RISE IN AGRICULTURAL PRODUCTIVITY AND THE EFFICIENCY WAGE HYPOTHESIS

A CASE STUDY OF WEST BENGAL

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Remarkable rise in agricultural production of West Bengal in the last two decades has now become a common knowledge. Total food production has increased steadily since the begining of the eighties and continued to do so in the nineties as well. This has been attributed in many studies to the strategies taken by the Left Front Government through land reforms, improvement of both small and large scale irrigations, and initiative taken so that even the small and marginal farmers can avail of HYV seeds and chemical fertilisers etc. to enhance agricultural productivity. In six years between 1990-91 and 1996-97, aggregate foodgrains production in the state has increased by over 22 percent, which is much higher than most of the states of India. Besides food crop, the productivities of cash crops, such as jute and other fibers are also quite high. The cropping intensity of West Bengal is now also very high. Mukherjee and Mukherjee (1996), Chatterjee and Roy (1998) and many others have also shown that the agricultural productivity has increased in West Bengal in the past two decades. Mukherjee and Mukherjee (1996) have also shown that several institutional factors have played a major role in raising production and productivity during the post-Panchayat years. But the agricultural prosperity of West Bengal does not fully percolate down to the poor rural labour class. It is ture that the average daily wage rate of agricultural labourers in this state paid in cash and kind together was Rs. 5.60 in 1976-77 and this has risen to Rs. 39.41 in 1996-97--an increase of over seven times in last twenty years. But most of the increase of money wages is eaten away by sharp rise of the consumer price index of the agricultural labourers (CPIAL). Hence, the real wage rate has not improved so much as money wage rates. The basic motivation of the present paper is to investigate the factors-apart from different institutional factors such as improvement of irrigation facilities-that are responsible for the tremendous surge in agricultural productivity of West Bengal from the point of the efficiency wage hypothesis. The basic theoretical concept is taken from efficiency wage hypothesis where total output does not depend on labour hour but on labour power. Neo-classical theory tells that in any labour market the equilibrium wage is determined through the interaction between labour demand and supply where the market totally clears. As the production depends on labour hour i.e. how long a labour works, the

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producer in order to minimize cost always wants to pay wage as low as possible. But imperfection in the labour market is a very common feature in the rural areas of the less developed countries. One of the widely recognised logic behind this imperfection is the existence of efficiency wage hypothesis where the total output does not depend on labour hour, but on labour power, i.e. how efficiently a labourer can work within the specific time period. The labour power of any worker totally depends on the nutritional status of the worker which itself depends on his real wage income. It is said that higher real wage means higher consumption of food item and less undernourishment of the agricultural labourer which will help him become more productive. This wage-productivity nexus holds only at low level of income. In most of the developing countries including India, the poorest people in the rural sector spend more than 70% of their budgets on food. Their income elasticity of food expenditure is also very close to one. Since food would seem to translate directly into calories, this result appears to carry the further implication that the income elasticity of calories must also be close to unity at least for the poor households. But later it has been observed that increases in income cause even poor households to switch from cheapest source of calories such as course cereals towards more desirable but more expensive sources of calories such as wheat and rice.

Rentlinger and Selowsky (1976) has shown that the expenditure elasticity of calories was as low as 0.40 for the poorest households. Estimate of Behrman and Deolakikar (1987) about the elasticity is also very close to Rentlinger and Selowsky's estimate which is 0·37 The estimates made by Subramanian and Deaton (1994) of the total expenditure elasticity of calories are around 0.55 for poorest hourseholds and 0·40 for better-off households, all of which basically supports that higher income means higher expenditure on food item and correspondingly higher intake of nutrition which will help the poor remove their undernourishment and become more productive.

So the basic objective of the employers who support efficiency wage hypothesis is that in order to maximize profit one should pay comparatively higher than the market clearing wage on the basis of the presumption that by paying higher wage the problem of undernourishment of the labourer can be removed. This theory is very much applicable in the agricultural labour market of the the less developed countries where most of the landless agricultural labourer are suffering from malnutrition, and wage is the only source of their income. If we look at West Bengal it is observed (see Table 1) that the percentage of rural poor (who basically comprise poor landless agricultural labourer class), suffering from malnutrition gradually decreases over time.

TABLE 1 ESTIMATES OF POVERTY AND MALNUTRITION IN WEST BENGAL

PERIOD	% of People below the Poverty Line	% of People Having Per capita Daily Intake of 1540 k. cal or less
N.S.S. 27th Round (1972)	79.4	38.76
N.S.S. 38th Round (1983)	74.96	26.46

Source : *N.S.S. data, estimate by Chatterjee (1996)*

SECTION II : THEORETICAL DEVELOPEMENT OF EFFICIENCY WAGE HYPOTHESIS

In developing the efficiency wage hypothesis the following notations have been used.

Y ⇨ Total Output

N ⇨ Gross Cropped area

A ⇨ Productivity enhancing factors, which accommodate other factors, except labour power i.e. use of chemical fertilisers, rainfall, irrigation, credit which can influence production.

n ⇨ Total number of labour force engaged in the agricultural production.

w ⇨ Real wage rate of each labourer

e (w) ⇨ Efficiency of the labourer where $e' > 0$ and $e'' < 0$.

$L = n\ e(w)$ ⇨ Total labour power engaged in the production process or total labour force in terms of efficiency units.

y ⇨ Output per hectare or total productivity.

w^+ ⇨ Reservation real wage of each labourer.

Here $Y = Af\{ne(w)\} - nw$ .....(1)

The basic objective of the landlord is

$$\underset{(w,n)}{\text{Max}}\ \pi = Af\{ne(w)-nw\}$$

subject to $w > w^+$ .....(2)

As the profit maximizer landlord does not want to minimize cost, rather want to improve the labour power, we can say that the above optimization problem with inequality can be solved by Kuhn-Tucker condition which gives the optimum wage and employment level w^* and n^* respectively. This w^* is basically the efficiency wage rate which we got

from the equality of average labour power and marginal labour power i.e. from $\frac{e(w)}{w^*} = e'(w)$. The total optimum labour power in efficiency units now becomes $L^* = n^* e(w^*)$ and the profit maximizing total productivity becomes

$$y^* = \frac{A}{N} f\{n^* e(w^*)\} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

Following (3) we can say that at the optimum level the elasticity of total productivity with respect to real wage rate 'E' becomes

$$E = \frac{f'(L^*)L^*}{f(L^*)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4)$$

As $f' > 0$, we can argue following the efficiency wage hypothesis that E is strictly positive.

Another aspect of the efficiency wage hypothesis is that of the existence of wage rigidity. Actually, $w^* = \max\{w^*, w^+\}$. If we consider w^+ as the neo-classical market clearing real wage which basically will be very low in a labour abundant rural economy of a less developed nation, the obvious outcome of the efficiency wage hypothesis is that $w^* > w^+$ and the problem of involuntary unemployment will crop up in the agricultural labourer market because the landlord himself will not become interested to bid down the wage rate.

Chatterjee and Kundu (1997) has shown that due to the emergence of Green Revolution technique in the agricultural sector the production time span squeezes, and in order to maximize gain the landlord has to complete his agricultural activity within the specific time period such that the demand for labour will increase and the problem of involuntary unemployment will decrease if the landlord, of course, believes in the concept of efficiency wage hypothesis. From the Rural Labour Enquiry (1987) it is clear that in West Bengal alongside substantial increase of cropping intensity and money wage rate as well as of real wage rate of the agricultural labourers the average annual number of days of involuntary unemployment has gradually decrease from 78 annual days in 1983 to 53 annual days in 1987. So West Bengal is a state where we can check whether the real wage rate, apart from other productivity enhancing factors, plays a significant role to improve agricultural productivity.

SECTION III : PREVIOUS EMPIRICAL STUDIES ON EFFICIENCY WAGE HYPOTHESIS

Although the efficiency wage hypothesis has important implications for agricultural labour market in the less developed countries its empirical testing has been few and far between. Two pioneering empirical exercises were done by Strauss (1986) and Anil, B.

Deolalikar (1988). Strauss, using instrumental variable estimation procedure, had estimated a Cobb-Douglas agricultural production function in order to find out whether nutrition affects labour productivity. Using farm household level data from Sierra-Leone he tried to quantify the effect of current nutritional status on annual farm production. The farm output is hypothesized to be a function of effective hours of family and hired labour, variable non-labour inputs, fixed capital and land cultivated where effective labour--both family and hired, is a function of calorie intake at the individual level and hours worked where household calorie intake depends on household food consumption. It is the inflow of calorie during the current year, which influences the so-called effective labour during that particular year. He basically assumes an instantaneous consumption-efficiency relationship ignoring any time dimension in his model and had shown that effective family labour is a statistically significant input in the production function and it increases at a diminishing rate with average calorie intake. But Strauss was criticized for using cross-section data. According to Sukhatme, the calorie requirements for maintenance of basal metabolism of the human body are subject to intertemporal variations. Hence, even if an individual's total intake of calories was stable over time, there could be large intra-temporal variations in the amount of energy actually available for work. According to Sukhatme, current calorie intake would be a very poor proxy for the amount of energy available for work effort.

Deolalikar, using ICRISAT village level study data, had also tried to establish efficiency wage hypothesis empirically. Besides household level farm production, he also estimated individual level wage equation. Individual-specific nutritional status appears as an explanatory variable in these equations. If wage reflects the marginal productivity of labour, a positive effect of nutrition on individual wage would lend support to the nutrition productivity hypothesis. Since current calorie intake is a poor proxy for energy actually available for work effort, he used stock measures of calorie intake in addition to the conventional flow measures. This is weight for height measure that is favoured by the nutritionists as long term indicator of nutritional states. The inclusion of weight for height in the production and wage function serves two purposes : it controls for past calorie intakes and for body size in the relation between current calorie intake and productivity, and its co-efficient may also be interpreted variously as the returns to endurance, strength or health status etc. Through this paper Deolalikar had shown that nutritional status as measured by weight is important in determining labour productivity in developing agriculture. The elasticity of farm output with respect to weight for height for family workers is found to be as large as 2. The market wage rate which is likely to reflect the marginal productivity of labour is also highly elastic with respect to weight for height. He concluded that weight for height is a better indicator of nutrition than average daily calorie intake.

SECTION IV : OUR EMPIRICAL VERIFICATIONS IN CONTEXT OF WEST BENGAL

In this section we try to find out whether the efficiency wage hypothesis exists in the agricultural labour market of West Bengal. We do not consider weight for height of any agricultural labourer, rather we try to see whether, apart from other productivity enhancing factors, real wage plays any significant role to improve the agricultural productivity of West Bengal. In order to find out the existence of efficiency wage hypothesis we have examined the following three things.

<a> ***whether the labour market follows the Neo-classical hypothesis.*** In the Neo-classical labour market the real wage rate is determined through the interaction between demand and supply and the equilibrium real wage rate is determined through the equality between labour demand and labour supply. But under the efficiency wage hypothesis there will be wage rigidity in the labour abundant agricultural sector and this wage rigidity will occur if and only if the real wage is not influenced by labour supply.

<b> ***we shall have to examine whether real wage influences productivity or vice-versa.*** The basic concept of the efficiency wage hypothesis is that higher real wage means more nutrition to the agricultural labourer, i.e., higher labour power which leads to more output and correspondingly higher average productivity of agricultural output.

<c> ***we shall also have to find out if the real wage influences average productivity*** , i.e., Whether the elasticity of total productivity with respect to real wage rate is positive or not.

The critics as of the efficiency wage hypothesis argue that consumption productivity link is far from instantaneous. Hence, if the efficiency wage hypothesis is to be considered a significant explanation of wage formation in agricultural labour markets, one would expect it to be supported by the prevalence of long-term employment contracts which allow sufficient time for employers to capture the productivity benefits of paying higher wage. The report of the National Commission of Rural Labour, Vol-I (1991) affirms that there is increasing casualisation of labour contract in the rural labour market of India. West Bengal is also not an exception. Hence, the critics of efficiency wage hypothesis including Datt (1996) argued that if the efficiency wage theory is considered it is applicable primarily to the category of regular or attached farm labourers. Therefore, its relevance is limited to a small and shrinking segment of the agrarian labour market in India.

But Basu (1996) had reformulated the efficiency wage hypothesis on the basis of casual labour market, where the productivity of a landlord's worker depends not on the

wage the landlord pays but on the wage rate that prevails in the labour market from which labour is hired.

While testing whether the real wage has any impact on the agricultural productivity in the agrarian economy of West Bengal, we take the time period 1979-1992. Data are collected from the West Bengal Statistical Abstract 1978-79 and 1990-93 and from West Bengal Bureau of Applied Economics and Statistics. While calculating real wage, we initially calculate average money wage rate of the male casual agricultural labourers of different districts in different years and then convert the money wage rate into real wage rate after considering 1978 as the base year.

We use following notations to portray the production function and labour supply function.

$Y_{it} \Rightarrow$ Total food and non-food crops produced in the i^{th} district in the t^{th} year.

$N_{it} \Rightarrow$ Gross cropped area of i^{th} district in the t^{th} year.

So, $y_{it} = \frac{Y_{it}}{N_{it}} \Rightarrow$ Total productivity of the i^{th} district in the t^{th} year. Here

y_{it} is measured in Kg/hectare unit.

$F_{it} \Rightarrow$ Total use of chemical fertiliser of the i^{th} district in the t^{th} year.

$f_{it} = \frac{F_{it}}{N_{it}} \Rightarrow$ Use of chemical fertiliser per hector of the i^{th} district in the

t^{th} year. Here f_{it} is measured also in Kg/hector terms.

$R_{it} \Rightarrow$ Rainfall of i^{th} district in the t^{th} year (measured in centemeter)

$W_{it} \Rightarrow$ Average real wage rate of the i^{th} district in the t^{th} year

$L_{it} \Rightarrow$ Total casual male agricultual labour force of the i^{th} district in the t^{th} year.

Initially, we want to check whether the real wage rate is influenced by labour supply. If it is not influenced, the labour market does not follow Neo-classical market clearing proposition and the wage rigidity problem will emerge.

The Neo-classicial labour supply funciton is given by

$L^s = f(W)$

where L^s is the labour supply and W is the real wage rate. The inverse of

the above function gives $W = \psi(L^s)$.

Now in order to test the existence of wage rigidity in the agricultural labour market we consider the following linear equation.

$$W_{it} = \alpha_0 + \alpha_1 L_{it} + U_i$$

The wage will be rigid if and only if the parameter estimate of α_1 is not statistically significant.

To test the wage rigidity in the agricultural labour market of West Bengal as a whole we consider each year between 1980 and 1992 and we consider the labour supply and real average wage rate of all the districts simultaneously in each year. The real wage rate is calculated after considering 1978 as the base year. Table 2 shows that, except in 1989 and 1990, the real wage rate is not influenced by the agricultural labour supply. The low value of R^2 also supports our view. So, we can argue that the real wage is rigid in all years between 1980 and 1992 except in 1989 and 1990. The above estimation is based on cross section data across the districts of West Bengal.

Now we have tested whether the real wage influences productivity or is influenced by productivity. In order to check it we have used causality test, suggested by Granger.

It is true that due to lagged consumption efficiency relationship, the total output of the present period should be influenced by the volume of consumption of the labourer at the previous period. This is because the actual labour power of any labour in the present period depends on the volume of his own consumption in the previous period. But what should be the time lag? Actually in the agricultural sector the whole time period is divided into lean season and peak season. The first one is basically the drag period when no agricultural activity is done and the agricultural labourers are totally unemployed. The agricultural activity is done only in the peak season.

M. R. Gupta (1987) has argued the labour power of any labourer in the peak season depends on the nutritional efficiency he gained through consumption in the slack season. The labourer can maintain the consumption level in the slack season by taking loan from the landlords after binding himself in a nutrition based interlinked contract or from professional moneylenders. But due to the modernisation of agriculture and emergence of multiple cropping system the gap between slack and peak season has narrowed down.

Here due to lack of seasonal data on total output, wage rate, rainfall and use of chemical fertilisers we have to take lag of one year at the time of checking whether real wage influences productivity. In order to check it the following causality models have been used.

$$y_{it} = \alpha_{0i} + \alpha_1 y_{i(t-1)} + \alpha_2 W_{i(t-1)} + Ui$$

and $$y_{it} = \beta_0 + \beta_1 y_{i(t-1)} + V_i$$

After estimating the parameters of the above equations in different years and following Granger causality test the values of F statistic in different years corresponding to our estimated equations have been calculated. The results are presented in Table 3.

Table 3 shows that the F values which we get in different years are not much

encouraging. One of the basic reasons behind the result is that the time lag considered here is one year. It is very unlikely that the value of consumption of a labourer in the t^{th} year will influence the output in the $(t+1)^{th}$ year. Still we see in seven out of thirteen years, the F value or Granger casuality test shows that real wage influences the average productivity.

So, from the above two estimates it is clear that most of the times the labour supply does not influence real wage rate, and real wage of previous year influences the average agricultural productivity in the current year. But during the time of establishing the wage productivity nexus in the casual labour market of the agricultural sector where each time span consists of one year, it is noticed that if any such relationship exists then the real wage rate of any particular year can influence the total productivity of the same year, where the elasticity of total productivity with respect to real wage rate should be strictly positive. Here total productivity instead of total output is considered because in West Bengal the size of the districts is not uniform. Hence, large amount of disparities is observed, particularly in gross cropped area. Therefore, an attempt has been made to remove these disporities, as far as practicable, by considering average productivity and use of chemical fertilizers per hectare.

Now, real wage of a particular year greatly influences that of the next year. In case of West Bengal the correlation co-efficients between the real wage rate of two consecutive years are varying between ·60 and ·88. Hence, while calculating elasticity of total productivity with respect to real wage rate we form the following nonlinear simultaneous equation system where the total productivity of a particular year is explained by real wage rate of the same year, rainfall and use of chemical fertiliser per hectare and the real wage rate of that year is explained by that of previous year. Following the notations already mentioned the simultaneous equation system becomes

$$\log y_{it} = \beta_0 + \beta_1 \log W_{it} + \beta_2 \log R_{it} + \beta_3 \log f_{it} + U_i$$

$$\log W_{it} = r_0 + r_1 \log W_{i(t-1)}$$

Hence, in this equation system the endogenous independent variable is log W_{it} 'and predetermined independent variables are 'R_{it}' and 'f_{it}' where the predetermined independent variable excluded in the first equation but included in the simultaneous equation system will be '$W_{i(t-1)}$'. As this simultaneous equation system is exactly identified, we can get the parameter estimates of the first equation in the system by applying Indirect Least Square Estimation method and the parameter estimate of β_1 indicates the elasticity of total productivity with respect to real wage rate. The parameter estimates of $\beta_0, \beta_1, \beta_2$, and β_3, between 1980-1992 are shown in Table 4 where it is seen that in all the years the elasticityof total productivity with respect to real wage rate is

positive and it is statistically significant either at 10% or 5% or at 1% level of significance, except in the year 1989.

Thus, we see that, apart from different productivity enhancing factors, the real wage rate of a particular year also plays a significant role to imporve total productivity in the agricultural sector of that year. Actually due to the adoption of Green Revolution technique through use of HYV seeds, chemical fertilisers, and improvement of both small and large scale irrigation, not only the production time span squeezes but also due to the emergence of multiple cropping system the gap between the two peak seasons has also narrowed down. West Bengal is such a state where the cropping intensity has increased gradually between 1979 and 1992 and it is still increasing. In case of production of food crop its growth rate between 1983-84 and 1993-94 is 5.7% which is higher than that in any other state of India. Besides this, due to land reforms and distribution of land to the small and marginal farmers, the scarcity of agricultural labourer has gone up in the rural areas. As a result, the landlord has to pay higher wage to the agricultural labourers. It is true that the rate of increase in real wage is not so high as that in money wage. It is due to the emergence of multiple cropping system that the agricultural labourers get employment almost throughout the year.

Besides this the agricultural labourers can also get employment in non-farm activities even in the slack season though panchayats. As a result, they are well fed and can maintain their nutritional status and can influence the total productivity in the agricultural sector.

CONCLUSION

The above excersice establishes the relationship between real wage rate and productivity in the agricultural sector of West Bengal. Thus, it is found that the output or total productivity is influenced not by neo-classical labour hour but by labour power which depends on the volume of food consumption of that labourer, which also depends on the real wage income of the labourer. The elasticity of total productivity with respect to real wage rate has been positive between 1980-1992, and statistically significant in all the years, except 1989. Hence, we can say that besides different Green Revolution techniques, increase in real wage among the agricultural labourer also has played a significant role to

TABLE 2 ESTIMATES OF LINEAR REGRESSION

YEAR	$\hat{\alpha}_0$	$\hat{\alpha}_1$	R^2
1980	6.48 (9.14)*	2.17E-7 (0.32)	.006
1981	5.382 (13.479)*	3.16E-7 (0.2002)	.00304
1982	4.79 (13.23)*	1.15 E-6 (0.827)	.049
1983	4.49 (9.47)*	1.97 E-6 (1.10)	.085
1984	5.34 (9.93)*	8.84 E-7 (0.44)	.015
1985	6.42 (13.79)*	6.96 E-7 (0.416)	.013
1986	7.08 (11.73)*	7.31 E-8 (0.034)	.009
1987	6.93 (13.05)*	2.14 E-6 (1.18)	.096
1988	7.33 (8.72)*	1.19 E-6 (0.42)	.0134
1989	5.80 (8.25)*	7.48 E-6 (3.24)*	.44
1990	6.21 (10.58)*	3.58 E-6 (1.88)**	.21
1991	6.59 (13.17)*	1.4 E-7 (0.863)	.0542
1992	6.859 (14.24)*	8.57 E-7 (0.562)	.0237

Degress of Freedom - 13

* ⇒ Significant at 1% level

** ⇒ Significant at 5% level

TABLE 3 F-STATISTICS FOR CAUSALITY

YEAR	F(1, 12)
1980	3.65***
1981	4.03***
1982	3.25***
1983	1.93
1984	1.49
1985	0.97
1986	1.28
1987	3.44***
1988	3.59***
1989	1.42
1990	4.15***
1991	3.49***
1992	1.52

*** ⇒ **Significant of 10% level**

TABLE 4 ESTIMATES OF LINEAR REGRESSION

YEAR	$\hat{\beta}_0$	$\hat{\beta}_1$	$\hat{\beta}_2$	$\hat{\beta}_3$	R^2	$\overline{R^2}$	VALUE (3/11)	D. W
1980	4.45 (1.89) ***	.836 (1.40) ***	.0604 (.153)	.329 (1.52) ***	.548	.425	5.08	2.16
1981	3.86 (2.38) **	1.467 (1.88) **	.020 (.086)	.215 (1.40) ***	.35	.18	2.18	2.64
1982	5.19 (2.93) *	1.607 (2.47) **	–.33 (–1.37) ***	.263 (1.99) **	.579	.465	5.15	2.51
1983	5.21 (3.20) *	.944 (1.74) ***	–.155 (–.64)	.382 (1.96) **	.63	.53	8.32	2.37
1984	4.87 (2.72) *	1.33 (2.92) *	–.202 (–.86)	.376 (2.72) *	.62	.51	8.49	1.96
1985	5.77 (5.17) *	.915 (1.70) ***	–.239 (–1.68) ***	.311 (2.24) **	.77	.710	12.11	2.95
1986	5.09 (2.83) *	1.437 (2.12) **	–.367 (–1.22)	.377 (1.97) **	.72	.646	11.27	1.63
1987	4.85 (2.69) **	1.32 (1.97) **	–.22 (–1.22)	.276 (1.52) ***	.76	.69	12.35	1.95
1988	6.50 (2.93) *	1.117 (1.46) ***	–.364 (–1.25)	.175 (.454)	.48	.34	5.45	1.58
1989	7.30 (3.26) *	.294 (.533)	–.324 (–1.34)	.33 (1.49) ***	.60	.497	5.16	1.68
1990	4.98 (1.787) ***	1.15 (1.97) **	–.218 (–.65)	.333 (2.02) **	.72	.65	9.94	1.93
1991	2.74 (1.03)	2.07 (1.96) **	.018 (.072)	.193 (.822)	.51	.386	6.35	2.09
1992	7.13 (3.74) *	1.61 (1.59) ***	–.569 (–2.28) ***	.061 (.22)	.533	.464	5.43	1.624

DEGREES OF FREEDOM = 11

* ⇒ Significant at 1% level

** ⇒ Significant at 5% level

*** ⇒ Significant at 10% level

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CAPITAL FORMATION IN INDIAN AGRICULTURE : PRIVATE AND PUBLIC SECTOR INITIATIVES

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Capital formation viewed as an engine of development brings about growth and structural changes in the economy. In the agricultural sector it brings about changes in the crop-pattern, land-man ratio and acreage yield. But it does not fall from the heaven as manna. It is to be created ; its phasing is to be planned. Looked as an enterprise, agriculture in India is primarily a private business. The role of cooperative farming is very limited. Private initiatives mainly shape the pattern of agricultural development, though the Govt. frames policies and allots funds for its infrastructural development. Private as well as public initiatives are instrumental towards capital formation in Indian agriculture. Investment on land development, ground-water development, farm machinery and implements, farm livestock, farm buildings, animal sheds etc., usually come under the purview of private initiative. These items are relatively less costly, less risky and farm-specific. Compared to these, items like flood control, irrigational network through canals and deep tubewells, rural electrification, rural transport, marketing of the farm produce, storage facilities and above all, farmer's skill formation through lab-to-land training etc, require massive investment and are not farm-specific, risky and costly. These are phased over time with a view to bringing about inter-generation equity. These come directly under the purview of the Govt. which allots funds for their development. All these items- privately and publicly owned and managed-directly or indirectly contribute to the GDP of the country. The time profiles of gross capital formation in agriculture (GCFAG) - both the private and public components (PVGCFAG and PUGCFAG) - have been examined by several researchers (Rath, 1990; Shetty, 1990 ; Kumar, 1992 ; Mallick, 1993 etc.) All the studies conform to indicate the deceleration in agricultural capital formation during the 80's. Such a decelaration is attributed to the substantial decline in the public sector component of capital formation in agriculture (Mallick, 1993).

Studies so far made on agricultural capital formation are in most cases at the all-India level. State-level analysis is very few in number. Disaggregative analysis at the level of different components of capital formation is absent. An attempt has been made in this paper to make a disaggregate analysis for investment in Indian agriculture during the period 1960/61-1992/93. Inter-state variations in the size-class distribution of the different components of investment (buildings, livestock, machines etc) in agriculture have been examined : size-class inequlality has been measured using Theil's Index. Factors influencing capital formation are also examined. Section I discusses the growth profiles of capital formation. The changing scenerio of public and private investment is discussed in section 2. The components of private investment are examined across

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different states in section 3. Inter-state variations in the degree of size-class inequality existing in different components of private investment are quantified. Section 4 contains concluding remarks. Data on capital formation at constant price (1980-81) are taken from the C.S.O. Publications on National Accounts Statistics (1989, 1991 and 1992). Data on the components of private investment are taken from the NSD (37th round).

Section 1 Growth of GCFAG

The trend growth rate of GCFAG in India during 1960/61-1992/93 is 3.26% which is slightly higher than that of GDPAG (2.64%). Sub-period analysis shows that during 1960/61-1970/71 and 1970/71-1980/81 GCFAG has attained much higher trend growth rate than gross domestic product in agriculture (GDPAG). But during 1980/81-1991/92 the trend has reversed. GDPAG has attained much higher rate (3.19%) than GCFAG (0.07%). The period of the 80's is a period of retrogression for GCFAG.

All these reflect two things : (a) up to 1980-81 average capital-output ratio (GCFAG per GDPAG) has accelerated at the rate of about 4% annually. (b) After 1980-81 it has retrograded annually at about 3%. Acceleration up to 1980-81 and retrogression thereafter have, however, made the average capital-output ratio even to grow at 0.62% during the entire period 1960-92 (Table 1).

Compared to total gross capital formation (TGCF) in the economy as a whole, GCFAG having a higher rate of growth up to 1980-81 has exhibited thereafter a lower rate of growth. This indicates that though the non-agricultural secotor has advanced more and kept the pace of high growth rate of investment, the agricultural sector has lagged behind (Table 1) in the 80's.

Section 2 Public Vs. Private Capital Accumulation

Why has retrogression in capital formation taken place to agriculture after 1980-81? As noted earlier, GCFAG has two components : Private and Public. Public investment takes place in the areas of general use (flood control, irrigation etc.) while private investment is meant for individual use.

The latter assumes the major role. Its share in total GCFAG was 64.7% in 1960-61. The share increased to 71.4% in 1970-71 and came down to 61.3% in 1980-81. Thereafter it incresed to 75% in 1990-91 and continued to rise afterwards. The share of government investment has been continuously declining since 1980-81 (Table 2). The retrogression of GCFAG is, therefore, to a large extent, due to the retrogression in its public component. But how much is agricultural surplus invested? It was 5.8% of GDPAG in 1960-61. It rose to 10.9% in 1980-81. Thereafter, it has started declining, it has been 7.4% in 1992-93. In other words, average capital-output ratio (COR) which attained its highest value in 1980-81 has started declining afterwards. This indicates increasing capital productivity in the 80's. But the incremental COR in most of the years has been negative (Table 2).

It is claimed that PUGCFAG and PVGCFAG are complementary : the former, in fact, stimulates the latter (Nayar, 1993; Mallick, 1993). If it be so, the growth of public investment must stimulate the growth of private investment. Our estemates reveal that during 1960/61-1970/71, PVGCFAG has surpassed in growth rate (7.75%) PUGCFAG (2.4%). But the reverse has happened in the next decade, 1970/71-1980/81 : PUGCFAG has attained the growth rate of 9.28% and PVGCFAG 5.61%. Things became really bad in the 80's. PUGCFAG has retrogreded (–4.92%) and the growth rate of PVGCFAG has declined to 2.30%. During the entire period PVGCFAG and PUGCFAG have grown almost at the same rate (3.49% and 3.14%).

The causal chain between PVGCFAG and PUGCFAG may be quantified in terms of a functional relationship. PUGCFAG usually takes place first and then PVGCFAG comes in. The postulated relationship is thus :

PVGCFAG = f (PUGCFAGt-11). Assuming log-linearity, it is estimated as :

Period	Intersept	Coefficient	R^2	D W
1960/61-1970/71	–3.327*	1.627*	0.51	0.67
	(0.899)	(2.883)		
1969/70-1980/81	4.519*	0.467*	0.66	2.29**
	(5.790)	(4.198)		
1979/80-1989/90	10.843*	–0.393*	0.27	2.48**
	(6.372)	(1.706)		
1960/61-1989/90	2.868*	0.691*	0.73	0.63
	(5.110)	(8.608)		

* : Statistically significant, Figures within parentheses ( ) indicate t-values.

** : No auto-correlation.

PUGCFAG with one period lag significantly affects PVGCFAG. Up to the 80's it has directly stimulated. But during the 80's it has indirectly affected PVGCFAG. For the entire period, direct relationship is, however, observed. In the 80's, even though PUGCFAG has retrograded, its private counterpart has behaved otherwise : it has increased (trend rate being 2.30%, almost a half of the previous decade's rate). Private intiatives do not always follow public initiatives : in fact, agriculture being the private enterprise in India, a critical minimum level of initiative is expectedly maintained by the farmers for their evolutionary survival.

Furthermore, responsiveness of PVGCFAG to PUGCFAG has varied over time. The value of elasticity in the 60's has exceeded unity while in the subsequent decades it has been falling short of unity. Responsiveness of PVGCFAG to PUGCFAG has been all through neither direct nor inelastic. This is contrary to the existing findings (Nayar, 1993; Mallick, 1993).

PVGCFAG and GDPAG : Capital is viewed as the produced means of production. PVGCFAG is a part of the surplus generated in agriculture. It is thus postulated that more (less) GDPAG, more (less) PVGCFAG. The estimated log-log relationship during 1960-92 is : Log (PVGCFAG) = – 4.923 + 1.195* log (GDPAG).

$R^2 = 0.91$ (9.547)

The coefficient is positive and statistically significant. It is greater than unity, indicating that private investment is elastic in respect of GDP.

Section 3 Private Investment : Different Components

Private investment is the major source, we have already said, of capital formation in agriculture. It takes place in alternative forms : livestock, farm machinery, transport equipments, farm buildings etc. which are the major components of PVGCFAG. It changes over time in composition ; changes it also across the states. Size-class distributions of the components also vary over time and across the states. Constrained by the non-availablity of data, we have attempted to examine the inter-state characteristics of the size-class distribution of each component (said above). NSS data for 1981-82 (37th round) are used. Assets formed by the rural cultivator households are considered for PVGCFAG.

Average value of capital per reporting household diverges across items as well as states (Table 3). At the all-India level it is Rs 8877 for 'buildings', Rs 2599 for 'livestock', Rs 1279 for 'machinery' and Rs 1082 for 'transport equipment'. State-wise variations measured in terms of coefficient of variation are 85% for 'building', 117% for 'livestock', 208% for 'machinery' and 83% for 'transport equipment'. Inter-state variations are maximum in case of machinery. Punjab and Haryana are the states where per cultivator agricultural investment has been maximum in cases of the first three items.

Inster-state varations in average capital (value) do matter in the variations of agricultural productivity. More the mechanisation of agriculature, more the agricultural productivity. The states having more average (value) machine capital in agriculture have more agricultural productivity. Such a direct relationship is observed in our study. The coefficient of a rank correlation between rice yield (per hectare) and average machine value (per household) across the states has been 0.32 which is positive.

Theil's inequality index[1] [based on 5 broad size-classes (Rs .000) : (i) less than 1, (ii) 1-5, (iii) 5-10, (iv) 10-20 and (v) 20 & above] is computed. The index has been very low (0.063) in case of transport equipments which are usually animal-drawn carts. Almost all the farmers possess such carts and consequently a very low degree of inequality prevails in the size-class distribution. But contrary to the general trend, Tamil Nadu and Punjab have exhibited some degree of inequality in transport equipment.

The degree of inequality is found to be the highest in case of machinery. This is quite expected. Poor farmers can hardly afford to possess the costly equipments and consequently a high degree of inequality expectedly prevails. Tamil Nadu has exhibited

highest degree of inequality (0.682), followed by Madhya Pradesh, Andhra Pradesh, Bihar and Kerala.

Livestock and other farm animals are possessed by the common people. Consequently, inequality here is relatively low (0.135). Andhra Pradesh is ranked first (0.177) followed by Tamil Nadu, Orissa and West Bengal.

'Building' has displayed a relatively high degree of inequality (0.399). Tamil Nadu is once again ranked first (0.559), followed by Orissa (0.376), Assam (0.351) and West Bengal (0.306). Compared to 'machinery' and 'building', 'transport equipment' and 'livestock' have relatively low degree of size-class inequality.

Section 4 Concluding Remarks

Capital formation in Indian agriculture has been declining since 1980. The retrogression in the public investment is mainly responsible for such decline.

The private initiative plays a major role in the capital formation in agriculture which is essentially a private enterprise in India. Though public investment has been declining, private investment has not followed such pattern It seems that cultivators are essentially guided by their survival strategy. Public initiative is not always a determining factor of private initiative in the field of agricultural investment.

Private investment takes place in various alternative forms : building, machinery, livestock, transport equipment etc. Inter-state variations are prevalent in these items. Inter-state variations in the average value of machine capital, for example, significantly affect agricultural productivity. Size-class variations are also observed across the states and in the items of capital. The size-class distribution of machine-capital is observed to be relatively inegalitarian.

Notes : 1. Theil's (weighted) inequality index :

$$I = \sum_{1}^{n} y_i \log (y_1 / x_1), \text{ where}$$

y_1 : the share of class 1 in total investment,

x_1 : The share of class 1 in total number of households.

(Theil, 1967, P. 102).

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TABLE 1 TREND GROWTH RATE OF CAPITAL FORMATION DURING 1960/61-1992/93

Period	GCFAG	TGCF	GFCFAG	TGFCF	PUGCFAG	PVGCFAG	GDPAG
1960/61-1970/71	6.02*	3.18*	5.85*	3.50*	2.41*	7.75*	1.86*
1970/71-1980/81	6.81*	5.23*	6.12*	5.54*	9.28*	5.61*	2.06*
1980/81-1992/93	0.07	5.10*	0.17	5.27*	-4.92*	2.30*	3.19*
1060/61-1992/93	3.26*	4.98*	3.22*	5.14*	3.14*	3.49*	2.64*

Notes : * ***Significant at 5% level of significance.***

GCFAG : Gross Gapital Formation in Agriculture.

TGCF : Total Gross Capital Formation in the Economy.

GECFAG : Gross Fixed Capital Formation in Agriculture.

TGFCF : Total Gross Fixed Capital Formation in the Economy.

PUGCFAG : Public Gross Capital Formation in Agriculture.

PVGCFAG : Private Gross Capital Formation in Agriculture.

GDPAG : Gross Domestic Product in Agriculture.

SOURCE : ***National Accounts Statistics*** (1989, 1991 and 1992), Govt. of India.

TABLE 2 GROSS CAPITAL FORMATION IN INDIAN AGRICULTURE : PUBLIC Vs. PRIVATE SECTOR

Year	GCFAG as % of	PVGCFAG as % of	PVGCFAG as % of	% share in GCFAG			As % of GDPAG			GCFAG as % of	Incre-mental
	TGCF	TPUGCF	TPVGCF	PUGCFAG	KPVGCFAG	TOTAL	PUGCFAG	PVGCFAG	TOTAL	TGDP	CDR
1960-61	14.2	12.3	15.5	35.3	64.7	100.0	2.0	3.8	5.8	18.7	19.1
1965-66	15.6	10.8	20.6	34.6	65.4	100.0	2.9	5.5	8.4	20.4	-4.3
1970-71	16.7	11.3	20.6	28.6	71.4	100.0	2.1	5.6	7.7	18.3	-4.6
1975-76	14.8	10.5	19.8	30.7	69.3	100.0	2.7	5.8	8.5	21.8	8.4
1980-81	18.0	15.3	20.2	38.7	61.3	100.0	4.1	6.8	21.1	21.4	10.8
1985-86	11.2	8.2	13.9	35.1	64.9	100.00	3.1	5.6	8.7	24.4	-149.7
1990-91	9.0	5.3	11.7	25.1	74.9	100.00	1.9	5.6	7.5	22.5	9.9
1991-92	9.8	5.0	13.4	22.4	77.6	100.00	1.7	6.0	7.7	20.7	0.84
1992-93	9.3	5.2	12.2	23.1	76.9	100.00	1.7	5.7	7.4	23.9	0.45

Notes : As in Table *1*.

TABLE 3 INDEX (THEIL) OF SIZE-CLASS INEQUALITY AND AVERAGE VALUE OF CAPITAL FORMED IN INDIAN AGRICULATURE

1981-82 : Different Components

States	INEQUALITY INDEX				AVERAGE VALUE (Rs)			
	B	L	M	T	B	L	M	T
Andhra Pradesh	0.292	0.217	0.438	0.028	6694	2670	1060	1131
Assam	0.351	0.143	0.081	0.051	6063	2585	118	744
Bihar	0.260	0.135	0.431	0.065	8059	2163	608	1053
Gujarat	0.214	0.089	0.303	0.032	9969	3932	2133	2369
Haryana	0.032	0.015	0.044	0.024	23438	6470	7379	1272
Himachal Pradesh	0.062	0.025	0.052	0.007	20536	3517	601	1486
Karnataka	0.249	0.106	0.359	0.093	10254	2863	1096	1821
Kerala	0.243	0.138	0.203	0.028	17352	829	349	2923
Madhya Pradesh	0.179	0.148	0.429	0.043	6144	2962	1009	854
Maharastra	0.175	0.103	0.331	0.062	7975	3067	1443	1848
Orissa	0.376	0.174	0.279	0.033	3866	1323	127	534
Punjab	0.052	0.092	0.247	0.119	16889	4753	8694	1208
Rajasthan	0.166	0.083	0.301	0.031	9176	3850	2036	1136
Tamil Nadu	0.559	0.177	0.682	0.128	6086	1394	993	1001
Tripura	0.242	0.120	0.193	0.054	3114	1543	123	435
Uttar Pradesh	0.186	0.076	0.300	0.037	10620	2727	1642	691
West Bengal	0.306	0.172	0.341	0.003	5895	1465	299	676
India	0.399	0.135	0.418	0.063	8877	2599	1279	1082
Coeff of Variation (%)					84.81	116.86	208.60	82.79

Notes : B : ***Building etc; L : Livestock and poultry birds ;***
M : ***Agricultural machinery etc.; T : All transport equipments.***

Source : ***NSS (37th round)***

DECENTRALISATION : DEVOLUTION AND PARTICIPATION WHAT MAY SUSTAIN A PARTICIPATORY ETHOS ?

NITA MITRA *

INTRODUCTION

Over the last few years, economic policies world over, as also in India have undergone profound changes. In fact, more changes are in the process of being implemented.

It is felt by many that the contemporary debates on economic policies need to go beyond the issue of economic reform in its present form. It is a matter of concern that the singular focus on broadening the reach of the markets may result in substantial conceptual derailment of the basic purpose of development.

In response to the need for strengthening the foundations for a pluralist democratic society and a well functioning market economy, new institutions and economic infrastructure are evolving. The difficulties encountered in this respect perhaps relate to being able to strike the right balance between public and private markets and planning, between short-term contingencies and long-term visions based on ideals of social justice.

In this paper we argue that the emphasis on decentralisation of the government itself, so critical to the transition process to a market economy, may constitute a promising path to explore. The concept of decentralisation matched with considerable institutional flexibility and open minded experimentation could be instrumental in re-orienting development debates more towards the prospect of participatory economic expansion.

Bardhan (1996) has discussed extensively on the advantages and disadvantages of decentralisation. He has subsequently (Bardhan 1996) tried to embed the local self-governing institutions within the equity-efficiency debate on poverty alleviation. We approach the concept of decentralisation from planning theory's point of veiw, as being central to the paradigmatic shift towards participatory planning (Mitra 1996). We approach planning from a power-theoretic perspective. We consider the possibilities of the self-governing institutions' involvement in the planning process as being the instrumental inference for people's empowerment and development from below. We try to approach the issue of plan reforms and examine the possibilities of such reforms being able to generate endogenous forces of recovery for the repairable lapses of some of the society's basic institutions. it is in this context that the emphasis on such a planning mode, which itself may incorporate institutionalised participation, gains importance. It is our opinion that such reforms may be connducive to a 'negotiated and contractual environment'.

As a logical extension, we have also tried to examine whether such reforms may pave the way for the emergence of the 'people's sector'. If such a third sector could evolve in response to democratic decentralised planning, an alternative interpretation of civil society may be attempted. Civil society is usually interpreted as a space of critical reflection and creative transformation (Giri 1998). Alternatively, it is seen as self instituted, independent

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social partner that may modify governance systems (Sachs 1998). We interprete it as being an institutional response to that democratic decentralised planning mode which may incorporate participation of the beneficiaries. Such a concept of the people's sector which may itself strengthen social decision making provides for an area of overlap between the state and market. This is in contrast to its contemporary valorization which makes it an ally of the market and an alternative to the state.

DECENTRALISATION AND THE THEORY OF PLANNING

In the theory of planning decentralisation is generally defined in terms of its two interpretations viz. informational decentralisation and decentralisation of the authority to take decisions. The former interpretation is concerned essentially with the structure of information flows through the partitionings of the economy. Most extensive discussions on resource allocation mechanisms or adjustment processes centre around this interpretation. The crux of the definition is the way in which communication occurs among the hierarchies in the structure of the economic system. Designing suitable informationally decentralised models was initially the search of short-run planning theories. Subsequently, optimal planning of the multi-level have been designed and the arguments for a routine to be multi-level examined.

However, as compared to the questions regarding the channels of information flows, when the issue is who makes what kind of decisions, or when the focus shifts to the way in which decisions are made, one is dealing with the decentralisation of authority to take decisions.

The relevant question is : does decentralisation of decision making authority define a desirable property? While planning theory previously held that the case for decentralisation of authority rests entirely on non-economic factors, a power-theoretic perspective would expose the inadequecy of such theorisation. In the context of the inseparability of the economic and political domains, it is now apparent that the concept of informational decentralisation may not be divorced from decentralisation of authority. Acknowledging this overlap, the decentralised models of economic management now attempt a synthesis of the two.

Despite much conceptual and functional ambiguity, popularity of the concept of decentralisation has increased in recent years. It is often suggested and implemented as reducing the role of the state. Sometimes the focus shifts to the government at the local level where 'transactions costs may be low and information failures less acute'.

In recent discussions, the relevance of decentralisation in the sense of devoloution of power to local agencies and communities, i.e. to assign decision-making and control rights to those who have information and incentives and at the same time be accountable (politically and economically) for their actions, has assumed much significance. The emphasis appears to be on incorporating the beneficiaries' participation. However, the important question is : what organisational arrangements and mode of societal decision-making may generate and sustain a participatory ethos? It may be possible that such forms of decentralisation where decision-making power may be devolved on representative organisational structures that may empower the common people to participate in development planning, that provide the

meeting ground for the state and the grassroot tracks may make participation incentive compatible.

The question relating to decentralisation is thus one of ensuring basic democracy and participant planning. It boils down to the appropriate form of that third sector which may be incorporated between the market and the state. The embedding of the local self-governing institutional structures in an otherwise market economy could perhaps ensure efficiency and accountability of the state and help the cause of participatory economic expansion. In the context of the 'social and economic deprivations that blight living conditions in India' such interpretation of the analytical issue of decentralisation appears to be relevant.

PARTICIPATION

Participation as an analytical category has been widely disucussed. Contemporary strategies of international development agencies have also focussed on participation. The emphasis of this paper is on the institutionalised form of participation in development planning.

Participation through citizen's involvement has at its core greater public awareness of policy and political influence. It involves three processes as dispersing information, collecting information and promoting interaction. However, if it is to be viewed in terms of the goal of the best realisation of social objectives, it has to be apporached from the perspective of development planning and local governance. Here again, it may turn out to be an empty concept, if the questions of power structure, elite domination and institutional weakening forces are not taken into account. It is, therefore, important to ask what could be the pre-conditions to empowering people and their organisations for effective control of their lives. The answer perhaps relates to the compulsions of freeing the state, the planning process and local bodies from power domination. We will touch upon this in due course.

Many scholars like Hart (1978), Wade (1981), Jayaraman (1918), Bardhan (1984), Chopra Kadekodi and Murty (1990), Sengupta (1991) dealing with Indian examples have focussed on the relevance of participation in the management of common property resources, in water management and local level planning of irrigation schemes. Participation as micro-action of weaker sections has been analysed by others (Bhatt 1989). Participation as grassroot planning has been discussed by Prasad (1989).

The issue being power contextual, these studies point towards participation and collective action. However, except for Prasad, their basic orientation may not be said to be directed towards integrating the concept to a framework of overall planning.

Our conceptualisation of participation is contextual to the reform of geovernance and planning. We think it appropriate that participation should be analysed as a process which may afford wider opportunities for people's involvement in framing and implementing development planning under a system of open and democratic set up. Such participation process may improve the effectiveness of co-ordinated societal response to the problems of development. Participation may help the cause of people's empowerment and development from below.

The empirical validity of such hypotheses was tested through a random sample survey of 98 rural households from two districts of West Bengal. What do the results of household survey reveal ?

The housenholds' perception in both the villages more or less confirmed the views that had been elicited earlier from the elected members of the gram panchayats, regarding rural transformation and development activities initiated form below. More importantly with more than eighty percent of such households belonging to the landless, marginal and small farmers category, the households unanimously agreed that the Panchayati Raj system had been able to empower them. In the sense that they were now able to have some dignity and their voices could be heard, involving the people in the decision making process had indeed yielded rich payoffs to the people.

The household level data brought out the following aspects which may be enumerated below :

(1) The Panchayati Raj system had bestowed power on the people.
(2) Social Justice had increased.
(3) These people's institutions as compared to administrative structures do not work in isolation, they involve the local people.
(4) They keep track of local needs and plan accordingly.
(5) Interaction of the local people with departmental structures was difficult as they appeared less approachable from the common people's point of view.
(6) The discussions with the gram committees, whereby the panchayats are seen to take the people into confidence, create an environment of co-operation in contrast to the resistance that centralised planning may generate.
(7) Keeping the people informed and taking account of common needs, the panchayats have been able to meet such local needs as roads, drinking water, schools and etc. more effectively.
(8) These structures being more informal, confidence inspiring and conductive to basic democracy, the people and their organisations such as the farmers organisations, women's organisations were confident to discuss their peoblems and help the flow of information for effective development planning.
(9) As compared to not more than a few (15-20) days of work previouusly, in the off-season, people are now able to find work for at least three or four months in such times. This indicates the transformation taking place in rural areas.
(10) In addition to its accountability to the local people, the accountability of these institutions to the state sector if ensured, would bring out the participation of the common people with greater enthusiasm.

Some negative aspects such as the restrictiveness of local level polities and weaker accountability and non-co-operation were touched upon by a negligible proportion of the households. Yet, the general perception seemed to confirm our arguments regarding participation's effectiveness in promoting people's empowerment and development from below.

However, when one moves away from empirical validity to the concept, one realises the need for much conceptual clarification regarding what constitutes the essence of participation, what is implied by institutionalised participation, what may be the pre-condition for effective participation, and what eventually may determine the pace of participatory development. One may try to find answers to these questions.

Neun (1986) gives a fairly extensive survey of the notions and meaning of participation. He notes the difficulties of arriving at a satisfactory definition. For working out a definition of participation, we would like to argue for that alternative interpretation of decentralisation that has been attempted in the earlier section. Contingent upon such an interpretation of decentralisation, institutionalised form of participation in planning implies the activisation of the people's local bodies of the self-governing type such as the Panchayats and Municipalities. However, activisation alone may not be a pre-condition for effective participation. The separation of political and social domination at the local level has to be attempted.

To test the ground realities in rural areas of the state of West Bengal we collected some grassroot level data. Taking (1) the number of meetings held as a proxy of active panchayats, and (2) the social structures of the gram panchayats as revealing the separation of political and social domination at local level, we tried to examine the tenability of our arguments. We present below our findings :

Regarding (1), the West Bengal Panchayat Act 1973 and the amendments thereof have made it a part of the constitutional duties of the gram panchayat to hold at least 12 (ordinary, special budget and emergency) meetings per year. It further provides for two public meetings within the local limits of the gram (for each of its constituency)-gram sabhas, where people are informed about the development activities, the social asset generation and public investments that are undertaken by these bodies. It is from these meetings that information relating to subsequent action plan is generated. For the year 1987-88, from section data, we can examine to what extent these constitutional obligations were actually performed in all the gram panchayats belonging to two panchayat samities selected from two districts of West Bengal.

While on an average in both the Panchayat Samities under study, its grass root bodies were found to perform their constitutional obligations for the year 1987-88, Koch Bihar II block's performance seems to be better than that of Narayangarh (Table 1). Some time-series data as available for some panchayats under study may be used to get an idea about the trend of performance in this respect (Table 2). In 1989-90, all gram panchayats more than performed their constitutional obligations as may be seen from Table 2. Though for most of other years (except for Makrampur) their performance was fairly good. In the years around 87-88 and 88-89, most of the gram panchayats were seen to meet a maximum number of times. This was when decentralised planning through the panchayati raj bodies had gained some momentum after its introduction in 1985. This was when these bodies were also getting ready for the ensuring democratic elections. So grassroot democracy, activisation of panchayats and decentralised planning appear to be closely interlinked.

had gained some momentum after its introduction in 1985. This was when these bodies were also getting ready for the ensuring democratic elections. So grassroot democracy, activisation of panchayats and decentralised planning appear to be closely interlinked.

Regarding (2) (the representativeness of these bodies), the grassroot data regarding the social structure of the gram panchayats as revealed by the socio-economic attributes of its elected members present interesting information.

In terms of the following socio-economic attributes, namely (i) land holding size (ii) education (iii) occupation and (iv) caste affiliation, the nature of representativeness in these bodies may be examined. Tables 3, 4, 5, and 6 bring out the details in the different gram panchayats under the two Panchayat Samitis of the two districts.

It can be said from Table 3 that the landless, marginal and small farmers are in substantial control of these bodies-78.66% for Medinipur & more than 75% for Koch Bihar–compares well with the overall land ownership pattern of the districts and respective blocks.

Caste information as given by the Census of India 1981 figures regarding their general representation in the districts and blocks show that in case of Koch Bihar the SC/ST population is 50.41% for the district and 47.18% for Koch Bihar-II Panchayat Samity. For Medinipur the corresponding figures are 23.45% in the district and 35.11 in Narayangarh Panchayat Samity. As table 4 indicates the representation of SC/ST in these bodies is well above the corresponding district and block figures for both the districts. The table does not corroborate the general belief that the SC/ST population does not find proper representation in these bodies.

The occupation profile of the elected members as given in table 5 indicates that the farming community is in absolute as also relative majority. Among other services rural librarian, press workers, peons, bus conductors, home guards, van rickshow drivers, biri labourers have found a berth in these bodies.

Table 6 shows education-wise share of educated panchayat members. In none of the districts the percentage of members having read above school level exceeds more thatn 35%. It is the semi-literate primary level educated, middle level educated and matric level educated at the most who comprise between 65 and 74% of the elected members. In all these senses it may be meaningful to say that these bodies have been found to be representative.

Coming back to the fundamental question addressed in this paper, it has to be kept in mind that arguments for institutionalised participation or participatory planning is not essentially confined to local planning. It calls for the integration of local level planning into macro planning at the central level and necessitates a corresponding matching of decentralisation of fiscal power and devolution of funds from the upper to lower bodies.

DEFINITION OF PARTICIPATION

As the literature suggests, the imperative of defining the concept presents a difficult task. One may recall Uphoff and Cohen's four facets or types of participation corresponding

state and grass-root agency collaboration and provided an operational definition of community participation. To him participation is an active process to influence the direction and/or execution of development activity towards enhancing people's well-being in terms of income, personal growth, self-reliance or other values.

We in this paper find it important to focus on people's participation principally in terms of the local organisational structures of the panchayats. While the decentralisation-participation debate may imply a shift towards administrative decentralisation, debates relating to rural development planning bring out the relevance and appropriateness of the mix of decentralised line departments, people's self governing institutions along with the common people and their organisations. Our emphasis is thus on the decentralisation of decision making power to democratic local bodies. This would generate greater public involvement in governance and its co-ordinating instrument of planning. Such conceptualisation of participation where the Panchayati Raj institutions can become the sheet anchor of all development activities, be the meeting ground of state, market and civil society, may be relevant in re-orienting development debates more towards participatory economic expansion.

VOLUNTARY PEOPLE'S SECTOR

In recent decades economists have begun to re-examine the psychological as also organisational premises of their discipline. As the economics of organisational form is producing new models of institutional behaviour, interest in 'non-economic institutions' like churches, club, political parties and charities is growing. The literature on altruism, nonprofits or, in other words, the interface between nonprofits and profits sector has been reviewed by Rose-Ackerman (1996) among others.

Regarding generosity and volunteerism one finds considerable differences of opinion. While some consider generosity and civic commitment as being maintained structurally through political and economic institutions (viz. Wolpert 1990), others dismiss volunteerism as a symbolic personal act, in contrast to the impersonal structural decisions that affect substantive conditions. It is the least effective way to compensate for the devastating social consequences of the free market (viz. Petras, 1997).

To some, voluntreerism could be seen as an attempt to open alternative political space outside the usual arenas of party and government (Kothari 1984). To others, it is to be dismissed as strengthening the status quo, quite counter-revolutionary (viz. Karat. 1984). There appears a considerable ambivalance regarding the transformative potentialities of volunteerism.

At this present juncture, with the widespread renewal of interest in the dynamics of human interaction and evolutionary game theory (Samuelson, 1997) it might be interesting to examine whether as the planning mode may transform a 'statist' to a 'people-centric' one, volunteerism may be generated. In the context of the arguments put forward in this paper regarding decentralised participant planning, it may be relevant to examine whether

paper regarding decentralised participant planning, it may be relevant to examine whether the existence of the many levels of decision making is likely to create conditions for the growth of the local voluntary sector. It may be possible to overcome the reservations regarding the transformative potentialities of volunteerism.

In West Bengal, the history of the voluntary sector in the recent past may be traced to the extensive development works that had been executed by the migrants from erstwhile East Pakistan to the Calcutta subburbs and other areas in the late forties to early sixties. The migrants were seen to establish colonies and settlements in the face of state apathy and often antipathy of its organs. They could mobilise themselves to build roads, to set up schools, libraries and dispensaries, to rejuvenate water bodies and sink tubewells and execute such other works wholly with their own contributions over the years.

Unsettled, uprooted existence was seen to release the forces of people's power, quite independently of state effort or impulses.

Yet, one finds also in the relative stability of the post-independence decades, examples of primary, junior and high schools being established through local initiatives and voluntary public contributions motivated by public spirit. One may recall also the 'Shramdan' programmes associated with the community development projects of the fifties and sixties.

The point of departure of our conceptualisation of the people's sector, as compared to the earlier evolutionary patterns is that here volunteerism may be interpreted as a rational response to the changes in the institutional arrangements, particularly that of planning. The question addressed here is : whether the forces of peoples power could be released to sustain volunteerism when planning mode could be reformed from a status to a decentralised participatory one.

Bradford and Oates (1975), Bennet (1990) among others have argued that local government was not on its way out. In fact such arguments are corroborated by the experience of both previously centrally planned economies as also mixed economies. An effective public sector, it is felt, will be one, when service levels, responsibilities and fiscal instruments are assigned to the levels that can address and use them most advantageously.

While a lot of documentation exists regarding the democratic relationship between the state and people for better functioning of irrigation schemes in India, we explore the institutional environment that may best promote participation. Democratic accountability appears to be an important issue.

With the insights from theoretical public economics we have tried to approach West Bengal's planning experiment towards testing our hypothesis that collective organised participatory interaction may make people's involvement forthcoming. Such empirical data obtained from rural areas of the state were used to test the hypothesis. Information was collected mostly on those grass root level gram panchayat schemes relating to poverty alleviation, employment generation and rural works programmes that had been merged under the umbrella of the Jawahar Rozgar Yojona (JRY).

It is said that such integration has enabled the grassroot bodies to plan for a gradual transformation of village life as a whole through the betterment of communication, irrigation and educational facilities and other durable social assests creation. The efficiency and effectiveness of such schemes have been studied by many and considerable differences of opinion are seen to exist.

It was our objective to examine on the other hand to what extent the involving of the poeple in the planning of such schemes via their self–governing institutions could be related to the absence or presence of the local voluntary sector.

All gram panchayats (i. e., lowest grass root local institution) in two panchayat samities (i.e., below the district level institution of local governance) selected from two zilla parishads (i.e., below the state level institution) in West Bengal formed the data set. Information was collected from these grassroot bodies. The elected members of these bodies were asked to identify only four outstanding examples of such schemes which in their opinion were able to generate voluntary co-operation (in terms of contributions) and participation and whose planning, selection and execution were the sole responsibility of this lowest tier of self-governance. The time period related to 1985-86 to 1992-93. It was found that in these grassroot bodies commitment appeared to be a common phenomenon, irrespective of whether such schemes may confer benefits of immediate value or benefits that might accrue at some future time.

Before presenting our findings, some points regarding the methodology employed require to be discussed. Over-estimation on the part of ruling party members was cross-checked with underestimation that might have been made by elected members from the opposition. In those mixed gram panchayats, the viewpoints could be corroborated by the members of both groups in a common meeting. In this sense we have tried to overcome 'bias' from both over-and under-estimation.

As to the different components of voluntary contribution such as labour material or cash the members helped the calculation of their value in monetary terms in terms of the local ruling wage rates and prices. It was also probed, in the presence of all-party members, whether such contributions may embody an element of coercion. The unanimous viewpoint that emerged from such meetings was that volunteerism was not forced but was a natural outcome of activities that might have helped or had an expected pay off ingrained in them.

It may follow from the above that in those group acivities or development schemes that might be individual beneficiary-oriented as also collective public good-type, where the principle of excludability may not apply, voluntary contribution may be forthcoming from agents of different socio-economic status. Such contribution was seen to account for at least a third of their total develoopment expenditure (table 7).

We have discussed elsewhere the restricted domain of local finance and its implication on local development from below (Mitra 1996). In this context the people's sector, if it can augment the local resource base in terms of such voluntary contribution, may definitely extend the frontier of local finance. A third of development expenditure being borne locally by the people themselves is not a mean achievement. It definitely augers well for local efficiency.

Apart from its efficiency consideration, where the concept of exchange may be widened to include a vector of attributes, under a negotiated and contractual environment, our concept of the people sector may present an informal yet cheaper method of internalising externalities. Experience has proved it to be so and this may not be captured fully under the contractual framwork.

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TABLE-1 MEETINGS HELD IN THE GRAM PANCHAYATS OF WEST BENGAL, 1987-88

	Gram Panchayats Under Narayangarh Panchayat Samiti In Medinipur District.			Gram Panchayats Under Koch Bihar II Panchayat Samiti In Koch Bihar District	
No.	**Name of Gram Panchayat**	**Total No. Of Meetings Held**		**Name of Gram Panchayat**	**Total No Of Meetings Held**
1	Belda II	14	1	Pundibari	12
2	Kushbasan	12	2	Dhangdhinguri	14
3	Hemchandra	12	3	Ambari	15
4	Ranisaral	14	4	Madhupur	21
5	Kunarpur	17	5	Gopalpur	13
6	Belda I	15	6	Takagach-Rajarhat	7
7	Narma	10	7	Khapaldanga	NA
8	Mukrampur	8	8	Patiakhawa	16
9	Bakrabad	14	9	Baneswar	18
10	Kashipur	14	10	Marichbari Khotta	15
11	Narayangarh	15	11	Bararangrash	15
12	Turtanga	12	12	Chakchaka	11
13	Gramraj	12	13	Khagrabari	13
14	Manna	2			
15	Khursal	15			
	TOTAL	186		TOTAL	170

Meetings : Ordinary, Spl. Budget and Emergency
Source : Auditted Accounts.

TABLE 2 TRENDS OF MEETINGS HELD IN SOME GRAM PANCHAYATS, 1985–86 To 1989–90

Gram Panchayat	Meetings Held in The Year				
	1985–86	1986–87	1987–88	1988–89	1889–90
Medinipur District Narayangarh Panchyat Samiti					
1. Belda II	14	NA.	14	N.A.	13
2. Makrampur	8	8	8	9	14
Koch Bihar District Koch Bihar II Panchayat Samiti					
1. Pundibari	14	11	12	18	14
2. Takagach Rajarhat	10	12	7	14	13
3. Marichbari Kholta	13	13	15	13	13

TABLE 3 VOLUNTARY CONTRIBUTION TO GRAM PANCHAYAT SCHEMES

Contribution To Gram Panchayat Schemes	Gram Panchayat Under Narayangarh Panchayat Samiti	Gram Panchayat Under Koch Bihar II Panchayat Samiti
Cash Value Of Voluntary Contribution (Mandays + Materials + Cash)	Rs. 8,76,432	Rs. 3,25,975
Total Actual Dev. Expenditure Which Generated Such Contribution.	26,44,108	8,05,327
% Of Volumntary Contribution To Total Actual Dev. Expenditure.	33.15%	40.48%

TABLE 4 LAND OWNERSHIP AMONG ELECTED GRAM PANCHAYAT MEMBERS

Type Of Land Marginal	Percentage Of Elected Gram Panchayat Members	
	Under Narayangarh Panchayat Samiti	Under Koch Bihar II Panchayat Samiti
Landless & Marginal (0-1 Hectares)	50.01	53.72
Small Farms (1-2 Hectares)	28.61	22.34
Medium Farms (2-4 Hectares)	8.51	7.98
Large Farms (4 Hectares & above)	2.49	1.60
No Information Available	10.38	14.36

TABLE 5 CASTE COMPOSITION OF ELECTED GRAM PANCHAYAT MEMBERS

CASTE	Percentage Of Elected Gram Panchayat Members	
	Under Narayangarh Panchayat Samiti	Under Koch BiharII Panchayat Samiti
General Caste	58.90	39.89
SC/ST	39.05	54.79
Minorities	2.05	5.32

TABLE 5 OCCUPATION OF ELECTED GRAM PANCHAYAT MEMBERS

Occupation Category	Percentage Of Elected Gram Panchayat Members	
	Under Narayangarh Panchayat Samiti	Under Koch Bihar II Panchayat Samiti
Teaching Service	18.60	12.44
Other Service	2.33	14.51
Business	2.33	11.40
Farming	52.91	54.12
Other Workers	20.93	4.66
Unemployed	2.33	2.07

TABLE 6 EDUCATION LEVEL OF ELECTED GRAM PANCHAYAT MEMBERS

Educational Level	Percentage Of Elected Gram Panchayat Members	
	Under Narayangarh Panchayat Samiti	Under Koch Bihar II Panchayat Samiti
I.		
(A) Literate	4.17	.53
(B) Primary Level	10.12	7.37
(C) Middle Level	33.93	41.58
(D) Matric/Madhyamik	16.67	24.21
TOTAL I (A + B + C + D)	64.89	73.69
II.		
(E) H.S./P.U.	18.45	11.58
(F) Graduate & above	16.67	14.74
TOTAL II (E + F)	35.12	26.32

RURAL POVERTY IN THE DRUGHT PRONE REGION

A STUDY OF THREE DISTRICTS IN WEST BENGAL

SACHINANDAN SAU *

Rural Poverty is more pervasive than urban, and is more intense and pervasive in the ecologically disadvantaged areas like dought prone areas (DPAs). The World Development Report 1990 observes that the poor are often concentrated in rural areas, resource poor areas and in areas of acute environmental degradation[1]. It also observes, the incidence of poverty is often high among ethnic groups such as scheduled castes in India. In India we observe that the poverty ratio among the scheduled castes and tribes is high and these ethnic groups are concentrated in the drought prone region of India.

Drought is a meteorological phenomenon indicative of prolonged dry weather. Drought occurs due to absence of rainfall which destabilises productivity of land, livestock and water resources. A drought prone area is identified by low extent of irrigated areas and erratic distribution of rainfall. Poverty among the masses in this area is the inevitable outcome.

Poverty generally means a person's lack of adequate command over goods and services to satisfy his basic needs relating to food, shelter, clothing, health and education etc. Relative poverty reflects the degree of inequality in the distribution of income[2].

The World Development Report 1990 addressed the most pressing issue facing the development communtity : how to reduce poverty. Earlier in 1776 Adam Smith, the founder of classical political economy, emphasised this for the building up of a flourishing and happy society. He remarked, "no society can surely be flourishing and happy, of which by far the greater part of the numbers are poor and miserable". In the 1950s and 1960s also amelioration of poverty among the masses was emphasised while many saw growth as the primary means of reducing poverty and improving the quality of life. For example, the Indian Planning Commission viewed rapid growth as the main (although not the only) instrument for achieving this objective. In the 1970s attention shifted to the direct attact on poverty, though during the first three decades of India's planning India made enormous economic progress.

In fact, planned intervention in the overall rural poverty situation started in the early fifties and the major thrust of the policy was to intervene indirectly hoping that poverty will practically diminish through the expected 'trickle down' effect of the growth strategies[3]. Several general rural development measures like Community Development Programme, National Extension Service etc. were introduced in the first decade of India's Independence. But the experience shows that these measures had not been effective either in increasing productivity substantially or in removing rural poverty, unemployment or in reducing socio-economic inequalities[4]. To remedy the problems of chronic food deficits and large food imports, the green revolution technologhy was adopted in the 1960s . While it caused a high rate of growth of agricultural production through increase in yield rate, that was limited to

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rice and wheat, and occurred at the cost of stability. The much applauded new agricultural strategy has also resulted in tremendous pressure being put to the ecology, which reflects itself on the growing regional as well as ecological imbalances and crisis[5].

In the year 1970-71 Rural Works Programme was started in areas chronically affected by drought with the principal objective of organising permanent works to alleviate scarcity and to generate adequate employment through labour-intensive schemes such as major, medium and minor irrigation works, soil conservation, afforestation and village and district roads necessary to open up the area for agricultural production. In the Fourth Plan, after the Mid-Term Appraisal, the programme was redesignated as Drought Prone Area Programme (DPAP) and reoriented as an integrated area development programme with the objective of developing land, water, livestock and human resouces in these areas.

Of the various rural development programmes sponsored by the Government of India during the Fifth Five Year Plan the DPAP was not only massive in terms of coverage and financial allotments but also unique due to its innovative approach with reference to the programme component as well as the organisational structure for its implementaion[6]. The main thrust of the DPAP was in the direction of restoration of ecological balance by adopting watershed approach for the optimum utilisation of land, water and livestock resources. This programme which was essentially treated as an integrated area development programme aimed at integrating efforts in agriculture and allied sectors for mitigating an adverse effect of drought and for stabilising the economy of these areas and stabilising the income of the people, particularly of the weaker sections of the society. As against the green relvolution strategy which focused exclusively on crop lands and ignored environmental costs, the watershed development programmes as are being recently implemented in the dry belt of India are holistic in nature covering both arable and non-arable land development[7]. These programmes seek to promote soil and moisture conservation as well as enhance the productive capacity of dry lands.

SCOPE OF THE PRESENT STUDY :

Despite these institutional measures rural poverty in the drought prone areas remains high. The present study makes an attempt to examine rural poverty in th DPA and to analyse the factors that account for relative economic backwardness of these areas, the three drought prone districts of West Bengal, namely Bankura, Midnapore and Purulia being the case studies.

REVIEW OF THE EXISTING LITERATURE :

It may be noted that studies on rural poverty in relation to DPAP are rare and they represent a relatively neglected branch of Indian economic literature. Mukhopadhyay (1984) dealt with problems of small and marginal farmers in DPAs in India. Thaha (1975), Dass (1980) and Jaiswal and Kolte (1984) evaluated the achievements and drawbacks of DPAP in India. Jaiswal (1978), Kumar (1979), Das (1982), Chaudhury and Sevak (1974), Dubey (1981), Nanda Kumar and Knight (1982) studied the DPAP in individual states and districts. Jadavpur

University on belalf of the West Bengal Government evaluated the programme in West Bengal. Very recently Singh and Hazell (1993) discussed improtant characteristics of the poor in the semi-arid tropics and analysed the determinants of per capita incomes of sample households in the semi-Arid Tropics.

The brief survey of existing literature of the DPAs thus reveals that there is no in-depth study of DPAs relating the DPAP to rural poverty. The present study seeks to remedy this gap in the existing literatrure.

OBJECTIVES OF THE STUDY :

The study sets the following objectives for itself :

(i) to discuss the geo-physical, demographic and economic conditions of the drought prone region,

(ii) to examine the adequacy of the DPAP,

(iii) to compare the poverty ratio in the DPAs with and without DPAP,

(iv) to analyse the factors that explain the variation in income across the households.

HYPOTHESES :

The following are the hypotheses that will be tested in the study.

1. The drought prone areas are predominantly inhabited by the scheduled castes and scheduled tribes among whom the poverty ratio is higher than other groups of people :
2. The drought prone districts are economically and infrastructurally backward relative to other districts of West Bengal ;
3. The DPAP is inadequate to tackle the problems of backwardness of the drought prone region ;
4. The poverty ratio among the households benefited by DPAP projects is lower than that among those without those projects benefits.
5. The variation in per capita income across the households is explained by factors that are related to DPAP projects.

II

DATA BASE AND METHODOLOGY

Secondary data used in our study have been collected from plan documents of Govt. of West Bengal, and district plan documents of District Rural Development Agencies. Census data and data from Statistical Abstract of the Govt. of West Bengal have also been used to test some of the hypotheses.

For the sake of an indepth and detailed study on rural poverty we have collected and used primay data. The sampling design for the purpose of collection of the data consists of a stratified two stage random sampling with villages of districts under DPAP forming the first stage unit, while individual households constitute the second stage ultimate unit of sampling. The strata include villages with and without DPAP benefits from projects like Irrigation, Sericulture and other such projects. The villages selected having the DPAP projects are

Sonakonia of Midnapore district, Jhilimili of Bankura district and Chelani of Purulia District, and the villages without having these projects are Bansberia of Midnapore district, Bansdiha of Bankura district & Tasgan of Puralia district. These villages respectively belong to Jhargram Block of Midnapore district, Ranibandh Block of Bankura district and Bandwan Block of Purulia district. 15 house-holds of each village have been selected to be interviewed through canvasing a structured questionaire. 1997 constitutes the year for which necessary data have been collected from the sample households. Simple statistical tools like average, standard deviation, coefficient of variation have been used to analyse the data. To estimate the poverty ratio among the sample households we have used two indices :

(i) *Per capita Income* & (ii) *Per capita per day calorie consumption.*

The Planning Commission of India developed the poverty line approach on the basis of 2400 calorie intake per person per day in rural areas. To calculate the head count of poor individuals below the specified cut-off point (i. e. income or calories), Rs 3, 370/-has been estimated to constitute the poverty line based on the estimates of the Seventh Five Year Plan in respect of poverty line in rural areas as income worth Rs 107/-per capita per month in 1984-85 prices and by adjusting the same by consumer price index.

We have used the tow test to examine whether (i) the proportion of sample households in the DPAP-endowed villages is significantly greater than zero and is significantly not less than 1/2, and (ii) the said proportion for DPAP–endowed villages is significantly lower than that in the villages with DPAP.

III

DROUGHT PRONE REGION AND RURAL POVERTY IN INDIA

The drought prone areas as identified by the Govt. of india lie in the arid, semi-arid and sub-humid areas of the country and are spread over a large area from Haryana to Tamil Nadu, and from West Bengal through Rajasthan to Gujarat. SC and ST people are mostly inhabited in the DPA. Adhikari (1998) has shown that percentage of SC/ST population in the DPAP districts of the states like Karnataka, Madhya Pradesh and West Bengal have been higher than that in the individual states. In West Bengal we observe that 29.21% of total population of the state are SCs & STs, while in Purulia district, the only cent percent drought prone district of the state, 38.58% of the total pupulation are SCs & STs. in 1991. The respective percentages for 1981 had been 27.61 and 40.48. Sen (1996), while discussing profile of poverty in India has shown that among the SCs 56.1% and among STs 62.7% are poor in the rural areas while the overall poverty ratio was 44.9% in rural India in 1987-88. Of the total poor households, SC/ST constituted 37.6%, while these population groups constituted hardly 20% of the total population in India. Thus, our first hypothesis that the drought prone areas are predominantly inhabited by the SC & ST among whom the poverty ratio is higher than other groups of people is accepted.

TABLE 1 PROFILE OF RURAL POVERTY IN INDIA, 1987-88

Groups	Population Share	Percent Poor	Percent of Total Poor
Scheduled Castes	18.4	56.1	22.9
Scheduled Tribes	10.5	62.7	14.7
Female Headed		47.0	
All Households	100.0	44.9	100.0

Source : Sen, 1996 : 2461

IV

BACKWARDNESS OF THE DROUGHT PRONE AREA IN WEST BENGAL

The drought prone areas of the three districts under study contain three types of soil-red, laterite and alluvial, its colour in major parts varying from brown to red. The climatic features of the DPAs in these districts are oppressive heat in summer and high humidity nearly all the year round. Rainfall is inadequate and erratic. The standard deviation and coefficient of variation in rainfall are quite high.

The variation of rainfall from year to year is not significant. The drought situation brings on disaster to the agrarian economy with predominance of small and marginal farmers and agricultural labourers. Most of the rural people live below the poverty line on account of adverse geo-climatic conditions of the area, lack of irrigation facilities, low productivity of land and the poor industrial base of the economy.

These DPAs of the districts suffer from economic, infrastructural and other types of backwardness, as revealed from the data presented in Table 2.

TABLE 2 SOME INDICES OF BACKWARDNESS OF PURULIA, BANKURA & MIDNAPORE DISTRICTS

Indices	Purulia	Bankura	Midnapore	West Bengal
Per Capita Income (Rs) 1988-89	1630	1677	1450	1930
Foodgrains Productivity (Kg./Hectare) 1995-96	1515	2393	1918	1960
Registered Factory (per lakh population)	3.32	4.35	2.34	15.72
Percentage of Villages electrified, 1997	62.85	67.32	51.76	76.98
Percentage of Cultivators & Agricultural Labourers	61.40	68.13	58.39	49.74
Per Capita Bank Deposits (Rs) 1997	1523	1529	1584	5096
Per Capita Bank Advances (Rs) 1997	397	404	468	2300
Literacy Rate, 1991 (%)				
Person	43.29	52.04	69.32	57.70
Male	62.17	66.75	81.7	67.81
Female	23.24	36.55	56.63	46.56
Road Length (Km.) Per 100 Square Km., 1997	16	16	14	21
Percentage of Urban Population, 1991	9.44	8.29	9.85	27.48

***Source** : Govt. of West Bengal*

Purulia is the most backward of the sample districts.

Thus, we accept the second hypothesis that the drought prone districts are economically and infrastructurally backward relative to other districts of West Bengal.

V

DRODUGHT PRONE AREA PROGRAMME AND ITS ADEQUACY

In West Bengal the DPAP came into operation from 1976-77 and is now in operation in 20 blocks of Purulia district, selected blocks of Bankura district and seven selected blocks of Jhargram sub-division of Midnapore district. In Purulia district the highest priority in the DPAP was accorded to minor irrigation (above 39% of total funds), closely followed by afforestation. In Bankura district afforestation constituted the largest project under DPAP followed by minor irrigation with a view to retrieving the lost balance of ecology and in view of the ever increasing demand for the forest produce. Pasture and forestry as well as minor irrigation constituted the major project under DPAP.

To examine whether the DPAP is adequate we formed two indices-(i) financial expenditure per unit area, (ii) financial expenditure or investment and mandays of employment per prospective beneficiary of small and marginal farmers and agricultural labourers. It is observed that in Purulia district 20% of the total agricultural area has so far been covered under the DPAP. Besides, Rs 299.66 have so far been spent per hectare of the agricultural area. Thus, investment in this area development programme turned out to be too meagre to make any perceptible impact on the geo-socio-economic conditions of the DPA districts. In Bankura district, it is observed that financial investment per hectare of area under the DPAP blocks during 1976-77 to 1990-91 worked out to be only Rs 657.53 and mandays of employment per marginal farmer and agricultural labourer were only 16 during the 16 year period. All the data point to meagre investment and meagre amount of mandays creation in the projects of DPAP.

In Midnapore district we observe that total area covered under soil conservation consituted not more that 2% of the total cultivable area of the drought prone region and mandays of employment generated directly in the projects per year do not exceed 12.

Thus, we accept the third hypothesis that the DPAP is inadequate to tackle the problems of backwardness of the drought prone region.

VI

IMPACT OF DPAP ON RURAL POVERTY : A MICRO LEVEL STUDY

Though the DPAP is not adequate it has substantial impact on yield rate, cropping intensity, cropping pattern and small industrial activities like sericulture, babui and lac development of the region. Through these procesess the DPAP produces quite significant impact on rural poverty. In our micro level study we mainly concentrated on estimation of family income, expenditure on food items, calorie intake per capita per day and poverty ratio for the sample households.

FAMILY INCOME

In family income we include the income of all working members of a family, i. e. adult male, adult female and also children. The distribution of households by per capita family income shows that most of the sample households in the villages having no DPAP projects have family income per capita ranging between below Rs 2,000/-and Rs 3,370 (**Table 3**).

TABLE 3. DISTRIBUTION OF HOUSEHOLDS BY PER CAPITA INCOME

Per capita income (Rs)	Number of Households					
	DPAP Project villages			Villages having no DPAP Projects		
	Sonakonia	Jhilimili	Chelani	Bansberia	Bansdiha	Tasgan
Below 2000	1(7)	1(7)	2(13.3)	1(7)	2(13.5)	4
2000-2999	2(3)	4(26)	2(13.3)	7(46.5)	2(13.5)	4
3000-3370	2(13)	1(7)	2(13.3)	0	5(33)	3(20)
3370 & above	10(67)	9(60)	9(60)	7(46.5)	6(40)	4
Total	15(100)	15(100)	15(100)	15(100)	15(100)	15(100)

Source : *Field Survey*

It is observed that in the villages endowed with DPAP schemes less than 40 percent of the households live below poverty line. The estimated tow value indicates that the proportion of poor households is significantly greater than zero but significantly not less than $\frac{1}{2}$, the former value being significant at one percent level and the latter value at five percent level.

While comparing the proportion of poor households in the villages endowed with DPAP projects with that in the villages having no DPAP project we observe that at one percent level of significance the calculated value of tow is greater than the table value, the calculated tow value being 3·51 and the table value being- -2·33. This indicates that the proportion of poor households in the DPAP-endowed villages is significantly lower than that in the villages without DPAP projects.

CALORIE INTAKE

The calorie requirement norm provides the better index for poverty. Table 4 shows the distribution of households by calorie intake per capita per day (PCPD).

TABLE 4 DISTRIBUTION OF HOUSEHOLDS BY PER CAPITA CALORIE INTAKE

Calorie intake PCPD	Number of Households					
	DPAP Project-endowed villages			Villages having no DPAP Projects		
	Sonakonia	Jhilimili	Chelani	Bansberia	Bansdiha	Tasgan
Below 2000	1(7)	1(13)	2(13)	1(7)	4(27)	2(13)
2000-2400	3(20)	4(26)	4(26)	6(40)	6(40)	9(60)
2400-3000	6(40)	6(40)	6(40)	4(27)	5(33)	4(27)
3000 & above	5(33)	3(21)	3(21)	4(21)	0(0)	0(0)
Total	15(100)	15(100)	15(100)	15(100)	15(100)	15(100)

Source : *Field Survey*

As per calorie PCPD less than 39% of the sample households in the villages endowed with DPAP projects live below poverty line while for the other villages with no such projects the said figure is more than 47 per cent.

Table 3 and Table 4 together reveal that there is substantial impact of DPAP projects on rural poverty in the form of reduced poverty intensity among the sample households in the DPAP project villages.

Thus, we accept the fourth hypothesis that the poverty ratio among the households benefited by DPAP projects is lower than that among those without those projects benefits.

VII

DETERMINANTS OF PER CAPITA INCOME

We made an attempt to examine the factors that significantly explain the variations in per capita income across the sample households. The regression results in such exercises are shown in **Table 5.**

TABLE 5 REGRESSION EQUATIONS CONCERNING PER CAPITA INCOME

Sample Village	Dependent Variable	Regression Equations	R^2	F
Sonakonia	PC_y	1241.77+171.23veg%+10.78*L (1.61) (3.97)	0.6069	9.26*
	PC_y	2531+68.69 Irrigation/H (5.16)	0.67	26.63*
	PC_y	369.06+334.79*veg/H (4.39)	0.597	19.27*
	PC_y	4083+10.97***GCA/H (1.99)	0.2334	3.95
	PC_y	2512.18+64.59 Irrigation/H+2.21 GCA/H (4.33) (0.54)	0.70	13.94*
Jhilimili	PC_y	3134.54+2.8397**DPAP Income (2.58)	0.357	6/67*
Tasgan	PC_y	1602.77+1.91***DAPA Income (1.80)	0.213	3.25

Notes : PV_y=Per Capita Income, veg% = Percentage of area under vegetables (Dry land farming),

L=Gross Cropped area, veg/H=Vegetable area per family member, GCA/H=Gross Cropped Area per family member, DPAP Income=Income derived from DPAP project.

*, **, *** ***Significant at 1, 5 and 10 per cent level respectively.***

It is observed from this Table that Gross Cropped Area, Dry land farming (namely vegetable cultivation) and DPAP income significantly explain variation in per capita income across the sample households in the sample villages. Thus, we accept the fifth hypothesis that the variation in per capita income across the households is explained by factors that are related to DPAP projects.

It may be mentioned in this connection that Adhikari (1998) also observed that water resource development scheme (River lift irrigation) significantly explains variation in gross agricultural income across the sample households of Jambani and Jhargram block under DPAP of Midnapore district.

FACTORS AFFECTING CALORIE INTAKE

Similar exercises have been made to examine the variables that influence calorie intake across the households. The results obtained are shown in **Table 6.**

TABLE 6 REGRESSION EQUATIONS CONCERNING CALORIE INTAKE PER CAPITA PER DAY

Sample Village	Dependent Variable	Regression Equation	R^2	F
Sonakonia	PCPD	1956.7+0.15*PC_y	0.44	10.29*
		(3.21)		
	PCPD	2146.89+1.73***veg/l	0.22	3.68
		(1.92)		
	PCPD	1997+20.47**Irigation/H	0.56	7.64*
		(2.67)		
	PCPD	246+85.28**veg/H	0.30	5.53*
		(2.35)		
	PCPD	1639+0.22**PC_y+0.90 GCA/H	0.40	4.65*
		(2.43)		
Jhilimili	PCPD	1566+0.19**PC_y	0.38	7.53*
		(2.74)		
	PCPD	2095+0.73**DPAP Income	0.26	4.12
		(2.03)		
	PCPD	1624+0.15***PC_y+0.30 DPAP Income	0.41	3.88
		(1.72) (0.73)		
Chelani	PCPD	1884+0.14***PC_y	0.24	3.88
		(1.97)		
	PCPD	1840+0.78**DPAP Income	0.45	9.95*
		(3.15)		
	PCPD	1735+0.07 PC_y+0.66**DPAP Income	0.50	5.42*
		(0.97)	(2.34)	

Notes : *Same as in Table 5*
Veg/1=*vegetable area per unit of land.*

From this table we observe that PC_y, DPAP income, Irrigated area per head and vegetable area per head individually explain the variation in calorie intake per capita per day among the sample households and these factors may be considered significant to influence calorie intake of the sample households. It may be noted that these variables have much to do with DPAP projects. Hence, we conclude that DPAP, particularly projects like water resource development and dry land farming, has much to do with poverty alleviation.

VII

SUMMARY AND CONCLUSION

Rural Poverty in the ecologically disadvantaged areas like drought prone areas is pervasive and intense. The Drought Prone Area Programme (DPAP) is inadequate to restore ecological balance and to tackle the problems of these areas which are mostly inhabited by SCs and STs among whom poverty ratio is very high. However, our micro level study of three DPAP projects–endowed villages and three non-DPAP villages shows that in the former set of villages less than 40% of the households live below the poverty line of Rs. 3,370/- while in the latter set of villages more than 53% of the households live below the poverty line.

The distribution of households as per calorie intake per capita per day shows that in the DPAP villages less than 40% of the households has calorie intake of 2400 per capita per day which is poverty line as per calorie intake norm. On the other hand, not less than 47% of the households in the non-DPAP villages has calorie intake of 2400 per capita per day and they live below poverty line.

While examining the factors that explain the variation in per capita income across the sample households we observe that gross cropped area, vegetable cultivation and DPAP income are significant independent variables. The variation in calorie intake per capita per day among the sample households is explained by per capita income, DPAP income, irrigated area per head and vegetable area per head on an individual basis.

NOTES

1. *World Development Report*, 1990, p2
2. Chaudhury, 1989, p47
3. Dolly, 1995
4. Bhattacharya and Dutta, 1993
5. Hussain, 1991
6. Jaiswal and Kolte, 1980, p3
7. Ninan and Chandrasekhar, 1993, p A-2

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NORMAL FORM VERSUS EXTENSIVE FORM : A STUDY OF NONCOOPERATIVE GAME THEORY

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INTRODUCTION

Game theory analyses situations of multi-agent conflict in which the payoffs of any agent is dependent not only on his own actions but on those of others also. The main purpose of game theory is to derive solutions for these games. The combination(s) of actions prescribed as the solution must be consistent with the rules of the game. In cooperative games there exists an institution which makes any agreement among the players binding. In noncooperative games there is no such institution. A noncooperative game does not allow any communication, correlation or commitment unless they are stated in the rules of the game and/or unless they are self-enforcing. Games in this branch are presented in two forms, viz. the extensive form and the normal or strategic form and they are treated as two alternatives.

Here are some excerpts from the standard literature. Friedman says, "Noncooperative games are often expressed in a fashion that exposes each individual move a player can make(this is called the extensive form. Or they are expressed in a way that supresses individual moves but highlights the overall plans of strategies, which are available to players. This form ... ... has been called the normal form."[1] Van Damme observes, "There are several ways in which a game can be presented."[2] Kreps notes, "Two sorts or forms of models are used, the so called extensive form game and the normal or strategic form game."[3] He further observes, "some game situations can be represented by a number of different extensive forms. Since all these extensive forms represent the same game, we might suspect there is another way to represent the game that is a bit clearer about the essence of the situation."[4] He defines this 'another way' as the normal form game. Fudenberg and Tirole write, "There are two (almost) equivalent ways of formulating a game."[5]

The basic reasons why they treat them equivalent may be stated as follows. **First**, in one shot or single period games the temporal structure or the extensive form is considered uninteresting. **Secondly**, simultaneous moves, which is the basic characteristic of normal form games, are modelled in extensive forms using information sets. Such games are called games of imperfect information. **Thirdly**, an extensive form game of perfect information is expressed in normal form by extending the moves of the later player to accommodate all conditional moves subject to the moves of the former.

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Therefore, in solving a game in extensive form one is instructed to consider its normal form and it is said that a strategically stable solution should possess the property of invariance which, in turn, tells that a solution of a game is also a solution of any equivalent game (having the same reduced normal form).[6]

The above lines of reasoning, however, lead to some awkward situations. This paper tries to illustrate some of these situations and to infer that normal form games and extensive form games are not two alternatives; they are actually two branches of noncooperative games. For illustrations examples are drawn only from two person games. Nature is also incorporated in some examples. It is assumed that the probability distribution over different moves of nature is known to the players.

TRANSFORMATION OF EXTENSIVE GAMES TO NORMAL GAMES

In an extensive form game the moves of different players are sequential in nature, whereas in a normal form game moves are simultaneous. To distinguish games in these two forms it is assumed that in a game of the first type all the players are well aware of the sequence and make use of this awareness in selecting their individual moves. Information in such a game at different decision points, however, may be perfect or imperfect ; but for a normal form game there is no question of any information about the sequence of moves. It is assumed in this analysis that all the players have complete information regarding all the strategies and all the payoffs of all the players. Incomplete information regarding strategies and payoffs creates problems of separate dimensions which have nothing to do with the distinction between extensive form and normal form games.

Extensive form games can not be completely transformed to normal form games because the information, perfect or imperfect, contained in the games of the first type can not be completely modelled in the games of the second type. For illustration, consider the simple examples of game-1 to game-4 described at the end of this paper. Game-1 is an extensive form game of perfect information. Game-2 and game-3 are extensive games of imperfect information. Game-4 is a normal form game or a game of simultaneous moves. All these four games, however, contain same set of strategies and same payoffs. In the standard literature, though game-1 is distinguished from game-2, game-3 and game-4, these later three games are considered alternative representations of the same game. To quote Kreps, game-2 and game-3 are 'two extensive form representation of a simultaneous move game',[7] viz, game-4. In games of perfect information, like that of game-1, players use this information through the principle of dynamic programming or backwards induction to reach the solution. The solution of game-1 obtained in this way is (S_2, T_2). This principle of dynamic programming is well accepted for extensive games of perfect information in the existing literature, but for extensive games of imperfect information dynamic programming is not used in that way because such games are treated equivalent to normal form games. But actually the principle of imperfect dynamic programming can be used in such games as the players have an imperfect information regarding the ways the games are played. In game-4, which is a game of no information[8] regarding the sequence of moves, there are

three solutions,[9] viz, (S_1, T_1), (S_2, T_2) and $(\frac{1}{5} S_1 + \frac{4}{5} S_2, \frac{4}{7} T_1 + \frac{3}{7} T_2)$ with payoffs (5, 6), (8, 4) and $(\frac{32}{7}, \frac{18}{5})$ respectively. Of these three solutions the last one (i.e., the solution in mixed strategies) is unstable and dominated by other two solutions and so this can be treated as unreasonable, but the two solutions in pure strategies are equally reasonable.[10] In game-2 also, the solution will be one or more of the above three combination as because for other combinations any or both the players will have incentive to deviate. But as player-1 moves first in this game, he will choose the combination (S_2, T_2) as the solution of the game and player-2 being the follower will not try to deviate. Thus (S_2, T_2) is the only reasonable solution of game-2. Similarly for game-3 (S_1, T_1) is the only reasonable solution.

Though both game-1 and game-2 give birth to same solution here, this is not true for all games of these sorts. To observe this, just change the payoffs of player-2 for his second strategy. Replace 2 by 7 in (S_1, T_2) and 4 by 2 in (S_2, T_2). Now the solution for game-1 is (S_1, S_2) and the only solution for game-4 is $(\frac{1}{2} S_1 + \frac{1}{2} S_2, \frac{4}{7} T_1 + \frac{3}{7} T_2)$. For both game-2 and game-3 the solution will coincide with that of game-4. Thus, the solution of game-1 is not same as the solution of game-2. It is further interesting to observe that it is not even a Nash solution for game-4. To show that the solution of game-1 is also a Nash solution for some game, a different normal form game is constructed from game-1. This is given in game-5. Here player-2 has four moves : T_1'—the move to choose T_1 whatever move the player-1 chooses ; T_2' —the move of choosing T_2 whether player-1 moves S_1 or S_2 ; T_3' — the move to choose T_1 if he observes player-1 to move S_1 and to move T_2 if he observes S_2; T_4' — the move to choose T_1 if he observes player-1 to move S_2 and to move T_2 if S_1 is moved by player-1. Game-5 captures a lot of characteristics of game-1, but not all. Game-5 has only one Nash solution in pure strategy, viz, $(S_1 T_4)$ which indirectly means the play of (S_1, T_2). In this sense, (S_1, T_2) of game-1 is also a Nash solution. But with original payoffs of game-1, game-5 looks quite different with three Nash solutions in pure strategies. They are (S_1, T_1'), (S_2, T_2') and (S_2, T_3') which, in turn, imply (S_1, T_1) and (S_2, T_2). In this normal form game if T_1', T_2', T_3' and T_4' are considered as four pure strategies and information that player-1 is playing first is withdrawn, then both these solutions are equally reasonable. Thus, this normal form game is not a pure transformation of game-1. Rather this game of perfect information can be completely transformed to a game of imperfect information. Such transformation of game-1 with original payoffs is shown in game-6. In game-6 if the principle of imperfect dynamic programming is applied the reasonable solution will be either (S_2, T_2') or (S_2, T_3') and both, in turn, imply (S_2, T_2). All these illustrations show that extensive form games can not be completely transformed to normal form games. Game-4 can be called a normal form reduction of game-2 or game-3 ; similarly game-5 is also a normal form reduction of game-1 with revised payoffs, but none of them are proper transformations.

TRANSFORMATION OF NORMAL GAMES TO EXTENSIVE GAMES

It has already been mentioned in section-2 that neither game-2 nor game-3 is a proper transformation of game-4. A game is presented in the normal form if the players move

simultaneously or if their extensive nature of moves is completely uncertain to them. Keeping this second alternative in mind the extensive form counterpart of game-4 can be presented by game-7. Here either player-1 or player-2 starts the game with probability equal to-1 2each. If player-1 moves first, then player-2 moves second and vice versa and both the moves of any player is in the same information set. This means that any of the players while moving does not know whether he is moving first or moving after the opponent's move. In this game if the probability distribution of nature's move is changed the game will no longer be equivalent to game-4. It will be an extensive form game of its own. In this extensive form game the information to the players are so imperfect and uncertain that it is equivalent to no information and thus this sort of transformation of normal form game to extensive form is a trivial one. This extensive form transformation, however, helps explaining why players may not rely on a single solution in normal form games.

SOME CONCLUDING REMARKS ON THE SOLUTIONS FOR GAMES IN THE TWO FORMS

An extensive form game contains more information than a normal form game. This extra information regarding the nature of play of the game helps in refining away some solutions, in the extensive form as unreasonable or inconsistent with the nature of play of the game, which are quite reasonable in the corresponding normal form game. Further, in extensive form games, unless there are payoff ties, the solution turns out to be unique: whereas in normal form games there may be more than one reasonable solution (consistent with the nature of play of the game). Application of Nash's criterion or point-to-point stability and consistency with the nature of play of the game does not cover all aspects of ratioinality which a player may apply in selecting his equilibrium strategy. By accommodating other aspects of rationality game theorists try to eliminate some unreasonable Nash solutions. Some important criteria in this direction are perfectness of Selten, properness of Myerson, strict perfectness of Okada, strategic stability of Kohlberg and Mertens etc. All these criteria try to accommodate some stability considerations in the choice of strategies. Refinement of the set of Nash solutions through any of these stability criteria in some cases may lead to a conflict with the refinement in extensive form games done through dynamic programming or backwards induction (perfect or imperfect). This conflict is, however, apparent. Given a proper specification of rationality or stability and a criterion corresponding to that, a subset of Nash solutions is determined first. Final refinement in extensive form games is to be done on the basis of extensive nature of play of the games. The distinction between normal form games and extensive form games is relevant mainly for this reason. If some aspects of rationality referred to above is tied with the extensive nature of play of the games, then any criterion to accommodate such rationality will have different interpretations in the two forms, otherwise refinement based on such criteria will have same interpretation and the final solution(s) will be obtained through the extensive nature of play of the games from the refined subset so determined.

AN ECONOMIC APPLICATION

The distinction between normal form games and extensive form games of imperfect information as explained in this paper can be used for defining solutions in duopoly games. If the reaction functions of the two firms (say, A and B) are of usual shape and have single intersection, then that will be the solution of the duopoly game, whether the firms move simultaneously or sequentially with imperfect information. With sequential moves and perfect information the solution will be on the reaction function of B and to the right of the intersection point if A moves first and on the reaction function of A and to the left of the intersection point if B moves first. But if the reaction functions have multiple intersection and if the two firms move simultaneously, then all these points turn out to be reasonable according to the nature of play of the game. If, however, they move sequentially with imperfect information all these points will not be reasonable. Specifically, if the reaction functions have three intersection points, the point closer to the axis of A will be the solution if A moves first and the point closer to the axis of B will be the solution if B moves first. If we apply some stability criterion the middle intersection point will turn out to be unreasonable ; but the other two intersection points will be equally reasonably for simultaneous moves. Finally, if the game is played sequentially with perfect information then the solution may occur at a point other than intersection points.

NOTES

1. Friedman (1986) : p7.
2. Van Damme (1991) : p3.
3. Kreps (1990) : p355.
4. Kreps (1990) : p376.
5. Fudenberg and Tirole (1989) : p261.
6. Kohlberg and Mertens (1986) : p1020.
7. Kreps (1990) : p371.
8. The term 'no information' refers to the concept diametrically opposite to perfect information.
9. Solution as developed by Nash. At a Nash solution individual players have no incentive to deviate unilaterally from his strategy. Nash's criterion is treated as necessary in defining solution of noncooperative games.
10. A reasonable solution of a game is defined on the basis of information the players have regarding the sequence of play of the game.

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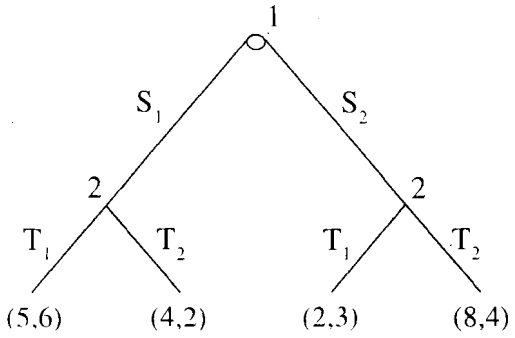
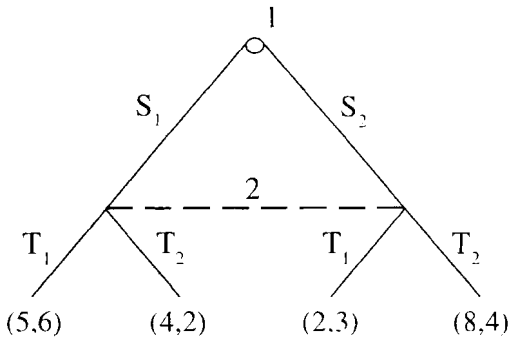
ILLUSTRATIONS



game–1



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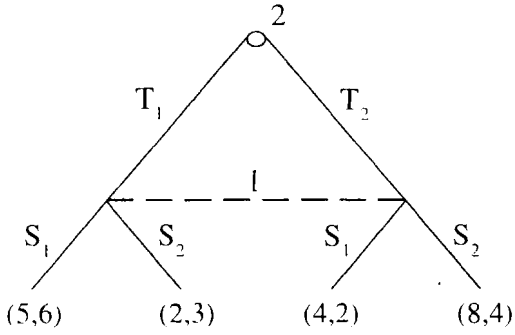


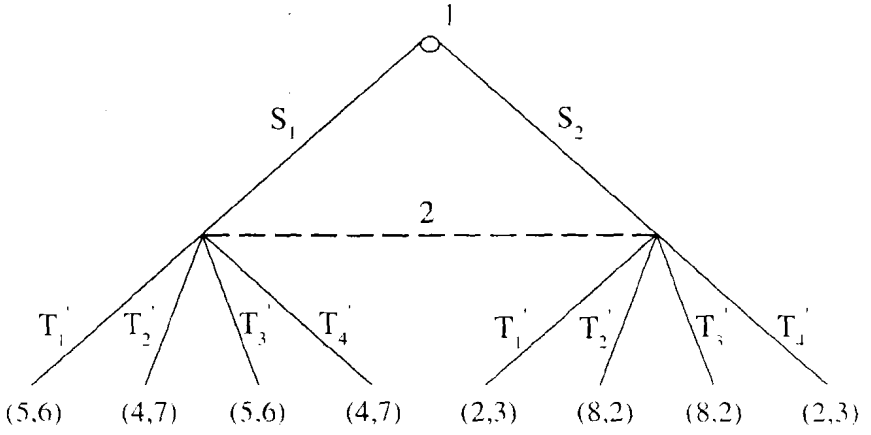
game–3

Player–2 / Player–1	T_1	T_2
S_1	5,6	4,2
S_2	2,3	8,4

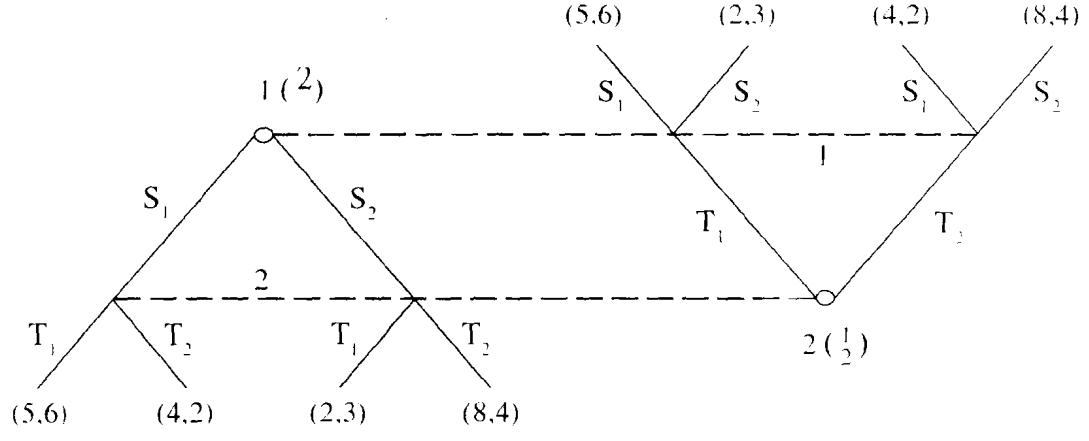
game–4

Player–2 / Player–1	T_1'	T_2'	T_3'	T_4'
S_1	5,6	4,7	5,6	4,7
S_2	2,3	8,2	8,2	2,3

game–5


1
S1
S2
2
T1'
T2'
T3'
T4'
T1'
T2'
T3'
T4'
(5,6)
(4,7)
(5,6)
(4,7)
(2,3)
(8,2)
(8,2)
(2,3)

game–6


(5,6)
(2,3)
(4,2)
(8,4)
1 (2)
S1
S2
S1
S2
1
S1
S2
T1
T2
2
T1
T2
T1
T2
(5,6)
(4,2)
(2,3)
(8,4)
2 (1/2)

game–7

INSTABILITY IN CROP OUTPUT IN WEST BENGAL, 1957-58 TO 1994-95

ARUP CHATTOPADHYAY *

I

Instability means fluctuations and in agricultural production this results from numerous changes in an agroecosystem's physical, technical and social environment like variations in rainfall, temperature and humidity, periodic attacks of diseases, insects and weeds, use of high yielding varieties (which are more vulnerable than local varieties to environmental stresses), extension of cultivations to the marginal lands, degradation of soil (due to salinity, water-logging, deforestation, excessive use of chemical fertilizer etc.), fluctuations in input and output prices etc. Combining the effects of all these changes on crop output, the measure of instability gives an understanding of the agricultural products'/incomes' security that determines the liquidity, viability (i.e., the ability to meet up financial obligations) and general well-beings at the house-hold level and the general prospects of business cycle at the aggregate level. In other words, instability in crop output creates hardship to the farmers as well as the policy makers and the effectiveness of an agricultural strategy should be assessed *inter alia* from the angle of stability in agricultural production.

Observing the spectacular growth in West Bengal agriculture during the Left Front Government (LFG) rule (compared to the pre-LFG regime) a number of scholars have established the appropriateness of agricultural strategy (radical institutional reforms along with technological improvements) adopted by the LFG. But in respect of the measurement of output instability in West Bengal agriculture we get few studies and that too with contrasting views. During pre-LFG regime (1950-51 to 1973-74) Das (1978) observed that instability in both agricultural production and foodgrains production declined significantly. On the other hand, Boyce (1987) argued that output instability in West Bengal agriculture did not change over the period 1949–80. Similarly, while Mahendradev (1987) established that instability in foodgrains production during the initial years of the LFG rule was increasing, Saha and Swaminathan (1994) found that the period of high growth (1980-81 to 1990-91) was not associated with greater instability (i.e., instability remained unchanged). These contrasting observations might be due to the adoption of different techniques and different time periods of measuring instability. To resolve this issue a comprehensive analysis on instability in West Bengal agriculture is necessary taking longer time period and applying improved techniques. In this paper a modest attempt is being made in that direction.

For the study we have chosen all the major crops and crop-groups (22 in number) of the State and only the total agricultural productions of the districts. The period of the analysis is from the crop year 1957-58 to 1994-95. This whole period is divided into two sub-periods, namely, from 1957-58 to 1976-77 (pre-LFG regime) and from 1977-78 to 1994-95 (LFG

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regime), to facilitate a comparative analysis of the state of instability in West Bengal agriculture before and during the LFG rule. For the analysis we have collected officially published yearly data on production (in thousand tonnes) for the crops and crop-groups, except total non-foodgrains and total agricultural production on which the production data have been collected in the form of index numbers. For the State and its districts these indices have been expressed in terms of triennium ending crop year 1969-70 and 1971-72 as base years respectively.

After examining the existing methods carefully, an improved method has been devised for measuring instability in the next section. In section III and IV the nature of instability (i.e., the nature of the movement of instability over time) and the extent (i.e., level or magnitude) of instability have been measured respectively. In the last section the conclusion of the study has been drawn.

II

In regard to the measurement of instability in agricultural production we get broadly two techniques : Summary measure and Trend measure. The prevalent summary measures of instability, adopted by Barker et al (1981), Mehra (1981), Hazell (1982, 1984), Ray (1983), Dhawan (1983), Hanumantha Rao et al (1988) etc., are standard deviation (also the standard error of the estimated growth rate), variance and coefficient of variation either measured from the dispersion in production around trend line (fitted for growth estimation) or from the year-to-year fluctuations in production. But, in general, these summary measures have been highly criticised on the following grounds.

(i) These measures could not fully grasp the necessary information on the change of instability through time.

(ii) Summary measures around mean value lead to overestimation (underestimation) if there is acceleration (deceleration) in growth rate over the given period. On the other hand, summary measures around trend line are suspected when fluctuations are large and frequent (that lead to distortion in trend estimation) or when the trend is itself mis-specified.

(iii) Measures based on year-to-year fluctuations are more influenced by the short-term variations than the long-term variations and one can change the conclusion on instability simply by adding or removing one or two years having strong outliers in a period.

(iv) Like growth rates, standard errors (and the residual variances) may be strongly affected by the discontinuities between the separate estimates for sub-periods.

As an improvement over the summary measures the scholars presented the trend measures of instability. We get two broad categories of trend measure. The first one is to estimate separate trends (linear or exponential) for 'peak' and 'trough' years and to see whether these two trends are converging, meaning thereby declining instability over time, or diverging, signifying thereby increasing instability over time. For selecting peaks and troughs there are mainly three criteria : (a) The usual local maxima and minima definitions, used by Sen (1967), Das (1978) etc. This criterion is, however, open to the criticism that very small output differences can cause certain years to be included or excluded. To avoid this limitation Roa et al (1980) suggested two alternative criteria, namely, (b) identifying local maxima and minima by a certain percent margin (say 5% or 10%) and (c) identifying maxima and minima by a certain percent (5% or 10%) deviation from the estimated trend. These two criteria, however, introduce arbitrariness in identifying maxima and minima. The criterion (c) further

introduces the additional problem of trend specification. Further in all these criteria instability is measured by using only a few selected data points, instead of using full information. Moreover, if selected peak or trough points happen to be small in number, the estimates of peak or trough trends would be noticeably affected. These different criteria may also give inconsistent result on the nature of instability, as observed by Boyce (1987, P. 273)

To overcome these difficulties, in the recent studies [Boyce (1987), Mahendradev (1987), Saha and Swaminathan (1994) etc.] another trend measure of instability has been used by fitting the time trend (linear or exponential) on the 'statistic' of instability and observing the sign of the slope parameter with statistical significance (negative sign implies declining instability overtime and *vice versa*). Mahendradev has used this 'statistic' of instability as 'a nine year moving standard deviation in year-to-year changes in production'. On the other hand, Boyce and Saha and Swaminathan have used this 'statistic' of instability as the squared or absolute values of detrend output data (similar to Glejser's test for heteroscedasticity). In comparison to Mahendradev's [which is based on standard deviation and arbitrarily chosen nine year moving average period], the Boyce's statistic (also followed by Saha and Swaminathan) is more reliable as, being the detrend statistic, it captures all sorts of variations (*viz.*, seasonal, cyclical and irregular variations) in the agricultural production and also it takes into account the whole data set.

The Boyce's method of instability measure is also not free from limitations. Boyce (and also Saha and Swaminathan) has calculated the series of 'detrend statistic', Z_t, from the estimation of kinked exponential trend on unadjusted data. The arbitrary kink point on unadjusted data is likely to result in a high value of $|Z_t|$ at or near the 'break-point', which, in turn, may make the instability coefficient insignificant, thus forcing one to infer that there is no change in instability. Further, linear or exponential trend fitted on $|Z_t|$ may not be the proper specification for all types of data sets. Moreover, the Glejser test [$|Z_t| = a + bt + u_t$], used by Boyce, is not a very powerful test of heteroscedasticity if the disturbance term is autocorrelated which has occurred in quite a number of time series under study. To avoid these difficulties we have proceeded in a different way for measuring instability through detrend statistic.

The reliability of instability measure through detrend statistic heavily depends upon the correct specification and estimation of the trend equation. There is a large number of trend equations which may be fitted to the data for the choice of a particular trend equation. But we propose that instead of trying with all known equations, one can consider only a few, leaving out other equations, on the basis of a careful study of the behavioural pattern of the data. For this purpose the point-to-point growth rates of production are estimated using the formula, $\frac{Y_t - Y_{t-1}}{Y_{t-1}}$. Since the piont-to-point growth rates exhibit wider fluctuations as compared to the original series, 9 year centred moving averages of the point-to-point growth rates are calculated. A linear trend [$gr_t = a + bt$] is then fitted to the smoothed data after necessary correction for the presence of autocorrelation in the disturbance term [by applying Cochrane-Orcutt two step procedure], which is very likely to occur because of smoothing of the series. The estimated trend parameter, $\hat{b}$ indicates the behavioural pattern of the data set. If $\hat{b}$ is

statistically insignificant, the growth rate is constant and so exponential equation is chosen. If $\hat{b}$ is positive and significant (implying accelerated growth rate), the choice of trend equation is restricted to parabolic, log-quadratic and S-type growth curves. On the other hand, for decreasing growth rate [$\hat{b}$ is negative and significant] the linear trend along with the above three curves is also chosen.

When this behavioural pattern is either increasing or decreasing over time, we have chosen a particular form of trend equation from among other alternatives after ensuring the fulfilment of the following criteria sequentially : (a) presence of no auto-correlation, detected by DW statistic, (b) presence of random errors, detected by run test, (c) absence of long-term variation in the series, measured by heteroscedasticity tests, and (d) P. E. test (a variant of Box-Cox transformation) for non-linearity. If all these criteria fail, which, of course, rarely happens, log-quadratic form may be chosen arbitrarily due to its special characteristic. In this connection it is to be noted that we have given minimum importance to R^2, unlike earlier studies, as it is non-comparable among alternative trend equations having different forms of dependent variable [Maddala (1988), P. 317] and it gives wrong information in the face of non-fulfilment of other econometric criteria. However, the criterion of R^2 is very useful in discarding a trend equation which gives poor fit in the statistical sense.

Now to tackle the problem of trend estimation in the face of short-term and long-term volatile fluctuations in the agricultural production data, smoothing is necessary. In the study after specification of the model (as outlined above), we have, first, fitted the chosen trend equation, then calculated the residuals which have been smoothed (by applying 3-year centred moving average) and these smoothed residuals have been added back to the respective predicted values to construct the new series for trend estimation. Due to this smoothing of the residuals, autocorrelation problem is very likely to arise and in that case autocorrelation has been corrected by 'Cochrane-Orcutt procedure' assuming either first order or second order auto-regressive scheme. We have carried out this sort of adjustment for all those cases where after adjustment the econometric criteria for estimation are fulfilled. Otherwise, we have corrected only auto-correlation if it is present or have carried out the smoothing (subsequently followed by the correction of autocorrelation) for that part of the series where volatile fluctuations are more pronounced or have made no adjustment if the above mentioned econometric criteria are fulfilled beforehand.

All these steps and adjustments in the data set lead to correct specification and estimation of the trend equation. Now fitting appropriately chosen trend equation to the whole period's adjusted data we have estimated the detrend statistic, X_t, defined as,

$$X_t = \frac{\text{Actual production at time t—Production predicted at time t}}{\text{Production predicted at time t}}$$

The X_t series will naturally exhibit the true picture of instability, being free from specification and estimation errors. To know the nature of instability we have then estimated the linear trend on the absolute values of X_t, i. e., $|X_t| = \alpha + \beta t$. The statistically significant and positive (negative) β signifies increasing (decreasing) instability. A statistically insignificant β signifies constant or unchanged instability. Further, considering the possibility of existence of non-

linear trend of $|X_t|$ and the failure of Glejser test, the rank correlation test, a non-parametric test, has been applied, following Johnston's suggestion [Johnston (1972), Pp. 219-221], between $|X_t|$ and t as an additional measure of nature of instability.

Though trend measure of instability is better than its summary measure, yet one cannot ignore the importance of the latter specially in knowing the magnitude of instability as in the former case only the movement of instability over time can be deciphered. Keeping in mind the limitations of summary measure, we have calculated it from $|X_t|$ which is supposed to give the real picture of instability. More specifically, for the measurement of the extent (i. e., magnitude) of instability in crop output over two sub-periods and the whole period, the period-wise averages of the absolute values of A_t (for all t) have been calculated. Here A_t is defined in the same way as X_t, stated above, excepting that it is expressed only on the arithmetic scale (to make comparable) unlike X_t which is also expressed on logarithmic scale for exponential, log-quadratic and S-type growth curves. Further, as an average is unduely affected by the extreme observations, here in $|A_t|$ we have replaced the strong outliers by the next higher value. The existence of the strong outliers has been detected by observing period-wise extreme values of $|A_t|$ as well as from the graphical exposition of the original series along with A_t and the trend values.

III

The results on the nature of instability in the production of major crops and crop-groups in West Bengal are presented in Table 1. In the first two columns of the table (also of Table 2) the chosen trend equation and the nature of adjustments, if any, corresponding to each data set have been mentioned and these lead to the fulfilment of necessary econometric and statistical criteria for estimation, results are not reported here; for detailed discussion see Chattopadhyay and Das (1997). It is observed from Table 1 that both $\hat{\beta}$ and rank correlation coefficient are of same sign in all cases. Among 22 crops and crop-groups of West Bengal, in 15 cases both rank correlations and $\hat{\beta}_s$ are negative and only in 7 cases they are positive. Further, both $\hat{\beta}_s$ and ranks are statistically significant in 8 cases and in 4 cases only rank correlations are statistically significant. Altogether in 9 cases [*viz.*, boro rice, total rice, wheat, total cereals, total foodgrains, jute, potatoes, total non-foodgrains and total agricultural production] the instability in production is declining significantly over time (i.e., during the LFG regime compared to the pre-LFG regime). Only for three crops [*viz.*, gram, sesamum and sugarcane] the output instability is increasing significantly over time. For the remaining crops and crop-groups no significant change in instability in production over time is observed. From these observations it can be said that the instability in agricultural production in West Bengal during the LFG regime (compared to the pre-LFG regime) has declined significantly so far as the important crops and major crop-groups are concerned.

In order to measure the spatial difference in output instability in West Bengal agriculture the nature of instability in the production of all crops combined in the districts have also been measured. The results are given in Table 2. Here also it is observed that in each of the districts $\hat{\beta}$ has same sign as that of rank correlation. For ten districts they are of negative sign and only in 5 cases they have positive sign. However, there is no district in which the instability in

been measured. The results are given in Table 2. Here also it is observed that in each of the districts $\hat{\beta}$ has same sign as that of rank correlation. For ten districts they are of negative sign and only in 5 cases they have positive sign. However, there is no district in which the instability in agricultural production is significantly increasing over time. On the other hand, it has declined significantly in three districts, namely Howrah, Hooghly and Nadia ; in all other districts in stability over time remains statistically unchanged.

IV

Crop-wise levels of instability in agricultural production of the State for the whole period (1957-58—1994-95) and for two sub-periods (i.e., 1957-58—1976-77 and 1977-78—1994-95) are presented in Table 3. From Table 3 it is observed that the patterns of changes in the levels of instability over two sub-periods maintain consistency in regard to the nature of instability, as explained in the previous section, for all 22 crops and crop-groups of West Bengal. But the magnitudes of these changes in the levels of instability between two sub-periods do not maintain consistency in all cases. The limitations of the summary measure might have contributed to this inconsistency. However, replacing the strong outliers by the next higher value in the summary measure it is seen that the differences in the magnitudes of the instability levels between two sub-periods become consistent with the nature of instability in all cases, which was absent in the earlier summary measures. Such type of consistency is also observed for the districts in Table 4.

From the estimated results of Table 3 it is seen that the levels of instability are much higher in the cases of individual crops than the crop-groups. In all the crop-groups (except total oil seeds) the levels of instability for all the periods are low (i.e., less than 10%). Among the individual crops, the instability levels are very high (greater than / equal to 20%) for all the periods in case of wheat, boro rice, linseed, sesamum and other cereals ; only for the first sub-period in case of barley and jute and for the second sub-period in case of sugar cane. In case of mustard this is high for both the whole period and the second sub-period. Only for three crops such as potatoes, other pulses and jute, the levels of instability have changed to low value (around 10%) in the second sub-period.

The district-wise variations in the levels of instability in agricultural production for the whole period and two sub-periods are presented in Table 4. From Table 4 it is observed that the magnitudes of instability in agricultural production over the districts are, in general, much low. So far as inter-district variations are concerned, output instabilities are relatively high in Howrah, Purulia and Bankura and they are very low in Jalpaiguri, Darjeeling, Burdwan, Malda and West Dinajpur compared to other districts. So levels of instability in the northern districts are generally lower.

V

To conclude, the appropriate choice of methodology is the primary task for measuring instability in crop output ; otherwise erroneous conclusions may be derived from the empirical investigations. In the study some improvements in the earlier methods of instability measure have been devised. With these improvements, the results of our empirical analysis strongly support the proposition that the agricultural strategy adopted by the LFG in West Bengal brings down the instability in crop output significantly. Higher instability in an individual

TABLE - 1 Trend Measure of Instability in Crop Output in West Bengal, 1957-58—1994-95

Crop/ Crop-group	Chosen Trend Equation[a]	Nature of adjustment[K]	Nature of Instability	
			$\hat{\beta}$ (Parametric)	Rank Correlation (Non-parametric)
Aus Rice	E	MA(3), A_2	−.00035 (−1.023)	−.1707
Aman Rice	P	MA(3), A_1	−.00264 (−1.075)	−.2651
Boro Rice	L	MA(3/I), A_2	−.00497* (−5.828)	−.7313*
Total Rice	L	MA(3), A_2	−.00013 (−.827)	−.3331**
Wheat	L	A_2	−.00437* (−4.796)	−.5735*
Barley	L	——	−.00077 (−1.088)	−.2093
Other Cereals	E	MA(3), A_2	−.00104 (−1.256)	−.2252
Total Cereals	L	MA(3), A_2	−.00012 (−.797)	−.3344**
Gram	L	A_1	.00142** (−2·540)	.3359*
Other Pulses	L	MA(3), A_2	−.00009 (.395)	−.0301
Total Pulses	L	MA(3), A_1	−.00004 (.218)	−.0358
Total Foodgrains	L	MA(3), A_2	−.00010 (−.692)	−.3107***
Mustard	L	MA(3/II), A_1	.00050 (.753)	.1907
Linseed	P	MA(3), A_2	.00602 (1.259)	.2659
Sesamum	E	MA(3/II), A_1	.00629* (2.853)	.4844*

Table 1 contd.

Crop/ Crop-group	Chosen Trend Equation[a]	Nature of adjustment[K]	Nature of Instability	
			$\hat{\beta}$ (Parametric)	Rank Correlation (Non-parametric)
Total Oilseeds	L	MA(3/II), A_1	.00021 (.528)	.0708
Jute	S	MA(3), A_1	−.00454*** (−1.955)	−.3712**
Sugarcane	L	A_1	.00074*** (1.906)	.3184***
Potatoes	E	MA(3), A_2	−.00086* −(3.804)	−.5351*
Tobacco	E	MA(3/II), A_1	.00059 (.795)	.0839
Total Non-food grains	P	A_1	−.00196* (−2.820)	−.4481*
Total Agricultural Production	L	MA(3), A_2	−.00021 (−1.024)	−.3915**

Key : E = Exponential, P = Parabolic, L = Log-quadratic, S = Straight line, MA(3) = 3 period centred moving average of residuals, MA(3/I) = First sub-period [1957-58—1976-77] smoothed by MA(3), MA(3/II) = Second sub-period [1977-78—1994-95] smoothed by MA(3), A_1 = First order autoregressive scheme [$e_t = be_{t-1} + \varepsilon_t$], A_2 = Second order autoregressive scheme [$e_t = be_{t-1} + re_{t-2} + \varepsilon_t$].

Notes : [a] S-type growth curve [$y_t = e^{a-b/t}$] gives poor fit in all cases.

[K] Smoothing of residuals is followed by correction of autocorrelation, if so arises [e.g., MA(3) is followed by A_1]

$\hat{\beta}$ is the parameter estimated from $|X_t| = \alpha + \beta t$

Rank Correlation is between $|X_t|$ and t, for X_t see text.

* Significant at 1% level, ** Significant at 5% level, *** Significant at 10% level, t ratios are in the parentheses.

TABLE 2 Trend Measure of Instability in Total Agricultural Production in the Districts of West Bengal, 1957-8 to 1994-5

District	Chosen Trend Equation [a]	Nature of adjustment K	Nature of Instability	
			$\hat{\beta}$ (Parametric)	Bank Correlation (Non-parametric)
Burdwan	L	Ma(3), A_2	·0003	·0808 (·163)
Birbhum	E	MA(3), A_2	·00020	·0278 (·483)
Bankura	L	MA(3),A_2	−·0036	−·2399 (−·777)
Midnapore	L	A_1	−·00019	−·2227 (−·578)
Howrah	L	MA(3/1),A_1	−·00206*	−·5650* (−4·036)
Hooghly	E	MA(3/1),A_1	−·0086*	−·5503* (−3·067)
24-Parganas	P	–	·00068	·0389 (·356)
Nadia	E	MA(3), A_2	−·00043* (−1·803)	−·2412
Murshidabad	E	—	−·00017 (−·718)	−·0445
West Dinajpur	P	MA(3), A_2	−·00093 (−·767)	−·1279
Malda	P	A_1	·0006 (·098)	·0832
Jalpaiguri	P	—	−·00026 (·485)	−·0406
Darjeeling	E	—	·00028 (−·575)	·0052
Coochbehar	E	—	·00025 (−1·293)	−1137
Purulia	P	—	−·00136 (−·695)	−·0384

Key & Notes : Same as those in Table 1.

Table 3 Summary Measure on Instability in Crop Output in West Bengal, 1957–58 to 1994-95 and Sub-periods 1957-58 to 1976-77 & 1977-78 to 1994-95

Crop/Crop-group	Strong Outlier(s)		Value of the Summary Measure, Mean of A_A		
	Year(s)	Extreme Value(s)	Whole Period (1957-8—1994-5)	First Sub-period (1957-8—1976-7)	Second Sub-period (1977-8—1994-5)
Aus Rice	——	——	·1701	·1969	·1401
Aman Rice	——	——	·1361	·1370	·1350
Boro Rice	1971-2	2·01	·4041 (·4224)	·5856 (·6203)	·2014
Total Rice	1982-3	0·35	·0792 (·0834)	·0844	·0735 (·0823)
Wheat	1970-1	1·99	·4607 (·4776)	·6591 (·6912)	·2389
Barley	——	——	·1762	·2356	·1098
Other cereals	——	——	·2677	·3164	·2133
Total Cereals	1982-3	0·37	·0813 (·0846)	·0881	·0736 (·0807)
Gram	——	——	·1797	·1627	·1987
Other Pulses	——	——	·1131	·1244	·1005
Total Pulses	——	——	·0898	·0945	·0845
Total Foodgrains	1982-3	0·34	·0794 (·0822)	·0841	·0741 (·0800)
Mustard	——	——	·2124	·1694	·2604
Linseed	——	——	·3127	·2540	·3784
Sesamum	——	——	·3012	·2054	·4083
Total Oil Seeds	1987-8	0·81	·1508 (·1564)	·1306	·1733 (·1851)
Jute	1968-9 1985-6	0·56 0·58	·1558 (·1625)	·2021 (·2079)	·1040 (·1117)
Sugarcane	——	——	·1813	·1435	·2236
Potatoes	——	——	·1410	·1788	·0986
Tobacco	——	——	·1672	·1624	·1725
Total Non-foodgrains	——	——	·0633	·0779	·0471
Total Agricultural Production	1982-3	0·27	·0622 (·0647)	·0656	·0584 (·0637)

Notes : Values not adjusted by the deletion of strong outlier(s) have been presented in the parentheses. For $|A_A|$ see text.

TABLE 4 Levels of Instability in Total Agricultural Production in the Districts of West Bengal, Whole Period and Two Sub-periods

District	Strong Outlier(s)		Value of the Summary Measure, Mean of A^{λ}		
	Year(s)	Extreme Value(s)	Whole Period (1957-8—1994-5)	First Sub-period (1957-8—1976-7)	Second Sub-period (1977-8—1994-5)
Burdwan	———	———	·0696	·0608	·0794
Birbhum	1982-3	0·44	·1006 (·1053)	·0915	·1107 (·1207)
Bankura	1982-3	0·48	·1252 (·1294)	·1310	·1188 (·1276)
Midnapore	1982-3	0·38	·0961 (·0986)	·0976	·0945 (·0998)
Howrah	——	——	·1723	·2235	·1151
Hooghly	——	——	·0862	·1103	·0593
24-Parganas	——	——	·1128	·115	·1143
Nadia	——	——	·1083	·1170	·0987
Murshidabad	——	——	·0958	·0999	·0907
West Dinajpur	——	——	·0762	·0803	·0715
Malda	——	——	·0669	·0640	·0702
Jalpaiguri	——	——	·0435	·0455	·0413
Darjeeling	1964-5	0·33	·0661 (·0700)	·0625 (·0699)	·0701
Coochbehar	——	——	·0802	·0887	·0708
Purulia	1979-80 1982-3	0·50 0·58	·1295 (·1406)	·1390	·1189 (·1424)

Notes : Same as those in Table 3.

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DIVERSE CHANGES IN CROPPING PATTERN ACROSS STATES IN INDIA : AN ANALYSIS

SUBRATA KUMAR RAY *

INTRODUCTION

Since Independence considerable progress has been made in the sphere of agricultural development in the country in terms of not only increase in crop production and productivity but also technological development and crop diversification.[1] In India as a whole and also regionally agricultural growth has become much more diversified in recent years than earlier. Important changes in cropping pattern have taken place across states in the post-Green Revolution period. The important questions that arise in this context are : What is the nature of cropping pattern changes across the states ? What factors account for these changes ? The present study makes an attempt to address these and related questions.

The existing literature on cropping pattern changes in India highlights mainly three aspects - (i) role of changes in cropping pattern on agricultural growth, e.g. Minhas & Vaidyanathan (1965), Dharam Narain (1977), Devasena Naidu (1989), and that on income and employment, e.g. Chand, Sidhu & Kaul (1985), Singh, Sharma (1991), (ii) factors influencing the changes in cropping pattern / farming practices, e. g. Majid (1963), Sinha (1978), and (iii) optimum cropping pattern, e.g. Mehta, Sharma & Singh (1982).

It is evident from the brief review of the existing literature that no in-depth study has yet been undertaken on the nature of cropping pattern changes across the states and on the factors responsible for the same. Our present study aims at filling in some of the gaps in the existing literature.

II

DATA BASE AND METHODOLOGY

Secondary data from Govt. of India sources have been used for the study which covers twelve states, namely Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh, Madhya Pradesh, Maharastra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal which account for more than 80% of the gross cropped area. To

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analyse these data simple statistical techniques like average, percentage and regression have been used. Cropping Pattern Index (CPI) has been constructed using the formula as follows :

$$C\ P.\ I. = \frac{\sum C_{ij} Y_{io} P_{io}}{\sum C_{io} Y_{io} P_{io}}$$

where, Cio = proportion of area under i-th crop in the base period
Cij = proportion of area under i-th crop in j-th year
Yio = yield per hectate of the i-th crop in the base period
Pio = price per unit of the i-th crop in the base period.

C.P.I. indicates the value of aggricultural output of the current period in relation to the base period at the base year price. This formula has been used by Bureau of Applied Economics and Statistics while computing cropping pattern index.

III

NATURE OF CHANGES IN CROPPING PATTERN

Three types of cropping pattern changes have been distinguished in this study–(i) Pro-Superior Cereals and Pro-Foodgrains cropping pattern change, (ii) Pro-Non-Foodgrains cropping pattern change, (iii) Pro-HYV cropping pattern change. The first implies changes in cropping pattern in favour of superior careals, i. e., here percentage of area under superior cereals rises over years. The second refers to changes in cropping pattern in favour of non-foodgrains, i.e., percentage of area under non-foodgrains rises over years, and the third implies changes of cropping pattern in favour of HYVs of crops.

The first type of cropping pattern change is observed to have occurred in eight of our sample 12 states, namely Punjab, Himachal Pradesh, Andhra Pradesh, Gujarat, Haryana, Uttar Pradesh and West Bengal (Table 1) while the second type has been observed in four sample states, viz. Madhya Pradesh, Orissa, Rajasthan and Tamil Nadu (see Table 2). The third type of cropping pattern change has occurred in almost all states, being particularly prominent in Punjab, Himachal Pradesh, Uttar Pradesh, Haryana & West Bengal where more than 50% of the gross cropped area is recently allocated to HYVs of crops (Table 3).

Table 1 Pro-superior cereals and pro-foodgrains cropping pattern changes in some states of India

Sl. No.	States / Crops	Percentage share of crops				
		1972-73	1979-80	1985-86	1990-91	1993-94
1.	**Punjab**					
	Rice	8.01	17.85	23.94	30.63	32.52
	Wheat	40.55	42.61	43.48	49.52	49.76
	Jowar, Maize & Bajra	11.75	6.69	4.06	3.04	3.18
	Non-foodgrains	32.46	26.86	24.68	15.14	14.52
	Non-superior cereals and non-foodgrains	51.44	39.54	32.58	19.85	17.72
2.	**Himachal Pradesh**					
	Rice	10.18	10.34	9.32	9.46	9.13
	Wheat	33.86	34.89	38.72	41.66	44.08
	Jowar, Maize & Bajra	32.82	35.08	34.44	39.53	39.71
	Non-foodgrains	12.92	8.94	11.75	9.35	7.08
	Non-superior cereals and non-foodgrains	55.96	54.77	51.96	48.88	46.79
3.	**Maharashtra**					
	Rice	7.56	7.43	7.29	7.35	7.99
	Wheat	4.11	5.86	4.24	4.02	3.60
	Jowar, Maize & Bajra	34.26	41.69	40.66	38.91	39.13
	Non-superior cereals and non-foodgrains	88.33	86.71	88.47	88.59	88.41
4.	**Andhra Pradesh**					
	Rice	23.77	27.75	21.98	28.33	26.14
	Wheat	0.16	0.16	0.12	0.08	0.07
	Jowar, Maize & Bajra	29.73	25.27	20.24	12.77	11.52
	Non-superior cereals and non-foodgrains	76.07	72.09	77.90	71.59	73.79
5.	**Gujarat**					
	Rice	3.94	4.32	5.09	5.25	7.12
	Wheat	3.62	6.42	4.47	7.10	5.79
	Jowar, Maize & Bajra	29.05	23.66	26.15	23.51	23.31
	Non-superior cereals and non-foodgrains	92.44	89.26	90.44	87.65	87.09

Table 1 contd.

6.	**Haryana**				
	Rice	5.61	10.40	10.44	12.80	14.49
	Wheat	24.48	30.26	30.33	35.53	38.45
	Jowar, Maize & Bajra	21.22	21.47	14.64	14.81	12.09
	Non-superior cereals and non-foodgrains	69.91	59.34	59.23	51.67	47.06
7.	**Uttar Pradesh**				
	Rice	19.07	20.90	22.29	22.95	22.16
	Wheat	26.76	31.45	33.06	34.89	37.59
	Jowar, Maize & Bajra	14.39	12.72	10.76	9.96	8.30
	Non-superior cereals and non-foodgrains	54.17	47.65	44.65	42.16	40.25
8.	**West Bengal**				
	Rice	71.48	66.21	57.17	76.63	76.52
	Wheat	5.19	6.83	3.82	3.54	4.15
	Non-superior cereals and non-foodgrains	23.33	26.96	39.01	19.83	19.33

Source : Government of India

In these states excepting Himachal Pradesh there has been an increasing shift of land from coarse cereals (e. g., jowar, bazra, maize etc.) to superior cereals like rice and wheat. In Himachal Pradesh the increase in percentage share of superior cereals has occurred at the expense of non-foodgrains. While in states like Punjab, Himachal Pradesh, Andhra Pradesh, Gujarat, Haryana, Uttar Pradesh and West Bengal. The changes of cropping pattern in favour of superior cereals are substantial in the 1980s and the early 1990s, in Maharastra these changes are very marginal.

On the other hand, in states, namely Madhya Pradesh, Tamil Nadu, Orissa and Rajasthan cropping pattern has changed in favour of non-superior cereals and non-foodgrains.

Table 2 Pro-non-foodgrains cropping pattern for sample states

Table 2 **Pro-non-foodgrains cropping pattern for sample states**

Sl. No.	States / Crops	Percentage share of crops 1972-73	1979-80	1985-86	1990-91	1993-94
1.	**Madhya Pradesh**					
	Rice	22.07	22.39	21.86	20.68	19.34
	Wheat	15.80	14.51	16.10	15.27	17.99
	Jowar, Maize & Bajra	14.82	13.41	12.88	11.41	8.33
	Repeseed & Mustard	1.03	0.81	1.47	2.57	2.70
	Cotton	3.30	3.22	2.33	2.40	1.91
	Non-superior cereals and non-foodgrains	62.13	63.10	62.04	64.05	62.67
2.	**Tamil Nadu**					
	Rice	37.62	36.94	32.83	29.09	30.33
	Wheat	0.01	0.02	0.05	0.01	0.01
	Jowar, Maize & Bajra & Ragi	18.21	18.62	18.34	15.61	13.73
	Groundnut	13.78	12.96	13.67	14.59	15.63
	Sugarcane	1.87	2.14	2.80	2.92	3.02
	Non-superior cereals and non-foodgrains	62.37	63.04	67.12	70.90	69.66
3.	**Orissa**					
	Rice	64.52	50.41	45.31	51.08	50.02
	Wheat	0.74	0.60	0.60	0.39	0.30
	Jowar, Maize & Bajra	3.54	5.04	4.86	4.74	2.32
	Groundnut	1.24	2.14	3.76	4.61	4.15
	Rapeseed & Mustard	0.94	1.64	1.58	1.94	1.98
	Non-superior cereals and non-foodgrains	34.74	48.99	54.09	48.53	49.68
4.	**Rajasthan**					
	Rice	6.84	1.13	0.72	0.72	0.86
	Wheat	8.69	12.64	9.24	10.94	12.30
	Jowar, Maize & Bajra	43.64	36.64	37.08	40.43	36.23
	Groundnut	1.60	1.78	1.35	1.39	1.75
	Rapeseed & Mustard	1.83	2.23	5.59	12.89	15.31
	Cotton	2.13	2.36	1.84	2.74	3.17
	Non-superior cereals and non-foodgrains	84.47	86.23	90.04	88.34	86.84

Source : Govt. of India

In all these four sample states the percentage of area under rapeseed and mustard increased during the period from 1972-73 to 1993-94.

As is evident from Table 3 all the sample 12 states have experienced significant shift of land to HYVs of crops in the late 1970s, which accelerated during the 1980s and the beginning of the 1990s. But excepting Orissa either the pace of this shift slackend as in Himachal Pradesh or a reverse trend has set in as in Andhra Pradesh, Gujarat, Haryana, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Table 3 Percentage of HYV cropped area to gross cropped area in states of India

States / Crops	Percentage share of crops				
	1972-73	1979-80	1985-86	1990-91	1993-94
1. Andhra Pradesh	12.83	23.43	30.24	41.75	30.34
Gujarat	12.21	17.69	20.98	28.41	21.75
Haryana	25.52	43.44	45.29	63.60	51.63
Himachal Pradesh	30.12	42.84	50.30	58.61	60.46
Madhya Pradesh	5.30	9.64	21.53	30.99	24.64
Maharashtra	8.56	20.24	32.30	41.09	38.12
Orissa	7.37	13.27	18.54	34.79	46.50
Punjab	38.59	60.34	68.23	90.94	82.56
Rajasthan	5.59	10.16	15.13	19.72	17.99
Tamil Nadu	37.11	36.74	43.40	44.48	40.74
Uttar Pradesh	18.15	31.73	45.49	60.36	57.66
West Bengal	14.60	29.11	28.87	50.13	50.07

Source : Govt of West Bengal.

IV

FACTORS EXPLAINING DIFFERENTIAL TRENDS IN CHANGES IN CROPPING PATTERN

The factors responsible for the diverse cropping pattern across the states may be classified into three groups : (i) Economic factors, (i.e., per capita income, agricultural exports and profitability), (ii) Infrastructural factors (e.g., irrigation and finance) and (iii) Geographical factors (i.e., soil conditions and climate).

Economic Factors

Per Capita Income : Per capita income of the sample states varies widely. Superior cereals and non-foodgrains enjoy a higher income elasticity of demand.[3] It is hypothesised here that the lower the per capita income the higher the percentage of area under non-superior cereals and non-foodgrains. While testing this hypothesis with the help of cross-section data relating to the sample states, we observe that in the relevant equation the coefficient of per capita income as the independenct variable is negative but that is not statistically significant. Hence, this hypothesis is partially accepted.

Agricultural Exports : There has been a substantial increase in the overseas demand for India's agricultural and allied products in recent years. India's exports to overseas markets have recently risen spectacularly in rice, raw cotton and oil cakes (see Table 4) and this has given a boost to changing cropping pattern in favour of rice, raw cotton and oilseeds in many of the sample states.

Profitability : Commercial crops are more profitable per unit of land area than non-commercial crops and attractive in the context of declining land-man ratio and the preponderance of small and marginal farmers who plan optimally the use of their scarce land resources for maximising gross revenue from and employment in land.

Table 4 India's exports in rice, oilcakes and raw cotton, 1970-71 to 1993-94 (Quantity in thousand tonnes)

Commodity Exports	1970-71	1980-81	1985-86	1990-91	1993-94
Rice	32.8	726.7	245.0	550.0	767.7
	(100)	(221)	(74)	(1677)	(2341)
Oil cakes	878.5	886.0	806.9	2447.8	4820.7
	(100)	(101)	(92)	(279)	(549)
Raw cotton	32.1	131.6	35.7	374.4	297.3
	(100)	(410)	(111)	(1166)	(926)

Source : Govt. of India, **Economic Survey**

Note : ( ) Figures in parentheses indicate index numbers.

Infrastructural Factors

Irrigation : Irrigation plays a vital role in cropping pattern change. Variation in cropping pattern across the sample states may significantly be explained by irrigation factor. The index for irrigation used here is percentage of irrigated area to gross cropped area. Variations in percentages of HYV area (HYV%) and those in rice-wheat-sugarcane area to gross cropped area (RWS%) across the sample states are significantly explained by the variation in percentage of irrigated area (Irrigation%) (see Table 5 below).

Finance : Finance is the life-blood of modern agricultural activities, particularly in commercial cropping. Table 6 shows that institutional credit per unit of land area (IC) significantly has affected changes in cropping pattern (CP) over years.

Table 5 Regression Equations concerning cropping pattern

Year	Dependent Variable	Explanatory Variables		R^2	F
		Constant	Irrigations%		
1985-86	HYV%	17.14	.4938*	.5392	11.70*
"	RWS%	22.42	.4327***	.2649	3.60**
1990-91	HYV%	24.48	.5952*	.6066	15.42*
	RWS%	24.11	.5015***	.2664	3.63**
1993-94	HYV%	25.43	.4256**	.4169	7.15*
	RWS%	19.43	.5676**	.3548	5.49*

*, **, *** significant at 1 per cent, 5 per cent and 10 per cent level respectively.

Table 6 Estimated Regression Eqations concerning C.P. in sample states in India

States	Explanatory Variables			
	Period	Constant	I.C.	R^2
Punjab	1972-73 to 1933-94	94.68	0.03*	0.16
Haryana	1972-73 to 1933-94	105.86	0.02**	0.49
Mahashtra	1972-73 to 1933-94	81.04	–0.02	0.04
Orissa	1972-73 to 1933-94	102.67	–0.014*	0.31
Rajasthan	1972-73 to 1933-94	84.41	–0.08**	0.31
Tamil Nadu	1972-73 to 1933-94	99.60	0.03**	0.45
Himachal Pradesh	1972-73 to 1933-94	167.34	–0.04*	0.18
Andhra Pradesh	1972-73 to 1933-94	110.91	0.001	0.06
Gujarat	1972-73 to 1933-94	84.17	0.05**	0.41
Uttar Pradesh	1972-73 to 1933-94	100.11	0.05*	0.202
Madhya Pradesh	1972-73 to 1933-94	126.34	0.01	0.034
West Bengal	1972-73 to 1933-94	104.69	0.03**	0.27

*, **, *** indicate significant at 5%, 1% and 10% level respectively.

Source : Ray (1994).

Geographical factors : The ecologically disadvantaged regions, particularly drought prone area (DPA), offers scope for the farmers, particularly marginal and small farmers, for switching over to commercial crops like oilseeds, horticulture. It is argued that the higher the percentage share of drought-prone area in total geographical area of the states the higher the percentage share of non-foodgrains and non-superior cereals. While tresting this hypothesis with the help of relevant secondary cross section data we observe the significant coefficient of DPA area percentage (DPAP) as an independent variable in the equations concerning percentage share of non-foodgrains and non-superior cereals (NFNSC) as shown below.

Year	Relevant Equations	R^2	F
1985-86	NFNSC = 46.57+0.9482* DPAP	0.5414	11.81*
1990-91	NFNSC = 41.56+1.011** DPAP	0.4350	7.70*

*, ** indicate significant at 1 and 5 per cent level respectively.

Hence, the hypothesis that the higher the DPAP the higher the NFNSC is accepted.

V
SUMMARY AND CONCLUSION

Important changes in cropping pattern have taken place across the states of India in the post-Green Revolution period. Three types of these chages are distiguished. First, there is pro-superior cereals and pro-foodgrains cropping pattern change which has occurred in states like Punjab, Himachal Pradesh, Andhra Pradesh, Gujarat, Haryana, Uttar Pradesh and West Bengal. Second, Pro-non-foodgrains type of cropping pattern change is observed in Madhya Pradesh, Orissa, Rajasthan and Tamil Nadu. Third, pro-HYV cropping pattern change is evident in all states, prominently in Punjab, Himachal Pradesh, Uttar Pradesh, Haryana and West Bengal where more than 50 per cent of the gross cropped area (G.C.A) is recently allocated to HYVs of crops.

Among the factors responsible for the diverse cropping pattern across the sample 12 states we consider economic factors like per capita income, agricultural exports and profitability, infrastructural factors like irrigation and finance and geographical factors.

It is revealed that percentage of area under non-superior cereals and non-foodgrains is negatively correlated with per capita state domestic product, while higher profitability of commercial crops induces the small and marginal farmers to undertake more and more commercial cropping in the interest of increase in gross profit per unit of land. The spectacular recent increase in exports of oil cakes, raw cotton and rice has induced large increase in share of these agricultural crops in GCA. Percentage of irrigated area in GCA is positively and significantly related to share of HYV area, rice and wheat area and rice-wheat-sugarcane area in GCA. The variation in cropping pattern index during 1970s and 1980s in states like Haryana, Punjab and West Bengal is significantly explained by institutional credit per hectare of GCA. The state level variation in share of non-foodgrains and non-superior cereals area in 1985-86 and 1993-94 is significantly explained by percentage of drought prone area in geographical area across the sample states.

The conclusion that emerges from the above analysis is that the diverse cropping pattern across the states in India is explained by a variety of economic, infrastructural and geographical fators.

NOTES

1. Malik (1997).
2. i) Sawant and Achuthan (1995 : A-10).
   ii) Nadkarni (1996 : A-66)
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EVALUTION OF LAMPS – A PARTICIPATORY ORGANISATION IN WEST BENGAL*

ALOK K. CHATTERJI**

INTRODUCTION

Evaluation is an essential part of the percolation in poverty alleviation measures. There is need for enterprise generation among the people for alleviation of poverty. While the poverty ratio among the scheduled castes and scheduled tribes is higher than that among other groups of people[1], not only extension of provisions among them but also their participation in development programmes is of importance.

Against this brief backdrop this paper examines the functioning of the Large-Sized Adivasi Multipurpose Co-operative Societies Limited (LAMPS) as operative in the Gopiballavpur I Block of the Jhargram Sub-division of West Bengal in course of the two points of time, 1983 and 1993.

It is argued here that provisions are necessary, but the sufficient condition for poverty alleviation is participation by the people.

Secondary data have been used to reveal the state of official records as regards LAMPS. The methodology used to analyse the data is descriptive.

Rationale for LAMPS

The concept of LAMPS was introduced in India in 1972 as per the Bawa Committee's recommendation. In West Bengal they came into existence since 1977[2]. Intensive Tribal Development Project (ITDP) mouzas with a total population of 10,000 and above with more than 50 percent of them tribal population were to be covered by LAMPS. Specifically meant for the backward classes of people these organisations could be said to have constituted the first serious attempt at deriving 'Own' effort of the SC/ST for co-operative formation with a view to poverty alleviation.

A tribal requires a package of services, the main components of which are credit for production as well as consumption, supply of seed, and other agricultural inputs and consumer goods and marketing of produce from both agriculture and minor forest. These activities constitute the major areas of exploitation of the tribals. Large-Sized Multipurpose Co-operative Societies (LAMPS) are meant to meet these needs. If LAMPS are to be effective, they have to be streamlined and restructured to produce short, medium and long-term credit for agricultural purpose to meet expenses incurred in certain social obligation, primary processing of minor forest produce and the promotion of thrift.[3]

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* This paper takes a leaf out of the author's Ph. D. Thesis on the HRD for poverty alleviation.

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In the promotion of thrift among the beneficiaries and in the assignments of comprehesnive package the LAMPS' experience is a distinctly different approach from other poverty alleviation measures which do scarcely contain anything other than provisions. Such provisions without the necessary preparation at the HRD level are expected to run into unsustainable doles. On the other hand, human capital formation directed specifically at enterprise generation and instituting indigenous saving and investment can have some real income and asset generating effect from within a society. It is with a view to this kind of poverty alleviation consideration that a micro-level study in the perspective of a particular people in its own aspirations and organisation is attempted. Health and education aimed at eradicating sickness of body and mind are necessary, but the sufficient condition from the point of view of poverty alleviation may be directed at overcoming one's own shortcomings which left him poor after all. An individual's achievement in promoting well-being is a vector of his functioning within prevailing conditions of nutrition, health and avoiding escapable morbidity etc. (Dutta, Panda, Wadha, 1994)[4]. We find that the role of the individual and the Man is necessary in human resource conceptualisation.

II

LAMP— ITS WORKING IN GOPIBALLAVPUR I BLOCK

The Gopiballavpur I block in Jhargram sub-division of the Midnapore district formed part of the western plateau of West Bengal. The river Subarnarekha divided Gopiballavpur with blocks I and II. The block I constituted the southern portion bordering Orissa and Bihar. The choice of the area was on the ascertaining of the best performing LAMP in the state. This suited our attempt at evaluating poverty alleviation, not measurement. The apex body[5] in Calcutta helped sort out the best in terms of both quantity and quality.

In Jhargram, 30 percent of the 7 lakh population constituted the scheduled tribe. In Gopiballavpur I block 34 percent of 68,288 people formed the STs by the 1981 census. They formed by far the major part of the agricultural laborers. Their title is 'Singh'. Some of them owned the barga right over 18 decimel land, leaving cultivation an unviable pursuit.

Concentration of tribals in drought prone areas is the testimony of the vicious circle of poverty. They lived there because they were poor as also they were poor because they lived in the drought-prone area. We might consider a hypothetical policy of population exchange. Unfortunately, this won't work because poverty is a habit and soon the economically green area will be turned into gray by the lack of zeal on the part of the backward people. A people is poor because its members are backward. If this is true, efforts need be directed at eradicating backwardness and not poverty.

Backwardness has got its manifestations. In Darjeeling, e.g. people are outwardly very forward, but they lack in the saving and investment habits. Education and literacy go abegging in the alter of the hill habit of mercurial style of high spending. In contrast, Jhargram in its Gobiballavpur I block has an 'excess' of saving, and that even within its LAMPS which is the organisation of poor people.

As we take stock of the functioning of the Saria-Kendugari LAMP situated at the Chatinasol village during its formative years we find the following picture (Table 1).

The LAMP concerned starts with a membership of 485 among the Tribals in 1977. These people contributed Rs 2,285 as core capital toward the formation of the LAMP.

The state government extended @ Rs 65,000 per year for 5 years. In the meanwhile the tribal share had increased by leaps and bounds and the state quickly reached the maximum limit of Rs 85,000 per year in its share capital contribution.

The enthusiasm of the Tribals in subscribing to the LAMP in terms not only of membership but even contributing to capital knew no bounds in their new found zeal against existing activities consisting of purchase and sale proceeds of 'Kendu' leaves and 'sal' seeds. Collection, purchase and sale of the minor forest products (MFPs) etc. between 1977-78 and 1984-85 are shown in Tables 2 and 3.

These had their clearest contribution felt on the number of man-days created (Table 4) and the number of persons benefited (Table 5). The only dark side encountered was in short-term loans recovery. It remained a sad tale except for the year 1982-83 when there was a spurt in collection (Table 6).

Before the introduction of LAMPS, the tribal collection of Kendu leaves was exploited in various ways. The year 1979-80 was the last year of private purchases from them by the Mahajans. The above collectors were paid between Re 1 and Rs 1·50 per 3021 leaves. The LAMPS purchases began in 1980-81. Instantly, the rates were revised to Rs 3·00 per 2000 leaves. The collectors at Gopiballavpur I jungle area No. 4 and 7 could get @ Rs 6·00 per manday of collection. Thus the severity of poverty was surely reduced.

The LAMPS further proceeded to arrange marketing of the leaves through the TDCC. The local merchants tried to extend the counterpart of 'dumping' the TDCC efforts by offering to pay higher prices. To that extent the LAMP was loser on this score at least for its formative years. During the years 1984 and 1985, those who could arrange sales directly to the private merchants maintained more profit margins. This extra margin too could be seen as bye-product of the LAMPS.

Inspired by the success, the Saria LAMP went on adding to the tally of its activities. Apart from agricultural loans and large finance, the LAMP concerned had aspired to the development of a Sabui Rope industry for which the required sum of Rs 2,57,300/- was sanctioned by the state government. Also under active consideration were a small soap factory, one or two bidi factories etc. The society nourished in its thinking a desire to execute contract works under the ITDP scheme.

Of all the activities, Kendu leaves proved to be the very basic and most profitable. In the year 1985, it made a profit of Rs 2 lakhs out of it. Sal seeds too returned a handsome margin of Rs 46 thousand in that year.

However, Mahua flower collection had to be given up due to the losses incurred. Tassar made a marginal gain and was not found sustainable in the long-run. Copplice coupes survived some initial set back.

Collection of Sabui grass could not be continued in view of the dashed hope of developing a small scale industry in the line. Alternatively, purchases of the grass from the neighbouring state of Orissa continued.

The formative years of the LAMP was thus marked by the hopes of stepping out from the primary to the secondary activities. In actuality, people had to be contented with some organisation of the existing activities only.

It must be recalled in this connection that the Bawa Committee had specifically suggested that the LAMPS were not meant for the distribution of doles. The activities of the LAMPS differed in the sense that the members had to take their own dicisions. Governmental provisions were marked by absence. Ultimately, such authorities were to withdraw altogether from the working of the LAMPS. The latter was to feed for itself. Thus, it was enterprise generation which was emphasised.

For the IRDP and other projects, HRD meant provisions of infrastructure, health, education etc. The term 'Provision' is a non-starter in the case of the LAMPS. Thus, the purpose of the HRD is restricted in LAMPS to enterprise generation only. This one point emphasis makes the LAMPS a distinct experience.

The particular Chhatinasol LAMP took the intiative in baptising the SC and ST population of the area under its operation to some real 'Own' effort through awareness in HRD. It had the effect of reviving hopes among the down-trodden sections of the society. Slowly it was developing steadily also. It could conjure up some of the suggestions of its own to be transmitted upward through the proper channel. Unfortunately, it accosted a set back in the process as the authorities in the TDCC could hardly rely the LAMPS members to take their own decisions even though the former vochesafed for the same in its policy. Such of the HRD considerations proved to be a myth. The LAMPS caught in the wrong foot, realised after some shock that poverty alleviation measures for their members were no different from others of its kind. It did invariably and unexceptionally end up as commands from above, at least in actual implementations.

It was obvious that the authorities would prefer presenting the picture of poverty alleviation in terms of their own expenditures, rather than any other criteria derived at the receiving end.

III

CONSTRAINTS IN POVERTY ALLEVIATION

On the 1st August, 1993, the Chhatinasol (Saria-Kendugan) LAMP of Jhargram held its AGM of the 16th year of its existence. Out of an ST population of 14,000 for the area of operation under the Lamp 2572 now took the membership of LAMPS. It covered 10 percent of the total population and 20 percent of the ST. Therefore, 80 percent of the people remained unattached to it after fifteen years.

Within the limited membership and activities confined to the primary levels, the LAMPS could still catch up to the capabilities of borrowing more than Rs 4 lakhs. The ratio of own

fund to borrowing was 2 : 1. What is shocking is that LAMP concerned had to deposit in bank account a sum of Rs 38,000 because it ran short of the way to utilise them.

The 1993 profile of the Chhatinasol LAMPS hides more than it reveals. It shows firstly, that the LAMP concerned gave up the process of record keeping for whatever reasons not excluding the possibility of near stagnancy. Secondly, it came to business, rather than economics of the HRD as revealed by the Tables (7 & 8). Thirdly, in business too there remained hardly more avenues than maintaining bank accounts.

IV

CONCLUSION

In poverty alleviation the constraint is not fund but enterprise. The latter commodity again is not really lacking among the poor but among the authorities. It is the apathy to accept people's participation rather than the lack of it which was responsible for a continuing legacy of poor living. There is the need for enterprise generation among the people for poverty alleviation. Provision is necessary, but sufficient condition for poverty alleviation is participation by the people.

Table 1 Participation by the tribals in LAMP, 1997-85

Year	Total Members	Tribal Members	Tribal Share Capital	Govt. Share	Share of other Members including the SC members.
			(Rs)	(Rs)	(Rs)
1977-78	486	485	2,285	65,000	9,540
1978-79	1617	1240	10,400	65,000	12,360
1979-80	1788	1314	15,850	65,000	13,890
1980-81	1766	1314	35,850	65,000	13,890
1981-82	1945	1430	37,940	65,000	19,787
1982-83	1963	1440	38,640	75,000	21,052
1983-84	2126	1522	38,568	85,000	21,592
1984-85	2144	1527	40,348	85,000	22,292

Source : LAMP Register, Chhatinasol, Gopiballavpur - I.

Table 2 Purchase and Sale proceeds of 'Kendu' Leaves (Rs. Lakha)

Year	Purchases	Sales	Net proceeds
(1)	(2)	(3)	(4)
1980-81	6·30	6·74	0·44
1981-82	6·08	4·57	1·51
1982-83	3·86	2·51	1·35
1983-84	5·13	7·13	2·00
1984-85	6·30	8·47	2·17

Source : Ibid

Table 3 Purchase and Sale proceeds of 'Sal' Seeds

Year	Amount of Purchases in metric tonnes	Purchases (Rs. Lakhs)	Sales (Rs/ Lakhs)	Net proceeds (Rs. Lakhs)
(1)	(2)	(3)	(4)	(5)
1980-81	252	2·05	2·51	0·46
1981-82	120	0·99	1·60	0·61
1982-83	140	1·24	2·14	0·90
1983-84	30	0·43	0·45	0·02

Source : Ibid

Table 4 Number of Mandays created

Year	Kendu Leave	Sal Seed	Tassar	Coppice Couples
(1)	(2)	(3)	(4)	(5)
1979-80	1,25,000	—	—	—
1980-81	1,26,850	16,000	—	660
1981-82	1,22,453	9,450	—	—
1982-83	1,16,420	10,200	—	1,680
1983-84	1,53,520	5,962	—	—
1984-85	1,71,670	6,378	—	—

Source : Ibid

Table 5 Number of persons benefited

Year	Kendu Leaves	Sal seed	Sabui Grass	Coppice Couples	Mahua
(1)	(2)	(3)	(4)	(5)	(6)
1979-80	8150	—	—	—	—
1980-81	8454	4000	400	50	485
1981-82	7850	4000	—	80	—
1982-83	8200	4100	—	—	—

Source : Ibid

Table 6 Short-term loan issues & collection

Year	Issues	Collection	% of collection	No. of beneficiaries
(1)	(2)	(3)	(4)	(5)
1978-79	21,300	15,800	—	140
1979-80	1,07,150	22,142	29	445
1980-81	37,900	25,273	34	70
1981-82	1,07,781	98,731	55	343
1982-83	78,990	65,995	32	295
1983-84	—	56,190	—	—
1984-85	20,450	10,143	—	32

Source : Ibid

Table 7 Business turnover (Rs.)

Items	1987-88	1988-89	1989-90
Consumer items	1,42,437	1,81,250	1,02,313
Kendu Leaves	6,08,278	3,34,250	43,04,313
Five Wood	242,796	—	22,04,702
Fertilizer	—	—	7,200
Total	9,93,511	5,15,400	46,18,528

Source : data collected from the Chhatinasol Lamp.

Table 8 Stock in trade (Rs.)

Items	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93
Kendu Leaves	2,14,999	15,77,740	4,40,050	11,69,140	3,16,280	—
Consumer Items	27,496	37,655	1,24,172	1,37,809	1,69,487	2,61,111
Kendu proce-						
ssing Meterials	39,337	97,336	43,452	15,497	85,866	
Sal Seeds	—	1,24,784	—	88,092	Nil	—
Fertilizer	—	—	—	13,576	25,858	
Sabui Grass	—	—	—	2,886	1,22,500	
Total	2,81,832	18,37,525	6,07,674	14,27,000	5,98,143	

Source : Ibid

Notes and References :

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