms of their contribution to the total value of output of the manufacturing sector.

Energy Productivity is defined as output per unit of energy consumed. Since physical measurement of output and energy is not possible for groups of industries due to heterogeneity problems, the definition is modified to represent both output and energy input at 1970-71 base prices.

The output is measured in terms of product and byproducts as given in the Annual Survey of Industries (ASI). For deflating product values to 1970-71 base prices, corresponding price indexes from the Index Number of Wholesale Prices series are utilised.

Energy input is measured in terms of cost of power and fuel, deflated to 1970-71 base prices. The energy price index for each industrial category has been computed by a weighted combination of the Index Numbers of Wholesale Prices of electricity, motor spirit, diesel oil, coal, furnace oil and others, the weights being their shares in total cost of fuel in the case of each of the 46 industry groups. These shares are arrived at based on the energy composition of each industry group during the year 1978-79, the latest year for which the detailed information is available from the source (ASI). (table 1)

The study is limited to 1973-86 period due to reasons of data availability from the source, ASI. In table 2 the information on three aspect are given :-

1. Share of energy at current prices in the total value of inputs at current prices (%).
2. Output (at 1970-71 prices) per unit of energy input (at 1970-71 prices).
3. Number of factories covered.

* The conversion factor in page 648 should be read as MTER = 1000 MKWH. The error is regretted–ed.

Table.1. Fuel Cost Weightages (%) (1978 - 79)

Industry code no	Coal	Motor Spirit	Diesel Oil	Furnace Oil	Electricity	Others
20-21	13.42	3.53	8.06	13.29	36.98	24.72
206	9.05	3.97	4.23	11.93	22.35	48.47
210	29.13	1.55	1.25	10.88	48.05	9.14
22	27.16	9.07	7.81	16.96	23.09	15.91
23	17.07	1.22	1.54	10.01	56.63	13.53
24	14.79	2.79	3.65	14.23	42.32	22.22
25	14.80	2.42	4.77	0.80	66.07	11.13
26	6.13	16.20	4.97	14.08	43.66	14.96
27	6.80	11.11	18.47	4.62	40.85	18.15
28	27.85	2.72	1.66	15.83	42.55	9.39
280	31.08	1.18	1.42	17.79	40.34	8.19
29	5.53	11.21	8.36	9.77	52.95	12.18
30	5.45	2.89	2.66	13.65	44.52	30.83
31	9.32	1.56	2.47	23.12	45.88	17.65
310	12.97	1.11	4.05	19.14	49.57	13.16
311	1.86	1.44	1.10	12.21	58.74	24.65
312	9.37	0.29	0.19	28.67	41.41	20.07
313	0.00	4.62	2.54	41.98	43.65	7.20
32	8.53	2.00	2.97	20.15	47.66	18.69
320	7.62	1.89	2.02	19.18	44.89	24.40
321	5.00	1.01	1.97	18.10	45.00	28.92
324	1.96	1.22	1.40	10.20	55.56	29.66
33	23.26	0.72	2.07	11.37	33.08	29.51
330	1.97	9.41	3.90	10.07	64.29	10.36
331	12.88	2.06	5.89	16.23	33.25	29.69
332	0.69	0.32	0.56	3.04	83.33	12.06
333	5.43	1.21	11.54	33.97	45.35	2.50
335	3.94	0.46	0.78	16.38	67.78	10.66
336	0.10	0.56	1.73	3.54	87.42	6.65
34	4.41	7.51	6.01	14.37	44.52	23.18
35	9.27	6.75	8.71	5.80	42.52	26.95
350	3.25	4.96	6.91	4.01	38.10	42.77
352	0.00	23.00	7.78	0.00	59.45	9.77
353	7.43	11.52	3.94	15.35	57.66	4.10
354	9.77	42.74	0.49	2.32	30.89	13.80
355	0.16	7.81	7.24	1.36	43.99	39.44
357	0.48	5.53	4.22	12.40	48.17	29.20
36	6.24	9.56	7.30	19.00	50.05	7.84
360	4.95	5.58	7.79	4.92	56.72	20.24
37	14.50	3.62	4.98	14.25	42.35	20.30
371	5.29	1.11	2.21	22.91	37.80	30.66
372	6.32	1.66	2.82	23.71	37.58	27.92
374	1.26	4.50	9.58	11.80	44.66	28.19
375	0.31	5.95	7.28	10.79	44.85	30.81
376	2.28	4.97	8.82	22.53	39.24	22.16
38	2.22	13.63	4.78	8.95	58.88	11.54

Table 2 : Energy Productivity Ratios in Indian Manufacturing Industries

	Food Product (20-21)			Refining of Sugar (206)			Hydrogenated Oils, Vanaspati (210)			Beverages, tobacco & tobacco products (22)		
	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)
1973	1.96	42.21	13509	2.03	49.88	261	1.72	49.93	65	1.52	85.94	2357
1974	2.23	45.34	13454	2.39	52.27	251	1.88	51.80	71	2.12	79.12	2080
1975	2.52	46.75	14126	2.45	55.63	243	2.27	64.71	75	2.22	69.25	2880
1976	2.76	44.69	15306	3.01	49.20	261	2.58	58.78	79	2.16	78.73	6398
1977	2.60	49.29	15783	2.90	54.98	288	2.01	59.45	69	2.04	73.71	7307
1978	2.66	58.51	16310	2.86	62.13	286	2.60	55.07	69	2.35	70.45	8240
1979	2.90	47.62	16840	3.24	56.43	293	3.02	49.49	83	2.86	66.16	9629
1980	3.25	37.98	17067	3.88	43.31	304	3.31	48.01	82	3.23	69.15	8901
1981	3.24	60.02	18351	2.77	69.54	296	3.44	49.41	76	3.43	75.40	9568
1982	3.17	61.77	17111	2.44	94.28	308	3.32	54.52	90	3.33	80.57	8486
1983	3.42	58.47	17523	2.73	94.14	318	3.82	46.63	109	3.79	81.04	8188
1984	3.54	54.58	17459	3.56	73.64	318	4.27	42.78	102	3.84	78.02	7093
1985	3.68	55.25	17725	3.07	80.06	323	4.26	55.44	88	3.99	71.48	8457
1986	3.60	54.48	17299	2.92	83.92	328	4.38	44.53	97	4.37	60.99	7163

	Cotton Textiles (23)			Wool, Silk, Synthetic fiber textiles (24)			Jute, hemp & mesta textiles (25)			Textiles products (26)		
	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)
1973	5.96	21.47	5719	4.58	19.63	2413	4.56	31.96	429	1.19	106.22	1642
1974	6.32	20.43	5560	5.54	19.42	2368	5.82	26.77	322	1.53	81.71	1652
1975	7.74	20.17	5968	5.43	20.89	2743	6.57	30.21	184	1.52	79.26	1979
1976	7.78	19.93	6213	6.14	18.15	3090	6.59	31.08	201	1.49	80.83	2192
1977	6.99	20.45	6508	5.80	19.16	3112	6.39	28.64	223	1.45	80.37	2347
1978	7.59	21.09	6701	5.56	20.33	3216	6.16	27.76	247	1.49	72.78	2577
1979	8.88	20.10	7207	5.72	23.07	3455	7.06	22.94	257	1.44	72.07	2907
1980	9.79	20.24	7189	6.71	24.14	3743	7.89	26.67	265	1.52	83.52	2889
1981	9.59	22.04	7141	6.95	27.13	4100	9.33	28.08	297	1.58	93.69	2943
1982	10.33	21.50	6569	7.83	24.75	3267	10.55	28.84	219	1.69	96.40	2491
1983	12.34	20.47	6731	9.27	24.43	3532	9.66	24.72	236	2.14	89.37	2621
1984	11.34	22.03	6760	9.31	24.77	2955	7.31	20.74	215	2.00	84.94	3063
1985	13.39	20.23	7073	7.97	31.02	3236	6.98	29.80	204	1.99	72.66	2835
1986	14.20	21.73	6981	8.84	29.26	2986	12.23	29.33	184	1.93	75.01	2821

(Contd.)

Table 2 Contd.

	Wood & Wood products furniture & fixtures (27)			Paper, paper product, printing (28)			Pulp, paper & boards (280)			Leather, & fur products (29)		
	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Fact ories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)
1973	3.07	46.27	2932	9.10	14.68	3779	15.75	9.53	560	0.92	92.06	594
1974	3.52	38.94	3158	9.56	14.15	3820	15.96	10.09	490	1.26	83.91	667
1975	3.85	37.41	3431	11.63	13.33	3936	20.06	9.28	424	1.23	76.38	670
1976	4.21	36.76	3573	11.40	13.78	4506	21.55	8.72	449	1.21	81.08	727
1977	4.01	36.30	3676	12.55	12.45	4439	23.58	7.86	538	1.35	73.22	762
1978	3.73	36.62	3788	11.76	13.36	4901	21.31	8.60	500	1.13	80.16	797
1979	3.96	36.75	3978	12.15	13.32	4743	21.42	8.66	587	1.17	70.21	862
1980	3.62	35.99	4033	12.89	14.25	4798	22.91	9.11	585	1.58	61.44	886
1981	4.34	36.64	4094	13.75	15.21	4890	24.13	9.46	672	1.69	68.84	899
1982	4.95	32.78	3618	14.20	14.67	4571	25.13	8.69	637	2.08	63.47	880
1983	4.99	36.60	3591	15.05	14.36	4710	25.75	8.90	734	2.46	58.50	942
1984	4.68	37.31	3847	15.25	13.89	4808	25.06	9.11	696	2.26	62.94	929
1985	5.20	35.37	3580	14.89	14.48	4870	24.68	9.30	802	2.42	55.75	999
1986	4.57	42.16	3873	15.46	14.62	4921	26.15	9.48	779	2.19	62.43	976

	Rubber & plastics (30)			Chemicals & Products (31)			Basic & Industrial gases (310)			Fertiliser & Pesticides (311)		
	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Fact ories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)
1973	3.67	39.45	1794	7.70	19.70	3043	18.18	8.59	389	13.75	11.17	335
1974	2.47	57.52	1952	8.07	17.91	3221	16.89	7.72	543	11.65	9.37	344
1975	2.05	68.01	2496	9.12	17.05	3732	19.70	7.12	639	13.43	8.36	378
1976	2.24	69.91	2831	10.17	17.08	4152	21.39	7.28	701	16.02	8.65	440
1977	2.25	71.45	2881	9.70	17.84	4674	20.63	8.05	764	17.05	8.64	469
1978	2.67	53.58	2350	10.26	17.92	4881	20.58	7.74	874	17.54	9.55	493
1979	2.68	52.83	3302	10.03	18.66	5328	19.95	7.15	883	16.09	11.58	503
1980	1.61	93.86	3498	10.66	19.15	5479	22.53	6.68	917	14.69	10.67	447
1981	1.75	88.51	3864	11.99	19.14	6834	20.94	7.62	1223	16.95	9.68	618
1982	2.05	78.21	3514	12.08	19.78	5350	24.61	7.31	934	16.88	10.65	442
1983	3.07	54.50	3778	13.84	19.62	5824	27.98	6.65	978	20.83	10.64	495
1984	2.24	76.33	3900	13.59	19.33	6032	26.29	6.75	1320	20.05	11.88	469
1985	2.22	84.89	3958	12.81	21.87	6402	26.88	6.77	1040	18.93	13.94	546
1986	2.68	70.80	4097	14.38	19.17	6335	27.84	7.16	1017	21.59	11.68	474

(Contd.)

Table 2 Contd.

	Paints & Varnish (312)			Drug & Medicines (313)			Non-metallic mineral products (32)			Structural clay products (320)		
	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)
1973	3.89	35.01	338	4.01	49.30	674	22.83	6.32	3757	27.69	5.87	1182
1974	4.84	27.03	372	4.49	60.14	682	24.44	6.27	3890	29.81	5.58	1223
1975	4.18	34.34	368	4.30	69.37	800	26.53	5.73	4820	31.45	5.36	1533
1976	4.87	31.49	403	5.33	56.54	865	26.69	6.04	5309	30.74	5.48	1641
1977	4.83	31.77	496	4.96	58.44	918	25.18	6.63	5558	30.35	5.82	1666
1978	5.18	30.85	498	5.11	58.52	958	26.03	6.09	5639	31.49	5.84	1727
1979	5.16	30.73	551	5.04	69.86	1070	25.82	6.12	6083	28.59	5.95	1899
1980	6.11	31.75	568	5.39	91.14	1121	25.99	7.17	6440	31.91	5.39	2159
1981	6.51	32.86	773	6.10	89.35	1434	27.88	7.21	7694	33.41	5.68	3048
1982	7.44	27.62	476	5.96	87.45	1131	28.54	6.69	6667	34.83	5.46	2495
1983	7.79	31.03	547	5.85	95.54	1187	30.39	6.53	7618	34.87	5.43	3117
1984	8.61	27.74	515	5.86	89.19	1265	30.78	6.34	7841	37.43	5.44	3146
1985	7.16	31.81	555	5.00	118.20	1358	31.54	6.65	8515	35.88	5.77	3421
1986	7.47	29.42	592	5.75	103.64	1374	33.94	6.33	8267	35.23	5.48	3247

	Glass & glass products (321)			Cement, Lime & plaster industry (324)			Basic metal & alloy industry (33)			Iron & Steel Industry (330)		
	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)
1973	24.98	5.91	391	32.14	3.85	126	12.04	9.88	4132	15.14	8.03	942
1974	29.13	4.35	932	33.72	3.20	126	13.74	9.51	4215	17.41	8.18	1114
1975	31.44	3.95	414	35.87	3.46	205	15.85	8.26	4562	18.69	7.41	1150
1976	31.89	4.57	448	36.60	3.57	226	16.19	8.49	4988	18.96	7.66	1143
1977	30.33	4.93	483	35.47	3.54	247	13.57	9.87	5054	14.11	10.21	1299
1978	29.90	4.44	560	37.04	3.19	232	17.06	7.57	5259	19.94	6.89	1332
1979	31.05	4.39	573	37.67	2.97	271	16.03	7.89	5538	17.67	7.10	1471
1980	30.02	5.12	590	37.25	3.39	261	15.91	9.23	5779	17.10	8.68	1546
1981	33.50	5.18	674	40.31	4.17	276	14.66	10.19	6013	14.66	9.86	1714
1982	34.27	4.88	607	37.61	4.04	276	14.41	9.67	5509	13.96	9.28	1474
1983	35.62	5.44	601	39.18	4.21	328	18.19	8.61	5888	18.90	7.95	1686
1984	34.67	5.65	567	38.16	4.79	366	17.16	8.47	5901	16.85	8.06	1657
1985	34.26	6.69	571	38.89	5.50	468	17.00	8.45	6077	16.87	8.21	1764
1986	33.50	6.68	556	43.37	5.91	448	16.03	9.21	6191	15.82	8.89	1822

(Contd.)

Table 2 Contd.

	Locomotive parts (371)			Railway wagons (372)			Motor vehicles (374)			Motorcycle, scooter (375)		
	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)
1973	5.09	21.73	25	6.84	14.61	109	2.97	46.33	523	3.18	46.43	114
1974	5.22	26.06	23	6.84	20.68	110	3.66	39.78	569	2.98	56.04	147
1975	*	*	24	5.85	27.82	102	3.82	38.74	990	3.48	48.92	110
1976	9.94	20.94	16	7.16	25.08	101	3.79	43.15	1021	3.22	58.74	146
1977	7.62	26.90	19	7.49	20.99	139	4.32	38.73	1023	3.29	54.81	201
1978	11.27	37.37	24	8.85	15.70	137	3.92	40.36	1113	3.88	49.39	215
1979	8.01	13.25	36	12.23	10.24	173	3.68	39.68	1205	3.90	47.60	270
1980	9.73	17.40	41	7.41	15.03	145	3.52	45.54	1297	3.82	60.32	235
1981	8.24	21.69	44	9.69	14.61	187	4.14	42.35	1565	3.59	67.99	293
1982	8.74	24.59	37	8.58	19.04	153	4.23	43.59	1334	3.73	65.90	255
1983	10.94	21.22	37	8.27	19.23	153	4.78	44.61	1302	3.81	70.21	257
1984	*	*	42	9.49	18.03	149	4.64	45.41	1529	3.70	69.49	287
1985	*	*	36	8.17	20.39	146	4.30	46.39	1594	3.61	50.25	295
1986	10.11	23.68	42	10.82	12.34	134	4.14	49.53	1567	3.41	73.63	348

	Bicycle, Parts (376)			Other Manufacturing Industry (38)		
	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)	Share of energy in total input %	Energy productivity ratio	Factories (Nos.)
1973	2.87	49.65	464	2.97	51.61	1662
1974	3.70	44.27	498	2.85	52.09	1566
1975	3.93	43.04	581	2.67	60.73	1473
1976	4.18	43.48	600	2.91	57.66	1871
1977	4.06	46.58	598	2.70	61.26	1897
1978	3.85	44.93	643	2.49	63.97	1799
1979	3.55	53.70	694	2.26	75.76	2047
1980	3.18	78.08	676	2.33	87.40	1956
1981	3.94	*	748	2.74	85.63	2383
1982	4.51	65.04	638	2.75	96.21	1475
1983	4.93	65.36	669	3.09	100.08	1871
1984	4.44	67.75	658	3.15	101.78	1509
1985	3.96	73.35	673	3.18	121.79	1725
1986	4.24	73.33	627	3.53	101.46	1573

Notes:
* Cases with extreme values are not reported

Figures in brackets are the industry codes according to NIC

Complied by :
V. Raghuraman
N.K. Nair
Manju Kalra

Data Bank

Pollution from Meat Processing Units : Cost Implications for Abatement & Control

NPC Pollution Control Division

India produces approximately 1.2 million tonnes of meat annually, but, due to Indian's preference for hot meat, only 6% of the total production is processed for export as well as for domestic consumption. A total of 153 licensed meat processing units are operating in the country and about 100,000 tonnes of frozen meat and 25,000 tonnes of processed meat are produced by them. Most of these units are located in Metropolitan cities and they have not installed any pollution abatement or control facilities.

To evaluate the techno-economic feasibility of implementing appropriate pollution abatement and control measures and to evolve National Environmental Standards, a study was conducted by the National Productivity Council. The study was conducted in two phases; Phase 1 - Preliminary survey in 30 units to collect relevant baseline data and Phase 2 - Detailed Pollution audits in 14 units to collect comprehensive information on process details, resource recovery, water consumption, sectional and combined pollution loads generated etc,.

Status of Pollution

Considering the broad variations in the process steps followed and the consequent pollution loads generated, the meat processing industry is grouped into:

a) Frozen Meat
b) Processed Meat

During the preliminary study it was observed that the specific pollution loads generated by these units vary with it's installed production capacity. Hence, these units are further subdivided into:

Frozen Meat Industry

- Large Scale - 25 Tonnes and above/day,
- Medium Scale - >10 Tonnes & upto 24 Tonnes/ day,
- Small Scale - < 10 Ton/day,

Processed Meat Industry (as per the Meat and Food Processing Order - MFPO, classification)

- Class A - Animals slaughtered in own slaughter houses
- Class B - Units using animals slaughtered in public slaughter houses
- Class C - Units procuring meat from the local market.

Based on the detailed Pollution Audit Studies, specific pollution loads in terms of M^3 Wastewater, BOD (kg), Solid Waste (kg.)per Tonne of meat processed are computed and shown in table-I. The observed variations in specific wastewater volume and specific pollution load in processed meat units are due to variations in product mix, scale of in-house fat rendering facility, type of carcass procured i.e. unwashed carcass from slaughter house or washed carcass from contractors etc,.

Pollution Abatement Measures :

Major pollution load in Class-A meat processing units is contributed by the discharge of blood from slaughtering section. Since blood is a valuable by-product, it can be converted effectively into either animal feed supplement or soil conditioner, which in turn will reduce the pollution load in terms of BOD by around 30%.

In a meat processing unit, the cut losses, green & spoiled meat, contribute substantial solid waste as well as BOD load. Therefore by introducing appropriate screening, proper collection, dry handling or off site processing of these solid wastes into fertiliser or as soil conditioner will reduce the total pollution load by around 20%. In addition these measures will avoid chocking of sewer lines by class B &C units.

Wastewater Treatment Costs

To meet the existing inland water stream disposal standard of 30 mg BOD/l, the required capital investment and the annualised operation & maintenance costs for an appropriate wastewater treatment system before and after introduction of pollution abatement measures have

been estimated (Table-2). In case of Frozen Meat units, introduction of pollution abatement measures will result in about 10% reduction in capital investment and operation & maintenance costs of the wastewater treatment system. Similarly in case of processed meat class-A units, the reduction will be about 20%. Class B & C units are basically shop establishments and they are normally located in the market place. In addition they generate low quantity of wastewater. Hence, it is not feasible for these units to install a full fledged wastewater treatment system.

Table 1. Wastewater Generation and Specific Bod Load in Representative Meat Processing Units

Type	Category	Combined wastewater Flow		Spec. Pollution Load (Kg.BOD/TON)			%	Sp.Solid Waste (Kg/TON)		%
		M^3/d	M^3/ton	BOD* Kg/d	Before Abatement	After Abatement	Reduction	Before Abatement	After Abatement	Reduction
Frozen	Large	57.0	1.90	35.8	1.2	1.0	17%	1100	900	18%
Meat	Medium	28.5	1.95	18.0	1.2	1.0	17%	1200	900	25%
	Small	9.5	2.00	6.0	1.2	1.0	17%	1100	900	18%
Processed	Class-A									
	Pig	58.2	11.6	90.0	18.0	10.8	40%	399	260	33%
	Poultry	155.0	20.8	166.0	20.7	12.0	42%	300	200	33%
	Class-B	2.2	8.8	1.8	7.2	6.0	17%	67	40	40%
	Class-C	1.3	6.5	2.6	13.0	10.0	23%	42	40	5%

* Characteristics are based on the flow monitoring and composite wastewater sample collected during whole operation.

Table 2. Capital Investment and Annualised Operation and Maintenance Costs for Wastewater Treatment System (Rs. 000)

Type	Category	Before Pollution Abatement			After Pollution Abatement		
		Capital Invest.	Annualised-O & M	Costs % of Turnover	Capital Invest.	Annualised-O & M	Costs % of Turnover
Frozen	Large	5.55	1.52	0.12	5.05	1.46	0.11
Meat	Medium	4.05	0.95	0.14	3.70	0.88	0.13
	Small	3.15	0.90	0.30	3.05	0.88	0.29
Processed—	Pig	7.00	1.90	0.60	5.16	1.52	0.50
Meat	Poultry	0.15	2.8	0.70	7.0	1.90	0.40
Class-A							

— Investment costs does not include land
— Annualised operating costs (operating cost + Maintenance + Depreciation + Interests)
— Annual depreciation cost by applying straight line method
— Annual interest rate at 18% on total investment
— To achieve the existing stream disposal standards of 30 mg BOD/l the treatment system envisaged is extended aeration activated sludge process.

Compiled by:
P.K. Gupta & L. Paneer Selvam

□

News & Notes

GLOBAL COMPETITION AND PRODUCTIVITY

"The most important management reality is that competition for manufacturers, for most financial institutions, and most service business has become global. This does not mean,----that, to have a leadership position in any part of the developed world, a business must have a market presence, and perhaps a leadership role in any part of the world. Many businesses will remain primarily regional or local. Global competition does mean that every business will be managed in the context of a global economy, ----. A reality of global competition is that, rather than a community of national economies, the developed countries will arrange themselves in a series of trading blocs", asserts Professor Donald N. Thompson of the York University. He was delivering the keynote address at the First Academic Conference of the Association of Management Development Institutions in South Asia (AMDISA) on 'Challenges of Management Development in South Asia', "The formation of this 'triad' of major trading blocs means both rapid development of trade and rapid evolution of trade protectionism among blocs. It means that the concept of reciprocity will become a central principle for international economic integration. Economic relations will increasingly be between trading blocs rather than between countries, and will be conducted as bilateral or trilateral deals involving both investment and trade. But whether between trading blocs or among individual countries, reciprocity will govern leaderships. Countries and trading blocs, will offer free market access to those countries that themselves offer free market access"; according to Dr. Thompson.

One result of the emergence of global competition is that the factors that determine competitive position are changing fast. One of those is productivity. "We teach students in business schools that productivity means what blue-collar workers in manufacturing industries do. But that kind of productivity is not very important any more. In most manufacturing business today, labour represents something like 12-15 per cent of the total costs. Even in labour-intensive industries like manufacturing automobiles, the labour quotient is falling rapidly. It is 15 per cent at Honda's new plant in Mrysville, Ohio; Toyota predicts that the blue-collar labour quotient in its late-1990s' automated plants will be no higher than 12 per cent. Even ICI, a chemical giant in Britain, has more white-collar than blue-collar people in its workforce—in spite of recently eliminating several levels of middle management. In such companies, differences in transportation costs quickly become more important than differences in blue-collar labour productivity (which is one reason Honda has a plant in Mrysville, Ohio). What this means is that low-wage countries can no longer establish and maintain competitive leadership through blue-collar productivity, or through very low blue-collar labour costs,"adds Prof. Thompson.

There are other kinds of productivity that matter. Perhaps the most important is the cost and productivity of capital. The biggest advantage the Japanese, Swiss, and Germans have today, in world-wide competition, is their low capital costs. The Americans probably manage the productivity of capital better than the Japanese, but their base rates are two to two-and-a-half times those in Japan. The second important area of productivity relates to that of knowledge-workers who already outnumber blue-collar workers in every advanced country, yet we know little of their productivity. North America has been one area where knowledge-workers have a distinct advantage, ----- because of the abundant supply of people prepared for knowledge work is constrained by far fewer political and social restrictions or conventions than in the Far East, or indeed in South Asia. The third important area of productivity relates to service work. In many businesses, even those in manufacturing, service and supply workers represent as large a percentage of the work force as do blue-collar workers. Service work is increasingly becoming capital-intensive. In many businesses, investment in information technology per-clerical employee in the office equals investment in machinery per-production worker in the plant. And productivity levels in service work are relatively low in every country. Productivity levels in service work are going to improve dramatically in the developed world over the next decade, as first Japan, then western Europe, and finally, North America experiences its tightest labour market in 20 years. Labour shortages will cause increased productivity by forcing corporations to use workers in more creative and efficient ways.

As with those firms that provide meals and maintenance to hospitals, the only way to come to grips with the productivity of service work may be to unbundle most service functions, and create free-standing, independent companies which do nothing but provide service to others. Only by putting the work in a separate, outside organisation with its own career ladders and training can ensure that there is a quality emphasis, and that training, and appropriate management exists. We are already seeing in the western world situations where hospitals contract but their lab work and functions like physiotheraphy; brokerage firms contract out all the "back office" functions concenring paper processing; and large companies contract out most of their word processing and data processing; according to Prof. Thompson.

ORIGINALITY IN MANAGEMENT

"Originality in Management is necessary because of the rapidly changing environment and the need to research or adapt to the changing conditions- - - -.The skill of a manager, in this context, can be defined as the ability to conceive and adapt new methods and systems to attain company goals", states a Report on APO Top Management Forum; held in Kyoto from 5th to 9th March, 1990. The Forum dealt with some unique experiences from Japanese enterprises in working out and successfully applying originality in their management systems.

According to the Report, "Originality in Management includes incorporating the ability to consider as viable something that is creative, new and different from established practices. At the nascent stage, these ideas could even border upon absurdity. Originality in management is applicable to all phases of national and business development, as originality in thinking and management is required at all times. However, the intensity of the development and application of these approaches may vary according to the different phases of national development or the stages of the company's growth. The influential factors determining this intensity include the social, economic, and political conditions at the time. But it is important to recognize that original approaches to management are a dynamic concept."

Originality in management can cover all aspects of business—marketing, finance, manufacturing, technology, human resources and research and development. The goal of originality in management is usually one or more of the following; cased longevity of the organizaiiion; more competitively excellent; increased satisfaction of customers; improved quality of life; increased efficiency, productivity, and effectiveness; increased benefits to stakeholders; growth in the economy and the standard of living. Specific conditions which would compel firms to seek out originality in management might arise from both external and internal factors. The major internal factors are: the stagnation in the company and the need to grow and expand; unsatisfactory performance in specific areas of operation; loss of leadership and intelligent resources; a restless labour force or a shortage of labour; new ownership, a takeover, or a merger. The major external factors are: scientific and technological breakthroughs; increasing competition; changing market conditions; changes in the availability and the cost of raw materials or other resources; fluctuations in foreign exchange rates and the stock markets; changing government policies or legislation; changing international trade, economic, and sociopolitical conditions in and around the country, adds the Report.

A strong desire for change within an organization and a keen urge to seek out new ideas through different sources may be a manifestation of a company's search for originality in management. The observation and analysis of success as well as failures in related and unrelated businesses and different national contexts can provide many valuable lessons. Typical examples of this were the case histories presented in this Forum such as the unconventional management structure at Seiren, the unconventional processes and systems employed at Nomura Security, Panasonic, and Mazda, and innovative products such as Yoshikawa's lanolin and Panasonic's individualized bicycle.

In regard to strategies to inspire originality in management, the steps recommended are: the creation of a "think tank," the creation of a positive environment within the organisation to establish mutual trust through internal communication with newsletters, lectures, and briefing; less management control; the promotion of both bottom-up and top-down management; the adoption of a participative style of management through sharing long-term management objectives with all employees; encouraging experimentation within established limits; conducting workshops, brainstorming sessions, and informal dialogues; regular review meetings; building teams and taskforces; establishing quality circles, producitivity circles, etc.; the development of human resources through training and development; the exchange of ideas; exposure to seminars and conferences; producitivity incentives, bonus shemes, and other fringe benefits; recognition and

rewards for innovative ideas; greater autonomy and responsibility of employees; and job security; and ensuring the loyalty of employees through a give-and-take relationship.

The following might easily serve as catalysts in identifying the need and spreading the concept of originality in management; they also can serve as a possible source of ideas: foreign and local case study seminars, conferences, and study tours; organisations of retired executives like those in the United States, Canada, and Japan; governmental and quasi-governmental organisations; local human resource development organisation such as universities, chambers of commerce, management institutes, etc.; and altruistic organisations such as APO, JPC, and ILO. It has been recommended that APO, in cooperation with JPC, JICA, and other national organisations like the National Productivity Organisations (NPOs), sponsor programmes such as this Forum at the national level in interested countries in the Asia-Pacific region. In turn, the NPOs could bring the programme down to the grass-roots level, according to the report.

TECHNOLOGY TRANSFER

A recent analysis carried out by Dr. Richard Diesslin based on literature review led to a specific set of success factors which should be used as a measure against any proposed technology transfer programmes; reports Manufacturing Competitiveness Frontiers, (Nov. 1990). The analysis was carried out by Dr. Diesslin for the Wright Research and Development Center's (WRDC) Manufacturing Technology Directorate to investigate technology transfer mechanisms which might assist small and medium sized manufacturing firms in the utilisation of developed technologies. These success factors are :

Focus : Focus is defined as a clear development of the targeted thrust area. Success favors a very specific area, or a highly focused effort. A common problem of many technology transfer programs is that they are very broadly defined and try to cover a very diverse area. The main elements of focus are location, technology and client base.

Contact: Contact is primarily defined as the interface to the potential and actual user base. Some points of interest are:

(a) The need for fairly self-sufficient points of contact.

(b) Warning: For technology transfer to be successful it needs to be staffed by people who have the proper expertise and the authority and backing from top level management to carry it out.

(c) The community college approach seemed more sucessful than the university approach.

Timeliness: Timeliness is basically responsiveness of a program to provide end-user services. Technology transfer is basically a service and needs to be responsive to client interest, otherwise, it is of no benefit,

Relevance: Relevance is defined from the user perspective; the information must be in a usable form, or "relevant," to the application. With small and medium sized firms this may mean as much adoptive engineering (technical implementation assistance) as information about a technology.

Interest: The community which the technolgoy transfer is trying to reach must have an interest in being reached. As one of the documents point out, new industries (and ones with a history of high R & D) are more fertile markets for innovation and R & D.

Exposure: The target market needs to know that the service exists. A combination of market conditioning (paving the way to consider a technology feasible and acceptable) and promotion (advertising) is required to make potential clients aware of the service. This often includes informing market catalysts of the service (e.g., professional associations, key players and consultants in the field).

Support : Support is both the proper funding to carry out the mission (or focus) and the proper political backing (internal and external). Internal support comes from management backing the program and providing the authority and expertise needed to achieve its mission.

Accountability: Accountability is assigning a staff who is in charge of the program, whose performance measurement is tied to the program, and who has the authority to make decisions important to the program's success. This is a very serious deficiency in government organisations and universities. People need to be tied to the success of the program, but they also need enough authority to influence the outcome of it.

Adaptability: The ability for programs to change with changing needs of its user base. Adaptability could also take the form of the same program structure with varying technologies to transfer. For example, emphasize different technologies based on the characteristics of the small and medium sized shops in a given area.

Systematic Approach : Rather than viewing a technology transfer objective as a program to be managed (e.g., project management techniques), it should be considered

more of a system from which one of the primary results is technology transfer. This is important because models based solely on redistributing or secondary technology (not aimed at a specific and user) tend to fail (e.g., most federal lab technology transfer efforts).

Control : Control is the ability to influence the other 10 success factors. The provider must have a great deal of control over its own destiny, hence the capability to change and grow while accomplishing its mission.

CUTTING DELIVERY TIMES

Assembling and packaging electronic components is a contract manufacturing business that depends a lot on speedy, responsive service. A typical contractor employs hundreds of assembly line workers, mainly female, "stuffing" integrated circuits and other components into other companies' printed circuit boards. Output is in the hundreds of thousands of units a week which the customers always seem to need yesterday, according to a Report in Industrial World (Oct 1990).

For Phillippine contractors, the customers are often overseas. Indeed, assembled electronic components have been the country's largest manufactured export product, topping $1 billion a year since 1987. The customers in the U.S., Europe and Asia have come to rely on the country's low wages and the nimble fingers of a large, young trainable labor population.

Integrated Microelectronics, Inc (IMI), based in a suburb of Manila, promises fast two-week turn arounds of orders. But so do some of their local competitors. Moreover, U.S. competitors are questioning the economics of relying on Asian suppliers who dominate what is described as a cut throat job-shop business estimated at $ 15 billion worldwide.

These American contractors admit that offshore bids are generally 60 per cent to 65 per cent of U.S. prices. But they claim the quality isn't nearly as good, with reject rates averaging five per cent to eight per cent. In addition, says one company, by the time an engineering change works its way through a trans-Pacific supply line, six to eight weeks worth of circuit boards may have to be scrapped.

There are also hidden costs to going offshore, they warn—shipping, which can add five per cent to fifteen per cent; paper-work and communications, three per cent more; extra inventory in the supply line, five to ten per cent. IMI is aware of such cautionary tales and has responded with a proven technolgoy called just-in-time (JIT) manufacturing.

IMI's complex south of Manila has four buildings with a total floor area of 170,000 sq. ft. It has the capacity to turn out 10 million units per month. All the assembly lines are environmentally controlled. The dust count in the area is kept to 10,000 parts per cu ft. of 0.5 micron particles. In the clean room areas, it's 1,000 parts per cu. ft of 0.5 micron particles. Six standby generating sets can provide full plant power load in case the utility main source fails.

The plant packages integrated circuits and special products as well as assembles recording heads, PCBs and hard disk drives. The largest customer base are semiconductor producers in the U.S. (among them Motorola, IBM, Honeywell, AMD, Hewlett-Packard, Silicon Logic) who account for almost 70 per cent of the volume of work. This includes European customers such as ATAC France, Marconi, Plessey, Robert Bosch; and Asian companies (Nissho-Iwai of Japan and Goldstar of South Korea).

"Just before putting JIT in place in early 1988, we were turning our 120,000 units per week with a force of 1,200 workers. Today we have the same weekly output with only 660 workers," says Toti Barcelon, IMI project development manager. Since the application of JIT, there was a saving of 29 per cent on factory floor space, faster turnaround time from 7.4 days to 0.54 days in the assembly of disc drives.

In addition, inventory levels went down from 133,500 units in 1987 to 8,400 units by the second quarter of 1990. It was estimated that there was an increase of 35 per cent in efficiency. This was all done with a minimum of investment in new equipment. What new equipment was ordered was needed to reorganize the production force into smaller units and by the new floor layout resulting from this subdivision.

In JIT, the idea is to simplify the total manufacturing flow by getting processes and operations closer together, by performing individual tasks as efficiently and as closely synchronized as possible to actual requirements. Result: set-up and lead times are shortened, productivity is increased, quality is improved, and inventory minimized.

To implement JIT, the principles of the system were first explained to the rank and file. A typical batch process was reduced to one step consisting of a number of smaller self-sufficient modules, each performing the entire production process. This required two key steps : That each worker learn to perform more than just one step of the

process (and incidentally lessen the effects of absenteeism), and a new layout and redistribution.

CO-GENERATION : ROLE OF PRICING

According to Dr. Tridib K. Biswas, a noted Energy Economist, "pricing of electricity in India and many other developing countries is generally inspired by socio-political considerations rather than economic factors. There is currently no logical connection between rates and costs of service. Consequently, electricity rates give very poor signals to the customers as to the value of resources that are used to generate and distribute electricity. As a result, customers who pay less than the true cost tend to over use power and customers who pay more under use it. From a national perspective, this is likely to lead to a sub-optimal allocation of scarce national resources. Lack of proper pricing of electricity is likely to lead to inappropriate pricing for cogeneration too". Addressing a National Conference on Co-generation convened by the Confederation of Engineering Industry (CEI) Dr. Biswas noted that "avoided cost" was the key concept behind the boom in non-utility generation in the United States. This was a key rational concept in a situation where a utility really faced a choice between generating the next MW itself or buying it from a non-utility generator. In India, however, most of the utilities suffer from shortage of both capacity and energy and at the same time they are straved for funds for capacity expansion. So, the choice really is between buying from a cogenerator, if available, or cutting down power supply. Since most of the utilities do not have any compunction about cutting off customers whenever necessary (quite contrary to the attitude displayed by utilities in developed countries), the "avoided cost" to them is really "zero" because they can afford not to care even if customers', and indirectly the economy's, cost is significant due to load shedding.

If these utilities felt any compulsion to remain loyal to their true mandate, which is to supply reliable and quality power to their customers on demand, common sense would dictate that utilities would strive for every possible way to increase power supply including buying all the power they could from cogenerators - regardless of their avoided costs - until their generation capacities approach demand. At that point, the concept of avoided cost would be relevant as a reference point for cogeneration pricing.

The estimation of avoided costs is similar, but not identical to, the estimation of marginal cost. The total avoided cost can consist of several components:

- Avoided Capacity Costs
  - Generation
  - Transmission
  - Distribution
- * Avoided Energy Costs

The components of avoided cost resemble those of marginal cost. In addition, both the concepts are "forward-looking". That is, they measure changes or increments to the utility's total cost. Avoided cost is the change in the utility's total cost due to purchasing an increment of supply from a qualifying facility. Marginal cost, on the other hand, is the change in the utility's total cost due to an increment or decrease of load; according to Mr. Biswas.

This component of avoided cost is the change in a utility's capacity cost at the generation level due to an increment of capacity supplied by a cogenerator. The avoided cost depends upon the nature of the capacity supplied: whether it is "firm" capacity or "interruptible" capacity or "atwill" capacity. Only when it is "firm", the utility can avoid building additional capacity. Another important factor is whether the capacity supplied by the cogenerator is coincident with the utility's peak demand, adds Mr. Biswas.

The avoided cost also depends upon how "firm" or reliable the cogenerator is. Reliability is sensitive to the nature of the cogenerator's operation (type of equipment, forced outage rate, maintenance scheduling, etc). If the supply is highly reliable (i.e., with a forced outage rate lower than the utility's capacity it displaces) it is clearly more valuable than capacity from another cogenerator with a relatively higher forced outage rate. The reliability of the cogenerator's load also depends upon the extent to which the cogenerator is willing to guarantee its capacity.

Avoided capacity costs at the transmission and distribution levels are conceptually analogous to the avoided cost of generation, However the measurement of avoided cost for transmission and distribution is much more complex. The impact of a cogenerator or a parallel generator on the utility's transmission and distribution investments is both utility-specific and site-specific. For example, whether a cogenerator reduces or increases transmission investments depends upon the location of the cogenerator relative to load centres as well as power flows and capacity on the existing transmission system. The major implication of these complex issues is that one cannot simply or directly translate a utility's marginal cost for transmission and distribution into avoided costs for transmission and distribution.

This is the cost that a utility avoids by obtaining a KWh of energy from a cogenerator. When the absolute amount of energy provided by the cogenerator is small, relative to the total utility system send-out, the avoided energy cost will correspond to the marginal energy cost.

ROLE OF NPOs

"The national concern for productivity in India had been reflected in the establishment of the National Productivity Council of India as early as 1958 with the overall mission of spreading the Productivity Movement in the country. National level efforts to promote the Productivity Movement got consolidated into the declaration of 1982 as the Productivity Year by the then Prime Minister and subsequently in the commencement of the National Productivity Awards and the setting up of the industry-wise Productivity Boards for selected strategic sectors. The concern for the achievement of sustained productivity improvements in the economic and service sectors found its candild expression in the Seventh Five Year Plan which accepted productivity as one of its three pillars, the remaining being food and employment. The Eighth Plan is likely to continue the policies of the Seventh Five Year Plan which are required to ensure accelerated growth in productivity of its economic and service sectors", states the country paper from India presented at the workshop on Development of NPOs (National Productivity Organisations) and Productivity Promotion. The workshop convened by the Asian Productivity Organisation had the objective of sharing the experience in the South Asia Region in productivity promotion; in particular the development of NPOs. The five day workshop was attended by NPO heads and senior planning officials from Bangladesh, Nepal, Pakistan, Sri Lanka and India.

According to the Country Report from India, there are a number of administrative measures taken by the Government which have a direct and favourable impact on productivity in India. While the Industrial Policy Resolution of 1956 continues to provide the basic framework of industrial development in the country, adjustments have been made to meet the emerging needs and challenges. The effort has been to make the developmental and regulatory process more responsive to the needs of a changing and maturing industrial structure. Mention may be made of the liberalisation policies and procedures in regard to industrial investments and technology imports. A scheme of broad banding was introduced in order to optimise the utilisation of installed capacities by providing flexibility to the manufacturers to adjust their production and product mix according to changes in market demand. A scheme of minimum economic scale of operations was introduced to enable undertakings to expand their installed capacities to economically viable scales of operations. A new scheme of re-endorsement of capacity has also been introduced which allows automatic re-endorsement of the capacity actually achieved by the industrial units, according to the country paper.

Among the recommendations adopted by the workshop include: (i) NPOs should be preferrably tripartite in character and should play the role of a catalyst in coordination with other organisations which may be specialised in the functions having a bearing on productivity: (ii) APO may network with other agencies such as ILO, UNDP, ADB etc. to promote productivity movement in each country in general and strengthen NPOs in particular. In this context, the national governments may make appropriate proposals to the international agencies; (iii) The status of NPOs head should be significant enough to facilitate interaction at the policy making level.

QUALITY OF WORKLIFE

According to Mr. A.N. Varma, the former Industrial Development Secretary (Govt. of India) and currently the member Secretary of the Planning Commission, there is an urgent need to ensure production of quality goods in bulk and with consistencies of standards. This cannot be achieved only through installation of upgraded or improved machines. This requires a management which has an eye on details. The achievement of productivity change and modernisation requires skillful management of both men and machines. Machines require maintenance and re-tooling whereas the labour force requires constant retraining and redeployment to keep up with the changing technology. The quality of worklife would be improved if the workers feel comfortable and is adequately equipped to interact with the machines that he works.

Inaugurating the National Conference on Quality of Worklife convened by the National Productivity Council, Mr. Varma, who was also then the Chairman of the National Productivity Council, stressed the need for a better management of man-machine-interface in Indian industries and also fostering of a new work culture. According to him, a fresh thinking is essential on the role of workers in managing the production process. "This would include production programmes, target setting and planning on the one side and on the other, more mundane

matters like production procedures and the handling of materials within the factory. While one set of decisions gives workers a feeling of participation and involvement, the other set of issues like efficient handling of materials reduces the drudgery of physical labour. Both play a significant role in improving qualities of worklife and productivity", he added.

Mr. V. Srinivasan, President of Confederation of Engineering Industries (CEI) urged the Government to review its policies and strategies for economic development and move away from protection to competition so that quality and productivity are at a premium and not at a discount. "On the part of the industry, the past complacency comforts of a protected economy have to give way to a freer economy and to surviving in a competitive situation. Industry has to do many things which are required to upgrade its own performance in terms of production and service. Even more important, industry has to take its own initiative and action and do all that it can, with in its own power, without worrying about the government, without looking to the government constantly for direction and support. This is a very important attitudinal change which I am seeking from the Indian industry. Stop looking at the government and look totally at yourself. Stop depending upon the government, be totally self-dependent" according to Mr. Srinivasan.

The deliberations of the Conference were carried out spread into 7 plenary sessions and 9 concurrent sessions. About 302 delegates representing 81 public sector and 90 private sector organisations participated in the deliberations of the Conference which was sponsored by 22 National/International organisations, in addition to the active involvement of 24 patrons. The Conference adopted 18 recommendations with far-reaching implications on the working of the Indian industry. Among others the Conference recommended that a piece-meal approach through adhoc interventions will not be sufficient for enchancing Quality of Worklife and improved productivity. Instead, a holistic strategy for enhancing Quality of Worklife and productivity should be adopated. Such an approach would encompass improvement in physical working conditions; safety; job redesigning, enrichment, and enlargement; and shift from bureaucratic type of organisation, which curb initiative and peoples opportunities to learn, to polyform type of organisations which recognised people' as valuable resources and emphasize continuous learning, creativity, innovation. Cultural and attitudinal changes of both the management and workers should form an integrated strategy for improving Quality of Worklife and achieving higher productivity. The Conference emphasized on the need for evolving appropriate schemes for workers participation in organisations activities including formulation of productivity and technology improvement plans and their implementation. Technological changes should be implemented through labour management cooperation to resolve problems arising out of technological changes. The workers should be involved right from the planning stages for technological changes and productivity improvement. The technological changes should be applied alongwith skill development, retraining of employees, protection of wages and future prospects of growth of the employees, according to the recommendations adopted by the Conference.

ECOLOGICALLY SUSTAINABLE GREEN REVOLUTION

"The onward march of the Green Revolution is both economically and ecologically an imperative in population-rich but land-hungry countries in order to enhance the income of small farm families and minimize further expansion of the arable area at the expense of forests and areas vulnerable to soil erosion or other forms of deterioration"; according to Dr. M.S. Swaminathan, the noted agricultural expert. Dr. Swaminathan was inaugurating the Indo-Netherlands Alumni Silver Jubilee Workshop on Environment. According to him, there is no option but adopt land saving agricultural practices in countries where land is limited and population is increasing. But the new Green Revolution must be based on 'Green' or environmental frontier technologies such as integrated pest management, nutrent supply, sciertific land and water management and improved post-harvest technology. For this purpose, there is a need for a dynamic integration of traditional technologies with frontier technolgies such as bio-technology and space, information and management technologies.

"It is now widely accepted that chronic hunger today is due more to the lack of purchasing power than to the non availability of food in the market - - - - to win the battle against hunger, we have to avoid the famine of jobs. An integrated programme of work, wage- - - - welfare measures in the fields of public health, sanitation, nutrition, drinking water, education etc. is essential for this purpose. Compounding the problem of gross economic inequality is the growing damage being done to the ecological foundations to the sustainable agriculture. Dimunition of the biological potentials of soils, loss of bio-logical wealth, deforestation depletion of ground water resources, pollution and the growing imbalance between carbon emission and carbon absorption are leading to a situation where safe-

guarding the logical base of agriculture may become, in the 21st Century, the most important food security challenge. It is clear that economic entitlements and ecological obligations must go together for achieving sustainable food and nutrition security.-----. The needs of land saving agriculture and grain saving animal husbandry can be met only by further improvements in technology. This will call for intensification of efforts in the blending of traditional and frontier technologies in such a manner that the ecological and economic strength of both are combined. The frontier technologies of particular interests are bio-technology including genetic engineering, space technology, such as weather sattle and remote sensing, information technology including computerizted instruction and extension and the management technology which helps to introduce a systems approach to all aspects of production processing storage and marketing", according to Dr. Swaminathan.

According to Dr. Maheshwar Dayal, the noted Energy Expert and former Secretary of the Department of Non-Conventional Energy Sources (DNES), "The world is not on the verge of an ecological collapse, but there is mounting evidence that many technologies in use today are not ecologically sustainable because of their long-term effects on people or on nature. Although many uncertainities surround the predicted links between carbon dioxide in the atmosphere and global warming, the potential for serious and irreversible climate changes provides an additional incentive to push ahead with a major programme of energy conservation and development or renewable energy resources".

The Department of Non-Conventional Energy Sources has prepared a perspective plan for the development of non-conventional energy sources upto the year 2001. In preparing the plan, the Department took into account the resource availability, status of technologies, likely further developments in technology, and the growing energy requirements for various uses in the country. On this basis, it has been estimated that an annual energy generation or saving of about 250 million tonnes coal replacement per year is possible by the year 2000-01 which works out to about 20% of the projected overall energy demand, according to Dr. Dayal.

Renewable energy sources will certainly play a more dominant role in meeting the energy requirements of the world and will be useful in keeping the ecological balances. "We seem to be entering an era where sooner or later nations will have to formulate an agree upon long-term policies for all energy related activities affecting sustainable development and incluencing the climate on earth. Gains in energy efficiency and shift in the energy mix towards more renewable sources will be the two important components of energy scenario of the future", adds Dr. Dayal.

THE PRODUCTIVITY-WAGE LINK-UP

"Annual wage increments should be restricted to increase in value added productivity. This is the crux of the model out lined at the Workshop on Measuring a Company's Ability to Pay convened under the aegies of the Employers Federation of India", reports Business India (Jan. 7-20, 1991). The model developed by the Japanese Federation of Employers' Association (Nikkeiren) has been in use among Japanese industries as a corporate tool to evaluate the ability to pay in the context of wage determination. The model advocates the use of a 'Producitivity Standard Principle' based on past relationship between inflation wage increases, and productivity improvements. Wage hikes not linked to productivity increases trigger inflation, according to the Report.

"In South Korea, economic growth slackened because wage increase were higher than increase in productivity. Had this trend continued it would have resulted in an economic collapse", the Report quotes Nikkeiren sources. In order to stablize the cost of living and still maintain high growth, a wage spiral must be avoided, adds the Report.

The primary objective of any company is to add value. This value added will then be distributed among the various contributors which went into its production. An enterprise must, in order to stay healthy, keep increasing to its internal reserves and improving its ratio of stock holders equity to total assets. It is also necessary evaluate the value added per worker. This Nikkeiren model is unique because it looks at the various components of value added and quantifies the process of calculating the wages. It uses productivity from the macro as well as micro view points, according to the Report.

"The environment in India differs vastly from that in Japan", quotes the Report from Keshub Mahenra, President of EFI , while inaugurating the Seminar. "Out of the total labour force, only 10% is organised. The Dearness Allowance component is pegged to the cost of living index and not to the any national index. In India labour is organised on political lines and wages increase often depend on the comparative bargaining capacity of labour vis-a-vis management". Many high wage islands exist and wage increases are often adhoc and not planned", adds the Report.

CONSTRUCTIVE CHAIR

"Management is about problem solving, and the meeting is an instrument designed to solve problems. But effective meetings don't just happen. They happen only when there is an effective person chairing the meeting", writes Mr. Thomas R. Horton, Chairman and CEO of the American Management Association in the International Journal, Management Review (Oct. 1990). "There are chairs who are autocratic, people who have their own ideas and treat the meeting as a sheer formality. Their goals seems to be to stifle participants who may have any independent ideas. With the autocratic Chairperson, you don't really need the meeting. Perhaps a memo would do just as well. But on the other extreme of meeting leader, the chair who just lets the discussion ramble, independent of any agenda, is just as bad. With that kind of a leader, the meeting often ends up with a confused impression of what-if anything-was decided"

'Between these two extremes', according to Mr. Horton, "there is the constructive chair, the person who has an agenda in mind but also genuinely wants to take advantage of whatever the participants can offer. A good chairperson knows how to stimulate people to volunteer their ideas. Of course, there are always some who want to talk about topics that are unrelated, completely out of context'. A good meeting is always characterised by full discussion of the topic; while this discussion is taking place, the Chairman must not only listen but also must concurrently be analysing the subject in an effort to assure that no important aspect is ignored. Finally, the essence-the importance-of the meeting should not be sacrificed for time".

At most meetings there are atleast two types of people: some who are very analytical and perhaps also articulate, and people who may have less developed powers of analysis and persuasion. This later group may include people who have real imagination, individuals able to come up with ideas that are good, although they may not necessarily be supported quantitatively. It is important that the chair draw these people out. After all, if they deserve to be at the meeting, they must have something to contribute, according to Mr. Horton.

So the constructive chairperson starts by making participants feel comfortable, not threatened. During the meeting he or she successfully draws out the participants' views. But there is another point as well. In a series of meetings, one should always start at the beginning of each by summing up the progress that has been made to date. Through this method, one can also check on what the participants have done. And by doing this, they know that at the next meeting they will be asked what they have done by then. This technique gives the meetings continuity and momentum.It is also very important, at every meeting, to look around the room, to observe, judge from the behaviour and expressions of the participants whether they are really in agreement, not just to ask whether they are in agreement.

There is, of course, such a thing as a bad meeting. Indeed there are millions of them. These are the ones that give meetings in general a bad name. If, by the end, nothing is resolved other than to say, "Well, we'll have another meeting on this," discouragement and frustration result. Indeed, a bad meeting may simply be a substitute for a decision. The executive who does not want to take the responsibility for a decision often shifts this responsibility to a committee; then when this committee meets, there can be nothing but confusion. Such an executive may thrive on confusion, because the unwanted responsibility is successfully diffused. Whenever the result of a meeting is to schedule more meetings, it usually signals trouble, adds Mr. Horton.

AOTS TOP MANAGEMENT SEMINAR

According to prof Keinosuke Ono of Keio University of Japan, management has the greatest influence on how activities are carried out in an organisation, whether in the private or public sector. The atmosphere within an organisation, the degree of satisfaction the employees feel towards their work, and even the organisation business results depend greatly on the kind of determination and enthusiasm which they are able to relate to and motivate the employees who make up the organisations. In this sense, the participants' training in Japan goes beyond merely helping them to become passive recipients of ideas and that they will use it as an opportunity to review and redevelop their own business postures and working methods. Prof. Ono was reporting on the results of a survey visit relating to the role of Top Management seminar (TOPS), of the Association for Overseas Technical Scholarship, after a visit to Thailand, Malaysia and Indonesia (ADTS Quarterly KENSHU, Number 118, Winter 1990-91. The main body of the Top Management Seminar can be classified under the following three categories:

The first category consists of a series of lectures on the Japanese economy, the characteristics of Japanese-

style management and recent trends. Its object is to help participants grasp an overall picture of Japanese industry's dynamic development, something impossible to achieve through the individual case studies of businesses "We invite top specialists in various fields to give lectures with question-and-answer sessions on topics such as the Japanese economic development process and trends, Japanese corporations' management strategies and technical innovation, and companywide quality control", say Prof. Ono.

The second category, the core part of the course, consists of meeting top executives from Japanese corporations face-to-face, hearing them talk about their business philosophy and policy, and then holding question and answer and discussion sessions and seeing the corporations' activities by visiting their head offices and factories. "When possible, we also ask a top manager from the third company to meet and talk to the participants before and after their factory visit, even if only for a short time. One of the two companies asked to give detailed lectures will be a typical large corporation, and NEC Corporation (Chairman Koji Kobayashi), Honda Motor Co., Ltd. (Chairman Satoshi Okubo), Hitachi Ltd. (Executive Managing Director, Toori Sato) and Nissan Motor Co., Ltd. (Managing Director, Yoshio Arakawa)have so far responded to this request. The other company is a typical small-sized enterprise, and, for the past four years, we have asked President Kozo Sugiura of Shinei Sangyo Co., located in Yokohama's Kanazawa Industrial Park, to fulfil this role. This is because Mr. Sugiura is a unique top executive whose discussions are always stimulating and thought-provoking to the course participants and because a case-study material is available describing the process of development of this company since its foundation", according to Prof. Ono.

The third category consists of a series of activities aimed at having the participants think about how they will utilize what they have learned during their training and review their own management attitudes and day-to-day working methods. This is done through lectures by a specialist in technology transfer, small-group discussion reviewing the results of the training and the possibility of applying these to the participants' companies, presentation of the results of small-group discussion, plenary discussions, etc. The group discussion is particularly lively, continuing until late in the evening of the penultimate day.

After undertaking follow up surveys in Thailand and Indonesia. Professor Ono observed" - - - - that the business activities in these two countries had undergone quite marked qualitative changes, at least in the following two respects, compared with ten years previously. The first point is the expansion and sophistication of manufacturing activities. In addition to the recent rapid diversification of manufactured products and increase in numbers of technical tie-ups at the companies we visited during this survey, we noticed that companies which used to rely on imports for almost all of their jigs, tools and pressing dies are now abe to make a considerable proportion of these themselves or procure them locally, and we came across many cases in which some of these were being exported to Japan or third countries." The second point of change is the companies' orientation towards overseas markets. "When I visited these countries ten years ago, most export products apart from primary manufacturing products consisted of light engineering goods. With very few exceptions, the rest consisted mainly of labour-intensive products often assembled at export processing zones. Even in the automobile and electrical product fields, they were struggling to see how much local content could be achieved in import substitution for the domestic market. In contrast to this, we heard again and again at many of the companies we visited about their export figures to the ASEAN region for a variety of other products and parts in addition to the jigs, tools and dies mentioned above, the penetration of new foreign markets these companies are currently pursuing, and export data comparing different products. Some companies were even thinking of setting up production facilities abroad", adds Prof. Ono.

THE SEVENTH WORLD PRODUCTIVITY CONGRESS: THE KUALA LUMPUR DECLARATION 1990

The World Confederation of Productivity Science (WCPS), the World Academy of Productivity Science (WAPS) and National Productivity Centre (NPC) Malaysia, have brought together experts, scientists and professionals at the 7th World Productivity Congress in Kuala Lumpur, Malaysia. More than 400 delegates from 32 countries deliberated during the Congress. Throughout the Congress the following ideas and statements emerged as related to the overall theme: Creating Lasting Change are submitted as guidelines for the world wide activities of the WCPS and the WAPS, and other Productivity Organisations:

1. We realise that change is constant and eternal, and fundamental for progress. It must be pursued from the perspective of both continuity and change in the quest of progress for the benefit of all people.

2. We realise such a quest will require acceptance and positive attitudes towards change, and that any gains accrued should be equitably shared by the initiators and implementors.
3. We believe that the best framework for successful change is one that provides the greatest amount of human freedom. These freedoms include:
   a. Equality under equitable laws and rules that protect individual freedom and guard against abuse of such freedom.
   b. A market economy where people are free to engage in activities that promote their own best interest without harming the interest of others, allow for competition between suppliers of goods and services, allow for freely chosen political representatives, protection of individual property and its fair disposal, and high ethical standards of individual and organisational behaviour.
   c. Availability of and accessibility to an effective education and training system that meets the needs of all citizens to acquire and practise the knowledge they require to prosper in a changing world.
4. We believe that education and training is a life-long process of acquiring the knowledge and tools to achieve excellence in all the tasks that people undertake. We also believe that education must be imbued with values and standards that allow individual human beings to flourish in their chosen fields of endeavour.
5. We charge the Fellows of the World Academy of Productivity Science and the participants of this Congress to work towards the achievement of these noble objectives and help make change into a positive force that will benefit all mankind.

RURAL SAVINGS MOBILIZATION

"Rural savings mobilisation has been neglected until recently because of the traditional approach to rural financial markets that emphasised credit which targetted at agriculture in general and small farmers in particular. However, this traditional approach has failed to promote agricultural output or to redistribute incomes to small farmers, while at the same time most specialised agricultural lenders following the traditional approach have performed very poorly", states the Summary of Findings of a Symposium on Mobilization of Rural Savings organised by the Asian Productivity Organisation, recently. The main objective of the Symposium was to discuss the situation of rural financial markets in APO member countries with a veiw to appraising the major problems and current policies on mobilisation of rural savings as well as indicating general directions which might be taken by member countries in enhancing the rural financial services.

According to the Summary, the new view on rural financial markets argues that importance should be given to savings mobilization in rural areas. The Summary advances four major arguments to support this view:

First, savings mobilization will be more effective than subsidized and targeted credit in redistributing income towards the rural poor because a higher proportion of the rural population is involved with financial institutions as depositors than as borrowers, and the discipline of regular savings can provide the basis for permanent relationship between rural clients and financial institutions.

Second, attractive deposit opportunities improve resource allocation because they allow the rural population to disinvest in unproductive physical assets while the funds put at the disposal of financial institutions can be allocated to higher return activities. Even if individuals do not save a higher portion of their income, the stock of wealth will nonetheless be deployed more efficiently.

Third, rural financial institutions that specialize only in lending and neglect deposit mobilization have almost everywhere proven to be non-enviable. The information about potential borrowers together with the incentives and discipline involved in successful savings mobilization have given financial institutions that mobilize deposists—a great advantage over those that do not.

Fourth, successful rural savings mobilization requires appropriate rural financial market policies that provide appropriate incentives for rural financial institutions to be interested in and able to mobilize deposits. Foremost are policies that allow positive real rates of interest on deposits and do not offer cheap central banks rediscount lines that make deposit mobilization impossible or unattractive.

Four sets of incentives for rural savers are crucial in order to mobilize deposits: rates of interest that are competitive and positive in real terms; security; adequate liquidity which is essentially the same as low transaction cost for depositors; and reciprocity, that is, enhanced access to credit that grows out of the relationship between a financial institution and a depositor. These sets of incentives are not only important to rural savers but also provide the incentives and the discipline that make rural financial institutions viable, according to the Summary.

PATCH WORK PROTECTIONISM

According to Dr. Richard Friman (Patch Work Protectionism ;Textile Trade policy in the United Stats, Japan and West Germany, Cornell University Press, ithaca, NY 1990), the post war system of open international trade is slowly deteriorating. Advanced industrial countries have been either unable or unwilling to halt the system s decline. By the early 1980, roughly 40% of the total world trade was being conducted under restrictive arrangements. In contrast to across the board tariff wars of the 1930s, the postwar incarnation of protectionism is not only selective in its coverage but also a patchwork of different types of protctionist policy; each type distinguished by its ability to disrupt imports and incite retaliation in the international economy. Six broad types of protctionist polices could be identified, price-based restrictions (tariffs), unilateral quantitative restrictions, non-unilateral quantitative restrictions, administrative rstrictions, state subsidies and production cartels. These can be ranked according to their ability to disrupt imports and incite retalisation. Dr.Friman suggests a framework to integrate qualitative and quantitative data to trace changes in the independent and dependent variables through detailed operationalisation and the use of ordinal indexes. The indexes are :

1. *Index for international economic constraint* proposes rough combinations of major economic factors spoilers (SP), supporters (SUP), and hegemons (HRG) - and ranks possible combination by the system threat of retaliation faced by the actor within a given international economic system (IES). The rankings are tentative.

2. *Index for political military constraint* the issues of which are nested in broader strategic concerns. The rough ranking reflects state policy makers' concerns with war, spheres of influence and alliance politics. For the United States, trade policy has often been seen as the "carrot" to draw countries away from Soviet influence and as the "shield" to ensure the viability of American allies. State policy makers also face domestic pressures for the adoption of overt types of protectionist policy.

3. *Index for industrial alliance strength* is based on combination of indicators of alliance's organisation, inclusiveness, and convergence of interests. Alliances of producer's associations consist of different combinations of separate associations and merged associations. The weakest alliance organisation occurs in aliances of separate asociations, associations that encompass a single production process such as spinning or weaving. Industrial alliances also require high degree of institutional access to generate domestic pressure.

4. *Index for degree of institutional access* devotes attention to (i) the points of access, and (ii) nature of access. The former establishes the variety of access channels available to societal actors. In the latter lie a more dynamic conception of how different access channels affect the ability of societal actors to influence the policy making process. Different types of input by industrial aliance range from the absence of input to binding recommendation for state policy maker's action. Moderate degrees of institutional access are distinguished by strong electoral threats, holding state policy maker's initiatives hostage, or setting broad parameters that empower (but do not require) action by state policy makers.

5. *Index for type of protctionist policy* are based on the ability of the policy to disrupt imports and to provoke retaliation by trading partners. Price-based restrictions (tariffs) and unilateral quantitative restrictions (voluntary export restraints, voluntary restraint agreements, and orderly marketing agreements) and administrative restrictions (grey area measures such as import guidance and surveilance) are more moderate protectionist policies and, as such, are less likely to provoke retaliation and disrupt imports. The two types of protectionist policy least likely to provoke retaliation and disrupt imports are state subsideies and production cartels. State subsidies for producers include outright grants, low interest loans, and tax credits for investment or export. Non-monetary adjustment assistance measures refer to exemptions from domestic legal constraints. Antitrust, pollution, and safety regulations can be modified to increase the international competitiveness of domestic producers. These measurs are often difficult to discuss, thereby reducing their ability to provoke retaliation by trading partners.

From a policy standpoint, the integrative approach suggests an increase in the use of more overt types of protectionist policy in the future. The united States will be less likely to act as a check on protectionist policy choices in the international economy. American state policy makers no longer face the political military constraints against overt protectionist action that characterised the 1950s. Political military considerations are likely to increase for Japan and West Germany, as the United States places greater emphasis on the linkage between foreign trade and sharing the defence burden by NATO and Japan, according to Dr. Friman.

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Book Review

The Political Economy of Unorganised Industry: A Study of the Labour Process, *by Manjit Singh, New Delhi, Sage Publications, 1990, p. 234, Rs. 190/-*

There is no dearth of studies on Indian industry. A large variety of expertise has gone into various aspects of India's industrial sector, and yet one finds that the issues taken up in the study by Manjit Singh carve out a distinct niche for themselves as they have rarely been taken up in the bulk of the literature in this field. Industry represents an advanced stage in the evolution of the labour process in the generic sense of the term in which the exchange between man and nature reaches a higher level in terms of the totality of productive forces and production relations. Generally the industrial studies concern themselves with either some aspects of productive process (their productivity, rewards, their behavioural patterns, the process of their evolution and growth and policy processes having a bearing on these issues) or production relations (organisational forms, their relative performance, interface with public policies, etc.) This study focuses on the labour process in the unorganised sector of industries with a detailed examination of the hosiery industry of Ludhiana, encompassing both the productive forces and production relations and is connected specifically with the organisation of labour and capital in their mutual interaction as well in their internal and external relationships. The labour process exerts considerable, almost decisive, influence on the performance of industries and, in turn, is influened by it. The macro, aggregative analyses of modes of production have generally been unable, in their broad sweeps, to deal with the specifics of the labour process in their historical, spatial, technological and organisational diversity. Instead of or, perhaps, in addition to, the overall mode of production analysis, it is in the context of analysis of the forms of production (a micro-level category) that detailed examination of labour-processes is possible. Thus in the context of a social formation and mode of production, one has to detail one's analytical tools to the task of examining the forms of production and associated labour-processes (organisation of capital and labour and their mutual relationships, division of labour, forces and levels of surplus generation and its appropriation and their impact on further growth of the labour process etc.) for understanding the present position and dynamics of an industry. Such an analysis cannot proceed in terms of an apologetic, axiomatic paradigm like that of the neo-classical economics and methodological individualism. The actual course of political economy analysis seen in the book is germane to the tasks the author has undertaken and yields rich dividends. Given the methodological point of departure evident in the present study, one wishes the author to have devoted a specific section highlighting the methodological under pinnings and relevance of the study.

The study also has a direct bearing on approaches to the understanding of the informal sector which has remained a victim either of descriptive, positivist approaches or of elective approaches without synthesis. In so far as the study highlights the transitional stages of evolution of Indian industry, their co-existence and flexibility in terms of a variety of forms of production and the strong persistence of mercantile traits among our industrialists, it has significant policy implications and lessons for the forces engaged in social mobilisation. Having prepared the ground for a systematic exposition of the concept of the informal sector, it is a pity that the author fails to take a few additional steps for using the concept of forms of production and the involutionary nature of third world capitalist growth to put the concept of the informal sector in a systematic, usable and historical framework.

Studies on trade unionism without an objective analysis of the labour process, organisation of capital, the impact of division of labour and the character of the form of production with respect to the nature of the process of surplus generation and appropriation, their impact on the segmentation of the labour market and class consciousness, etc., cannot be considered satisfying and meaningful. This study indicates some of the avenues along which such studies should be carried out. The present study is a refreshing departure from the run of the mill types one

generally comes across, even the best of which is unable to go beyond sophisticated econometric or statistical exercises based on official data and largely irrelevant propositions ("theorems") borrowed from neo-classical economics.

Part I of the book is devoted, in addition to an analysis of the theoretical framework of labour process under various forms of production seen in the midst of the evolution of capitalist industry, to an examination of the process and course of growth of industrial capital in India and Punjab during the British and post-independence periods. The distinctive point of the present study in this exercise is to analyse the evolution of labour process and the emergence and growth of working class. This account and the classification of unorganised industries into four analytical categories highlights the factors which prevented the emergence of a homogeneous, working class endowed with a consciousness of being a class-for-itself. The author relates this analysis with the problems encountered in the organisation of unorganised labour, the inability of labour to pose a serious threat to the state in independent India and the manner in which trade union pressure contributes to the informalisation and atomisation of the labour-proess. It has been shown how the process and pattern of the emergence and growth of industrial capital deeply impacts as its essential counterpart the growth and emergence of the working class. It is a conclusion of some salience as to how rural industries have yielded place to urban industries and the related decline in the prominence of household industries. Thus what one sees in Punjab, as in the rest of the country, is the prevalene of mixed forms of production under the overall framework of capitalist mode of production with an amorphous working class. This pattern is what is sought to be captured under the rubric of 'informal sector'. Thus one can say that the labour process and the working class in a large segment of Indian industries display as a result of the involutionary process of growth of industrial capital, characteristics ascribed to the informal sector.

It is in this framework that the author brings out with meticulous care the evolution of the labour process and the co-existence of various forms of production and an amorphous working class under the control of centralised capital of merchant manufacturers in the hosiery industry of Punjab. A review cannot capture for want of adequate space the detailed account, neatly organised in a clear theoretical perspective, which draws parallels and contrasts with the available studies of other industries from different regions. One would emphasise the importance of this study not only from theoretical and methodological point of view but also for its implications for planning, public policy and mobilisation of the working class. One hopes that the study would really receive widespread attention which it so richly deserves.

Kamal Nayan Kabra
Indian Institute of Public Administration
New Delhi 110002.

Productivity Management : A practical Handbook
by Joseph Prokopenko, New Delhi, Oxford & IBH, 1990, p. 288 Rs. 150.

This is a practical handbook not only for the productivity specialists but also for the managers of economy and industry alike. The book covers various facets of productivity - concepts, analysis, techniques, organisation effectiveness, human resource management and productivity promotion at the national level. The book is written in a lucid form, quoting practical cases and experiences of various industries and countries. The book uses mathematical equations and models, yet these are quite simple to understand and comprehend. Chapters one and two are useful for everyone concerned with productivity. Chapters 3 to 7 are essentially useful for practitioners while chapter 8 deserves the attention of planners and policy makers concerned with productivity.

The first chapter deals with the concepts and definitions of productivity and convincingly demolishes the oft found misconceptions. The conceptual framework amply explains the changing dimensions of productivity from efficiency to effectiveness, concern for linkages between profitability and productivity on the one hand and between productivity and quality of work-life on the other.

Productivity of a country or an enterprise is influenced both by the internal and external factors. The control or manipulation of internal factors is essentially within the capabilities of the managers, whereas they can only influence the external factors over a period of time through their visionary strategic policies. The second chapter provides a differentiation between the external and internal factors and further divides the internal factors as hard and soft factors. The latter requires skillful handling as they are people oriented. For practitioners, coverage in the third chapter is quite important. There can't be any improvement unless we know where we are. Productivity analysis is the starting point to look for opportunities to improve and also how well improvement efforts are faring. This chapter provides various approaches to productivity analysis; most important being Kurosawa Structural approach, Lawlor's approach, Quick Productivity Appraisal approach (QPA), Company Performance Appraisal ap-

proach (CAP), and the Inter-Firm Comparison (IFC) approach. Productivity practitioner needs to know these approaches and be able to discriminate which approach is suitable under what circumstances.

Having gone through the analysis stage, the next obvious step is to concentrate on productivity improvement efforts. The book deals with this effort in two parts - Managing Organisation Effectiveness and Productivity Improvement Techniques. The author has rightly given precedence to Organisation Effectiveness over Productivity Techniques. After all, productivity improvement is a process of change or of managing a change which is possible only if organisational culture and attitudes among employees encourage experimenting with a change. Among others, the author deals with two important organisational approaches to productivity improvement programmes. The first one is the ILO approach to Organisation Development and Performance Improvement Planning (OD/PIP) and the second one is the PIP approach developed by the Action Learning Associates (ALA). The author also explains other variations in PIP; important being Productivity Improvement Circles (PICs), Performance Action Team Process (PAT) and Business Clinic Approach (BCA).

Chapter 5 deals with productivity improvement techniques, essentially focussing on Industrial Engineering and Behavioral aspects. Heartening feature is the coverage of JIT—a philosophy to eliminate wastes. Keeping in view the present economic trends and needs, the author has devoted a special chapter on energy conservation, improving productivity of capital through maintenance and total quality management.

Management experts in India and abroad, tend to believe that the most influencing factor in achieving spectacular rise in productivity levels in Japanese industry has been the emphasis on effective management of human resource. The author has rightly included one chapter exclusively on this theme. He himself says that the people are the most important and promising area for productivity improvement and supports amply his view point with Japanese illustrations to contrast with traditional management beliefs. High quality work-force is characterised by its productive behaviour which in turn is dependent upon (a) work attitudes (b) knowledge and skills and (c) opportunities to use manpower resource effectively. Good management is responsible for the development and realisation of these three main components of human resources. In this context attention has to be given to (a) the role of management (b) motivation (c) participation (d) training and (e) work organisation. The author has dealt with these and other issues concerning effective management of human resource. He has drawn our attention to the difference between the traditional western organisation structure and approach and the Japanese traditional organisation structure but a new management approach. We know that even the leading industrial giants in the west are trying to learn from the Japanese Management approach which has made it a super economic power in the world. Workers participation has been conceived as playing the key role in non-monetary motivation. It is now being increasingly realised that "achievement oriented" motivation is far more powerful once the basic human needs are adequately met. Productivity training, work organisation, working time and job structuring are other aspects which have been lucidly dealt with as a part of the Human Resource Management.

The book ends with a chapter on productivity promotion at the national level - a must for the planners and policy makers concerned with productivity.

This is an excellent book and covers all aspects of productivity management which a practitioner or a manager needs to know.

R.S. Gupta.
Dy. Director General (Retd)
National Productivity Council
C2/55, Janakpuri, New Delhi 110057.

Political Economy of Public Distribution of Food in India : *By Kamal Nayan Kabra; published by Ajanta Publications, Delhi, 1990 p. 269, Rs. 230.*

The book under review broadly covers three important aspects of India's food economy namely, the role of mercantile capital, India's Food Policy and Public Distribution of essential commodities the major component of which is cereals. The book is a collection of articles written at 'various points of time' in response to different 'types of needs'. The analysis of India's Food Policy covers the period 1950-1977 only. The other articles particularly, on Public Distribution System (PDS), however are recent. Updating of India's Food Policy to cover recent years would have been more useful. However, many of his conclusions would have remained relevant due to the fact that there are no major changes in policy objectives subsequently.

The first chapter is essentially a critique of Barbara Harriss' Monograph on *Agricultural Change and Mercantile State: A Study of Public Policy in Tamil Nadu.* The critique brings out the highlights of the study—the dominance of mercantile capital vis-a-vis industrial capital and capitalist agriculture and the failure of the 'state as mer-

chant' to control and regulate mercantile capital. As the 'merchant as state' has been fairly "powerful in using state policies to extend and strengthen their power", Barbara Harriss characterises Tamil Nadu as a 'merchant state'. Pointing out the inadequacy of Barbara Harriss' methodology and analysis the author notes that the failure of state intervention (in controlling merchant capital) is no less true in agriculture and industry. Further, the author emphasises the 'class' character of the state power that results in cornering benefits of state policy in public investment by industrial capital followed by capitalist agriculture. The dual role of the state as promoter of growth helped the industrial and agricultural capital whereas its role in balancing various social goals has failed due to intervention of capitalist classes.

The second chapter is an attempt to test this hypothesis. The emerging socio-political forces and class structure determining the process of growth of Indian Agriculture which ignored the interlinkages between increased production and generation of employment and income to those who participate in production. The failure of the policy is visible in terms of inequitous distribution of growth and its benefits across regions and different social classes. Though the country is able to achieve 'self sufficiency' in the sense that enough food is available to meet the market demand, nearly 40 per cent of the population still suffer from under-nutrition.

The next chapter is an analysis of India's Food Policy during 1950-1977. It covers the short-term and long-term policies and the interaction of these policies. The period is characterised as one with marginal increase in per capita production and availability but a decline in per capita consumption, periodic spurts in open market prices of food grains and uneven temporal and spatial growth in production. It is not surprising in view of the inability of the policy maker to link production with employment. The 'trickle down' approach failed to cause any percolation of benefits of growth to the poor. In the context of food production in India, access to food and micro-level food security are relatively downplayed vis-a-vis increased production. Increasing incompatibility, in the long run, in policies aimed at increased production that ignores access to food for larger sections of population causes distortions in production and distribution. Thus, "A myopic policy of obtaining quick increases in food output, ostensibly in the name of self-reliance and import substitution, has failed to see the adverse effects of these developments on the process of output growth itself." (p.114) The next chapter brings out interstate differences in production and per capita availability which increased sharply after green revolution, and the extent to which government policies of procurement and PDS have been successful in reducing the disparity in availability. However, the pattern of states' behaviour in increasing the per capita availability differed.

The rest of the book covers various aspects of public distribution system in India like objectives of PDS, productivity and target orientation of PDS, subsidies, viability of fair price shops, etc. The two objectives specified are protection against inflation and protection of consumption. Though conceptually the two objectives are distinct, the operations of PDS are intended to protect the consumption level of the poor. The analysis brings out the complex nature of estimating the costs and benefits of PDS-specification of objectives, determination of weights to be assigned to different objectives, the policy decisions required as to the coverage of (different) social groups, ration scale, unit subsidy, etc. On the other hand the modalities of procurement, distribution and price policy determines the costs. Though the author is not explicit on target orientation, his arguments for the continuation and extension (size and coverage) of PDS as a form of social security are convincing. Endemic hunger in the face of plenty is 'morally indefensible' and the long-term social cost cannot be measured in terms of food subsidy. The author demolishes the arguments for cuts in food subsidy. What is required is to plug loopholes to reduce diversion of subsidies which requires effective food management from procurement to distribution. Political opportunism and bureaucratisation may impede the emergence of an efficient food management system.

The most commendable aspect of the book is that, without formal knowledge of economics, one can understand the complex interrelationships and the politico-economic nature of India's food problem and policy. Those who are interested in India's food problem can immensely benefit by reading the book.

E.K. Rao.
Reader in Economics
Sri Venkataswara College
University of Delhi,
New Delhi 110021

Strategic Approach to Human Resource Management by *Y.R. K. Reddy, New Delhi, Wiley Eastern Ltd., 1990, p. 102.*

The book is an attempt at understanding human resource management from the practical point of view in the strategic environment, encompassing various sub-systems of people managment. The book is divided into 9

chapters, of which the first contains a brief discussion on the process of stratetgic management, a perspective of strategic scenario and its implications for HRM. In the next seven chapters, the author has examined various dimensions of HRM functions along with the relevant strategic issues and purposes. The last chapter presents the conceptual framework and importance of professionalism and ethical standards in HRM.

The global perspective and national economic compulsions are very briefly put forward in chapter 1 with a somewhat trite but cogent outline of the nature and significance of strategic response to challenges of the emerging environemntal compulsions. Chapter 2 which is devoted to personnel planning focuses on the modern techniques of manpower demand forecasting and the use of Human Resource Information System (HRIS) with the application of computer facilities. Approaches to job analysis and design, job description and job specification have been underlined as correlates of personnel planning and as a data base for personnel decisions.

Chapter 3 takes us through the stages in staffing function—assessment of candidates, interviewing, testing methods, the implications of external recruitment and internal staffing, and the process of induction relevant for both. It is postulated that the staffing strategy should be in keeping with the stage of business and organisational strategy determining the dominant values of management. A critique of the prevalent methods of performance appraisal and merit rating is presented quite incisively in chapter 4 leading to the recommendation that the Behaviour Observation Scale is more apropriate in the context of strategic management. The bearing of employee appraisal on the reward system as well as training and development are discussed underlining the deficiencies of methods based on western models as also the oriental (Japanese) type culture. The choice of tools and the techniques is thus shown to be predicated on their congruity with the organisational culture and human response being sought. An analogous generalisation is found in chapter 5 with regard to the choice of reward system and incentive scheme. The implications of financial and non-financial rewards, cash bonus, stock related schemes and the 'cafetaria' approach are outlined highlighting the modern innovations in approach. The general proposition advanced is that their strategic relevance should be judged in terms of the behavioural vision of the organisation.

Stragetic development of human resources is discussed in chapter 6 delineating the pros and cons of career planning, succession planning, transfer/job rotation, promotion and OD techniques as tools of individual development. Career planning is noted to have its limitations. In a stagnant organisation with a low turnover and high age profile, it would probably result in disenchantment. On the other hand, succession planing on the basis of retirement schedule is fairly acceptable and predictable. For unpredictable vacancies, succession planning is essential particularly for key jobs.

Transfers involving cross-functional mobility is obviously a necessary adjunct of employee development, but it needs to be planned and its objectives well understood by all. The author rightly points out that transfer decisions with the purpose of rewarding or punishing individuals is widely prevalent in goverment establishments in view of the narrowing scope of other means. But it is not a healthy practice for it implies certain positions/regions being perceived as hard postings even if they are as central as other jobs.

Promotion as a development effort and a motivating tool is not only predicated on the assumed effectiveness in terms of improving the skills and abilities but also on the employee's perception of the elevation as a reward. It is argued that promotions be linked to absolute orgaisational necessity.

The effect of OD technique on the development of people is said to be a matter of debate. But in view of its focus on people and the refinements that could be possible, the broad steps in the OD process are explained at length. It is also recognised that OD could be a powerful tool of managing change involving adaptability of human resources.

Integration of training activity with organisational strategy is highlighted in chapter 7 with a fairly detailed examination of various steps in the training process and the relative effectiveness of different training methods. This is followed by a scrutiny of the alternative ways of evaluating the training process. The necessity of enduring managerial performance through training is underlined in that context, and Revans' Action Learing Programme commended. Chapter 8 is devoted to an analysis of the relevant indirect measures of the state of employee relations and the impact of strikes and other forms of direct action. The legal framework, government policy of intervention in disputes, the role of participative management, trade union pressures and necessary managerial responses are examined to focus on the nature of positive actions that an organisation may take to smoothen the process of collective bargaining. The usefulness of contingency plans to meet the situation arising out of direct action is also brought out with reference to the strategic purpose of containing the

overall cost and impact on the organisation and the related public.

The dimensions of professionalism and ethical standards in HRM constitute the thrust of the last chapter. Emphasising that managers of human resources have a special role to play in developing concern for professionalism and business ethics, the author urges that they must understand the implications of the same and generate internal debate to reinforce these important elements in organisational life. To help that understanding, the distinctive attributes of a professional are mentioned and the stages in the professionalisation are listed.

As a whole the book makes a very impressive reading. Some of the striking qualities of the presentation ≤ the elegance and brevity of language, forthright observations on contentious issues, cogent reasoning and analysis, are noteworthy. However, the brevity of expression has at times tended to be cryptic. Thus, the reader must be knowledgable enough to apreciate the author's definitive views on certain issues and the sweep that is displayed throughout. The work is also lacking in specific documentation though select references are listed at the end. Findings of studies are just mentioned without indication of the source references. Statements have been made seemingly on factual basis, but there is no scope of looking into the facts unless one goes through the list of select references appended to the book. One should perhaps bear with this limitation in view of the author's professional standing and experience, which are evident in the incisive critique of the prevalent practices in HRM and the underpinning of the emerging tools and techniques.

P.K. Ghosh
Professor of Commerce (Retd)
University of Delhi,
Delhi.

Financial Accounting for Management : *By Subhas Sharma & M.P. Vithal, New Delhi, Macmillan India Limited, 1989, p. 324, Rs. 48/-.*

Accounting information constitutes an important segment of information generated within the organisations. In the present day context the managers need to have an understanding of the process involved in the generation of financial statements. The book under review is an attempt in this direction. The book is based on the teaching experience of the authors. A number of cases and exercises are drawn from the Indian scene to help the reader understand the underlying principles of an accounting system.

In chapter 1, the authors explain the need for accounting and try to make the reader familiar with the accounting concepts and conventions. The inclusion of important accounting jargons would have considerably made the non-accounting background readers more familiar with the concepts. Chapter II deals with understanding the Balance Sheet and its composition. The third chapter titled "Understanding an income statement" deals with explaining the meaning of the Income Statement, the format of income statement and different accounting formats. Chapter IV & V deal with the accounting process and system and the completion of the accounting process. The concept of accounting process has no doubt been explained quite explicitly, but in doing so, it has been made into a textbook for graduates. Chapter VI focuses on the measurement and recognition of revenues. This includes the purpose of revenue recognition, the methods of revenue recognition and the difficulties in applying the revenue recognition concept. The subject matter could have been dealt in more detail, as the discussed material leaves the reader asking for more.

Chapter VII, VIII and IX focus on inventory valuation policies, depreciation accounting and policies and accounting for intangible assets. The chapters just give a bird's view of the subject. The exercise could have been more fruitful, if it had been given in some more depth.

Chapter X brings to light the various ratios used for analyzing financial statements. This has been dealt in detail, and in such a way as to make the reader comfortable with the ratios. The eleventh chapter titled "Statement of Changes in Financial Position", deals with the funds flow statement, its preparation and the change in working capital. It also tries to clarify the misconceptions about depreciation.

Chapter XII discusses the current issues in financial reporting. The authors have incorporated human resource accounting and social accounting in the chapter, thereby taking an overall approach in accounting.

The continuing chapter presents the application of the various techniques such as ratio analysis, funds flow analysis etc. to predict the future performance of the enterprises. This enables the interested parties such as shareholders, bankers, creditors etc. to know the objectives of growth, stability or survival of the enterprise. The noteworthy feature of the study is, that it throws light on some of the recent practices and contemporary issues in accounting—like Human Resource Accounting and Social Accounting. The book will help to serve as a text for graduate students, and will also be of help to managers with non-accounting background.

Manju Kalra
Assistant Director
National Productivity Council
New Delhi 110 003.

Poverty Alleviation and Rural Development *by J.S.Sodhi. New Delhi, Criterion Publications, 1990, 183p, Rs 200.*

Before the commencement of the Sixth Five Year Plan, various programmes were in operation for the development of the rural poor. However, these programmes did not lead to significant improvements in the living conditions of the poor in the rural areas. Neither these development programmes covered the whole country. A large number of blocks in the country had more than one of the programmes operating simultaneously in the same area and for the same target groups. These overlappings combined with the different funding patterns created considerable difficulties not only in the effective implementation of these programmes but also in their monitoring and accounting. Therefore, during the Sixth Five Year Plan one single scheme called the Integrated Rural Development Programme(IRDP) was launched eliminating the multiplicity of programmes which were in existence untill then. Prof Sodhi in this book, discussed in detail the impact and shortcomings of the IRDP based on a case study in Swai Madhopur district of Rajasthan and suggested some policy recommendations in overcoming them.

The first chapter of the book highlights the achievements in different five year plans with regard to the rural poor, the concept, strategies and the steps involved in IRDP. This chapter also deals with the methodology and sample design in conducting the study. The second chapter gives the general background of the district covering land utilisation pattern, size of the holdings, cropping pattern, occupational structure of the workforce, literacy etc. Chapter 3 outlines the role and activities of the District Rural Development Agency (DRDA) of Swai Madhopur in some detail. It also highlighted some of the shortcomings of the DRDA with regard to preparation of the block level plans, identification of the right kind of beneficiaries etc. Chapter 4 mainly covers the experiences of the beneficiaries in getting the IRDP assistance besides dealing with the characteristics of the sample households. Chapter 5 is devoted to an assesment of the economic impact on the the beneficiaries of IRDP. Chapters 6 and 7 give the major findings and suggest some recommendations for the successful implementation of IRDP not only for the district of Swai Madhopur but also for the country as a whole.

An IRDP can be successful only when the principal aim of brining the poorest of the poor above the poverty line is fulfilled. This study provides us with some valuable indicators of the extent of success achieved by the IRDP in Swai Madhopur district in particular and in India in general. The findings highlighted in the book are pointers to the limited success of the IRDP . Based on the findings from the case study the author lists out some recommendations which include:

i) For most of the programmes the unit costs need to be enhanced.

ii) Demand for and supply of the assets provided to the beneficiaries should be taken care of while assisting the beneficiaries.

iii) Adequate training to the officials of IRDP, proper education to the beneficiaries particularly about the terms and conditions of loans received , strengtwening the support activities like veterinery services etc.

The author in his book wanted to answer too many questions and in the process avoidable details were dragged into the text. For example, what is the relationship between the sources of information about IRDP and their impact on the success of the scheme? Will the benefits of IRDP be improved if the information received by the beneficiaries is from the DRDA officials rather than village pradhans or bank officials? The author also stated some issues and problems not related to the theme in a particular chapter. To quote an example, in chapter 3 where the role of DRDA was spelt out, the issue of non payment of loan by the beneficiaries was also brought in. The repetition of some of the issues and findings in different chapters made the reading somewhat sluggish.

It was observed from the study that in reality only one third of the population in the district was not at all benefitted from the IRDP in the sense that they continue to remain poor. The author should have dealt in greater detail about the difficulties in bringing this section of the population above the poverty line.The findings of the study do not enable the reader to assess the ultimate impact of the scheme on poverty, although it was stated that one third of the beneficiaries who crossed the poverty line were from the poorest of the poor. It may be possible that these one-third might have been about to reach the poverty line and a slight push would have made them to cross over. A reader would also wonder the reasons for bringing the issues of land reforms and unionisation of rural labour in the concluding chapter. The author failed to explain the correlation between these issues and IRDP i.e. whether these steps are pre-conditions for the success of IRDP or not.

A.K.Barman
Dy. Director
National Productivity Council
New Delhi 110 003

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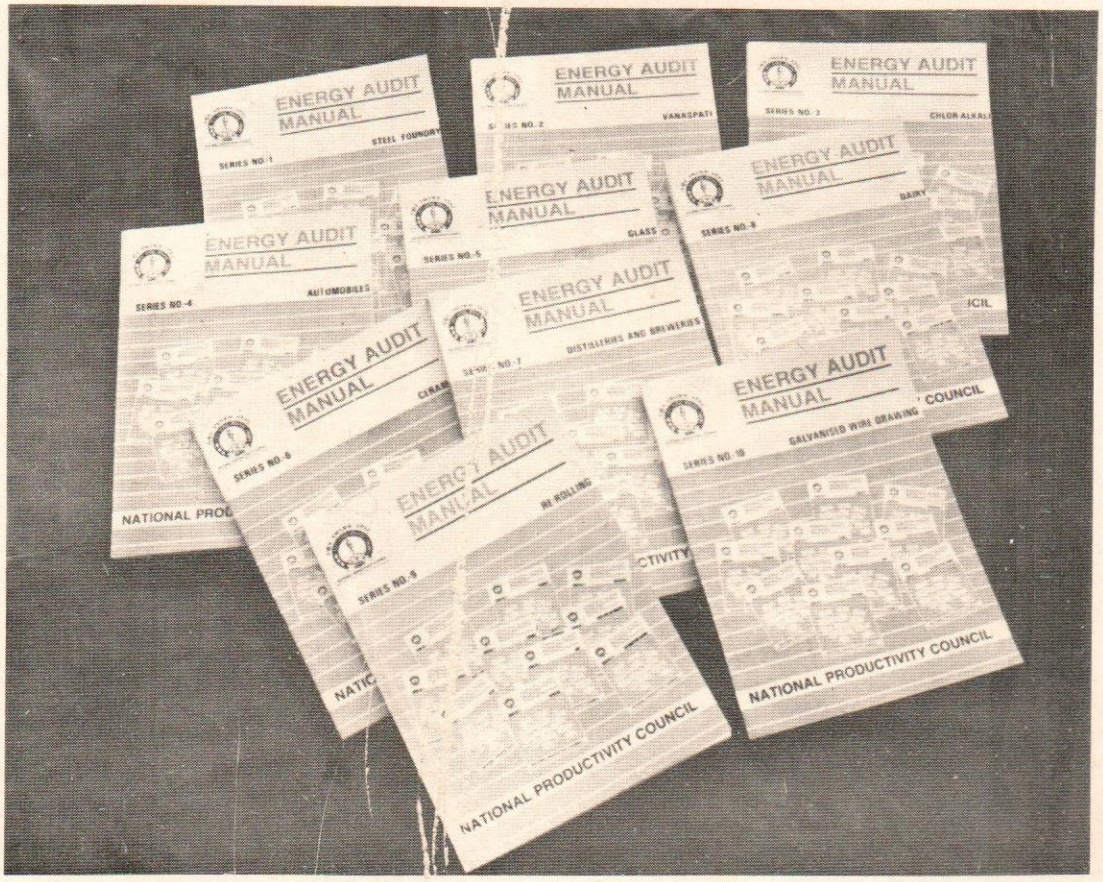

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