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THE CONSTRAINTS ON EMPLOYMENT EXPANSION IN CROP PRODUCTION IN BANGLADESH*

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1. The Problem

Until recently, maximization of output and employment were considered to be contradictory goals and a decline in the agricultural labour force was regarded as an indicator of economic progress. However, general underdevelopment and population pressure on land in many countries have created a situation where nowadays output and employment maximization in agriculture are considered complementary goals. Employment creation has, indeed, been adopted as a strategy to reduce poverty and provide basic needs to the masses, as in the First and Second Five Year Plans of Bangladesh¹.

Since crop production provided around 70 per cent of total agricultural employment in Bangladesh, it was expected that the greatest increase in employment would take place in this sector. But in spite of the great emphasis put on employment expansion in the plans, the employment situation improved very little. An analysis of the labour requirement of crop production undertaken in 1975/76 suggested that 30-40 per cent underemployment existed among the farming labour force. It was projected that the unemployment problem would further deteriorate and the absolute level of unemployment and underemployment in the crop sector was expected to increase by 2-3 per cent a year over the decade 1975-85².

In this paper, the causes of the slow growth in crop sector employment are discussed. Two sets of factors influencing employment, i.e. the technical and institutional ones are examined and the impact of these factors is shown at the aggregate level. The regional and seasonal dimensions of employment are important in any employment study, but these are not treated here due to the limitations of space.

2. Technical Factors Affecting Employment

To a large extent, employment growth depends upon growth in output. During the years 1964-65 to 1977-78, crop production increased by 0.91 per cent and cereal

* In: Rizwanul Islam (ed): *Employment Expansion with Local Resource Mobilization*. International Labour Organization. Asian Regional Team on Employment Promotion, ILO, Bangkok, 1981. pp.75-89.

¹ Government of Bangladesh, *The First Five Year Plan (1973-78)*, Planning Commission, (Dacca, 1973).

Government of Bangladesh, *The Second Five Year Plan*.

² E.J. Clay and Md., Sekandar Khan, Agricultural Employment and Under-employment in Bangladesh, AERSS Papers, No. 4, Bangladesh Agricultural Research Council (BARC) (Dacca, October 1977).

production by 1.39 per cent, per annum, as against population growth of 2.6 per cent and growth in the rural labour force of over 2 per cent per annum³.

The sources of the growth in output actually put limitations on the opportunities for expanding employment. The following sources of the growth in output and their implications for employment will be discussed:

1. Increases in the area cultivated and/or an intensification of cropping.
2. Changes in the cropping pattern.
3. Changes in the technology of production.

Increases in the area cultivated/intensification of cropping

An increase in the area of land under crops or an intensification of cropping leads to an increase in output and employment in proportion to the yield and labour requirement of the different crops produced. In Bangladesh, there is virtually no possibility of bringing new land under cultivation. In fact, available statistics suggest that between 1965 and 1978, there was a reduction in potential cultivable land by about 160,000 acres and culturable waste land by 550,000 acres (Table 1). Most of this decrease is due to a rapid increase in the demand for land for urban uses and for housing and other social, infrastructural development in the rural areas. During the same period, the acreage of land in the category of current fallow increased by about 1,100,000 acres. All these had negative effects on crop sector employment. This was partly compensated for by a slight increase in the intensity of cropping (Table 1).

During 1965-78, the overall cropped acreage increased by only 0.35 per cent per annum, and this was mostly through intensification of cropping. During the late sixties, winter irrigation facilities provided the opportunity to grow both LYVs and HYVs of rice, mostly on previously fallow land, thus increasing cropping intensity. Since 1970, the growth of winter irrigation capacity has slowed down, so that opportunities for expanding the *Rabi* cropped acreage became limited. This is reflected in the fact that the intensity of cropping has stabilized at around 150 per cent since 1970.

Table 1. Changes in the Acreage of Land Under Cultivation, 1965/66-1977/78

<i>Category of</i>	<i>'000' acres by year</i>			
	<i>1965/66</i>	<i>1969/70</i>	<i>1975/76</i>	<i>1977/78</i>

³ Mahabub Hossain, "Foodgrain Production in Bangladesh: Performance, Potential and Constraint", The Bangladesh Development Studies, VIII, 1 & 2 (Special Issue on Food Policy and Development Strategy in Bangladesh, Winter-Summer 1980).

<i>land</i>				
Cultivable land	23,356	23,236	23,221	23,196
Cultivable waste	1,225	742	662	665
Current fallow	730	731	1,591	1,838
Cultivated land	21,601	21,763	20,968	20,693
Cropped area	29,541	21,763	31,135	31,192
Cropping intensity (per cent)	137	32,841	148	151

Of the 16 per cent of agricultural land in the country which is irrigated, 9 per cent is covered by modern irrigation methods. Modern irrigation facilities are severely underutilized, however, so there is scope for a substantial increase in the area irrigated by a better utilization of the existing capacity. In practice there is unfortunately little hope of any such improvement. Both on-farm factors (e.g. farm size, tenure, fragmentation of holdings, topography, etc.) and off-farm factors (e.g. village factionalism, shortages in fuel, spare parts, and the lack of repair services, etc.) have in the past contributed to low capacity utilization and will continue to do so in the future. Therefore, opportunities for expanding crop sector employment through intensification of cropping seem to be very limited.

Changes in cropping pattern

Changes in cropping pattern may involve the substitution of one crop for another in a given rotation, or the substitution of the entire rotation⁴. In this case, the change in employment amounts to the difference between the labour requirements of the new and the old crop rotation, and may be either positive or negative.

The rate of expansion in the acreage of major crops over the period 1964-65 to 1977-78 is shown in Table 2. When interpreting these rates the relative importance of the different crops in the overall cropping pattern should be kept in mind. Paddy covers 75-78 per cent of the cropped area, while jute covers 6-9 per cent of it. Thus a given percentage change in the acreage of the two crops actually involves a much greater area when applied to paddy than it does in the case of jute.

Table 2. Trend Rates of Growth in production, Acreage and Yield of Crops, 1964/65-1977/78.

Crop	% growth rate per annum
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⁴ A change from local to HYVs of the same crop will be treated as a change in technology, and the employment effects of such changes will be discussed in a separate section.

	Production	Acreage	Yield
Paddy	1.18	0.52	0.66
Wheat	15.00	8.40	6.60
All cereals	1.39	0.60	0.79
Potato	4.09	2.68	1.41
Rape and Mustard	1.22	-0.22	1.45
All non-cereal food ^a	0.52	-0.13	0.65
All food	1.25	0.56	0.69
Jute	-2.87	-2.46	-0.41
Sugarcane	-1.52	-0.86	-0.66
Tobacco	4.14	1.96	2.18
All cash crops ^b	-1.53	-1.98	0.45
All crops	0.91	0.35	0.56

^a Includes sesame, masur, kalai, gram, khesai, chillies and other spices.

^b Includes insignificant amount of cotton.

Source: Hossain, "Foodgrain Production in Bangladesh", p.41.

Figures presented in table 2 suggest that the acreage under cereals, potato and tobacco increased at the expense of jute, sugarcane, pulses, oilseeds and spices. It has been estimated that about 25 per cent of the growth in cereal production has come from acreage reallocation⁵.

The employment effect of acreage reallocation is more difficult to assess because information on the exact nature of the substitution is not available. It seems that both substitution of a single crop and that of a full rotation are involved. By applying per acre labour use data derived from various cross-sectional cost of production studies, the employment effects of some likely cropping substitutions have been estimated and shown in Table 3. It appears that substitutions involving only traditional crops or rotations have a negative effect on employment, while substitution with HYVs generally leave employment unaffected, or have some positive effect on employment.

On the basis of the above findings, the most that can be said is that changes in the cropping pattern during the last decade have had little positive impact on employment. If the present jute/rice and sugarcane/rice price ratios remain unchanged, and if fuel prices continue to rise, both of which are likely to happen, than further substitution of jute, sugarcane, pluses, etc. with unirrigated (rain fed) paddy and wheat will take place. Thus, little additional employment from changes in the cropping pattern can be expected.

Table 3. Employment Effects of Some Hypothetical Changes in Cropping Patterns

Substitution	% change in employment ^a
LYV Jute to	

⁵ Hossain, "Foodgrain Production in Bangladesh", p. 42.

LYV Aus	- 37
HYV Aus (unirrigated)	- 23
HYV Aus/Boro (irrigated)	+ 8
HYV Jute to	
LYV Aus	- 45
HYV Aus (unirrigated)	- 33
HYV Aus/Boro (irrigated)	- 6
Sugarcane to	
LYV Aus + LYV T. Aman	- 2
LYV Aus + HYV T. Aman	+ 8
HYV Aus + HYV T. Aman	+ 19
LYV Wheat + LYV T. Aman	- 30
LYV Wheat + HYV T. Aman	- 20
HYV Wheat (irrigated) + HYV T. Aman	+ 2
HYV Boro (irrigated) + LYV T. Aman	+ 34
HYV Boro (irrigated) + HYV T. Aman	+ 44
Mustard/ <i>til</i> to LYV Wheat	- 15
Mustard/ <i>til</i> to HYV Wheat	+ 15

^a Estimated on the basis of standard labour requirement data derived from various cross-sectional studies and summarized in, M.A. Jabbar and A.K.M. Faruque: "Labour Requirements for Production of Major Crops in Bangladesh", The Bangladesh Journal of Agricultural Economics, I, 1 (June 1978).

Note: Aus, Aman and Boro are three varieties of rice grown in three different seasons.
T. Aman stands for transplanted Aman.

For the production of any crop, a technology may be defined as any combination of the following elements: (a) quantity and quality of the material inputs, e.g. seed, fertilizer, (b) method of application of these inputs, e.g. broadcasting, line sowing, (c) source of power, e.g. human, animal, mechanical. In this way an infinite number of technologies, each resulting in a certain output and level of employment (labour input) may be identified for each crop. Technological improvements imply a larger output with the same or fewer inputs⁶, or more exactly, a greater increase in output than in inputs. The choice of technology and changes in it (not necessarily improvements) than depend on whether the objective is to maximize output or employment or both. Depending on the direction and degree of change in technology, there may be, in varying degrees, a positive or negative effect on employment. For example, a slight increase in fertilizer or improvement in the genetic characteristics of the seed may not have a significant effect on employment, but a change from LYVs to an HYV package may substantially increase

⁶ C.E. Bishop & W.D. Toussaint: *Introduction to Agricultural Economic Analysis*, John Wiley and Sons, (New York, 1958) p. 225.

employment. Within the HYV package, a change from traditional to modern methods of irrigation, or a change from bullock power to tractor power for tillage is likely to decrease employment (Table 4). The combination of HYVs and traditional sources of power for tillage and irrigation is the best choice for an employment maximizing strategy. This combination has even been shown to be the best choice as an output-employment maximizing strategy⁷.

Table 4 Employment Matrix with Seed Variety and Irrigation Method

Seed Variety	Irrigation method		
	Traditional	LLP/DTW ^a	Gravity
Traditional			
Improved HYV			

^a LLP and DTW stand for low lift pump and deep tube well respectively.

Animals are virtually the only source of power for tillage. Apart from the work with animals for tillage, the care of these animals also provides employment. It has been estimated that it requires 5-6 hours of man-time to produce 8 hours of animal work. Unfortunately, there is an increasing shortage of draft power in the country. One of the major consequences of the shortage of draft power has been the slow growth of output and reduced employment opportunities for labour⁸.

Over the last two decades, the most important technological innovation has been of a biochemical nature. During the sixties both traditional and modern irrigation facilitated the cultivation of both LYVs and HYVs of paddy in the Rabi season, mostly on previously fallow land. Therefore, output and employment growth during this period were the result of an increase in cropping intensity rather than technological change. Since 1970, the growth in irrigation capacity has been of an intensive nature. Thus the growth of the rabi season cropped acreage and resulting employment also slowed down. Since 1970, LYVs have been substituted with HYVs and such substitution has been extended to Aus and Aman paddy (Table 5). So far only about 15 and 25 per cent of the potential yields for rain fed HYVs of Aus and Aman paddy have been achieved. Moreover, the overall acreage under HYVs has stabilized at around 15 per cent since

⁷ Iftikhar Ahmed, "Technical Change and Labour Utilisation in Rice Cultivation: Bangladesh", *The Bangladesh Development Studies*, V, 3 (July 1977).

⁸ M.A. Jabbar, "Draft Power Shortage and Mechanisation of Tillage in Bangladesh", *The Bangladesh Journal of Agricultural Economics*, III, 1 (June 1980).

1976; so there is further scope for the expansion of HYVs, particularly in Aus and Aman seasons.

The employment effect of a change from LYVs to HYVs depends on the extent to which the whole HYV package is adopted. The limited evidence available from cross-sectional studies over a number of years suggests that traditional crop varieties are generally intensively cultivated and cared for, for example, farmers give as much time to weeding traditional varieties as they give to HYVs. Thus a switch to HYVs provides little scope for employment expansion other than in the case of harvesting, carrying and threshing a larger output. As a result employment elasticity of output is very low. A number of studies in Bangladesh and in the neighboring states of India show this to be 0.2 to 0.4 (Table 6)⁹. Thus, it appears that technological changes in rice cultivation have contributed much less to employment growth than to a growth in output. Unless the acreages under HYVs expand as fast as they did during the sixties and the early seventies, further scope for employment expansion in rice cultivation is limited.

Table 5. Paddy Acreage (in 000 acres) by Season, 1967/68-1977/78.

Year	Boro		Aus		Aman		Total	
	Area	%HYV	Area	%HYV	Area	%HYV	Area	%HYV
1967/68	1,534	10	8,221	-	14,862	-	24,437	0.6
1968/69	2,016	18	7,658	0.2	14,400	-	24,073	1.6
1969/70	2,184	27	8,462	0.5	14,841	0.2	25,486	3.0
1970/71	2,425	35	7,885	1.0	14,184	1.0	24,495	5.0
1971/72	2,185	36	7,418	2.0	13,372	5.0	22,975	7.0
1972/73	2,434	45	7,241	2.0	14,121	10.0	23,795	11.0
1973/74	2,595	56	7,681	4.0	14,133	15.0	24,410	16.0
1974/75	2,871	57	7,857	9.0	13,469	9.0	24,197	15.0
1975/76	2,837	56	8,452	10.0	14,236	10.0	25,525	15.0
1976/77	2,112	63	7,951	11.0	14,355	7.0	24,419	13.0
1977/78	2,703	59	7,815	13.0	14,260	9.0	24,784	15.0

Sources: Bangladesh Bureau of Statistics, The Yearbook of Agricultural Statistics of Bangladesh, 1976/77 (Dacca, 1978); and Gordon O. Nelson, Food Aid and Domestic Food grain Production in Bangladesh, Paper presented at the A&P Agricultural and Resource Staff Seminar, (Yogyakarta, Indonesia, Nov. 13-17, 1979).

Among the other crops, technological changes in jute and sugarcane production might contribute substantially to increased employment, because these are the second and third most important crops in the country, and their employment elasticities are also quite high. Unfortunately, not only has the area under these crops decreased, the varieties grown have also degenerated, resulting in negative growth rates for yields (Table 2). During 1964-78, the yields of jute and sugarcane decreased at the rate of 0.41 and 0.66 per cent per annum respectively. A reversal of these trends in the near future is most unlikely.

Table 6. Employment Elasticities of Output at 1975/76 Levels of Productivity

⁹ See also, Iftikhar Ahmed, "Employment Effects of the Green Revolution", The Bangladesh Development Studies, IV, 1 (January 1976).

Cropping comparison/substitution	Employment % change (1)	Output % change (2)	Elasticity
Broadcast Local Aus to Transplanted HYV Aus	+44.6	+345.0	+0.13
T. Local Aman to T. HYV Aman	+35.4	+81.1	+0.44
T. Local Boro to HYV Boro			
Local Irrigation	+30.7		
Modern Irrigation	+45.0	+97.2	+0.46
Local to Modern Irrigation	-1.0		
Dwarf Wheat: Low to High Input Level	+80.00	+140.0	+0.57
B. Aman + Mustard to HYV Boro (Modern Irrigation)	-5.5	+27.7	-0.20
B. Aman + Dwarf Wheat (Low input Level) to HYV Aus + Dwarf Wheat (High Input Level)	+62.0	+23.0	+0.27

Source; Clay and Khan, Agricultural Employment and Under-employment.

In the case of wheat, the substitution of LYVs with HYVs is now almost complete. Thus the net effect of wheat production on employment will depend upon the kind of crops it replaces. In the case of potato and tobacco, the switch to HYVs is still going on. The employment elasticities of these crops are also slightly higher than those of paddy and wheat. However, the acreages under wheat, potato and tobacco make up so small a percentage of the total cropped area that their impact on aggregate employment growth will hardly be felt.

The production of vegetables and fruits are also highly labour absorbing enterprises. It was not, however, possible to examine the employment potential of such enterprises because of data limitations.

3. Agrarian Structure and Employment

The nature and level of technology employed and the extent of its efficient utilization depend mainly on the environment in which production decisions are taken. The prevailing agrarian structure provides the environment for such decision making. This structure may also be a cause of slow growth in employment and output in the crop sector.

The main features of the agrarian structure in Bangladesh are: (a) the average size of holding is very small (around 2.5 acres) and becoming smaller with increased population pressure on land, (b) there are certain districts with slightly larger average

holdings and a highly unequal distribution of land ownership, (c) 20-24 per cent of the total land area is cultivated under share-tenancy, which remained almost unchanged but the number of tenants has increased over the last two decades, (e) landlessness has increased from 17 per cent of rural households in 1960 to 43 per cent in 1977¹⁰. Since 1977, landlessness has further increased, probably to 50 per cent of rural households.

For a number of years, it was claimed that an inverse relationship existed between farm size and productivity in densely populated, less developed agriculture. This phenomenon used to be explained by showing that smaller farms, having a large labour supply in relation to land, could push labour use near to zero marginal productivity of labour. Larger farms, on the other hand, needed hired labour, and such hiring took place until the marginal productivity of labour was equal to the prevailing wage rate.

A few studies conducted in Bangladesh suggest that this inverse relationship between size and productivity may not hold over the entire range of farm sizes. It has been shown that medium sized farms are more productive and employment generating than either small or large farms¹¹. In the case of large farms, the explanation for low output and employment remains the same as the earlier one. In the case of small farms, most of them are so small that these farmers cannot afford to maintain draft animals, so they lack the opportunity of cultivating their land themselves. Since they have to hire draft power, and in most cases run short of cash, they settle for less than the optimum amount of ploughing. Many of these farmers simultaneously work as wage labourers. At critical times for farm operations, they hire out labour to take advantage of premium wage rates, thus settling again for untimely and less optimal operations on their own small plots of land. They also use less other inputs per unit of land. Ultimately they end up with sub-optimal output and employment¹².

The phenomena of decreasing farm size and increasing landlessness therefore indicate that crop sector employment growth is likely to be very slow.

The adverse effects of share-tenancy on output and employment have been empirically established in a number of micro level studies¹³. A recent macro-level study also established that the districts with a higher concentration of land and a higher

¹⁰ F.T. Jannuzi & J.T. Peach, *Report on the Hierarchy of Interests in Land in Bangladesh*, USAID, (Washington D.C., 1977).

¹¹ Mahabub Hossain, "Farm Size and Productivity in Bangladesh Agriculture: A Case Study of Phulpur Farms", *The Bangladesh Economic Review*, II, 1 (January 1974). M.A.S. Mandal, "An Economic Analysis of resource Use with Respect to Farm Size and Tenure in an Area of Bangladesh", Unpublished Ph.D. thesis submitted to the University of London, 1979.

¹² Mandal, "An Economic Analysis of Resource Use".

¹³ M.A. Jabbar, "Relative Productive Efficiency of Different tennur Classess in Selected Areas of Bangladesh", *The Bangladesh Development Studies*, V, 1 (January 1977);

Mahabub Hossain, "Farm Size, Tenancy and Land Productivity: An Analysis of Farm Level Data in Bangladesh Agriculture", *The Bangladesh Development Studies*, V, 3 (July 1977);

Mandal, "An Economic Analysis f Resource Use".

incidence of share-tenancy always showed lower rate of adoption of HYV packages, resulting in lower growth in output¹⁴. Naturally, employment growth in these districts was also low. These results indicate that a substantial part of the potential for increases in output and employment on 20 per cent of the cultivated land is lost because of share-tenancy. This loss could be minimized, either by arranging a sharing of inputs by both owners and tenants, or by removing share-tenancy altogether. Neither alternative seems likely to be achievable in the near future.

4. Summary

In the First and the Second Five Year Plans of Bangladesh, the expansion of employment in the rural areas has been adopted as the main means of reducing poverty and providing basic needs, the prime objectives of the plans. Since crop production provided about 70 per cent of agricultural employment, it was anticipated that the greatest increase would take place in this sector. But since the rate of growth in crop production has been lagging far behind the rate of population growth, growth in crop sector employment has failed to keep pace with the growth of the labour force.

There are three main sources of employment growth: an increase in the intensity of cropping or in the land area under cultivation, changes in cropping patterns, and changes in technology. All three sources provide only limited opportunities for employment expansion. The acreage of land under cultivation has already started to decrease, cropping intensity has been increasing rather slowly, and has almost stagnated of late. Cropping pattern changes have involved the replacement of labour intensive crops like jute and sugarcane with less labour intensive ones. Technological changes of a bio-chemical nature have contributed substantially to a growth in output but very little to employment growth because of low employment elasticities. The prevailing agrarian structure provides an environment which is primarily responsible for the slow growth in output and employment.

The recent performance of the agricultural sector, both in terms of output and employment, indicates that there are very limited opportunities for expanding employment in crop production unless major changes in the agrarian structure is envisaged. Otherwise a solution to the growing unemployment problem has to be sought partly in other sub sectors of agriculture, e.g. fisheries and livestock, but mainly in non-agricultural activities in both rural and urban areas.

¹⁴ Hossain, "Food grain Production in Bangladesh".