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A Critique of the Green Revolution in West Pakistan

Introduction

Pakistan's agricultural economy stands poised at a critical stage of its history. On the one hand it is witnessing the emergence of capitalist farming and the rise of a class of 'elite' farmers, who pride themselves in the achievement of the agricultural breakthrough in production or what is more popularly known as the 'green revolution'. On the other, stand the small farmers,* the tenant farmers and the landless labour force, comprising the overwhelming majority** of the rural population who have been left out of this green revolution. In fact quite a few of the tenant farms have been evicted from the land and the smallest farmers have had to sell out as capitalist agriculture spreads in the countryside with all its historical ill effects.

In between stands the government bent upon maintaining the momentum of growth generated by the green revolution, but committed to improving the lot of the small farmer, the tenant cultivator and the landless labour—the major force from which the People's Party draws its support.

This paper is divided into two parts. In the first part, we have discussed the nature of the 'green revolution' and then seen in detail Pakistan's outstanding achievements in the agricultural sector in the sixties. In the second part, we have pointed out the major weaknesses of this agriculture breakthrough with special emphasis on the conflicts, social unrest and tensions which it has generated. The purpose of highlighting these weaknesses is to help the government in the framing of its new agricultural policy.

Nature of the Green Revolution

It is now commonly agreed that the breakthrough in agricultural production was not just the result of the scientific discoveries of high

*A small farmer is defined as one with less than 12.5 acres of land.

**About 90% of the rural population

yielding miracle seeds. But far more important were the accompanying technological and social conditions necessary for its adoption. Also as the green revolution continues, it is becoming abundantly clear that the earlier expressed optimism, that it has solved all problems, is to quite some extent unfounded. For between the 'technological breakthrough' and the period of 'sustained economic growth', there still remain very important stages which have to be crossed.

For the purpose of analysis the green revolution can be divided into four different stages (a) Scientific breakthrough (b) Technological breakthrough (c) Production breakthrough (d) Agricultural breakthrough.

Scientific Breakthrough*

The first stage in the green revolution was the discovery of the high yield varieties of seeds. This is usually associated with the Mexican wheat varieties (Mexi-Pak) developed in the International Corn and Wheat Improvement Centre (IMMYT) and the high yielding rice varieties in the International Rice Research Institute (IRRI) in the Philippines.

Technological Breakthrough

The next stage in the green revolution is to make available the various inputs indispensable for cultivating the new varieties, so as to ensure the successful adoption at the farm level of the new technology. This means that farmers should have easy availability of such inputs as fertilizer, chemicals and the acquisition of water which are all essential for the cultivation of the high yielding seed (hereafter referred to as HYS).

Production Breakthrough

This stage consists of the spreading of the new technology as widely and rapidly as possible and solving the crucial problems of the supply at a large scale of fertilizer, chemicals, machinery, water and the new varieties of seed. This raises important question for the government as regards to the pricing of inputs and outputs. At what prices are the inputs to be provided and if they are to be subsidised, at what rate of subsidy? A sound system of financial credit has to be worked out for providing finan-

*In this connection it should be pointed out that there has been a tendency to play up the role of foreign agencies and to play down the achievements of local scientists and research institutes in this scientific breakthrough. The role of local scientists has been especially important in developing new varieties of the miracle seed which is essential for sustaining the green revolution.

cial help to the farmers, for the investment required for cultivating the HYS is far greater. Also the marketing system has to be improved upon.

Agricultural Breakthrough

The stage of agricultural breakthrough, means that the effects of the green revolution should now be very far spread. It should cover all the main crops and also the various enterprises of animal production. But most important of all its impact should be felt by the mass of the producers, especially the small farmer and landless labour and that the benefits should be passed on to the consumers.

It must be remembered, however, that at each stage there are considerable difficulties involved and some of them are not solved even when you move on to the next stage. For example in the 'scientific breakthrough' stage there still remains the problem of the seed being susceptible to damage by pests and diseases. Also very important is the need for constant discovery of new seeds to sustain the rate of growth of agricultural production.

Pakistan in relation to these stages

Where Pakistan actually stands in relation to these stages will be far clearer when we have gone into the achievements of the green revolution and pointed out its major weaknesses. It is, however, generally believed that we have successfully passed the stage of the technological breakthrough and have also achieved the production breakthrough by becoming almost self-sufficient in food production. The major problem, however, is that the production breakthrough is limited to the bigger farms who can afford the new inputs and that this has created situations of social tensions and instability. It was not surprising therefore that the entire country revolted against the Ayub regime at a time when the agrarian economy was also having a record wheat harvest.

The Achievement

That Pakistan's achievement in the agricultural sector is impressive cannot be denied. It was because of this performance that Odvar Aresvik wrote in 1969, 'the government and the people of Pakistan should be saluted for the results which are unprecedented among the developing countries of the world now the battle for manifold production is over West Pakistan has provided a model for the hungry nations of the world'.¹

To understand the true significance of this achievement one must look into the experience of the agricultural sector as it unfolded over the last 25 years in this country.

Between 1947 and 1959-60 very little happened in the rural areas of West Pakistan. Major crops grew at slightly more than 2% annually, about the same as the rate of population growth. The decade of the sixties, however, saw a radical change in the situation. In the Second Five Year Plan (1960-65) agricultural production grew by 3.8% p.a. and for the first four years of the Third Plan a rate of growth of agricultural production of 6% per annum, was claimed. Major crops grew at over 5 percent annually, with rice, wheat and coarse grains roughly tripling their earlier growth rates as can be seen from the following table :—

TABLE 1

Average Level and Rates of Growth in Crop Output by Time Period

West Pakistan	1949-50 to 1959-60		1959-60 to 1968-69	
	Rate of growth %	Average production 000 Tons	Rate of growth %	Average production 000 Tons
Rice ..	1.9	853.6	6.5	1,279.8
Wheat ..	1.1	3,449.2	5.2	4,521.9
Barley ..	2.1	126.4	—4.0	108.6
Coarse Grains ..	0.5	993.0	3.4	1,164.1
Grain ..	1.8	583.9	—2.6	578.8
Oilseeds ..	5.0	207.6	No trend	227.1
Sugarcane ..	6.6	8,564.2	7.7	17,207.0
Cotton ..	2.3	273.0	6.5	399.1
Tobacco ..	9.0	44.8	10.1	91.1
All Major Crops ..	2.3	—	5.4	—

Source : J.S. Stern and W.P. Falcon "Growth and Development in Pakistan 1959-69".

Factors Responsible

The phenomenal growth in West Pakistan's agriculture can be broken into two periods :

- (a) The period between 1960 and 1964/65 when additional irrigation water was the cutting edge of development.
- (b) 1965-66 to 1968-69 when in addition to continued increases of supplementary irrigation water, chemical fertilizer applied on new varieties of wheat became significant.

The tubewell era, beginning roughly in 1960, found large numbers of private farmers installing irrigation wells and by the mid 1960's annual rates of installation reached 9000 to 10,000, adding approximately 2 million acre feet of irrigation water annually. In addition to the private wells, there were a number of public tubewells installed and by 1968 more than 5000 of these large scale wells were in use.

The second phase in West Pakistan's agricultural development is associated with the seed-fertilizer revolution. The new high response varieties of wheat and rice made an enormous impact on the agrarian economy. Wheat production increased to 6.5 million tons in 1968-69 compared to 4.5 million tons only two seasons previously. Similarly rice production reached a record level of 2 million tons in 1968-69 compared with a level of 1.3 million tons obtained only two seasons earlier.

The direct cause of the shift in the agricultural production function was of course the use of inputs like fertilizer, seeds, water etc. However, one must also take into account the government's pricing policies especially of subsidies provided on virtually all purchased inputs (fertilizer subsidy alone stood over Rs. 100 million in 1967-68).

TABLE 2
Selected Agricultural Inputs by Time Periods

<i>West Pakistan</i>	1959-60	1964-65	1968-69
Area under principal crops (000 acres) ..	28,505	31,115	32,833
Fertilizer use (000 Nutrient tons) ..	19	86	246
Number of public tubewells ..	N.A.	2,500	9,000
Number of private tubewells ..	4,214	25,000	66,000
Area under high yielding wheat varieties (000 acres) ..	Nil	Nil	5,850
Area under Irri Rice varieties (000 acres) ..	Nil	Nil	760

Source : Gotsch C.H. & Falcon W.P. 'Agr. Price Policy and the Development of W. Pakistan,' Vol. I, Final Report (AID/OSTI MIMEO).

TABLE 3
SUBSIDIES ALLOWED FOR VARIOUS INPUTS IN AGRICULTURE IN
W. PAKISTAN DURING THE THIRD PLAN PERIOD

		Million Rupees.					
		1965-66	1966-67	1967-68	1968-69	1969-70	Total
Fertilizer	..	75.2	124.5	88.9	117.5	122.1	528.2
Plant Protection	..	15.2	17.5	30.3	30.6	25.4	119.0
Seed	..	0.7	2.0	3.0	2.7	1.6	10.0
Mechanisation	..	25.6	37.3	27.8	38.4	39.0	168.1
Total :	..	116.7	181.3	150.0	189.2	188.1	825.3

Source : Hamid : J. "A Review of the Agricultural Breakthrough in West Pakistan"—Punjab University Economist, June 1970.

Major Weaknesses

After having looked into the nature of the green revolution and outlined its achievements we will now discuss in detail its four major failures bringing out the conflicts, social unrest and tensions which it has generated. There is now considerable evidence to show that

- (i) the gains of the green revolution have been limited to the bigger and the better off farmers who could afford the technological pre-requisites for cultivating the miracle seed i.e. adequate water, fertilizer, credit etc.

- (ii) it has been uneven in its economic impact as far as different areas are concerned. Not only is this division marked between different provinces of West Pakistan but also within the different regions of the Punjab especially between the canal colony and other areas.
 - (iii) The introduction of mechanised farming, (facilitated and made profitable by a pricing policy which considerably underestimated capital costs), has led to the displacement of tenant farmers and small farmers with corresponding increases in the landless labour force.
 - (iv) the Government has been unable to expropriate the 'surplus' generated in the agricultural sector. This is because of an archaic and income and price inelastic taxation system, resulting in considerable increase in consumption expenditure by the richer farmers and furthering inflationary pressures on the economy.
- Let us now look into each one in turn.

The Green Revolution and the 'Elite' Farmer Strategy.

That the green revolution has been limited to the larger and better off farms is now recognised by almost all economists.* As Aresvik has pointed out 'the production breakthrough upto 1967-68 was most likely concentrated mainly among 10% of the bigger farmers operating 40% to 50% of the farmed area.'²

Hamza Alavi in his article states, "the impact of the so called 'green revolution' in different strata of the rural population has been quite uneven. Because it was mainly those who cultivate large holdings that benefitted most and those who cultivate small holdings have benefitted less, one consequence of the 'Green Revolution' has been to widen disparities in income and wealth between different strata of the rural population."

*The only evidence to the contrary is presented in the 'Fertilizer and Mexican Wheat Survey Report 1970' published by the Bureau of Statistics, Planning and Development Department, Government of the Punjab. According to this survey over 80% of the farmers in the Punjab use Mexican wheat irrespective of their size of holdings. This study was conducted in 1969 and covered the wheat crop for that year.

It should be pointed out that surveys carried out by Government agencies are not a reliable sources of information. Their purpose in most cases is to show the 'good work' the government is doing and are mostly used for propaganda purposes. This survey is no different.

He in fact further goes on to state, "In general the lowest strata of the rural population have benefited little from the green revolution and the position of many has actually *deteriorated*".³ Gotsch and Falcon also came to the same conclusion when they wrote—"the momentum of growth in West Pakistan, has been largely confined to the medium to the large scale farmers in the irrigated area of the province."⁴

Who are the Small Farmers ?

If we take the small farmer as one with less than 12.5 acres, although they represent only 32% of the total farm area they comprise 77% of the farms in West Pakistan.

TABLE 4
Number and Area of Farms in West Pakistan Classified by Size

Farm Size	Number of Farms (Percentage of total)	Cross Area (Percentage of total)
Small Farms (under 12.5)		
0—5	49%)	9%)
5—12	28%) 77%	23%) 32%
Medium Farms (12 to 25)	15%	25%
Large Farms (25 and above)	8%	43%

Source : Agricultural Census 1960

Small Farmers and the Green Revolution

There is considerable evidence to suggest that the area under the HYS variety is still not more than 40% even in the most fertile areas of the Punjab. A survey of Mexican wheat farmers covering Punjab and Sind carried out in 1968-69 showed that the area under Mexican wheat as a percentage of total farm area for the Punjab was 30 per cent and in Sind the figure was 11 per cent.⁵

Since most of the area where the farmer has not shifted over to the

HYS is covered by the small farms let us look into the main reasons why he has not done so.

The following can be the possible reasons for his not having changed over :—

- (i) It was not profitable for him to do so at the governments present support price of major crops.
- (ii) Because it entails higher costs, it is not within his financial reach to undertake the investment.
- (iii) Important inputs especially water and seed are monopolised by the larger farms.

As far as the first reason is concerned it is true that the HYS requires far more inputs/acre as compared to the local varieties. For example the cost per Mexi Pak acre is about 30 per cent higher than the local wheat.⁶ However, since the yield per acre is also higher for Mexi—Pak the important thing to see is whether the HYS takes more, less, or equal resources per maund of output as compared to the local wheat. It can be shown that in terms of land, water, labour, seeds and other inputs the new variety takes less per unit of output.⁷ Therefore the support price of wheat becomes irrelevant to the choice of the process of production as the input coefficients are such that Mexi Pak would always be produced irrespective of the price of wheat.⁸

The reason, therefore, for the small farmer not shifting to the HYS is not that it would be unprofitable for him to do so. The answer lies in the next two reasons that the investment required is not within his reach, especially if you take into account the risk factor, and that important inputs are monopolised by the larger farms. In fact the evidence available bears this out.

In terms of inputs it is now generally agreed that the availability of water is the most binding constraint for the cultivation of the HYS. Perhaps the most important reason for the increase in water has been the sinking of tube-wells especially during the Second Five Year Plan and this has been a crucial factor in the cultivation of the HYS.* The distribution

*Increased availability of water is a crucial pre-condition for the increase in other inputs also because adequate and timely watering is needed for increased application of fertiliser and these two, in turn, are necessary conditions for profitable cultivation of the high yielding varieties of seed. *One might, therefore, go so far as to say that tubewell development was the most important single factor which contributed to the Green Revolution.* (H. Alavi Opt. cit).

of tube wells by the end of 1969 by size of area owned as Table 5 clearly shows that the small farmers owned less than 4 per cent of the total tube wells sunk.

TABLE 5

Distribution of Tubewells by Size of Area Owned by Tubewell Owners

Size of Area owned		Number of Tubewells	Percent
No area*	..	4,680	7
Under 13 acres	..	3,320	4
13—25	..	15,240	20
26—50	..	18,050	24
51—100		14,240	19
101—200	..	9,120	12
201—500	..	5,550	7
501 and over	..	5,520	7
Total : ..		75,720	100

Source : 'A Report on the Farm Mechanisation Survey 1968'. Ministry of Agriculture & Works, Government of Pakistan, Lahore.

In the case of the other important input for the cultivation of the HYS, fertiliser, a survey showed that for farms less than 5 acres 80% use no fertiliser at all.⁹ Although a large percentage of farmers from 5 to 12 acres use fertiliser, compared to the large farms they are using almost 50% less nutrient pounds per acre for both HYS and local varieties.¹⁰ Why small farmers are not using any fertiliser at all, for farms less than 12.5 acres, 79% listed the reason as lack of funds and 35% as lack of water. Farmers who were using fertiliser but were using less than the amount they would like to use, 93% listed the main reason as lack of funds and 25% as due to lack of water.¹¹

*These are those entrepreneurs who have sunk tubewells primarily for selling water.

Since the investment for HYS is greater and not within the small farmers reach, one way the government could have tackled the problem was through providing loans for the smaller farms. The fact that the government extended its credit facilities mostly to the larger farmers is evident from Table 6 below. The major reason for this being that the small farmers could not provide the required security for drawing the loan.

TABLE 6

Loans paid according to size of holding during the year
1970-71 (West Pakistan)

Landless	..	..	5.5%
1 to 3 acres	..	..	0.5%
3 to 12 acres	..	..	7.6%
12 to 50 acres	..	..	36.3%
50 to 100 acres	..	..	37.8%
Over 100 acres	..	..	12.2%

Source : 'Agriculture Development Bank of Pakistan, Annual Report, 1970. (p. 25).

Another factor responsible for the small farmer not cultivating HYS is the difficulties he faces in the procurement of some of the inputs like the latest varieties of seed and fertiliser at the proper time. Since these inputs are distributed by government agencies, and especially at sowing time they are in great demand, they are in many cases available at a 'premium' *i.e.* paying extra money or bribing the local government officials. Obviously the small farmer can never muster the resources to do so.

We must, therefore, conclude that the 'Green Revolution' has been primarily an elite farmer strategy in which the small farmer has been left out because, either, he does not possess the financial resources or the important inputs essential for the cultivation of the HYS is monopolised by the larger farmers.

Regional Disparities in the Agricultural Development of West Pakistan. *

An important aspect of the Green Revolution which has received far less attention than it seems to deserve is that not only has it been limited to the larger and better off farms, but in West Pakistan it has been concentrated in the provinces of the Punjab and Sind. In the Punjab also the barani areas have not been affected by the green revolution.

A look at table No. 7 will show that there were already very marked differences in the agriculture wealth of the provinces of West Pakistan. The figures for 1969-70, however, clearly shows that over these years the relative position of N.W.F.P. and Baluchistan has further deteriorated. In the case of wheat, for example, N.W.F.P. which in 1964-65 was producing 7.2. % of the total wheat crop, was producing only 3.3. % in 1969-70. Similarly Baluchistan's share decreased from 1.8% to 0.8%. Figures of production for the different divisions of the Punjab also shows that Rawalpindi Divisions (barani) position has worsened in the period between 1964-65 and 1969-70.

These marked differences in the relative agricultural development of different areas once again brings out the importance of the increased availability of water, as the most important factor responsible for the increase in agricultural production. Tubewell development in West Pakistan has been highly concentrated in the Punjab and according to the 1968 Farm Mechanisation Survey 91.2 % of the tubewells in West Pakistan are located in the Punjab, of which only 3 % were in Rawalpindi division.

*Hamza Alavi in his article has studied this problem in great detail. In his study however, he has compared the figures of production of 1964-65 with 1968-69.

TABLE 7
Regional Share of Crop Production in West Pakistan

		1964 — 65		
		<i>Wheat</i>	<i>Rice</i>	<i>Cotton</i>
N.W.F.P.	..	7.2%	1.1%	0.1%
Baluchistan	..	1.8%	0.2%	—
Sind	..	12.6%	48.5%	21.0%
Punjab	..	78.4%	49.8%	78.9%
of which				
Rawalpindi Divn.	..	11.24%	6.59%	2.12%
Sargodha Divn.	..	27.57%	7.47%	22.55%
Lahore Divn.	..	16.35%	70.38%	4.47%
Multan Divn.	..	33.94%	12.31%	55.01%
Bahawalpur Divn.	..	10.88%	3.07%	16.46%
		1969 — 70		
N.W.F.P.	..	3.3%	2.1%	0.06%
Baluchistan	..	0.8%	1.1%	—
Sind	..	15.6%	47.8%	25.44%
Punjab	..	77.3%	49.8%	74.5%
of which				
Rawalpindi Divn.	..	7.20%	6.46%	0.80%
Sargodha Divn.	..	29.03%	9.78%	15.88%
Lahore Divn.	..	17.97%	65.36%	3.25%
Multan Divn.	..	35.77%	14.38%	59.45%
Bahawalpur Divn.	..	9.99%	4.00%	20.51%

Sources : Development Statistics of Punjab, N.W.F.P. Sind and Baluchistan, Vol. 3 No. 2, Planning and Development Department, Government of the Punjab.

Tractor Mechanisation

An important feature of the green revolution was the introduction of mechanised farming which has affected the very fundamental property relations as they existed in the agrarian economy. The introduction of capitalist farming, in certain areas, can be attributed to the introduction of mechanised farming there.

Since the question of mechanisation involves very important socio-economic consequences we must, therefore, study it in detail and try to answer the following important questions which are raised :—

- (a) Was mechanisation essential for the seed-fertiliser revolution ?
If not then why was it introduced.
- (b) What is the impact of mechanisation *viz.* displaced labour and whether this will be absorbed in the non-agricultural sector.
- (c) Has it altered the nature of feudalism as it previously existed and are the class of 'new entrepreneurs' different from their feudal predecessors.

Mechanisation and the Seed Fertiliser Revolution

This question revolves around the fact whether tractor mechanisation leads to an increase in productivity per acre. From the studies of economists who have made detailed investigations into this question it appears that it does not. Bose in his study concludes "it is very doubtful whether yields will increase as a result of replacement of bullocks by tractors. There is *no* satisfactory evidence that tractor mechanisation will increase yields".¹² (emphasis added)

Similarly Kaneda writes, 'there is no evidence that tractor mechanisation will increase yields ; output per worker will rise only by causing unemployment'.¹³ He goes on to state "It seems quite clear now that the key to increase production and yield is not generally more mechanised power but more of such inputs as 'miracle' seeds, water, fertilizer etc."¹⁴

The case for tractor mechanisation, according to Bose, rests on three claimed benefits which accrue due to its introduction. The first is that it increases cropping intensity. Second, that it improves the quality and speed of agricultural operation and lastly the benefits that will accrue from eliminating bullocks.

As far as the first benefit of increasing cropping intensity is concerned it rests on the assumption that land is the scarce resource. This, however, is not true, for the constraining resource in Pakistan's agriculture is not

land but water. There is only enough water available to irrigate about 29.3 million acres of land on a long term basis, at an average cropping intensity of about 150 per cent, whereas the total culturable land is about 73 million acres.¹⁵ Higher intensities will result in a higher return to the individual farmer, but not necessarily to society. This is simply because the additional water required for increasing the intensity from say 150 per cent to 200 per cent, on one farm must be taken from other farms, resulting in an equivalent lowering of intensities there. Thus, mechanization cannot result directly in an increased farming intensity in West Pakistan.

The second argument emphasizes the increase in yields which are supposed to result from improvements in both the quality and speed of agricultural operation. A tractor can plough deeper and faster. However, quality and speed are to a large extent, substitutes for each other. If one has time one can improve the quality of the operation regardless of how little power is available. The important constraint is therefore of time as there is an optimum planting date for any crop in a particular environment and if planting is delayed beyond this date, the yield is decreased. In West Pakistan this problem is especially important in getting the Kharif (Summer) crops planted. However, this bottleneck can be removed by less expensive methods than full agricultural mechanization. One way would be to mechanize the threshing of wheat. Small mechanical or even hand driven threshers could be produced by the local industry. Also many ways could be found by which animal powered operations can be speeded up.

The last advantage is the benefits that would accrue from eliminating the use of animal power. This can be done by calculating the gross social cost per working animal and after subtracting the total benefits to get net social cost. This is then compared with the potential social benefit of introducing tractors with their costs. Bose in his study calculated the gross social cost per working animal (two livestock per working animal) to be about Rs. 600 approx., after taking into account the opportunity cost of cultivating fodder, bhoosa etc. The total 'benefits per working animal are about Rs. 50 which gives the figure of Rs. 550 as the net social cost per working animal.

On the assumption that one pair of bullocks is required for every 15 cropped acres, one fifty horsepower tractor would replace from 7 to

10 bullocks. The potential social benefit of introducing one tractor horsepower to replace bullocks is therefore Rs. $\frac{550 \times 14}{50}$ or Rs. $\frac{550 \times 20}{50}$ i.e.

Rs. 150 to Rs. 225 roughly. The total annual social cost of one tractor horsepower (capital costs plus current costs) is, however, well over Rs. 200/-. This shows that there is hardly any margin of benefits over costs in social terms by replacement of bullocks by tractors. Furthermore, it must be remembered that all bullocks will not be eliminated. Some bullocks may be retained either as insurance against mechanical power or because the tractor cannot replace all the operations performed by the animals. In that case the benefits derived from bullock elimination would be correspondingly reduced.

Way was it Introduced ?

Since the social costs of mechanization (especially after taking into account labour displacement) far outweigh the social benefits, the question arises as to why was it introduced. The answer of course is that the individual farmer when he buys a tractor does not take into account the social costs and benefits but maximises his private profits on the basis of market prices. The private profitability of tractor mechanisation was facilitated by the governments pricing policy towards agriculture. Inputs were available to farmers with considerable subsidies, especially on fertilizer, pesticides and water rates. Then the government had granted tax and tariff exemptions to the imports of agricultural investment goods and licences were provided for imports at the artificially low official rate of exchange. (Rs. 4.50 per \$ whereas the effective exchange rate was nearer Rs. 8.50 per \$). On the output side also the government had introduced support prices for agricultural commodities which far exceeded the then prices at the international level.

All this made it very profitable for the larger farmers to introduce mechanisation and led to the paradoxical situation that the cheap input (labour) was being replaced by a relatively dearer input (capital).

Displacement of Labour

In most of the other countries where tractor mechanization has been introduced, it is because of shortage of labour resulting from large movements of labour to other sectors. The situation in West Pakistan is, however, very different. The agricultural sector is already very densely

populated and there is considerable existing unemployment and under-employment. One important characteristic of tractor mechanization is that it will displace labour from the farms in which it is introduced and this will add to the landless labour and increase population pressures on the smaller farms with dire social consequences. As Bose points out "Mechanisation of cultivation will surely displace a substantial portion (between 1/3 and 1/2) of labourers and remove many tenants from the land particularly in the irrigated areas of the Punjab where tractors are increasing most rapidly. It will benefit the large rich landlords and farmers and hurt the small farmer tenants and landless labour. It will tend to polarise the rural population and breed social discontent".¹⁶

Even under the most optimistic projections of the absorption of labour in the non-agricultural sector (i.e. if it grows at the very high rate of 4.6% and the labour force grows at 3% per annum) the absolute number of the agriculture labour force will continue to grow for several decades to come.

It is not possible to work out exactly the number of persons who have so far been displaced by tractor mechanization. But a crude exercise can be undertaken. Interviewing farmers in the Punjab who have mechanised showed that the labour force per acre had been reduced by about 50 per cent from the pre-mechanization period. The area brought under tractor cultivation according to the Farm Mechanisation Committee was about 3.3 million acres. To this we can add an additional 1.0 million acres since about 5000 new tractors have been introduced since the report of the Committee. The total area is, therefore, now approximately 4.3 million acres.

The 1960 Agricultural Census showed that holdings of 25 acres and above covered about 18 million acres and 1 million labour force or 11% of the agriculture labour force. If we include joint holdings the figure of 20 million acres and 1.2 million labour represents the upper limit for the area that can be brought under mechanisation and the labour force to be affected by it.

Since 4.3 million acres have so far been brought under tractor mechanisation we come to the crude approximation that almost 0.12 million people have so far been displaced (on the assumption that 50% of the labour force has been displaced where tractor mechanization has been introduced).

This must be seen in the light of the fact that there are already about 10 million people in the landless labour group or about 20% of the rural population.

Since the displaced labour will not be absorbed by the non-agricultural sector a vicious circle will set in which will result in the rural population being polarized into the larger rich farms and the small poor farmers. As Kaneda points out 'the tragedy is not only that the small will suffer, as they will suffer, but that the small will have nothing to look forward to despite the apparently promising future with the dawn of the green revolution'.¹⁷

Agricultures New Entrepreneurs

In a country where for centuries past feudalist relations have dominated the economic and political forces in the countryside the introduction of capitalist means of production has obviously very important consequences. It is not possible to go into this problem in detail in this paper but we will touch upon two important aspects.

- (1) The eviction of tenant farmers and replacement by wage labour.
- (2) Has the green revolution given rise to a new class of farmers, the middle class farmers which have vested control from their feudal predecessors.

As far as the first question is concerned there is definite evidence to show that especially over the last five years there has been considerable amount of eviction of tenants from the land and their replacement by wage labour. This is of course the direct outcome of tractor mechanisation which has made it profitable for the farmers to replace tenant farming by hired labour. The only structural difference, as Hamza Alavi points out, between farm mechanisation on large holding and that on medium sized holdings is that in the case of the latter the owners have evicted share croppers in order to resume sufficient land for cultivation by tractors. In the case of the former, however, the practice has been not to evict share croppers altogether but to take over a proportion of the land, as required for mechanised cultivation, from all share croppers and to retain them with diminished holdings as tied sources of labour needed by the big landowners to cope with seasonal harvest operation. Introduction of mechanical harvesting and threshing will eliminate the need for the big land owners to retain sharecroppers as

a tied source of seasonal labours. At the present time, however, a distinction can be made between medium sized land owners who have adopted mechanised farming techniques, for whom the constraint (apart from capital) is land rather than labour and who therefore evict all their share croppers, and big landowners for whom the constraint is labour rather than land and who therefore tend to retain their share croppers on diminished holdings.

The second part that the green revolution was the result of the emergence of a new class of entrepreneurs has been put forward by S.J. Burki.¹⁸ On the basis of a survey of 27 village carried out in summer 1969, and other evidence he concludes, "these figures testify to the fact that in the decade of the sixties the middle class farmer emerged as the new entrepreneurial class in West Pakistan agriculture sector. It was their emergence and not the introduction of high yielding seed varieties that ushered in the agricultural revolution in West Pakistan."

The evidence which he puts forward is as follows :—

- (a) His survey carried out in 27 villages showed that for farmers owning 50 and 100 acres as much as 19.2 per cent was acquired through purchases in the ten preceding years. The proportion of land so acquired was far greater for this category than for any other category identified in the survey. Thus the owners of holdings of less than 10 acres and between 10 and 25 acres held 12.2% and 6.9% less land than they did in 1959. The big landlords in the holdings of more than 100 acres had lost 15.7% of land in the same period.
- (b) If we look into the District wise breakdown of agricultural growth the highest was for the Multan, Sahiwal (formerly Montgomery) and Lyallpur (9 per cent), second were Lahore, Sheikhpura, Gujranwala and Jhang (ranging from 4.9 per cent for Lahore and 8.5 per cent for Jhang) and the least in Jhelum (2.5 per cent) and Mianwali (3.2 per cent). It is no coincidence that the presence of middle class farmers was most noticeable in the districts of Lyallpur, Sahiwal and Multan and least important in the barani areas.
- (c) Using Ghulam Mohammad data (1965) it is possible to argue that the rate of investment in tubewells was considerable in the

case of middle farms and was almost negligible for the very small and very large farms. (See also Table) 7

To the above we can add the last point :

- (d) The farm mechanisation Committee showed that the highest concentration of tractor owners is of those who *operate* 50 to 200 acres of land. Together they represent about 55 per cent of the total tractor owners and a similar proportion of tractors.

Before we look into each of these points there is one very important aspect of the exercise which should be kept clear in ones mind. The figures for landownership in this country must be viewed with extreme caution. A large amount of land, especially after the 1959 Land Reforms, has been distributed by big landlords in the name of their heirs, close family members and even trusted servants. The actual amount of land which they own therefore does not give a true picture of the land which for all practical purposes is effectively under their control. Especially after the election campaign started and perhaps even earlier when the revolt against Ayub took place and the Peoples Party came into the fore-front, many big landlords foreseeing things to come immediately started transferring lands and also evicting tenants.

Now as far as Burki's points are concerned, the first is subject to the obvious criticism that a small survey covering just 27 villages is hardly sufficient evidence to put forward a thesis of such an important nature. Then the two pieces of evidence which he puts forward can be viewed separately and not together as he does. It is in fact quite true that small farmers in a number of cases have had to sell out to the bigger farmers especially where his land stood in the way of his effectively using mechanisation. But why should the big landlord have been forced to sell land when there were apparently no economic pressures on him to do so? The more plausible reason seems the one we have put forward above—that the big landlords have been readjusting their land holding among their family members. As far as the second argument is concerned it has not so much to do with the rise of middle class holdings as with the fact that the areas which had the highest rate of growth were also the ones which had the maximum water facilities available.

Now we come to the last two points. One argument can be that the large landowners are getting sufficient income from their tenant farmers

and therefore have no desire for technological innovation. The middle class farmer on the other hand can make a large increase in his income by introducing tubewell and tractors on his farms. Therefore the middle class farmer emerge as the new entrepreneur class which is the vanguard of the green revolution.

The argument stated above might be quite plausible but it tends to confuse the real situation in the countryside where no such distinction i.e. between middle class and big landlord exists. What has happened in most cases is that the more enterprising member of the feudal family (say because of better education etc.) decided to go in for modern agriculture. Therefore, as far as land operated or even land ownership figures show, it could give the impression that a new middle class farmer has emerged. What in fact happens is that the middle class farmer in most cases is an off shoot of the feudal family. Figures might show them as belonging to different classes but in reality they belong to the same class.

There is also another very significant change which has taken place in the agrarian economy especially in the last decade. This has been the widespread allotment of government lands to both civilian and military officials. Their farm holdings are on the average between 50 to 100 acres. In most of these holdings the original tenants have been evicted and replaced by hired labour, and the new owners have sunk tubewells and introduced mechanised farming. Since in most cases they were serving officials they also found it easier to get loans for tractors and tubewells from the official loan giving agencies. If there is a distinct class of middle class farmers which has emerged in the green revolution it is this group.

But the point to remember is that they are in most cases absentee landlords i.e. they stay in the cities and run their farms through their managers with occasional visits especially during sowing and harvesting time. Whereas it is true that they enjoy the support of the local government officials, who help them, for example, in the eviction of tenants, and other disputes which might arise with their neighbours but they are *not* a political force in the country side. They take little or no interest in the local politics of their areas which is still dominated by the feudal landlords.

Also it must be remembered that all tractors have to be sanctioned

by the Agriculture Development Bank of Pakistan. Since it is not possible for one landlord to get more than a few on his own name they purchase them on the names of the different members of the family. Similarly in the case of tubewells because of the difficulties involved in getting electrical connections the same situation applies.

We may, therefore, conclude that it would be very premature at this stage to suggest the emergence of a new class of middle class farmers. All that has happened is that the feudal landlords have divided land between the members of the family although *control* still lies with say the head of the household. The only middle class capitalist farmer who has emerged is the government servant who is *not* a political force in the countryside.

Failure to extract surplus from the Agriculture Sector.

In an under developed country which is predominantly agricultural the major part of the surplus required for economic development must come from the agricultural sector. An important indirect effect of the green revolution was the Governments failures to extract the surplus generated from the agricultural sector because of an archaic and income inelastic taxation system.

This can be clearly seen from the table shown below that whereas agricultural incomes increased from Rs. 7711 million to Rs. 15478 million agricultural taxes as percentage of agricultural income fell from 1.7% to 1.2%.

TABLE 8

Ratio of Agricultural Taxes for Agriculture Income West Pakistan

Year	Agricultural income at current prices	Agriculture taxes (million rupees)	Agricultural taxes as % of agriculture income
1959-60 ..	Rs. 7,711	Rs. 172	1.7%
1965-66 ..	Rs. 10,572	Rs. 165	1.3%
1969-70 ..	Rs. 15,478	Rs. 183	1.2%

Source : Hamid J. 'Agricultural Taxation Policy in Pakistan', P.D.R. Vol. X No. 4, Winter 1970.

The increase in agriculture income has also not been accompanied by any corresponding increase in the level of domestic savings which have remained low—in the neighbourhood of the 8 to 10% of the GDP—all through this decade with no appreciable upward trend. In fact the Planning Commission admitted that 'the marginal savings rate declined during the Third Plan to less than 10%, this was even below the average saving rate.'¹⁹

The failure of the Government to expropriate the surplus has resulted in considerable increase in consumption expenditure by the richer farmer and is also an important cause behind the inflationary pressures which have built up in the economy.

Summary

We now present a summary of our findings :

(i) Pakistan's agricultural performance in the sixties is indeed very impressive but its gains have been shared only by the larger farms. The reason why this has happened is not because it was unprofitable for the small farmers to cultivate the HYS but because of the greater investment required for its cultivation. Also the most important input required for the cultivation of the HYS the additional water has been monopolised by the larger farmers.

(ii) Not only has it been limited to the bigger and better off farmers but in West Pakistan it has been concentrated in the provinces of the Punjab and Sind and the relative position of the N.W.F.P. and Baluchistan has further deteriorated. Also in the province of the Punjab the barani areas (Rawalpindi division) have not been affected by the green revolution which has had its impact in the canal colony and tubewell/well irrigated areas. This further lends support to the thesis that water is the most important factor responsible for the increase in the agricultural production and that tubewells development has been highly concentrated in the Punjab.

(iii) The introduction of tractor mechanization was not essential for the success of the seed fertilizer revolution. The major ill-effect of tractor mechanisation has been that it has led to displacement of labour and an increase in the landless labour force which cannot be absorbed by the non-agricultural sector. This has important social consequences.

(iv) That the agricultural sector has failed to provide the surplus for economic development. The government has been unable to tax away the higher incomes because of an ineffective taxation system and that there has been no corresponding increase in the savings rate.

Conclusion

The present government of the Pakistan Peoples Party came into power on the tide of a popular revolt against the old regime's economic policies. If the Government wishes to satisfy the hopes and expectations of the rural population it must take into consideration the major weaknesses inherent in the old system and try to avoid making the same mistakes.

This paper clearly shows that the policies which the old government pursued were not framed keeping in mind the over all national interest but primarily to serve the interest of a minority of people who belong to the richer classes. We can at this stage only warn the government against the introduction of capitalist agriculture in an agrarian economy dominated by small farmers and landless labour. It appears that the only way by which the government can involve the small farmers is through introducing co-operative farming. But this is beyond the scope of this article.

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