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Technological Change and Credit Requirements in Agriculture : A Study of Two Villages in North Bengal

Hossain, Md. Makbul

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TECHNOLOGICAL CHANGE AND CREDIT REQUIREMENTS IN AGRICULTURE : A STUDY OF TWO VILLAGES IN NORTH BENGAL

By

MD. MAKBUL HOSSAIN

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MD. MAKBUL HOSSAIN

ABSTRACT

TECHNOLOGICAL CHANGE AND CREDIT REQUIREMENTS
IN AGRICULTURE : A STUDY OF TWO VILLAGES IN NORTH BENGAL

By

Md. Makbul Hossain

This thesis is a study of agricultural finance in the context of the adoption of modern agricultural technology. The data used in the study are based on the survey of 120 farmers from two villages Ekdala and Ramjibanpur which respectively represent agriculturally advanced and traditional villages in the district of Rajshahi. The villages were selected purposively, while the farmers were selected by adopting stratified random sampling design. The selected farmers in each village were classified into seven size categories. The requirements of credit, the supply of credit, the share of different agencies, the utilization patterns, the interest rates and the existing credit gaps were studied and compared between the villages and among the size categories as well.

It has been observed that farms adopting superior techniques of cultivation reported substantially higher credit requirements per household and per bigha compared with those on traditional farming. The analysis of

purposewise requirements of credit showed that non-agricultural expenses accounted for the largest share of the total requirements followed by capital expenses, and current expenses in that order in both irrigated and unirrigated villages, and higher non-agricultural requirements of credit of the Ekdala sample households have emanated from non-food requirements. The relative proportion of credit allocated for agricultural purposes, however, appeared to have substantially increased in our present study.

In respect of agricultural expenses, our results provide strong evidence in favour of the hypothesis that large farmers exhibit a considerably greater requirement of external finance compared with their smaller counterparts.

It has further been observed that though the contribution of the institutional agencies to total borrowings of the cultivators has increased considerably, yet non-institutional agencies continue to have a dominant though declining influence in the rural credit market. Non-institutional agencies supplying major portion of the loans played very important role for the farmers in the smaller size categories of farms.

In both Ramjibanpur and Ekdala, farmers belonging to the larger size categories received larger proportion of their loans at cheaper interest rates while smaller farmers paid exorbitant rates for larger parts of their total loans. Both cheap and institutional credit are being unevenly distributed, as interest free loans are gradually becoming unavailable to the cultivators. Larger farmers appropriated institutional loans more than proportionately to their shares in land.

A big credit gap exists in both Ramjibanpur and Ekdala. Farmers in both the villages bridged a portion of the requirements by undertaking disinvestment of assets. An overwhelmingly large proportion of disinvestment of assets was caused by the demands of non-agricultural expenditure. There is thus a need to reformulate the credit policy in consonance with the growing technological needs and by taking into account the dismal condition of the smaller farmers.

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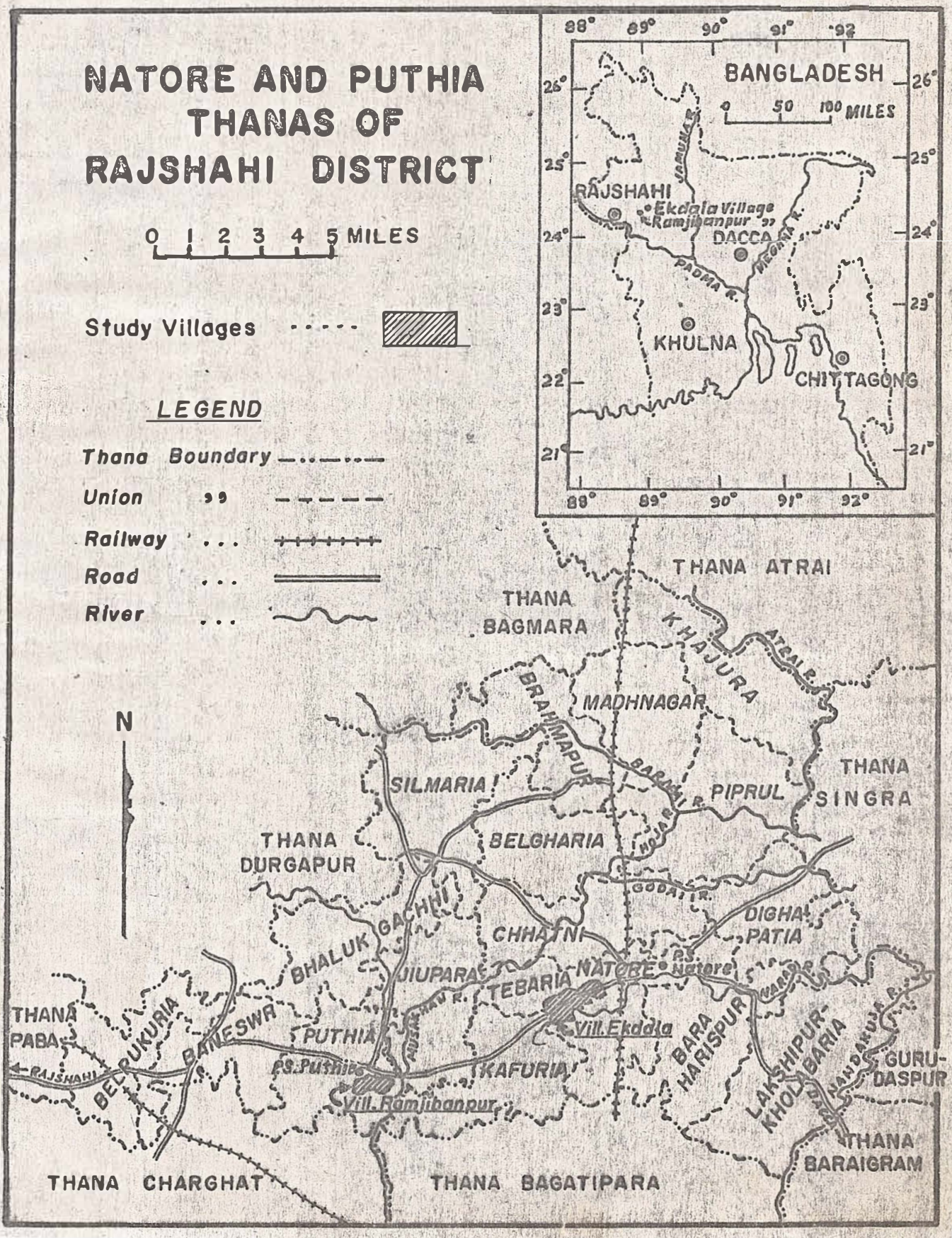

CHAPTER 1 INTRODUCTION

TECHNOLOGICAL PROGRESS: A CHANGING AGRICULTURAL PROFILE OF BANGLADESH

Agricultural economy in great many underdeveloped countries is experiencing change in recent decades. There has been not merely quantitative increase in agricultural production but also qualitative improvements in terms of techniques and practices ushering in a new era of modernisation of agriculture.

A recourse to technological progress in agriculture of Bangladesh is desirable to partly ameliorate the land scarcity problem, which, in a densely populated country with a high population growth rate but without any significant extension of area under cultivation, will perpetuate with its concomitant evil effects on the rural economy. Technological progress in agriculture will increase the productive efficiency of the inputs resulting in increases in the annual crop yield, thereby augmenting the effective supply of the most scarce land resource.

Bangladesh agriculture is beseized with twin problems of drought in the winter and flood in the rainy season. Her natural endowment of surface water and ground water, however, is rich, which, within certain

limits, could be tapped through power pumps, shallow - and deep tubewells for winter irrigation. It is thought that in the winter season sufficient surface water is available to irrigate about 20 per cent of the crop land (Thomas 1975) and water stored within 25 feet of the surface is thought to be sufficient to irrigate a further 15 - 20 per cent. In addition, almost all of the remaining cultivable land can be irrigated from deep aquifers.[1]

Though the Agricultural Directorate envisaged the exploitation of water resources in 1950-51 under the Mechanised Cultivation and Power Pump Irrigation (MCPPI) scheme, its attempt, however, was confined within specific haor areas of Mymensingh and Sylhet districts.[2] Uptil 1960 water resources were scarcely used in the winter.

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1 See Stephen D. Biggs, "Planning Rural Technologies in the context of Social Structures and Reward Systems". The Bangladesh Journal of Agricultural Economics, Vol.1, No. 1, June 1978, p.41.

2 Md. Manjurul Alam and Chowdhury Zulfiqur Haider, Report on the Evaluation of Thana Irrigation Programme in Bangladesh, Bangladesh Academy for Rural Development, Comilla, 1976, p.1.

In the late 50's and earlier 60's when a shortfall of foodgrain appeared, government took deliberate action to increase agricultural production in general and foodgrain production in particular. The Agricultural Commission outlined a strategy putting emphasis on a) fertilizer, b) seeds of better quality, c) irrigation, d) agricultural credit and e) agricultural extension. Agricultural Development Corporation was established as an outcome of the report of Agricultural Commission and in 1962-63, the operation of the Mechanised Cultivation and Power Pump irrigation scheme developed on the Corporation. With "Grow-more food" campaign "Japanese Method of Rice Cultivation" was added and "line sowing or line transplanting" production technique was introduced.[3]

Thus from the late 60's of the present century the agricultural economy of Bangladesh began to experience a change. Some of the planning activities which were undertaken for the purpose were in the nature of efforts to develop the physical resources, the infrastructure of the rural economy and facilities for the suppy of material inputs that are directly connected with production.

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3 Raisuddin Ahmed, Foodgrain Production in Bangladesh: An Analysis of Growth: Its Sources and Related Policies, Bangladesh Agricultural Research Council, Agricultural Economics and Rural Social Science Papers, No. 2, Dacca, 1977, pp. 32-33.

In the 60's the number of pumps for irrigation were increased by the BADC and by 1968-69, one year after the introduction of HYV seeds, the number of pumps were increased to 10,852 with a total irrigated area of 4,29,953 acres[4] and again by 1972-73 the number of pumps were increased to 32,924 with a total irrigated area of approximately 12,30,468 acres, a three-fold increase in both numbers and area irrigated.[5] Besides this, power pump irrigation by the BADC, large irrigation projects through tubewells, low-lift pumps and cannals were built up by the Water and Power Development Board (former EPWAPDA) in different regions of the country and the area irrigated by the projects covers an area of 1.07,414 acres in 1972-73 out of a total command area of 3,17,937 acres.[6]

A new approach to irrigation (on cooperative basis) developed at BARD[7], Comilla, called TIP (Thana Irrigation Programme) and administered from the TTDC (Thana Training and Development Centre), is being implemented from 1967-68

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[4] Government of the People's Republic of Bangladesh, Ministry of Agriculture, Bangladesh Agriculture in Statistics, 1973, p.57.

[5] ibid. p.57.

[6] ibid. p.60.

[7] Bangladesh Academy for Rural Development.

all over the country as a means of providing irrigation facilities in response to requests from cooperative water user groups.

Besides the agencies like UNICEF, IRDP[8] (Integrated Rural Development Programme) and BKB (Bangladesh Krishi Bank), a large number of foreign agencies like CORR (Christian Organisation for Relief and Rehabilitation), CCDB (Christian Commission for Development in Bangladesh) are involved in supplying irrigation machines, mainly manually operated shallow tubewells for irrigation (MOSTI). During the last few years MOSTI gained popularity as an irrigation technology and by 1976n the number of MOSTI reached 40,000.[9] Owing to cumulative efforts of the government and the private agencies the gross area under irrigation has gone upto about 3588965 acres[10] by 1976-77 which is about

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[8] Integrated Rural Development Programme is a Semi-autonomous Govt. institution in charge of agricultural co-operative programme (also commonly used to denote the programme as such).

[9] See Lawrence M. Hannah, "Hand Pump Irrigation in Bangladesh", Bangladesh Development of Studies, Vol. 4, No. 4, 1976, p.444, Table II.

[10] Government of the People's Republic of Bangladesh, Bangladesh Bureau of Statistics, Monthly Statistical Bulletin of Bangladesh, April 1981, p.43, Table 4.5.

11.57 per cent of the total cropped area of the country in 1977-78. Of the total irrigated area during 1973-78 about 67 per cent was covered by the public sector[11] which is an sharp contrast with the figure 18 per cent[12] in 1967-68, the year when HYVs of seeds were first introduced. The figures covered by the private sector during these two time periods were 33 per cent[13] and 82 per cent[14] respectively indicating a fall in the relative contribution of the private sector. Though the relative importance of the private sector seems to be falling, the area under irrigation in absolute terms has increased over time as evident from Table 1.1 below.

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[11] Hamid et al., Irrigation Technologies in Bangladesh: A Study in Some Selected Areas, Rajshahi, 1978, p.26, Table 6.

[12] Calculated from Raisuddin Ahmed, op. cit. pp. 145-47, Tables 1.5a-1.5c.

[13] Hamid et al., op. cit. p.26, Table 6.

[14] Calculated from Raisuddin Ahmed, op. cit. pp. 145-47, Tables 1.5a-1.5c.

Table 1.1

Irrigated Area in Bangladesh, 1969/70 — 1977/78

Year	Area	% of gross cropped area irrigated
1969-70	2614050	12.07
1970-71	2883950	13.49
1971-72	2587300	13.31
1972-73	2992500	14.30
1973-74	3202250	15.30
1974-75	3561472	17.30
1975-76	3457278	16.50
1976-77	3003020	14.72
1977-78	3588965	17.39

Source: Bangladesh Bureau of Statistics. 1969/70 to 1976-77 data are taken from Statistical Year Book of Bangladesh 1978, p. 163. 1977-78 data are taken from Monthly Statistical Bulletin of Bangladesh, April 1981, p.43.

Multiplication of the sources of irrigation both at the private[15] as well as public sector and the growth in irrigated area has made it possible to grow two or three crops from the same plot of land where previously such possibility was limited. And by 1976-77 area sown more than once increased from 7926000 acres in 1966-67 to 8534000 acres in 1976-77 and cropping intensity increased from 138 in 1966-67 to 148 in 1976-77.[16]

Development of institutions and sources of irrigation has also facilitated the adoption and diffusion of high-yielding varieties programme which ushered in the era of green revolution in a number of Asian countries. The high-yielding varieties programme, as the name indicates, envisages the changeover to improved seeds of paddy, wheat, jute, potato, etc. either indigenously developed or imported. The success of the programme depends, to a large

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[15] Besides the traditional implements like doon (a small wooden container conical in shape) and swing buskets, dugwell has gained popularity in North Bengal as an indigenous method of exploitation of ground water.

[16] Calculated from 1979 Statistical Year Book of Bangladesh, Bangladesh Bureau of Statistics, Dacca, 1979, pp. 159-60.

extent, among other things, on the application of proper doses of fertilizers, sufficient pesticides and insecticides and appropriate cultural practices. The programme was launched in Bangladesh in 1967-68 when 500 maunds of boro rice seeds were imported and since then there has been a significant increase in its coverage as indicated below in Table 2.2.

Table 2.2

Area Under HYV of Rice in Bangladesh, 1968/69 - 1974/75

(Area in '000' acres)

Year	Name of the crops		
	HYV Aus	HYV Amon	HYV Boro
1968-69	16.5	5.0	359.7
1969-70	42.9	29.2	579.5
1970-71	79.9	199.8	857.2
1971-72	120.7	625.6	795.4
1972-73	163.7	1378.6	1087.9
1973-74	329.2	1943.0	1454.4
1974-75	698.8	1239.0	1629.4

Source: 1968-69 to 1972-73 data have been taken from Bangladesh Agriculture in Statistics, Govt. of the People's Republic of Bangladesh, p.26 and 1973-74 to 1974-75 data have been taken from Basic Statistics of Bangladesh Agriculture, Govt. of the People's Republic of Bangladesh, pp. 64-66.

✓The changeover to improved varieties of seeds has the likely impressive effect on the level of productivity of crops. The productivity levels of the major agricultural crops are shown in Table 1.3 below which indicates an increase in the per acre yield except in case of jute.

Table 1.3

Yield Rate of Major Agricultural Crops in Bangladesh

Year	Rice	Wheat	Jute	Sugar-cane	Tea	Tobacco	Potato
1947-48 to 1949-50	10.3	6.0	13.6	393.8	5.6	9.2	-
1950-51 to 1954-55	9.8	6.5	17.6	401.4	7.9	9.9	-
1955-56 to 1959-60	10.1	5.7	19.8	403.8	8.3	7.3	80.3
1960-61 to 1964-65	12.1	6.8	16.8	421.4	7.8	7.3	67.8
1965-66 to 1969-70	12.2	8.4	14.0	514.0	7.7	8.8	99.1
1970-71	12.2	9.6	14.7	522.1	7.6	9.7	108.1
1971-72	11.5	9.8	12.2	446.4	2.9	9.2	107.1
1972-73	11.3	8.2	14.4	456.6	5.7	9.0	103.4
1973-74	13.0	9.7	13.2	474.2	6.7	9.7	96.1
1974-75	12.5	10.0	12.3	475.9	8.1	9.5	101.2

Source: Ministry of Agriculture, Government of the People's Republic of Bangladesh, Basic Statistics of Bangladesh Agriculture, Statistical Series no. 2, 1975, pp.53-54.

The per acre yield of the HYVs of paddy as contrasted with per acre yield of the traditional ones is shown in Table 1.4 which suggests that in modern times it is technologically possible even to treble the productivity per acre with the changeover to HYVs of seeds.

Table 1.4

Trends in the Yields of Local and HYVs of Paddy in Bangladesh, 1969/70 - 1977/78

(in tons per acre)

Year	Local Aus	HYV Aus	Local T. Among	HYV T. Amon	Local Boro	HYV Boro
1969-70	.3453	1.3089	.4916	1.2827	.6508	1.481
1970-71	.3532	1.3313	.4299	1.0614	.6409	1.385
1971-72	.3231	1.0719	.4176	1.1132	.5554	1.215
1972-73	.2977	1.0186	.3774	0.7109	.5431	1.233
1973-74	.3293	1.1586	.4137	0.9578	.5337	1.108
1974-75	.3023	0.9949	.4444	0.8641	.5438	1.000
1975-76	.3130	0.9835	.4813	0.8785	.5224	1.029
1976-77	.3100	0.9157	.4918	0.8578	.5084	0.983
1977-78	.3218	0.9298	.5166	0.9895	.6026	1.022

Source: Bangladesh Bureau of Statistics.

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Local Research Institutes[17], specially the Rice Research Institute, have gained success in cross-breeding some improved varieties. Government is conscious to induce farmers for adopting the new varieties developed locally or imported. Intensive T. Aman programme and Intensive Jute Cultivation schemes are given publicity through various mass media with the objective of increasing of the production of these crops. All these are some deliberate attempts to promote the adoption of a package of improved practices such as improved seeds, balanced doses of fertilizers, sufficient pesticides and insecticides, line sowing etc. Under the impact of all these programmes there has been increasing adoption of improved varieties of seeds, growing degree of fertilizer consciousness and fertilizer consumption, and increasing use of pesticides and insecticides.

The marked increase in the use of fertilizers which is an indicator of changing agriculture would be evident from Table 1.5.

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[17] There are two Rice Research Institutes, one Agricultural Research Institute, one Jute Research Institute, one Sugarcane Research Institute and One Institute for Research on Nuclear Agriculture in the country. Besides these institutes research is conducted by the Universities also.

Table 1.5

Fertilizer Consumption in Bangladesh 1966/67-1977/78

Year	Total fertilizer consumption in thousand tons	Fertilizer Consumption per acre (lbs)
1	2	3
1966-67	168	12.3
1967-68	227	15.0
1968-69	237	16.2
1969-70	277	18.9
1970-71	306	20.7
1971-72	244	19.03
1972-73	384	29.6
1973-74	373	28.6
1974-75	270	20.2
1975-76	444	31.2
1976-77	510	--
1977-78	--	35.0

Sources: Chowdhury (1981), de Vylder and Asplund (1979) and Ministry of Agriculture, Government of the People's Republic of Bangladesh (1973).

The above trends in the progress of agricultural technology in Bangladesh have a perceptible impact on the reaction pattern of the cultivating community which provide the background against which the requirements of agricultural credit have to be ascertained to day.

THE PROBLEM

Capital, with its property of exhaustability, is a limiting factor in the underdeveloped countries. All capital items almost always have their own prices attached to them which the production units can not afford to bear in these countries. Any economic activity undertaken for production, therefore, requires credit for the sustenance of the production process. The magnitude and duration of credit requirements of course, depend on the time involved in the process of production, capacity of internal financing of the production unit and organisation and scale of its operation. Modern agriculture, like production in other lines, under new technology is becoming dependant for its financial requirements, largely, on credit.

To understand the relationship between technological change and credit requirements in an agriculture where private property in land exists, it is necessary to have

a full and clear knowledge of the nature of the technological change which may have bearing on other determinants of credit.

Our discussion in the previous section on 'technological progress' is a macro one. The macro representation, however, conceals many things happening in reality. A greater portion of our cultivated area is not irrigated. Fertilizer consumption is mostly concentrated on the rice crops and even in rice the actual use-level is far below the recommended levels. Large areas under rice (particularly in Aus and Aman paddy) remain without the application of fertilizer. Non-rice crops, even of the farmers who have already adopted HYVs, get no or very small amount of fertilizers due to economic and biological causes. Thus technological change in Bangladesh agriculture is not uniform. Not to speak of regional variation or area-wise variation, a single farmer cannot adopt the same technology (or techniques) in all of his non-contiguous plots. A close look into the agriculture of Bangladesh reveal that both traditional and modern technologies are interwoven in farming practices.

In all technologies, whether it is traditional or modern, cultivators always want to maintain a capital base

which can assure an adequate supply of food and clothing. In a traditional agriculture, technology, however, is usually adjusted to the availability of capital. The need for additional funds for production purposes is, therefore, not so pronounced. Even reorganisation of the production plan by the cultivator under the existing technology does not put undue pressure on the present capital availability. Cultivators in such an agriculture are limited in their opportunities to use much additional capital. The requirements of external finance in traditional agriculture is, therefore, not for activities directly related with the production process, rather for non-production (consumption etc.) purposes and lie mostly with the cultivators who stand in the bottom of the agricultural ladder.

With the introduction of improved techniques of production, the importance of capital in agriculture however, has been rising considerably, especially in the areas where the new high-yielding varieties (HYVs) of important cereals have gained progressive adoption. The adoption of new varieties, as is well known, is associated with the use of yield-increasing non-farm-produced-non-traditional inputs which have largely brought a change in the factor proportions. Switching from the traditional to the high-yielding varieties, therefore, is an upward shift of the demand

curves of the purchased inputs leading to increased outlays by the farmers on these inputs. But the existing capital base of the agricultural community plagued with lower income and deficit farmers is not effective enough in providing an adequate amount of cash for the purchase of these inputs. Farmers, therefore, are likely to have come to depend, to a large extent, on non-owned or borrowed funds. Thus technological change, we can postulate, has given new dimensions to the problems of agricultural credit.

Factor prices which influence cost and its structure have significantly changed in the past few years and therefore not only the high yielding varieties of crops but also the traditional crops have undergone marked changes in respect of costs though the level of use of the purchased inputs in these crops is low. However, opportunities of yield increase almost always prevail with the increased use of some inputs particularly with the increased use of chemical fertilizers. The improvement in the yields of some HYVs of rice has been the most impressive. The superiority of the high yielding varieties over the traditional ones lies in the capacity of the former to withstand much higher doses of chemical fertilizers together with other inputs.

Experimental results give sufficient evidence to believe that increase in the use of appropriate doses of fertilizer could enhance the productivity of land at a significant rate. While the Boro rice (both local and IR-8) shows an average response (average of 90 trials on local varieties and 52 on IR-8) of 2450 to 2800 pound per acre to additional applications of nitrogeneous, phosphatic and potassium fertilizers of 120 to 220 lbs. per acre (Table 1.6), the fertilizer response of local Aus ranges from 1450 to 2550 lbs. while the application rates vary from 40 to 160 lbs. (Table 1.7). Under varying rates of fertilizer application - from 70 to 180 lbs. per acre - the response of local Aman paddy ranges from 1900 to 2750 pounds (Table 1.8). The yields of these crops under controlled situation (i.e. without using any chemical fertilizer) have been recorded at 1700 lbs. per acre for Boro and IR-8, 1350 lbs. per acre for local Aus and 1550 lbs. per acre for local Aman. The response of Mexipak wheat to varying rates of fertilizers ranges from 1400 lbs. per acre to 2000 lbs. per acre when fertilizer application varies from 120 to 320 lbs. per acre, yield in the absence of fertilizer use being 900 lbs per acre (Table 1.9). Response rates of local varieties of wheat range from 950 lbs. per acre at 70 lbs. of fertilizer per acre to 1200 lbs. per acre at 120 lbs. of fertilizer per acre, the controlled yield using no fertilizer being 700 lbs. per acre (Table 1.10).

Experiments in farmers' fields on other crops with varying rates of fertilizer application were conducted and the results derived therefrom are available for appropriate strategy in agriculture. Experiments on sugarcane reveals that when fertilizer application varies from 180 lbs. per acre to 310 lbs. per acre, the increase in yield (over 43300 at '0' level of chemical fertilizer) ranges from 11200 to 26500 lbs per acre (Table 1.11).

The above results of the experiments on farmers' plots clearly bring out that farmers can profitably[18] apply higher doses of fertilizers.

Using the results of the experiments conducted by the Soil Fertility and Soil Testing Institute of Bangladesh, Ahmed (1977) estimated the marginal products of fertilizer for Boro, Aman and Aus crops at the mean levels of production and fertilizer use. His calculation indicates that Boro, Aman and Aus crops yield 5.33, 6.32 and 5.08 unit per acre respectively for every additional unit of fertilizers (fertilizer being measured in nutrient terms). In terms of

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[18] The IRDP sector paper calculated the value of the increased output per acre at varying levels of fertilizer use and the costs of the fertilizers. The value-cost ratios suggest that farmers can profitably use additional doses of fertilizers. For details see Table 1.6-1.11.

commercial fertilizer the incremented rice-fertilizer ratios for the three crops would be about 2.50, 3.00 and 2.38 respectively.[19]

Ahmed (1977) also estimated the marginal products of the above three crops by using aggregate data of 14 years covering the period 1960 - 1974. His calculation with aggregate data generates the ratio of incremental output per unit increment of fertilizer as 8.03, 6.90 and 6.53 for Boro, Aman and Aus crops respectively, fertilizer being measured in nutrient terms. In terms of commercial fertilizer the ratios are indicated as 3.30, 3.24 and 3.05 for the three crops respectively.[20]

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[19] Raisuddin Ahmed, op. cit. p.123, Table 1.1.

[20] Raisuddin Ahmed, op. cit. p. 123, Table 1.1.

Table 1.6

Response of Boro Rice to Varying Rates of Fertilizer
(Average of 142 Trials: 90 on Local varieties, 52 on IRRI-8)

$N+P_2O_5+K_2O$	Rates of Application lbs/acre	Yields lbs/acre	Yield increase over control		Value of yield increase US $/acre	Cost of fertilizer US $/acre	Net return US $/acre	Value cost ratio
			lbs/acre	%				
0 +0 +0	0	1700						
40+40+40	120	2450	750	44	38	15	23	2.5
60+40+20	120	2350	650	38	33	16	17	2.1
60+40+40	140	2550	850	50	43	17	26	2.5
60+60+0	120	2350	650	38	33	17	16	1.9
60+60+20	140	2500	800	47	40	19	21	2.1
60+60+30	150	2550	850	50	43	20	23	2.1
60+60+40	160	2650	950	56	48	21	27	2.3
60+60+60	180	2750	1050	62	53	22	31	2.4
80+80+60	220	2800	1100	65	55	28	27	2.0

Source: IBRD; Land and Water Resources Sector Study, Bangladesh, Vol. V, Modern Inputs, Appendix 9.

Table 1.7

Response of Aus Rice (Local Varieties) to Varying Rates of Fertilizer (Average of 679 Trials)

$N+P_2O_5+K_2O$	Rates of application (lbs/acre $N+P_2O_5+K_2O$	Yields lbs/acre	Yield increased over control		Value of yield increase US $/acre	Cost of fertilizer US $/acre	Net return US $/acre	Value cost ratio
			lbs/acre	%				
0 + 0 + 0	0	1350						
0 + 0 +40	40	1450	100	7	5	4	1	1.0
0 +40 +40	40	1500	150	11	8	5	3	1.4
40+ 0 + 0	40	1750	400	28	20	6	14	3.2
40+40 + 0	80	1900	550	41	28	11	17	2.5
40+40+20	100	2100	750	56	38	13	25	3.0
40+40+40	120	2150	800	59	40	15	25	2.7
40+60+ 0	100	2000	650	48	33	12	21	2.8
40+60+20	120	2150	800	59	40	14	26	2.9
40+60+40	140	2200	850	63	43	16	27	2.6
40+60+60	160	2550	900	67	45	19	26	2.3

Source: IBRD; Land and Water Resources Sector Study, Bangladesh, Vol. V, Modern Inputs, Appendix 6.

Table 1.8

Response of Aman Rice (Local Varieties) to Varying Rates of Fertilizer (Average of 718 Trials)

$N+P_2O_5+K_2O$	Rates of application lbs/acre $N+P_2O_5+K_2O$	Yields lbs/acre	Yield increase over control lbs/acre	Yield increase over control %	Value of yield increase US $/acre	Cost of fertilizer US $/acre	Net return US $/acre	Value cost ratio
0+0+0	0	1550						
30+40+0	70	1900	350	22	18	10	8	1.8
30+40+20	90	2100	550	35	28	12	16	2.3
30+40+40	110	2150	600	39	30	13	17	2.3
30+60+40	130	2250	700	45	35	17	18	2.1
40+40+0	80	2000	450	29	23	11	12	2.1
40+40+20	100	2150	600	39	30	13	17	2.3
40+40+40	120	2200	650	42	33	15	18	2.2
40+60+40	140	2250	700	45	35	18	17	1.9
60+40+0	100	2050	500	32	25	14	11	1.6
60+60+0	120	2250	700	45	35	17	18	2.0
60+40+20	120	2200	650	42	33	16	17	2.1
60+60+20	140	2350	800	52	40	19	21	2.1
60+40+40	140	2300	750	48	38	18	20	2.1
60+60+40	160	2500	950	61	48	21	27	2.3
60+60+60	180	2750	1200	77	60	22	38	2.7

Source: IBRD, Land and Water Resources Sector Study, Bangladesh, Vol. V, Modern Inputs, Appendix 7.

Table 1.9

Response of Mexipak 65 Wheat to Varying Rates of Fertilizers
(Average of 47 Trials)

$N+P_2O_5+K_2O$	Rates of application lbs/acre $N+P_2O_5+K_2O$	Yields lbs/acre	Yield increase over control		Value of yield increase US $/acre	Cost of fertilizer[1] US $/acre	Net return US $/acre	Value cost ratio
			lbs/acre	%				
0+0+0	0	900						
40+40+40	120	1400	500	55	22	14	8	1.6
80+80+80	220	1700	800	88	35	28	7	1.2
120+120+80	320	2000	1100	123	50	34	16	1.5

[1] Based on unsubsidised prices of urea, triple phosphate and muriate of Potash.

Source: IBRD, Land and Water Resources Sector Study, Bangladesh, Vol.V, Modern Inputs, Appendix 10.

Table 1.10

Response of Local Varieties of Wheat to Varying Rates of Fertilizers
(Average of 327 Trials)

$N+P_2O_5+K_2O$	Rates of application lbs/acre $N+P_2O_5+K_2O$	Yields lbs/acre	Yield increase over control		Value of yield	Cost of fertilizer* US $/acre	Net return US $/acre	Value cost ratio
			lbs/acre	%	US $/acre			
0+0+0	0	700						
30+40+0	70	950	250	36	11	10	1	0.9
30+40+20	90	1050	350	50	16	12	4	1.3
40+40+0	80	1050	350	50	16	11	5	1.3
40+40+20	100	1150	450	64	20	13	7	1.5
40+40+40	120	1200	500	71	23	14	9	1.6

* Based on unsubsidised prices of urea, triple superphosphate and muriate potash.

Source: IBRD, Land and Water Resources Sector Study Bangladesh, Vol. V, Modern Inputs, Appendix 10.

Table 1.11

Response of Sugarcane to Varying Rates of Fertilizers
(Average of 325 Trials)

$N+P_2O_5+K_2O$	Rates of application lbs/acre	Yields lbs/acre	Yield increase over control		Value of yield	Cost of fertilizer	Net return	Value cost ratio
			lbs/acre	%	US $/acre	US $/acre	US $/acre	
0+0+0	0	43300						
120+60+0	180	54500	11200	26	72	51	21	1.4
120+60+60	240	61400	18100	42	116	55	61	2.1
150+60+60	270	68200	24900	57	159	59	100	2.7
120+80+60	260	65000	21700	50	139	59	80	2.3
150+80+0	230	58400	15100	35	97	57	40	1.7
150+80+80	310	69800	26500	61	170	63	107	2.7

Source: IBRD, Land and Water Resources Sector Study Bangladesh, Vol. V, Modern Inputs, Appendix 11.

The results of the experiments conducted by the Soil Fertility and Soil Testing Institute together with Ahmed's calculation signify that cultivators can increase foodgrain production by applying additional amounts of fertilizers. The profitability of the application of extra doses of fertilizer depends on the value of the product on the one hand, and the price of fertilizer itself on the other. Considering the price of fertilizer Tk. 50/- per maund and price of paddy at Tk. 65/- per maund we can calculate the marginal value product of fertilizer by using both aggregate and experimental figures of marginal products estimated by Ahmed. The value of marginal product of fertilizer in the three rice crops in such considerations will range from Tk. 214.50 in Boro to Tk. 198.25 in Aus under aggregate data. In the experimental data the MVP ranges from Tk. 195/- in Aman to Tk. 154.70 in Aus.

The above potential productivity (MVP) of fertilizers brings out clearly why the cultivators should feel keen to divert discretionary resources away from consumption or other investment alternatives into the production process. But most of the farmers in Bangladesh are capital starved and high marginal returns are expected to be strong incentives to them to acquire and use credit to purchase the additional fertilizers.

COMPONENTS OF AGRICULTURAL CREDIT

From the above discussion it is easier to understand that due to the penetration of new technique of production in agriculture the magnitude of finance required for cultivation has become higher influencing the credit requirements of the capital starved farms. The need for credit, as is well known, for greater section of our cultivators emanates from the fact that their output is unable to create any savings. Moreover, their income accrues during a limited period of time while their expenses are distributed throughout the year. Of course, continuous flow of income over the year and its equality with consumption expenses would not make the cultivators free from the need of credit. There would, however, still exist a need for credit for meeting certain production expenses. These production expenses of the cultivators can roughly be divided into two groups :

a) short term production or working expenses ;
b) long term investment or capital expenses.

Short term production finance is necessary to meet the current costs related to the production of only one set of commodities. Short term finance is mostly needed for meeting the cost of seeds, manures, fertilizers,

pesticides and insecticides, hired labour, irrigation charges, maintenance charges of agricultural machinery and implements and other miscilleneous expenses.

Long term investment or capital expenses is necessary for securing control over resources which help the production process for a number of years. The major purposes for which such capital expenses are made are : purchase of draught animals ; land levelling, bunding, terracing and such measures for land improvements, construction and repair of wells, purchase and installation of tubewells, purchase of agricultural machinery, and the like.

Financial institutions, however, considering the accounting period make a distinction between medium term and long term investment finance. Both medium - and long term finances are due to outlays of the nature of capital expenditure. The advent of HYVs and the associated improvement in technology have created vast potentialities for long term development of agriculture. Thus a major scope of converting a static agriculture with expenditure mainly on maintenance and replacement of current assets into a dynamic one lies in permanent investments in land and agricultural implements and machinery that generate a flow of income over a period of time. This a cultivator

can do in our country by taking credit for periods longer than a year. The stringency of long and medium term funds may restrict the demand for short term credit. Supply of short term production credit for HYVs of seeds, fertilizers, plant protection materials and other inputs, for example, can engender best results if irrigation facilities are available and, therefore, the absence of irrigation through long term loans for the purchase of pump sets, sinking and installation of tubewells may restrict the demand for short term production credit. On the other hand credit for long term capital investment will not be fully effective if short term credit requirements of a cultivator remain unfulfilled.

Besides short, medium and long term credit requirements for agricultural purposes, farmers frequently seek credit for their personal consumption, unforeseen expenses such as marriages, serious illness, funerals etc. The low income of a large section of the cultivators and natural catastrophe like cyclone, flood and draught etc., force them to borrow for the vary reason of their survival and such consumption loan, both in cash and in kind, forms an important part of the rural economy of Bangladesh. The smaller and deficit farmers have to sustain themselves and their families till the harvest of the crops and

without catering some cash for their subsistence needs and emergency outlays, their lots cannot be improved. These expenses, we may consider, is as essential as any production expenses and it would be unjust to consider them as unproductive. In fact, these expenses, though not strictly agricultural in the operational sense, are so essential that efficiency of the cultivator may decrease without these and unavailability of these may adversely effect cultivators' future production potential including health of the household members. Thus we cannot limit the estimates of credit requirements of the cultivators for agricultural production only. In addition, subsistence needs and emergency expenses should be counted as components of credit requirements as well.

REVIEW OF LITERATURE

Agricultural credit is considered as one of the major developmental problem in the underdeveloped capital-scarce countries. The problem has captivated the attention of professional economists, state policy makers and the bankers from time to time and nearly everyone is trying to resolve the problem viewed from his own angle. Discussions on the credit problem have engendered a large number of publications including those that often question the reality of the "need" for agricultural credit.

One of the scientific[21] pioneering study on rural credit in Bangladesh (former East Pakistan) is that of Farouk et al. (1958). Farouk et al. conducted a study on rural credit and unemployment in four sub-divisions[22] of the then East Pakistan. They observed:

> "A farm family seems to borrow in all the sub-divisions mainly for family expenditure. The purposes which come next in importance, are capital and current expenditure on farming. Generally, for farm families, loan for current expenditure on farming occurs more frequently than for the capital expenditure on farming ....." [23]

The study of Hossain et al. conducted around 1960 in a union of Rajshahi district confirms the above observation of the purposes of borrowing of the rural households. Hossain et al. observe that 36.96 per cent of the borrowed funds accounted for consumption expenditure, 23.93 per

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[21] Scientific enquiry here refers to the statistical methods in the process of data collection and analyses. Though it is of late, there had been many enquiries with regard to nature, volume, distribution and causes of indebtedness in the area now making Bangladesh. For a brief history of the enquiries see Farouk et al. Rural Credit and Unemployment in East Pakistan. Dacca University Socio Economic Survey Board, Dacca 1968, pp.10-16.

[22] Sub-division is an administrative unit next to district.

[23] Farouk et al. op. cit. p. 63.

cent for capital expenditure on farming and 9.56 per cent for current expenditure on farming, the remainder was incurred for business and other purposes.[24]

The importance of borrowed funds used for consumption or family expenditure as revealed by the above studies is the manifestation of the fact that land does not yield even the bare subsistence for survival. In the absence of employment avenues the borrowing households, therefore, cannot check the deterioration of their economic condition.

That borrowing is related to capital expenditure on farming and family expenditure is corroborated by studies elsewhere. P.K. Pani's study is worthnoting in this regard. Pani formulated an econometric model using data of All India Rural Credit Survey collected by the Reserve Bank of India for two sample periods 1951-52 and 1956-60. In his model he made an analysis of the functional relationship between demand for agricultural credit on one

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[24] Hossain et al. , The Pattern of Peasant Economy-Puthia, A Case Study, Socio-Economic Research Board, Rajshahi University, Rajshahi, p. 138, Table IX-2.

side and average interest at which loans are secured, capital expenditures in agriculture during the year (average per cultivating household), family expenditure on selected items which are assumed to necessitate loans during the year (average per cultivating household), and value of important (selected) assets held by the cultivating household during the year on the other.[25] His study concludes whereas "assets by itself is not a major factor in explaining the borrowing behaviour of the cultivator —— capital expenditures and family expenditure are positively associated with loans, and interest rate and loans are negatively related".

By classifying the districts from which the Reserve Bank of India collected data according to the interest and nature of agricultural development the author also found :

> In the districts with developed agriculture the share of institutional finance in the total borrowing of cultivators is also high at about 9 per cent in 1951-52 and about 20 per cent in 1956-60. At the lower end there are subsistence and less

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[25] P.K. Pani, "Cultivators' Demand for Credit: A Cross Section Analysis". International Economic Review, Vol. 7, No. 2, May 1966, pp. 176-203.

monetized districts with relatively higher interest rates. The corresponding share of institutional credit for these districts was above 4 per cent in 1951-52 and about 12 per cent in 1956-60. In developed agricultural regions it would therefore appear that not only are the interest rates low but the response is as high, i.e., the cultivators' demand for credit declines with a rise in the interest rate. In districts with less developed agriculture the interest rates are high and the cultivators are also less responsive to change in the rate of interest.

From the results of the above breakdown it may be inferred that in the districts with less developed agriculture the degree of risk and uncertainty involved in a given investment of resources is greater resulting in a restriction in the use of capital which a farmer could raise from borrowing. Farmers therefore in the backward regions become risk aversive. Consequently, the demand for credit would be less.

Not to speak of availability of irrigation (information of which the All India Rural Credit Survey probably lacks), and the adoption of HYV (which, of course, is of recent origion) Pani's set of independent regressors exclude the size of the holdings. M. Long (1968) however, building a theoretical model and drawing Indian and Thai data tried to test how well it can explain the observed behaviour. By drawing relevant information from the National Sample Survey of Indian farmers in 1951-52, he

examined the relation between tenancy and debt by fitting regression equation where the percentage of farmed land owned by the farmer himself was considered as an independent variable. The coefficient had expected sign, that is to say, other things being equal, debt rose when the proportion of land owned by the farmer increased. In addition, Long discussed the influence of poverty on farmers' debt position and concludes that for the overall Indian sample, the debts of the poorer farmers were higher relative to their wealth than those of the richer farmers. Many small farmers, however, had little or no debt at all.[26]

The studies so far we have discussed above are some attempts in explaining the borrowing behaviour of the cultivators who operate mostly in traditional agricultural settings. The agro-economic scene which confronted the above studies , however, is gradually changing giving the cultivators a new shape. Under the changing conditions most of the cultivators find themselves out of balance with respect to their financial resources. Economists and state policy makers hold the view of supporting the cultivators

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[26] M. Long., "Why Peasant Farmers Borrow" American Journal of Agricultural Economics, Vol. 50, No. 4, 1968.

with large doses of credit which will keep agricultural progress and prosperity moving and ultimately help the social and economic development of the country.

Uma Lele, an economist of the World Bank expresses the view:[27]

> Modernising agriculture required large infusions of credit to finance use of purchased inputs such as fertilizer, improved seeds, insecticides, additional labour, etc..... Because savings in traditional agriculture tend to be relatively small at initial stages of development, increased demand for working and fixed capital must largely come from increased supply of credit ..... Small farmers have meager internal resources and, therefore, are most in need of production credit.

In recent times this view has been challenged by some who question the reality of the "need" of credit at low interest rate to facilitate technological change in agriculture. Von Pischke (1978), for example, refering to performance of field trials on farms and on experimental stations in Western Kenya notes that "local maize yields can be increased from 8.8 bags to 21.8 bags per acre simply by good husbandry, without fertilizer and without improved

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[27] Cited in J.D. Von Pischke, "When is Smallholder Credit Necessary". Development Digest, Vol. XVI, No. 3, 1978, p.7.

seeds.[28] He also shares the view that in many cases credit may be unnecessary, in others it may be useless, and in most circumstances low interest rates do more harm than good.[29] There are others who asset that there must be a development of appropriate new technology prior to the expansion of credit system and that technology may have a low credit propensity.[30] Dale W. Adams however advocates that "While it is apparent that technological barriers are important in a number of situations, under some circumstances credit can be the leading edge of technological-change policy".[31] Adam's assertion finds empirical supports from studies conducted in many countries where new agricultural

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28 J.D. Von Pischke, op. cit. p.7. Good husbandry in Kenyan context in defined in the study as "early planting, recommended planting density and clear weeding untill tasseling time".

29 Ibid. pp. 6-14.

30 W. D. Hopper, "Investment in Agriculture: The Essentials for Payoff", in Strategy for the conquest of Hunger: Proceedings of a Symposium Convened by the Rockefeller Foundation, New York, The Rockefeller Foundation, 1968, pp. 102-113.

31 Dale W. Adams, "Agricultural Credit in Latin America" American Journal of Agricultural Economics, Vol. 53, No. 2, 1971, p. 167.

technology is in the process of introduction. Lowdermilk (1972), for example, in a study of wheat production technology in Pakistan's Punjab finds that credit availability is positively (though not significantly) related to the rate of use of dwarf wheat seeds and it is significantly related to the level of use of nitrogenous fertilizers which are highly productive at the margin.[32] In addition his study indicates that farmers to whom credit was available used 34 per cent more nitrogen than those without available credit. Moreover, his study reveals that about 64 per cent of the farmers reporting fertilizer as not easily available. Of these farmers 75 per cent reported "lack of funds" as the reason of why fertilizer was not easily available, the highest concentration being in the lowest farm size group (i.e. 2.5 - 7.5 acres group).[33] That credit is positively and significantly related to the level of use of fertilizer is supported by empirical studies conducted elsewhere. Lalit K. Sen (1968) in a study of fertilizer adoption for

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32 Max Kearns Lowdermilk, Diffussion of Dwarf Wheat Production Technology in Pakistan's Punjab, A doctoral dissertation, Ithaca, 1972, partially reproduced in AID Spring Review of Small Farmer Credit, Vol. XIV, No. SR 114, Feb. 1973.

33 ibid. p. 269, Table 57.

HYVs found that unavailability of credit was a bottleneck in the adoption of chemical fertilizers.[34] Reddy and Kivlin (1968) in their study of HYV in three Indian villages (in Andhra Pradesh) found that lack of credit put some farmers under restraint from using HYVs.[35]

Rochin (1971), however, in a recent study of the farmers' response to high-yielding varieties of wheat in Hazara district of Pakistan observes that though barani (rain-fed) smallholders shifted to new production function with considerable changes in the use of labour, fertilizer and seeds in the production of dwarf wheat, credit did not create

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34 Lalit K. Sen, "Social Psychological Correlates of Adoption of Agricultural Innovation", Behavioural Sciences and Community Development, Vol. 2 (March 1968), p. 47.

35 S.K. Reddy and J. E. Kivlin, Adoption of High Yielding Varieties in Three Indian Villages, (Hyderabad, India: National Institute of Community Development, 1968), pp.7-9.

any constraint in the adoption of high-yielding seeds. In his words:[36]

> Analysis of the "extended family", the pattern of off-farm migration and non-farm employment lead to the conclusion that the lack of credit does not appear to be a limiting constraint on the ability of the small holders to adopt high yielding seeds, since they have other sources of farm income and migrant remittances which enable them to experiment with "risky" innovations.

In the context of technological change this conclusion appears to be strongly biased, as most of his farmers "nearly everyone interviewed was indebted".

In a study of agricultural credit in Southern Brazil B.P. Rao found that though similarized livestock ranches and crop farms has used approximately the same amount of capital investment, credit use was 50 times larger on the units which had changed from livestock to crop farming. His data also indicate serious credit rationing problems which restrains a large number of small operators from using

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[36] Refugio I. Rochin, A Micro-Economic Analysis of Smallholder Response to High Yielding Varieties of Wheat in West Pakistan, A doctoral dissertation, Department of Agricultural Economics, Michigan State University, 1971, partially reproduced in AID Spring Review of Small Farmer Credit, Vol. XIV. No. SR 114, Feb. 1973.

available technological ingredients such as fertilizer, because most institutional credit in Latin America is absorbed by the large operators.[37]

A large number of Indian studies (Subrahmanyam 1975, Singh and Bhayana 1975, Dhawan and Kahlon 1978) conducted in the recent years also suggest that credit requirements dramatically increase when new technology (which in most cases both capital and labour intensive) is introduced in farmers' production plans.

Subrahmanyam (1975) in a study conducted in West Godavari district of Andhra Pradesh found that the increase in minimum and maximum credit requirements ranged from 34 per cent to 201 per cent of the existing capital use in 40 small farms when HYV of paddy was incorporated in the optimum plan.[38]

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37 Bodepudi Prasada Rao, The Economics of Agricultural Credit - Use in Southern Brazil, unpublished Ph. D. thesis, The Ohio State University, 1970, p. 82, cited in Dale W. Adams, "Agricultural Credit in Latin America: A Critical Review of External Funding Policy", American Journal of Agricultural Economics, Vol. 52, No. 2, 1971, p. 167.

38 K.V. Subrahmanyam, "Adoption of New Technology on Small Farms: The Role of Credit and Its Requirements", Indian Journal of Agricultural Economics, Vol. XXX, No. 3, 1975, p. 184, Table II.

Dhawan and Kahlon (1978) in a recent study conducted in Ferozepur district of the Punjab State, India, found that credit requirements on optimum production plans at improved level of technology without - and with purchasing irrigation water increased to 277.58 and 594.46 per cent respectively over the farmers' owned capital owing to higher cash requirements of improved varieties of crops and irrigation water.[39]

The main source of this huge credit requirements is the increase in cash costs related to the seed-fertilizer-irrigation technology. That modern technology needs more capital and cash expenditures is widely held and supported by empirical studies in various countries. Barker and Quintana, for example, in their 'Studies of Returns and Costs for Local and High Yielding Rice Varieties' compiled farm level input-output data from different places of Philippines and found that farmers have to incur 74 per cent more cash costs for improved cultural practices related to

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39 K.C. Dhawan and A. S. Kahlon, "Adequacy and Productivity of Credit on the Small Farms in the Punjab", Indian Journal of Agricultural Economics, Vol. XXXIII, No. 4, 1978, p. 96.

the high yielding varieties of rice than local varieties (pesos 526 Vs. pesos 296).[40] Though the adoption of the new technology has reduced the cost of production per unit of output (pesos 10.48/Cavan Vs. pesos 14.21/Cavan), they observed that "the reluctance of many farmers to adopt improved practices have been due largely to increased financial requirements."[41]

Studies on agricultural credit in Bangladesh are no doubt a plenty but almost everyone of them addresses the credit problem in a traditional agricultural environment. Studies relating agricultural credit to technological change are scarcely available in Bangladesh though some changes have been made in the system of agricultural finance during post-HYV periods.

The pioneering study along this line is that of Asaduzzaman and Hossain (1974). By using 1969/70 data of two irrigated areas collected by the former Pakistan Institute of Development Economics they set out some interesting

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[40] R. Barker and E.U. Quintana, "Studies of Returns and Costs for Local and High-Yielding Rice Varieties", Economic Theory and Practices in the Asian Setting, Wiley Eastern Limited, New Delhi, 1975, Vol. 2, pp. 39-55.

[41] ibid. p. 45.

findings. One of their pertinent findings which lends support to the increasing eash cost based approach of the credit needs under modern technology is that the average borrowing per household has been increasing over time.[42] Their study also suggests that with the passage of time (from 1956 till their study year 1969-70) capital expenditure particularly expenditures on current capital have become more prominent,[43] which seems quite plausible in a new agricultural environment with an increasing outlay of the cultivators for non-farm purchased inputs. In addition, their study indicates a positive relationship between the quantum of credit and tenurial status and family size of the cultivator borrowers.[44]

Though the above study of Asaduzzaman and Hossain (1974) unearthed many sides of credit problem in rural areas disseminated with new technology in Bangladesh, a

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42 M. Asaduzzaman and Mahbub Hossain, Some Aspects of Agricultural Credit in Two Irrigated Areas in Bangladesh, Bangladesh Institute of Development Studies, Dacca, 1974, p.10, Table-2. The authors compared their findings with the findings of earlier studies conducted in 1956 and 1965.

43 ibid. p. 14, Table-5.

44 ibid. pp. 24-32, Table 12 & 13. Their regression analyses, by dropping the variable 'L' i.e. land owned by the farmer, show a positive and significant relationship between quantum of credit and family size and rent-in land.

time span of about one decade has elapsed since their study and in the interim government strategy policy and programme in relation to agriculture has changed influencing both product and factor markets. Moreover, some new institutions have come into existence for extension services of the cultivators. All these have their likely impact on the agricultural environment influencing cultivators' decisioning in regard to agriculture, including their decisioning in relation to borrowing purchasing power from institutional as well as non-institutional sources.

While studies are inconclusive with regard to farm-level credit requirements, a large number of recent studies conducted on HYV - as well as non- HYV of crops in both irrigated and unirrigated areas of Bangladesh suggest that recent technological breakthrough in agriculture has not only resulted in increasing productivity and output, but also brought about significant changes in the magnitude and structure of cost associated with the process of production.

Hamid et al. (1978) in a recent study calculated costs that farmers incur in the production of crops within and outside irrigation schemes in five villages (one with power pump irrigation, three with tubewell irrigation and one being non-irrigated) of Natore sub-division of Rajshahi district.

Their study indicates that farmers cultivating under the irrigation scheme have to incur 238% more costs than outside irrigation schemes (Taka 1409/- Vs. Tk. 593/-).[45] The study also indicates a high correlation between costs of production and per acre yield of crops within the irrigation schemes.[46]

A recent study of Agro-Economic Research, Bangladesh Ministry of Agriculture and Forests, on costs and Returns on Boro paddy in two districts reveals that though the costs in the production of IR-8 decreases with the increase in farm size, the proportion of cash outlay in the total cost however increases with the increase in farm size.[47] This represents a relatively better capital endowment of the large farmers than their smaller counterparts who can hardly generate any surplus for financing necessary farm expenses. So the smaller farmers have to depend much on borrowed funds.

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45 M. A. Hamid et al. , Irrigation Technologies in Bangladesh - A Study in Some Selected Areas, Rajshahi, 1978, p.286, Table-53.

46 ibid. p. 98.

47 Agro-Economic Research, Ministry of Agriculture and Forests, Costs and Returns of Boro Paddy, Report no. 4-SS/78, 1978, Tables-4, 5 and 13.

Ahmed et al. (1974), Alam and Choudhury (1976) also found that improved varieties of Boro cultivation incur more costs than the local varieties[48] and both of the studies indicate that cash expenditures on improved varieties are larger than those on the local varieties. More cash expenditures on the improved varieties arise due to purchase of more fertilizers, better seeds, and irrigation water and also because of more labour requirements on these crops.

OBJECTIVES OF THE STUDY

The present study is conducted with the following objectives:

1. to quantify the credit requirements of farmers on different technological planes and different farm size groups ;

2. to assess the roles the formal and informal credit agencies play in providing these funds ;

3. to examine the credit utilization patterns and the borrowing behaviour of the farmers in different technologies ; and

4. to critically locate the credit beneficiaries of the institutional loan schemes.

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[48] Ahmed et al. (1974) reported that improved Boro incures 87.5% more costs than the local Boro (Tk. 504/- Vs. Tk. 274/-), see Ahmed et al. Evaluation of Thana Irrigation Programme 1971-72, BARD, Comilla, 1974, pp.47-51. Alam and Choudhury (1976) found the costs is 46.47% higher in case of improved varieties (Tk.1292.66 Vs. Tk.882.45), see Alam and Choudhury, Report on the Evaluation of Thana Irrigation Programme in Bangladesh 1973-74, BARD, Comilla, 1976, pp.58-62.

HYPOTHESES

Our discussion suggests the following inter-related hypotheses to be tested with relevant data :

1. In traditional agriculture, credit requirements lie largely with the smaller farmers and they require credit mostly for consumption purposes.

2. The introduction of new technology, with prospects of higher rates of return on extra resources, increases the credit requirements. Since under seed-fertilizer-irrigation technology more than one crop can be raised during a year, the requirements of production credit per unit of land will be much more than the credit required per unit of land in traditional areas where generally one crop is grown. Thus with the introduction of new technology, credit requirements of medium and large farmers increase rapidly and their demand is largely for production credit.

3. In both new - and traditional technologies, larger farmers get more benefits than their smaller counterparts.

DISPOSITION OF THE STUDY

The study is organised as follows. Chapter 2 discusses the methodology - the selection of the villages, sample design, procedure of data collection and operational definition of the concepts and their measurements. Chapter 3 briefly describes the setting of the study villages and examines the characteristics of the sample households. Chapter 4 examines the requirements of credit for different

sizes of farms operating under different technological conditions, disaggregating credit requirements into three broad components viz. , capital expenses, current expenses and non-agricultural expenses. Chapter 5 investigates into the actual credit flows from different sources to the cultivators, the use-pattern of credit, the rates of interest and assesses the credit gap existing under different size-groups of farms. Finally in chapter 6 the main findings of the study are recapitulated and some policy implications are stated on the basis of the observations.

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CHAPTER 2

METHODOLOGY

From our previous discussion of changes in factor proportions and sources of capital intensity of the new agricultural technology in the underdeveloped countries, including Bangladesh, we get an insight into the likely impact of the technological change on credit requirements of the cultivators. To verify the point, however, we need empirical data. Thus, it is necessary to investigate intensively into the pattern of borrowing and alternative way(s) of financing agriculture in the areas where new technologies have gained wide adoption.

In order to quantify the credit requirements of the farmers under different technologies, it is necessary to conduct a 'before' and 'after' analysis, thus constructing a time-series supplying 'treated' and 'control' measures. An alternative way of a comparative study is to investigate into as many cross-section of farmers as there are types of technologies. In short, a researcher pursuing a comparative study should have at least two sets of data in hand, one set for the treated unit and the other set for the controlled one.

Accordingly, considering financial and time constraints we have selected two villages for our study and collected relevant data from a cross-section of 120 households. To collect data, the researcher lived with the villagers for about four months interviewed them and discussed agriculture with them. These direct observations and in-depth interviews, augmented by consultation of village documents/ records and a survey of secondary statistics engendered our data. In this chapter the selection of the village, the sampling technique, methods and procedures used in the collection of the data, operational definitions of concepts and measurements of variables, and a statement of reliability and limitation of the data are presented and discussed.

SELECTION OF THE VILLAGES

Selection of the 'Treated' or Changed Village

Our study being an attempt to indicate the impact of technological change on the credit requirements of the cultivators, we had to find out the "changed" or 'treated' villages where the farmers had the knowledge of scientific methods of cultivation adopting new technology. Under the domain of new technology, a large number of villages can be included and from these villages selection could either

be made randomly or purposively. However, on the basis of our operational definitions of technological change we purposively selected Ekdala, a village under Natore Subdivision in Rajshahi district, as our 'treated' village. After fruitful discussion with the T. C. C. A. officers at Natore and Bimal K. Saha[1] who conducted a study on the impact of technological change in this village, we came to know that the village Ekdala realised a higher degree of technological change in the form of irrigation, fertilizers, improved seeds, plant protection chemicals, improved implements etc. During our survey year, Ekdala had three deep tubewell schemes and three private shallow tubewells. The villagers of Ekdala were then well acquainted with the cultivation of various high yielding varieties of cereals like Mexipak and Sonalika wheat, IR-75. IR-5 and Pajam varieties of rice together with their traditional crop-mix. In addition to producing sugarcane, jute and banana, some of the farmers were shifting to the production of some new cash crops like water-melon on commercial scale and under irrigation.

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[1] During Saha's field survey there was only one well-functioning deep tubewell scheme and two private shallow tubewells in Ekdala.

In addition to the above technological base, Ekdala had an Agricultural Cooperative Society (K.S.S.) which helps not only in advancing loans but also in facilitating the extension and adoption of new technologies.

The above considerations, together with easy accessibility of the village, largely dictated our choice in selecting Ekdala as one of our study villages. Our choice of Ekdala was also largely dictated by the availability of farm-level information from 63 farmers due to Saha's study.

Selection of the 'Controlled'or Traditional Village

Our search for a suitable control group of farmers with traditional technology led us to a dilemma. The dilemma that arose was either to select a group of farmers in Ekdala who did not practise HYV and irrigation in any form or to choose them from other villages where modern irrigation and HYV technology are absent. Theoretically it is feasible to select a control group in the changed or treated village by separating the farmers as irrigated and non-irrigated groups or as HYV and non-HYV groups, during the survey year. But the practical difficulty cropped up due to the fact that during the year of our study a farmer in 'control' group might have changed his position from the

'treated' group with no or minor changes in his reaction patterns. The chances of such a shift was quite high in Ekdala particularly for the sharecroppers. Studies elsewhere and also in Ekdala show that eviction of tenants is frequent and thus may be responsible for distortion of relevant data. Our next attempt, therefore, was to select a control-sample from a nearby village.

We selected Ramjibanpur as our traditional village from Puthia thana of Rajshahi district. In 1958, Rajshahi University Socio-economic Survey Project undertook a field-work in 13 villages of Puthia Union and subsequently a study[2] appeared in published form. The study covered, among other things, some aspects of rural credit. We displayed our choice in selecting a Puthia village which not only will meet our definition of traditionality in agriculture but also will help in tracing overtime change in some aspects of agricultural credit. We fixed our choice on Ramjibanpur, one of the 13 villages of Puthia Union. In this village, one year back a farm-level survey was conducted

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[2] Hossain et al., The Pattern of Peasant Economy Puthia, A Case Study, Rajshahi University Socio-Economic Research Board, Rajshahi.

by Saha[3] for his study on technological change. His collected data in village Ekdala will be used in our present study and therefore for the same reason we purposively selected Ramjibanpur as our control-village.

Easy accessibility criteria in both the villages were also considered. Both of these villages were familiar to the present researcher due to his occasional visits in these villages.

Selection of the Respondents

After the selection of the two villages, lists of the cultivating households were made. In making the lists we rearranged the lists prepared by Bimal K. Saha who carried out a six-month-field work in these two villages for his study. Saha, using some key informants and consulting some village records, prepared two different lists of households

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[3] Saha collecting background information from three Puthia villages dropped out two and selected Ramjibanpur purposively due to its lower use of pesticides and fertilizers and due to absence of irrigation and other improved practices in the village. See Bimal K. Saha, Socio-Economic Effects of Technological change in Agriculture: A Study of Two Villages in Bangladesh, unpublished M. Phil. thesis, Rajshahi University, 1978, p.16.

for the two villages. The list of Ekdala contained 210 households while Ramjibanpur list contained 96 households. We stratified the households on the basis of farm size measured fromm ownership view point. The four strata are as follows:

Stratum : I: households having no land for cultivation.

Stratum II: households having land in the range of .01-5.0 bigha.[4]

Stratum III: households having land in the range of 5.01-14.0 bigha.

Stratum IV: households having land in the range of 14.01 and above.

The above stratification was followed in both the villages. Our choice of stratification on the basis of farm size for the selection of respondents is persuaded by the reasoning that farm size in any peasant society is a critical variable in any economic study related to agriculture. It is the most scarce and the most important among all the factors of production in our rural economy and since the accessibility and use of other factors is largely determined by it, the stratification of households on the basis of land area might be considered the most appropriate.

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[4] 1 bigha is equivalent to about 0.33 acres.

After stratification of the households in both the villages, on manageability considerations within limited time and other constraints, we fixed our sample size at 120 households,80 from Ekdala and 40 from Ramjibanpur. For both the villages sample selection was made randomly, using random number tables, according to probability proportional to the number of households in each stratum. The actual number and proportions of households within each stratum in each of the villages and their numbers and proportions in our sample are shown in Table 2.1.

Thus the sample size 80 of Ekdala consisted of 29 households from stratum 1, 32 households from stratum II, 11 households from stratum III and 8 households from stratum IV.

In Ramjibanpur the sample size 40 consisted of 15 households from stratum 1, 10 households from stratum II, 9 households from stratum III and 6 households from stratum IV.

Table 2.1

Number of Households by Size Categories (Stratification) and Proportion in the Population and the Samples in the Two Villages

EKDALA

Farm size or stratum (in bigha)	Number of households	Proportion of households	Number of households in sample	Proportion of households in sample
0	77	.37	29	.36
.01-5.00	85	.40	32	.40
5.01-14.00	28	.13	11	.14
14.01-& above	20	.10	8	.10
Total	210	1.00	80	1.00

RAMJIBANPUR

0	36	.37	15	.38
.01-5.00	23	.24	10	.25
5.01-14.00	22	.23	9	.22
14.01 and above	15	.16	6	.15
Total	96	1.00	40	1.00

For presenting the relevant information in tabular forms sample farmers are divided into seven size categories. These categories are made by dividing each of the sample stratum (excepting stratum I) into two sub-classes. The seven size categories are as follows:

i) Landless
ii) .01-3.00 bigha
iii) 3.01 - 5.00 bigha
iv) 5.01 - 9.00 bigha
v) 9.01 - 14.00 bigha
vi) 14.01 - 25.00 bigha
vii) 25.01 and above

With a view to analysing the credit requirements of the different categories of farms, sample households in Ekdala are further divided into:

a) those having irrigation facilities (irrigated farms), and b) those lacking irrigation facilities (unirrigated farms).

PREPARATION OF THE QUESTIONNAIRE, PRETESTING AND DATA COLLECTION

For our purpose we prepared a questionnaire in Bengali containing simple and possible open-ended questions. Before the questionnaire was finalised for formal investigation it

was pretested on six sample households taking three from each selected village. Useless and time consuming questions were omitted, some questions were clarified and some new questions were added. The questionnaire was thus modified and reorganised in order to get continuity and flow in answers. Finally, the modified questionnaire was cyclostyled in sufficient numbers. The questionnaire sought the following major types of information:[5]

1. Family size and composition.
2. Size of holding and distribution of land under irrigation.
3. Lease market of land.
4. Purchase and sales of assets.
5. Cropped area and production figures.
6. Outstanding institutional loans.
7. Cash and/or kind loan contracted during the survey year.
8. Terms and conditions of loans.
9. Unsatisfied credit needs.
10. Land transactions.
11. Information of landless farmers.

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[5] An English version of the questionnaire is annexed with the Appendix (p.263).

The above questionnaire was operated on the heads of the households who in most cases are the farm-level decision makers. Making them understand that ours is an educational exercise and we would do neither good nor evil to them and we have no link with the govt. offcials, we succeeded in convincing them that our memory may betray if we do not keep their answers in written form. Thus we filled up the questionnaaire during the time of interview.

Direct Observation

Direct observation was also adopted as a method of research. For conducting field work the researcher lived with the village people for about four months. During our stay in the villages, in addition to the sample respondents interviewed, we walked through various parts of the villages and farmers' fields, and discussed agriculture, its problems and prospects, with the villagers. During our stay in the villages we discussed with the aged people about the cropping pattern, inter-household or interpersonal transaction which prevailed in the past and their changes if any. Moreover, the researcher, on several occasions, availed of the chance of participating in the meetings of the cooperative associations of the villagers. In addition, the researcher had the chance of observing the distribution pattern of inputs and

group loans of the P. I. P. scheme which was then functioning in one of the deep tubewell schemes of Ekdala village. Observations on all these facets of the socio-economic life of the village people helped in understanding the problems they face and benefits they got in reality. These observations couched a pool of qualitative data which helped much in interpreting and analysing even our quantitative data.

Consultation of Village Documents and Records

During the field survey, we consulted some valuable village records and documents which supplied us with over-time information of some aspects of agricultural situation in the study villages. From the records of the farmers' cooperative Association (K.S.S.) in Ekdala we collected over-time data of farmers participation in the cooperative, their savings and credit. Records of the deep tubewell schemes in Ekdala proved helpful in the collection of data over-time of land under irrigation.

OPERATIONAL DEFINITIONS OF CONCEPTS AND THEIR MEASUREMENTS

Technological change: 'Technological change' in this study, is defined as a shift from 'Traditional' to 'new technology' in the context of cultivation.

'Traditional technology' is to be understood as the long-standing art of cultivation associated with local varieties of crops. In its domain, use and/or spread of high yielding varieties of crops, chemical fertilizers, insecticides is absent or very low.

'New technology' on the other hand includes a new set of inputs or factors of production which are different, atleast partially, if not wholly, from the traditional sets. Thus we defined the production practices as new technology when tubewells are used for irrigation and use of high yielding varieties of crops, chemical fertilizers and insecticides are highly prevalent and/or spreading.

For the purpose of our study, we, however, considered technological change at the farmers' level by the use of irrigation water and the adoption of high yielding varieties. A farmer who raised HYVs of crops under Shallow tubewell and/or deep tubewell during March 1977 to February 1978, has been considered as an irrigated farmer.

Estimation of Credit Requirements

A number of techniques are available for estimating credit requirements of the cultivators. Linear Programming is one of the best approaches for estimating capital or cash

needs of different groups of farmers. Running the programme gives an indication of output, income, costs, etc., under different specified situations (technological levels). Inclusion of cash constraints in some situations and relaxation in others determine the magnitude of cash to be borrowed for a particular synthetic farm.

Another tool for quantifying the credit requirements at farm levels is budgeting. Farm management research workers use it as a method of research for analysing the probable effects on costs and returns of the various alternative systems of enterprise combination or resource use. Through proper budgeting of expected costs and incomes it is possible to estimate the probable returns forthcoming from a particular investment opportunity. Once the investment opportunity is finalised, there still remains the question of funds i.e., whether the costs will be financed from internal sources or will be borrowed. Cultivators' financial statement can provide a good indication of this question, thus determining the needs for production loans.

Both the above techniques, however, have their limitations in applicability. Because in most rural situations, including less developed conntries (LDCs), farm families make consumption, production, investment decisions which are

highly interdependent and incorporation of all these in the above tools make them complicated. Moreover, incorporation of risk-aversion phenomenon (which is common in underdeveloped agriculture) in the above technique is a hard job and cannot be easily handled.[6]

A third way of the assessment of credit requirements of the farmers, in a given technology, is indicated by the calculation of the money value of the 'difference between the recommended and actual use of various farm inputs', under the assumption that the investment behaviour of the farmers is rational.[7]

A fourth technique for estimating farm-level credit needs, most similar to that of the third one, is by calculating the actual total cash requirements of the cultivators to purchase production inputs and making some assumptions about the percentage of these cash costs which ought to be

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[6] Inspite of all these limitations Indian literature of agricultural credit is upsurged by LP models.

[7] Khan and Khan measured credit requirements in this way. See Dr. Mahmood Ali Khan and Dr. Ahmad Saeed Khan, "Agricultural Credit Requirements for West Pakistan". Pakistan Economic Journal, Vol. 9 No. 2, pp. 57-64.

covered by the formal credit and thus estimating the aggregate credit needs. Onchan, however, indicated a number of weaknesses in this approach: Investment credit needs are ignored in this approach. Informal sources and owned sources of liquidity are not systematically considered, and the percentages of total cash needs which ought to be supplied by formal credit is arbitrarily chosen. Use of smaller or larger percentage can sharply alter the estimates of credit needs. In addition, this approach ignores credit needs for household activites and other rural production activities outside of farming. It also does not shed any light on the creditworthiness of potential borrowers.[8]

Our estimation of credit requirements is based on the proper ex post assessment of facts prevailing in the village economy.

For our purpose credit requirements of an individual farmer have been defined as the sum of total loans contracted plus disinvestment of assets plus unsatisfied credit needs, all being converted into monetary terms and are related to the study year.

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[8] Cited in Dale W. Adams and Yuzuru Kata, "Research on Rural Finance: A Seminar Report", ADC Seminar Report No. 17, June 1978, New York, pp. 3-4.

Loan: Loan whether it is in kind or in cash is a means of gaining uses of things otherwise not available to the farmer with his own financial resources. Loans contracted during the survey year is the money value of the borrowings irrespective of whether they are payable or repaid during the reference period.

Disinvestment: Disinvestment in our study is defined as any sale of assets during the study year which the household would keep under its disposal if credit in any form were available. Sale of assets indicating normal adjustment mechanism to sale-purchase cycle was not percieved as disinvestment. Thus disinvestment bears with it elements of distress selling, indicating relative need for borrowings.

Unsatisfied Credit Needs: It is the money value of the needs of the cultivators which remained unsatisfied in his own judgement.

Though much weight was given to the cultivators' judgement in the measurement of unsatisfied credit needs, we reminded him during the time of interview that credit is not a gift rather loans which need to be repaid and with interest.

In our consideration the amount of loans actually availed of in cash or in kind by a cultivator in a reference period under a given technology may be used as a measure of credit requirements only when the credit market is perfect and all farmers irrespective of their relative position in the socio-economic strata have equal accessibility in it. Our allowance for self-fiancne out of disinvestment of assets is justifiable on the ground that many farmers having insufficient credit or without credit resort to depletion of assets to satisfy diverse pressing financial needs. Any neglect of this therefore will give an underestimation of the requirements.

If a farmer gets credit and/or take recourse to asset depletion, there may have some unsatisfied credit needs involving postponment, reduction or cancellation of a number of consumption, production, and at times, off-farm economic activities. Thus, we have given proper allowances for the unsatisfied credit needs in our estimation.

Thus we think this approach to the estimation of credit requirements is fairly adequate to furnish results relevant to the objectives of our study.

Farm Size

We measured farm size in two ways (a) from ownership viewpoint and (b) from operational viewpoint.

Farm size measured from ownership viewpoint refers to the actual amount of land in bigha legally owned by the family.

Farm size measured from operational viewpoint refers to the effective farm size of the family and is measured in bigha as:

> Cultivated area owned by the farmer plus cultivated area taken on lease by him from others minus area given by the farmer to others for cultivation.

LIMITATION OF THE STUDY

It is well-recognised that anybody who sets out to estimate credit requirements on the basis of farm level data must encounter a number of limitations in the venture. Our estimate of credit requirements is subject to following limitations:

1. Memory bias of respondents: In Bangladesh villages, as in most underdeveloped countries, farmers do not keep records. Their information are subject to memory bias and are not always reliable.

2. Farmers are sensitive about their debts and they often can not distinguish between payments due to principal and payment due to interest separately.

3. The present survey considers a single agricultural year and for this reason can not be expected to give adequate picture of the supply of anddemand for agricultural credit, because, the decisioning of the farmers regarding allocation of land under different crops is subject to seasonal fluctuations and varies from year to year.

4. In judging the extent of unsatisfied credit needs of the cultivators it becomes a difficult problem to relate associated terms and conditions which are extremely important consideration.

CHAPTER 3

SETTING OF THE STUDY VILLAGES AND CHARACTERISTICS OF THE SAMPLE HOUSEHOLDS

The two study villages, Ramjibanpur and Ekdala are ten miles apart from each other and both are under Rajshahi District. Ramjibanpur is located in Puthia Union Council in Puthia Thana[1] and Ekdala is located in Tebaria Union Council in Natore Thana.[2] Puthia and Natore thana headquarters are respectively about 17 and 30 miles away to the east of Rajshahi district headquarter. Ramjibanpur lies at a distance of about 200 yards of the Puthia thana headquarter and Ekdala lies 2 miles away to the west of Natore town.

Transport and Communication

Both of our s tudy villages enjoy fairly good communication facilities with neighbouring central places. The principal Rajshahi - Natore metalled road passing through Ekdala leads to Nagarbari ferry-ghat. Ramjibanpur stands

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[1] Administratively, Bangladesh is divided into 20 districts, 413 thanas and 4500 unions. There are about 63,000 villages in Bangladesh.

[2] For location of the villages see the Map.

within a radius of one mile from this metalled road and is accessible by a narrow pucca road upto the thana headquarter.

Ekdala is accessible by a narrow dirt road from the metalled road. Neighbouring villages are connected by narrow dirt roads while the Rajshahi-Natore metalled road carries almost all the traffic and merchandise to the neighbouring towns. The nearest railway station, Nandangachi is 4 miles away from Ramjibanpur. Natore railway station is one mile away from village Ekdala. Both the villages enjoy the facilities of rickshaw transportation. Bullock carts in both the villages are used in different agricultural and non-agricultural business enterprises.

Soil Types in the Villages

The total geographical area of Ramjibanpur is 173 acres[3] and that of Ekdala is 672 acres.[4] Both of our study villages fall in the same soil region.[5] Farmers in our

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[3] See Bangladesh Bureau of Statistics (1979), Population Census of Bangladesh 1974, District Census Report, Rajshahi, p. 119.

[4] ibid. p. 142.

[5] From Map 7, Bangladesh Land Development Units, 1971, it is seen that both of our study villages are included in North West Region 9: Lower Mohananda and High part of Ganges Flood Plains (see World Bank Sector Study, Vol. 1a 1972, Appendix 2, p. 18).

study villages distinguish three types of land on the basis of texture which can be classified as :-

a) the Bhita land or the elevated land above the flood-level ;

b) mathan or the flat fields of intermediate level partially inundated during the rainy seasons ; and

c) the beels, or the low lying lands which go under flood water during the rains.

The soil of the elevated land is known as 'bali mati' (sandy soil), so called because of higher proportion of sand in its composition. The 'doash mati' (loamy soil) is the most important variety of the alluvial soil comprising the flat field of intermediate level. The usual soil of the low lying land is called the entel mati (the clay or the clayey loam).

Of the various types of land the bhita land is used for settlement, orchards, tree crops, bamboo bushes, etc., Both Mathan and beel lands are used for the cultivation of various crops.

The People

In 1974 the population of Ramjibanpur was 573, of which 285 were males and 288 were females. The population of

Ekdala in that year was 1181, of which 595 were males and 586 were females. The total number of households in 1974 was 84 in Ramjibanpur and 219 in Ekdala. Thus the average family size was 6.82 in Ramjibanpur and 5.39 in Ekdala.[6]

Majority of the population in both Ramjibanpur and Ekdala were Muslims. A number of Hindu families also live in both Ramjibanpur and Ekdala. However, the number of such families is higher in Ekdala than in Ramjibanpur. The Hindus of Ekdala identify themselves as Khatryas but the other people recognise them as Santals.

A large portion of the households are non-local in-migrants in Ekdala while Ramjibanpur households are mostly locals.

Village Organisations

Ramjibanpur farmers have formed a sugarcane growers' cooperative which provides loan to the member-farmers. Some of the farmers of Ramjibanpur are also members of a non-agricultural cooperative society which is involved in transportation business.

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[6] Calculated from Population Census Report 1974, District Census Report, Rajshahi. p. 119 and 142.

The formation of farmers' organisations in Ekdala started as early as in 1964 through the establishing of an agricultural cooperative society which developed centering round financing system to assist the member-farmers. From then on village level organisations have had their ups and downs in Ekdala. By now there are five cooperative societies in Ekdala. They are :

1. Ekdala Cooperative Society,
2. Ekdala Multipurpose Cooperative Society,
3. Ekdala Jubo Samity,
4. Ekdala Bhumiheen Samity,
5. Ekdala Mahila Samity.

All of the above cooperatives are, however, not agricultural in their activities. Some of these are more business institutions. Savings and deposits by the members raise capital which are invested in business and other enterprises.[7] The first cooperative Society remained defunct during our field survey. Besides these cooperatives, farmers were observed to be organised to some greater or

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[7] Ekdala Jubo Samity by raising capital from their own savings and deposits have purchased rickshaws which are pulled by the village people. The Samity has the programme of purchasing a rice (husking) mill.

lesser degree around three deep tubewell irrigation schemes.[8]

Agricultural Implements Used in the Villages

Agricultural implements and machinery used in the villages are as follows:

a) Langala (Wooden plough)
b) Mai (Beam)
c) Nirāni (harrow)
d) Kodāl (Spade)
e) Kāchi (Sickle)
f) Dā (Sickle)
g) Kural (Axe)
h) Bullock cart.
i) Jant (An implement for irrigation)

Besides these, Ekdala farmers are now well acquainted with some improved implements which are needed for agricultural operations related to the cultivation of HYV crops. A new type of locally produced weeders gained popularity among the Ekdala HYV rice growers. Sprayers have already

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[8] A deep tubewell in Bangladesh seldom belongs to a single individual. To qualify in getting an irrigation scheme farmers need to form group. Coverage of the irrigation scheme determine the size of the organisation.

become popular in Ekdala. Not all farmers, however, own these improved new implements. Some farmers possess irrigation machines which they often hire out for the purpose of irrigation. Some households possess cane-crusher in a group.

Thus it is seen that while the agricultural implements of the Ramjibanpur farmers remained unaltered from those ones used in earlier days,[9] there have been marginal changes and improvements in Ekdala in regard to agricultural implements.

Of the above implements some are made by the farmers themselves while some others are got made by the village carpenters and local blacksmiths. Some others like sprayers are, however, procured from the agricultural departments.

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[9] Nelson made list of agricultural implements in common use in the district of Rajshahi. The list included nangal (wooden plough), mai (leveller), nirani (weeder), kanchi (scythe), kula (winnower) and an implements for irrigation called jant. See W. H. Nelson, Final Report on the Survey and Settlement Operation in the District of Rajshahi: 1912-1922, The Bengal Secretariat Book Depot, 1923. P. 19

Characteristics of the Sample Households

Credit requirements of an agricultural household are determined, inter alia, by the size of his holding which is generally indicated by the net area owned by him. The size of the holding in this physical sense, however, can not be accepted as a sufficient indicator of the farm size. There are other variables that influence farming conditions and, therefore, have to be taken into account. It is necessary to know the operational size of the farms, the nature and extent of irrigation facilities available, the cropping pattern that prevails, the size of the household, the structure and composition of fixed assets, etc. In this section we have examined these aspects of the sample households in Ramjibanpur and Ekdala.

Farm Size and Landownership

Command over economic resources which the village people achieve or inherit has a significant role in the dynamics of the socio-economic framework of the village economy in Bangladesh. In a densely populated agricultural country like ours where land is considered as most scarce and where private property in land exists, command over labour power and access to other resources are likely to

emanate mostly from command over land. In what follows we have attempted to examine command over land (considered both from ownership as well as operational viewpoints) of the sample households in our study villages.

Table 3.1 shows the distribution of sample households of our study villages in seven size categories ranging from landless (having no cultivated land) to very large (over 25 bighas of land). It also provides the net area owned in each size group as well as average size of holding and per capita land. So far as the distribution of households in different size groups is concerned, it is seen that in Ramjibanpur 53 per cent of the holdings are below 3 bighas in size, whereas in Ekdala the percentage of such holdings in this size group is 66. Thus less than 50 per cent of the total households have land above 3 bighas and a large majority of them own land below 14 bighas in both the villages. It is also seen that both average size of farms and area of land per capita in Ramjibanpur are larger than those observed in Ekdala. In both the villages there is a tendency for per capita land to increase with the increase in the size of landownership.

Table 3.1

Land Ownership According to Size of Holdings in Ramjibanpur and Ekdala

RAMJIBANPUR

Farm size (in bigha)	Households		Aggregate are (in bigha)	Average size of holding (in bigha)	Area per-capita (in bigha)
	No.	%			
0	15	37.50	0	0	0
.01-3.00	6	15.00	14.76	2.46	0.03
3.01-5.00	4	10.00	16.55	4.14	0.55
5.01-9.00	4	10.00	25.75	6.44	1.12
9.01-14.00	5	12.50	56.25	11.25	0.91
14.01-25.00	3	7.50	55.00	18.33	1.38
25.01 & above	3	7.50	113.50	37.83	3.24
All farms	40	100.00	281.81	7.05	0.87

EKDALA

0	29	36.25	0	0	0
.01-3.00	24	30.00	36.88	1.54	0.24
3.01-5.00	8	10.00	31.96	4.00	0.61
5.01-9.00	6	7.50	42.92	7.15	0.89
9.01-14.00	5	6.25	64.61	12.92	1.35
14.01-25.00	4	5.00	76.25	19.06	2.24
25.01 & above	4	5.00	171.40	42.85	3.01
All farms	80	100.00	424.02	5.30	0.78

Source: Field Survey.

(in maunds per bigha)

Farm size (in bigha)	IR - 8 DTW	B. ıan	HYV wheat DTW	HYV wheat ODTW	HYV Wheat STW	Deshi wheat	Jute	Sugarcane
0	16.40	-	6.28	-	-	-	-	-
.01-3.00	16.27	4.22	4.13	5.40	-	2.50	4.00	83.75
3.01-5.00	18.73	-	7.52	5.00	-	3.75	3.48	100.00
5.01-9.00	10.40	-	5.60	3.50	-	-	5.33	136.37
9.01-14.00	17.95	5.10	3.68	3.42	-	3.00	4.67	107.30
14.01-25.00	15.77	4.90	7.28	5.55	8.00	-	3.31	104.21
25.01 & above	20.21	4.00	7.63	4.45	9.00	4.00	4.24	130.00
All farms	16.72	4.54	6.25	4.56	8.81	3.72	4.10	120.34

:rop.

:ure:

(in maunds per bigha)

Farm size (in bigha)	IR - 8 DTW	B. ıan	HYV wheat DTW	HYV wheat ODTW	HYV Wheat STW	Deshi wheat	Jute	Sugarcane
0	16.40	-	6.28	-	-	-	-	-
.01-3.00	16.27	4.22	4.13	5.40	-	2.50	4.00	83.75
3.01-5.00	18.73	-	7.52	5.00	-	3.75	3.48	100.00
5.01-9.00	10.40	-	5.60	3.50	-	-	5.33	136.37
9.01-14.00	17.95	5.10	3.68	3.42	-	3.00	4.67	107.30
14.01-25.00	15.77	4.90	7.28	5.55	8.00	-	3.31	104.21
25.01 & above	20.21	4.00	7.63	4.45	9.00	4.00	4.24	130.00
All farms	16.72	4.54	6.25	4.56	8.81	3.72	4.10	120.34

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Table 4.9

Yield of Different Crops by Farm Size Categories of Ekdala Unirrigated Farmers

(In maunds per bigha)

Farm size (in bigha)	T. Aman	B. Aman	Aus aman (inter-crop)	IR-Aus	B. Aus	Pajam	HYV wheat	Deshi wheat	Jute	Sugarcane
0	5.20	4.00	4.99	-	-	-	-	-	-	-
.01-3.00	5.45	-	5.50	-	5.00	6.67	2.64	2.44	-	-
3.01-5.00	4.77	5.00	6.25	-	4.83	-	-	3.07	-	93.33
5.01-9.00	5.00	-	6.16	-	4.50	-	-	1.50	3.75	120.00
9.01-14.00	6.00	-	-	7.33	5.00	-	6.67	2.00	1.37	130.67
14.01-25.00	5.00	-	-	-	4.50	-	4.50	-	6.00	100.00
25.01 & above	4.50	4.50	-	1.33	4.00	-	4.48	-	2.70	111.10
All farms	5.20	4.50	5.85	4.33	4.47	6.67	4.57	2.45	2.87	114.07

Source: Bimal K. Saha, Socio-Economic Effects of Technological Change in Agriculture: A Study of Two Villages in Bangladesh, unpublished M. Phil. Thesis, IBS, Rajshahi University, 1978, p. 183, Table 15.

Notes: For explanation, see Table 4.8.

Table 4.10

Yield of Different Crops by Farm Size Categories of Ramjibanpur Traditional Farmers

(in maunds per bigha)

Farm size (in bigha)	T. Aman	B. Aman	Aus-Aman (Intercrop)	IR-Aus	B. Aus	HYV Wheat	Deshi wheat	Jute	Sugarcane
0	4.17	-	-	-	4.50	-	-	-	84.00
.01-3.00	4.50	5.00	6.12	-	-	-	2.71	4.00	112.22
3.01-5.00	-	-	6.17	-	-	-	3.00	3.00	100.00
5.01-9.00	5.09	7.00	6.95	-	5.10	-	2.38	5.33	141.86
9.01-14.00	5.00	7.33	5.44	-	5.33	-	3.00	4.00	100.00
14.01-25.00	4.06	4.45	5.00	2.00	4.00	2.25	2.50	2.31	126.53
25.01 & above	4.00	4.80	4.20	-	4.29	-	2.33	2.00	98.77
All farms	4.42	5.16	5.27	2.00	4.50	2.25	2.47	2.57	115.50

Source: Bimal K. Saha, Socio-Economic Effects of Technological Change in Agriculture: A Study of Two Villages in Bangladesh, M. Phil. thesis, IBS, Rajshahi University, 1978, p.184, Table 16.

Note: For explanation, see Table 4.8.

and operation of the deep tubewells, however, some of the farmers held, create problems in terms of quantity and timely availability of water. These factors necessitated and encouraged farmers with adequate continguity and less fragmentation of land holding in the installation of their own tubewells, to be procured on credit at the subsidised rate.[6] Very large farmers of Ramjibanpur differ from the very large farmers in Ekdala in respect of the nature of technology and the resulting productive efficiency. They, however, belong to the same genre. Very large farmers of Ramjibanpur with their knowledge gathered from the neighbouring villages about the role played by irrigation equipments in enhancing productivity and cropping intensity and also with their awareness of institutional arrangements providing assistance for securing insfrastructural facilities, demonstrated their willingness to procure irrigation machine. This makes for a swelling in of the felt need for credit required for capital expenditures on Ramjibanpur large farms.

In a traditional agriculture opportunity of capital investment is limited in general, and more so for the smaller

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[6] This individualistic inclination rather than group-orientation was also found in the Philippines, see Gelia T. Castillo, All in a Grain of Rice, Southeast Asian Study and Research in Agriculture, 1975, pp. 290-291.

farmers. Thus traditional small farmers in Ramjibanpur indicated one hundred per cent of their requirements for purchasing draft cattle only, while farmers in the two smaller groups in Ekdala displayed a portion of the requirements for the improvement of land to make irrigation water available in the fields. Farmers belonging to above 5 bighas of land excepting the very large group in Ramjibanpur demonstrated a very sizeable portion of their requirements for the improvement of and/or gaining control over land, in Ekdala upper middle farmers (9.01-14 bighas) demonstrated a 50:50 proportion for improvement of land and purchase of draft animals (Table 4.11).

Credit Requirements Towards on Farm Current Expenses

Since working capital requirements are much higher with the new as against traditional crops, average credit requirements per household towards on farm current expenses of the Ekdala farmers would be higher than those of the Ramjibanpur traditional ones. Table 4.12 dealing with average credit requirements per household towards on farm current expenses reveals that Ekdala farmers' requirements were about 29% higher than those of the Ramjibanpur farmers. The variation in requirements of credit becomes wider when Ekdala farmers are put to their technology types and

Table 4.11

Break-up of Credit Requirements Towards Capital Expenses on Farming in Ramjibanpur and Ekdala

(Percentages)

Farm size (in bigha)	Ramjibanpur			Ekdala		
	Land	Draft animal	Machine	Land	Draft animal	Machine
0	-	100.00	-	-	100.00	-
.01-3.00	-	100.00	-	11.80	88.20	-
3.01-5.00	-	100.00	-	8.11	91.89	-
5.01-9.00	100.00	-	-	3.43	32.19	64.38
9.01-14.00	47.62	52.38	-	50.85	49.15	-
14.01-25.00	65.50	34.50	-	13.58	16.05	70.37
25.01 & above	-	14.29	85.71	25.00	-	75.00
All farms	10.52	45.66	43.82	16.42	35.48	48.10

Source: Field Survey.

Note: '-' indicates nil.

Table 4.12

Estimated Credit Requirements per Household Towards on Farm Current Expenses of the Ramjibanpur and Ekdala Farmers Classified According to Size and Technology

(in Taka)

Farm size (in bigha)	Ramjibanpur	Ekdala		
		Unirrigated	Irrigated	All
0	69.67	18.40	658.75	106.72
.01-3.00	200.83	60.00	326.42	215.42
3.01-5.00	87.50	362.50	603.75	483.13
Small	155.50	146.43	388.06	282.34
5.01-9.00	362.50	60.00	650.00	551.67
9.01-14.00	250.00	600.00	325.00	380.00
Medium	300.00	330.00	505.56	473.64
14.01-25.00	613.00	=	737.50	737.50
25.01 & above	683.33	=	850.00	850.00
Large	648.33	=	793.75	793.75
All farms	229.75	77.32	526.15	296.13

Source: Field Survey.
Note: '=' indicates no farm.

Ekdala irrigated farms. The estimated requirements per irrigated household in Ekdala(Tk. 526.15) were 230 per cent of those in Ramjibanpur. Estimated average quantum of requirements per unirrigated household in Ekdala, however, have been observed to be very low and even lower than that of the Ramjibanpur traditional farmers.

From the above findings it can be said that higher credit requirements for current expenses on Ekdala irrigated farms are the resultant of irrigation technology. Technological change tends to alter farmers' use pattern of the new inputs available mostly in the non-agricultural sector and thereby increase the financial requirements of the farmers who lack it. "Fertilizer" writes Griffin "are a sine qua non of the 'Green Revolution'. Then comes irrigation. Next, pest and disease control becomes essential and lastly, mechanisation..."[7] Lower level of requirements of credit displayed by the Ramjibanpur and unirrigated Ekdala farmers is the manifestation of lower level of input use of these farmers compared to the irrigated farmers in Ekdala.

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[7] K. Griffin, The Political Economy of Agrarian Change, Mcmillan, London, 1974, pp. 206-207.

The coefficient of rank correlation between farm size and average credit requirements towards on farm current expenses is positive[8] and significant for both of our study villages, thereby indicating that credit requirements for current expenses increase with the increase in the economic status of the cultivators. From the data presented in (Table 4.13 it is observed that large farmers in Ekdala use higher doses of fertilizers and from Table 3.6 (Chapter 3) we have already found that larger farmers operate larger amount of irrigated land compared to the smaller farmers in Ekdala sample. All these entail greater cash expenditure on the part of the large farmers. It is therefore not surprising that larger farmers' requirements of credit for this purpose would be higher compared to those of the smaller ones.

In a traditional agriculture though productivity is mainly dependent upon the skill and devotion of the farmers, the attitude of our larger farmers in Ramjibanpur is not so traditional as that of their smaller counterparts. We have earlier observed that larger farmers in Ramjibanpur indicated their willingness to have shallow tubewells of

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[8] The value of the coefficient has been found to be 0.93 for the Ramjibanpur sample and 0.89 for the Ekdala sample.

(All figures are in Taka)

Fertilize in cro / Farm size (in bigha)	B. Aman	Jute	Sugarcane	Banana
0	-	-	-	-
.01-3.00	-	15.00	16.46	50.31
3.01-5.00	0	-	0	57.00
5.01-9.00	-	56.00	19.70	50.27
9.01-14.0(	0	6.67	29.37	103.18
14.01-25.(	0	24.72	43.16	82.50
25.01 & a	0	5.88	34.82	61.33
All farms	0	10.12	33.62	62.90

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their own (p.131) and some of the larger farmers use in small doses new inputs like chemical fertilizers and pesticides (Table 4.14 and 4.15). Furthermore, due to their easy accessibility in the credit dispensing institutions larger farmers in Ramjibanpur get a part of their credit in kind which is included in the working capital. Thus in the traditional set up also it is not unlikely that the quantum of requirements for current expenses of the larger farmers would be greater than those of their smaller counterparts.

Looking across the size-groups of farms, it is observed that higher levels of credit requirements persist in all size-groups of irrigated farms in Ekdala. This can be explained by the higher level of input use in the changing cropping pattern and also greater cropping intensity in Ekdala. In Ramjibanpur, though farmers in the 3.01-5.00 bigha size group displayed highest cropping intensity, credit requirements towards current expenses for these farmers are the lowest. The arrangement of sharecropping also accounts for higher credit requirements of these farmers in Ekdala. In Ekdala, landowners leasing out irrigated land share the costs of modern inputs if the tenant becomes unable to bear the costs. If the landowner shares the costs of modern inputs, the share of output of the irrigated land remains conventional i.e. 50:50. However, if the

Table 4.14

Use of Fertilizers per Bigha of Land in Different Crops by Farm Size Categories of Ramjibanpur Traditional Farmers

(Figures in Taka)

Farm size (in bigha)	T. Aman	Aus-Aman	IR-Aus	B. Aus	B. Aman	HYV wheat	Deshi wheat	Jute	Sugarcane
0	0	-	-	0	-	-	-	-	6.50
.01-3.00	0	0.48	-	-	0	-	0	0	0.83
3.01-5.00	-	7.50	-	-	-	-	0	15.00	15.00
5.01-9.00	12.00	4.29	-	15.00	30.00	-	4.92	26.76	21.41
9.01-14.00	16.25	0	-	0	15.00	-	0	12.00	0
14.01-25.00	4.29	0	0	10.00	0	0	0	8.46	28.53
25.01 & above	10.00	6.40	-	4.29	16.00	-	5.00	9.50	15.24
All farms	7.58	3.22	0	9.50	7.87	0	3.90	11.80	17.45

Notes: '-' indicates that farmers do not cultivate.
'0' indicates that farmers do not use the input (Fertilizer)

Source: Bimal K. Saha, Socio-Economics Effects of Technological Change in Agriculture: A Study of Two Villages in Bangladesh, M. Phil. Thesis, IBS, Rajshahi University, 1978, p. 177, Table 9.

Table 4.15

Use of Pesticides per Bigha of Land in Different Crops by Farm Size Categories of Ramjibanpur Traditional Farmers

(Figures in Taka)

Farm size (in bigha)	T. Aman	Aus-Aman	IR-Aus	B. Aus	B. Aman	HYV wheat	Deshi wheat	Jute	Sugarcane
0	0	-	-	0	-	-	-	-	0
.01-3.00	0	0	-	-	0	-	0	0	0
3.01-5.00	-	0	-	-	-	-	0	0	0
5.01-9.00	2.18	5.71	-	0	0	-	0	0	0.75
9.01-14.00	5.00	0	-	0	0	-	0	4.00	8.00
14.01-25.00	0	0	0	0	0	0	0	0	1.47
25.01 & above	0	0	-	0	0	-	0	10.00	4.12
All farms	0.86	0.82	0	0	0	0	0	5.66	2.40

Notes: '-' indicates that farmers do not cultivate.
'0' indicates that farmers do not use the input (pesticides).

Source: Bimal K. Saha, Socio-Economic Effects of Technological Change in Agriculture: A Study of Two Villages in Bangladesh, M. Phil. thesis, IBS, Rajshahi University, 1978, p.180, Table 12.

sharecropper bears the full costs of production, the sharing of output between the sharecorpper and the landowner becomes 60:40, the larger share accruing to the sharecropper. Thus, while the landowner finds incentive in sharing costs of production for appropriating a higher rent, the small farmers (sharecropper) prefer to bear the cost for increasing his share of the output. Moreover, Ekdala small farmers (sharecroppers) have the preference for investing in current inputs not only in the irrigated sharecropped land, but also in the unirrigated land, as many of them revealed, out of fear of eviction due to inefficiency.

Per Bigha Credit Requirements Towards on Farm Current Expenses

Data relating to per bigha credit requirements towards on farm current expenses of the Ramjibanpur and Ekdala sample farmers are presented in Table 4.16. It is observed that per bigha credit requirements on the whole, were at higher levels for the Ekdala farmers compared to those for Ramjibanpur ones. It is also seen that while per bigha credit requirements towards current expenses of the landless households in Ramjibanpur were at higher levels than those of the Ekdala households in the corresponding size group, the requirements of the very small (.01-3.00 bigha) as well as

Table 4.16

per Bigha Credit Requirements Towards on Farm Current Expenses in Ramjibanpur and Ekdala

(Figures are in Taka)

Farm size (in bigha)	Ramjibanpur	Ekdala		
		Irrigated	Unirrigated	All
0	202.91	151.87	92.00	138.48
.01-3.00	109.45	108.63	61.22	99.67
3.01-5.00	29.05	158.99	90.51	123.84
Small	67.43	121.99	79.40	108.75
5.01-9.00	51.79	73.38	17.54	69.38
9.01-14.00	20.83	24.82	85.71	32.00
Medium	30.68	47.07	63.34	48.65
14.01-25.00	28.27	41.40	=	41.40
25.01 & above	18.06	19.82	=	19.82
Large	23.29	26.15	=	26.15
All farms	32.45	49.56	76.87	52.03

Source: Field Survey.
Note: '=' indicates no farm.

the very large (25.01 bigha and above) groups in Ramjibanpur were almost equal to those of the Ekdala irrigated farmers in the corresponding size groups. In all other size groups, credit requirements per bigha for this purpose were higher for the Ekdala irrigated farmers than for the Ramjibanpur ones.

As regards the relation between farm size and per bigha credit requirements, negative association was observed in all situations. The values of coefficient of rank correlation were observed to be 0.92 and 0.88 for the Ramjibanpur and Ekdala farmers respectively. In case of the irrigated and unirrigated farmers in Ekdala the values of the coefficient were respectively found to be 0.86 and 0.50.

Non-Agricultural Credit Requirements

Non-agricultural requirements like consumption and other household expenses as also investment in non-farm activities occupy a larger proportion of the credit requirements of the sample farmers in both Ramjibanpur and Ekdala. Table 4.17 dealing with per household credit requirements towards non-agricultural purposes reveals that overall average quantum of requirements per household for this purpose in Ekdala was at a higher level than that in Ramjibanpur. Irrigated households in Ekdala, it is observed, displayed one and a half times larger requirements than both Ramjibanpur traditional farmers and Ekdala unirrigated farmers.

Moving along the various size-groups of farms, it is obsrved that per household average quantum of credit requirements for non-agricultural purposes were almost equal for

Table 4.17

Estimated Credit Requirements Per Household Towards Non-Agricultural Expenses of the Ramjibanpur and Ekdala Cultivators Classified According to Size and Technology

(Figures are in Taka)

Farm size (in bigha)	Ramjibanpur	Ekdala		
		Unirrigated	Irrigated	All
0	637.00	609.34	1797.50	773.23
.01-3.00	2494.83	870.23	1968.57	1510.93
3.01-5.00	489.00	2898.13	945.00	1921.56
Small	1692.50	1449.63	1741,11	1613.59
5.01-9.00	25.00	730.00	4694.00	4033.33
9.01-14.00	911.00	5900.00	263.75	1391.00
Medium	517.22	3315.00	2725.00	2832.27
14.01-25.00	2893.33	=	3537.50	3537.50
25.01 & above	466.67	=	6500.00	6500.00
Large	1680.00	=	5018.75	5018.75
All farms	1030.00	1028.25	2646.28	1817.04

Source: Field Survey.
Note: '=' indicates no farm.

the two groups of smaller and two groups of larger farmers in Ramjibanpur. In Ekdala, per household credit requirements for non-agricultural purposes of the two groups of larger farmers were 3.11 times those of the two groups of smaller ones (Tk. 5018.75 Vs. Tk. 1613.69). The coefficients of rank correlation between average credit requirements for non-agricultural purposes and farm-size, 0.07 and 0.72, respectively for Ramjibanpur and Ekdala farmers, thus indicate that while credit requirements for non-agricultural expenses are unassociated with economic status of the farmers in Ramjibanpur, average requirements per household in Ekdala increase with the increase in the economic status of the farmers.

By comparing the quantum of average credit requirements per household towards non-agricultural purposes of the various groups of farmers in one village with the corresponding groups of farmers in the other, it is observed that higher level of requirements in Ekdala persists in all size groups of farms except the very small one (.01-3.00 bigha). Very small farmers in Ramjibanpur displayed 65 per cent larger requirements than the Ekdala very small farmers (Tk. 2494.85 Vs. Tk. 1510.93). Average non-agricultural requirements of credit of the two groups of larger farmers in Ekdala were three times those of the two groups of large farmers in Ramjibanpur.

We have earlier observed that average credit requirements per household towards on farm capital - and current expenses were at higher levels in case of the Ekdala sample farmers than those of the Ramjibanpur ones. Here it is seen that non-agricultural requirements are also higher for Ekdala farmers.

At this stage one may put the following question: What accounts for the higher non-agricultural credit requirements of the Ekdala farmers ? What factors are responsible there for the higher non-agricultural credit requirements in the larger landholding categories?

The answer to the above questions may be sought by splitting up the various items constituting the magnitude of non-agricultural requirements. This we have done in Table 4.18. The table shows that food item accounted for the major share in non-agricultural requirements in Ramjibanpur. While food item accounted for more than 50 per cent of the total non-agricultural requirements in Ramjibanpur, it occupies only 23.17 per cent of the total non-agricultural requirements in Ekdala. In absolute terms the magnitude of credit requirements for grain needs is higher in Ramjibanpur than in Ekdala. The higher non-agricultural requirements of the Ekdala sample households have therefore

Farm size (in bigha)	A		
	Food	omic Non-food family consumption	Total
0	330.00 (51.81)	135.34 (17.50)	773.23 (100)
.01-3.00	1561.50 (62.59)	373.33 (24.71)	1510.93 (100)
3.01-5.00	326.50 (66.77)	811.63 (42.24)	1921.56 (100)
Small	1067.50 (63.07)	482.91 (29.93)	1613.59 (100)
5.01-9.00	25.00 (100)	2083.33 (51.65)	4033.33 (100)
9.01-14.00	681.00 (74.75)	340.00 (24.44)	1391.00 (100)
Medium	389.44 (75.32)	1290.91 (45.58)	2832.27 (100)
14.01-25.00	1000.00 (34.56)	562.50 (15.90)	3537.50 (100)
25.01 & above	-	6500.00 (100)	6500.00 (100)
Large	500.00 (29.76)	3531.25 (70.36)	5018.75 (100)
All farms	553.25 (53.69)	772.85 (42.53)	1817.04 (100)

ercentages.

emanated from non-food requirements. It is understandably evident that seed-fertilizer-irrigation technology has enabled many of the Ekdala farmers to reduce their deficit in food grains and enabled some of the farmers to become self-sufficient and/or surplus.[9] The higher non-agricultural credit requirements of the Ekdala farmers can, therefore, be attributed to non-food items. It is observed from Table 4.18 that there is a wide variation in respect of requirements under business and non-farm activities. While 34 per cent of the total non-agricultural credit requirements was accounted for by business and off farm economic activities in Ekdala, only 16.98 per cent of the total non-agricultural requirements was accounted for by business and non-farm activities in Ramjibanpur. This may appear to be overtly erratic. Because, new technology not only increases

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[9] Introduction of irrigation and adoption of HYVs enable farmers to become surplus is evident from a recent study conducted by Qadir et al. in seven villages (5 irrigated and 2 unirrigated) in Singra thana under Rajshahi district. The study shows that cent per cent of the households with land 2.5 acres and above, and some smaller farmers (under 2.5 acres) claimed surplus in the irrigated villages. In contrast, while only 40 per cent of the sample households in the largest category (7.5 acres and above) reported surplus no households in the smaller category (under 2.5 acres) even approach self-sufficiency, see Qadir et al., Productivity and Equity in IRDP Cooperative Schemes: An Analysis of A 1976 IBS Survey of Seven Villages in Singra Thana, Bangladesh, IBS, Rajshahi University, 1978, p. 124, Table 8-5.

productivity and output, but is also labour using.[10] Thus farmers (including their family members) who have adopted new technology will be more involved in the crop fields and less available for non-farm enterprises. In view of limited off-farm employment opportunities, it is thus possible that in Ramjibanpur where farmers raise low labour using crops and where cropping intensity is also lower, family members of the farmers may remain unemployed for longer periods of the year than the members of the Ekdala farmers who have incorporated labour using crops in their crop-mix and whose cropping intensity is also higher. It is thus more likely that credit requirements towards business and off-farm activities of the Ramjibanpur farmers would

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[10] By comparing labour use in the cultivation of HYVs of paddy (IR-8) and wheat by the Ekdala progressive (irrigated) farmers with labour use in the cultivation of local varieties of the above crops by the Ramjibanpur traditional farmers, Saha observes that the increase in labour use was as much as 140.10 per cent in case of paddy and 57 per cent in case of wheat, see Bimal K. Saha, op. cit., p.131. Similar results have been reported in other independent studies in Bangladesh, see Abdullah et al., SIDA/ILO Report Report on Integrated Rural Development Programme, Bangladesh, Appendix 1, Dacca, June 1974; Abdullah et al., "Agrarian Structure and the IRDP - Preliminary Consideration", The Bangladesh Development Studies, Vol. IV, No. 2, 1976; Iftikhar Ahmed, "Technical Change and Labour Utilization in Rice Cultivation: Bangladesh", The Bangladesh Development Studies, Vol. V, No. 3, 1977; M. Muktada, "The Seed-Fertilizer Technology and Surplus Labour in Bangladesh Agriculture", The Bangladesh Development Studies, Vol. III, No. 4, 1975; T. R. Islam, "Appropriate Technology and Rural Development", Paper presented at the ESCAP/IRDP workshop on Pilot Project in Integrated Rural Development in Bangladesh, held at BARD, Comilla, November 1976.

be higher than those of the Ekdala farmers. But evidence from Ekdala reveals the opposite. This can be explained by the Ekdala farmers attitude towards off-farm activities and credit as well. We have earlier mentioned that most of the Ekdala farmers are non-local in-migrants who have more entrepreneurial abilities as is revealed by a current sociological study (conducted in two neighbouring villages adjacent to our village Ekdala),[11] than the Ramjibanpur farmers (mostly locals). The farmers of Ekdala are becoming more venturesome and are throwing off some of their traditional fears of credit and debt. The farmers have the confidence that if credit facilities are extended to them, they can better use the debt capital in business and other off-farm income generating activities. Improved productivity and increase in production of land results in greater economic well being and higher creditworthiness. This makes the households more development conscious and consequently credit conscious. Thus inspite of being preoccupied with their land Ekdala farmers displayed higher credit requirements for business and other off-farm activities.

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[11] Showkat Hayat Khan, Beyond the Trap of Tradition ? In-migrants and Locals in a Rural Community of Bangladesh, unpublished M. Phil. thesis, IBS, Rajshahi University, 1977, pp. 123-142.

In Ramjibanpur, farmers displayed very small quantum of average requirements of credit for business and other off-farm income generating activities. This behaviour in regard to non-agricultural credit requirements of the Ramjibanpur farmers vis-a-vis the Ekdala farmers is explained by the peculiar historical preference of leisure to work of the Ramjibanpur farmers. Farmers in Ramjibanpur have the heritage of five and a half hours of working day (from morning to noon) from historical past. Few farmers displayed credit requirements for business and off-farm income generating activities.

In Ekdala some farmers in the middle size-groups revealed that they find it beneath their dignity to work as agricultural labourers on others' lands. Some large farmers do not put in their physical labour even on their own lands. These larger farmers, of course, have part-time business. They therefore, reported credit needs for the expansion of the business. In doing so they employ their own and family labour in more gainful and/or socially favoured forms than in agricultural occupation.

Credit Requirements of the Borrowing Households

The estimates of per household and per bigha credit requirements, as given in Table 4.1 and 4.2 are based on the averages of all sample households without regard to their borrowing status. To show the difference, if any, in the quantum of credit requirements between the borrowers and non-borrowers it is necessary to examine them separately. Excluding the non-borrowing households, which number 12 in Ramjibanpur and 19 in Ekdala, Table 4.19 shows the per household and per bigha credit requirements of only the borrowing households belonging to various size-groups. It is seen that Ekdala borrower-farmers, as a whole, recorded about 56 per cent larger requirements per household (Tk. 4497.18) than the Ramjibanpur borrower-farmers (Tk. 2870.18). Ekdala borrower-farmers in all size-groups except the very small one (.01-3.00 bigha) reflected larger requirements per household compared to the Ramjibanpur ones in the corresponding size-groups. In both the villages positive association was observed between farm-size and average quantum of credit requirements per borrowing household.

Table 4.19 also shows that on a per bigha basis borrower-farmers as a whole in Ekdala exhibited one and a half times

Table 4.19

Credit Requirements of the Borrowing Households by Farm Size Categories in Ramjibanpur and Ekdala

(Figures are in Taka)

Farm size (in bigha)	Per household basis		Per bigha basis	
	Ramjibanpur	Ekdala	Ramjibanpur	Ekdala
0	958.00	1736.18	-	-
.01-3.00	4434.80	1958.46	1808.65	1360.04
3.01-5.00	1935.33	2867.19	494.13	717.69
Small	3497.50	2238.07	1165.35	1005.35
5.01-9.00	600.00	8468.33	87.27	1183.83
9.01-14.00	1851.67	7868.33	179.19	637.97
Medium	1351.00	8268.33	150.95	931.12
14.01-25.00	7550.00	14400.00	431.00	755.41
25.01 & above	6983.33	24700.00	184.58	588.10
Large	7210.00	17833.33	242.76	667.71
All farms	2870.18	4497.18	369.90	920.41

Source: Field Survey.

Note: per bigha credit requirements have been worked out by considering owned land only.

'-' indicates not applicable.

larger requirements than the Ramjibanpur farmers. Higher requirements per bigha in Ekdala was seen to persist in all size-groups except the very small one (.01-3.00 bigha). Within the villages also, there was considerable variation

in the per bigha credit requirements among the borrower-farmers belong to the different size-groups. The very small farmers in both the villages reflected the largest requirements per bigha compared to other groups. In Ekdala the very large farmers (above 25 bigha) recorded the smallest amount of need per bigha while the smallest requirement in Ramjibanpur was reflected by the borrower-farmers belonging to the 5.01 - 9.00 bigha group. Per bigha credit requirements of the borrower-farmers in smaller categories in Ramjibanpur were remarkably higher than those of the very large farmers there. Unlike credit requirements per household, per bigha requirements of the borrower-farmers were inversely related with farm size.

What stands out in the total from the above discussion is that the pattern of credit requirements which we observed earlier on considering sample households without regard to their borrowing status continues basically unaltered when data relating only to the borrowing households are taken into consideration.

Distribution of Purposewise Credit Needs in Different Farm Size Categories

From our above estimation of credit requirements we have observed that both in Ramjibanpur and Ekdala, whatever

may be the purpose, larger farmers always recorded the highest average quantum. Higher average requirements per household however, do not imply that larger share of the demand for credit will necessarily be claimed by the larger farmers. In showing this, we have expressed credit requirement figures of a particular size group of farms for any purpose as a percentage of the total credit requirements of the aggregate of sample households for that purpose. Thus the sum of the proportions over the size groups for each purpose adds to 100 (Table 4.20). It is evident that in the Ramjibanpur sample, about 65 per cent the demand for investment finance (i.e. credit requirements towards capital expenses) comes from the two groups of larger farmers. In Ekdala, however, investment opportunity being wider for other farmers as well, the two groups of middle farmers, unlike those ones in Ramjibanpur, expressed a significant proportion of the demand for investment finance. Thus, in a traditional agriculture, while larger farmers claim most of the investment finance, penetration of new technology encourages other farmers to invest in agriculture and hence to claim a significant proportion of the investment finance.

An examination of the proportion of credit requirements towards current expenses on farming (Col. 3 and col. 7)

Table 4.20

Distribution of Credit Requirements by Farm Size
In Ramjibanpur and Ekdala

Farm size (in bigha)	RAMJIBANPUR				EKDALA			
	Distribution (%)				Distribution (%)			
	Capital expenses	Current expenses	Agricultural expenses	Non-agricultural expenses	Capital expenses	Current expenses	Agricultural expenses	Non-agricultural expenses
1	2	3	4=3+2	5	6	7	8=6+7	9
0	4.38	11.37	5.86	23.18	9.87	13.06	10.39	15.43
.01-3.00	17.53	13.11	16.59	36.32	6.06	21.82	8.63	24.95
3.01-5.00	10.22	3.81	8.87	4.75	3.04	16.31	5.21	10.58
5.01-9.00	0.29	15.78	3.57	0.24	19.16	13.97	18.31	16.65
9.01-14.00	3.07	13.60	5.30	11.05	12.13	8.02	11.46	4.78
14.01-25.00	13.38	20.02	14.79	21.06	33.30	12.45	29.90	9.73
25.01 & above	51.12	22.31	45.03	3.40	16.44	14.35	16.10	17.89
All farms	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Field Survey.

among the various size groups of farms shows that farmers upto 5 bighas of land claimed 28.29 per cent of the total production credit in Ramjibanpur while in Ekdala such households claimed about 50 per cent of the total production credit. In Ramjibanpur, the demand for production credit of the larger farmers was two and a half times that of the smaller farmers, while in Ekdala the demand for production credit of the smaller farmers was one and a half times that of the larger farmers.

Looking into columns 5 and 9 of Table 4.20 it is seen that both in Ramjibanpur and Ekdala, the demand for non-agricultural credit comes mostly from the smaller farmers (upto 5 bighas of land). The proportion of demand recorded by the larger farmers was almost the same in our two study villages and the recorded proportion of demand of these farmers remained below the corresponding proportions of the smaller farmers in both Ramjibanpur and Ekdala.

CHAPTER 5

THE SUPPLY OF RURAL CREDIT, ITS DISTRIBUTION, USES AND SHORTFALLS

Sources of Credit

Credit requirements, as have been considered in our operational definition, are partly conditioned by and connected with the farmers' accessibility to different sources of credit. For different farmers operating under varying technological conditions and living in different socio-economic strata, accessibility to some source is not similarly open to everybody. Further, variations in the terms and conditions for loans are often linked to the relative economic strength of the farmers determined by the objective conditions in which they live. An examination of the supply side of credit, therefore, becomes an essential part, of a study on credit requirements. This chapter is devoted to the analysis of the sourcewise distribution of agricultural credit and the terms and conditions associated with the loans.

Broadly speaking, there are two sources of agricultural credit in Bangladesh, viz: a) Institutional source, and b) Non-institutional source. Under the non-institutional source comes friends and relatives, landlords, traders and

shopkeppers, village money-lenders, neighbours. Historically, cultivators of Bangladesh had depended much on the non-institutional source for meeting their credit needs. Village money-lender with his exacting rate of interest occupied the pivotal role in the non-institutional market. Cultivators had to depend on the money lender to procure the much needed finance for agricultural operations and also for subsistence of the family. Village cultivators would even mortgage the land which had often been put to sale if the loans were not recovered in time. With the passage of time, however, institutional sources of borrowing have been developed. But the role of the institutions remained supplementary for long and non-institutional sources have maintained their dominance. During the sixties, a multi-institutional credit system was developed in the erstwhile Pakistan which used to deliver credit to the cultivators through the financial institutions directly as well as through the financial intermediaries like cooperatives.[1] The system provided credit to a section of the cultivators who had ample security but

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[1] M. A. Majid Molla, "Institutional Delivery System of Agricultural Credit in Bangladesh", in Problems and Issues of Agricultural Credit and Rural Finance, (Deliberations of the International Workshop on Providing Financial Services to the Rural Poor, Dacca, October 23-25, 1978), Bangladesh Bank, Dacca, 1979, p. 2.

the loans used to remain unrecovered for years together,[2] After the advent of Bangladesh, Government with firm commitment to rural development focused and empahsised agricultural productivity at an accelerated pace by supplying high yielding inputs and by creating institutional facilities. Many of the new institutions with their heritage in the past, provide, among other things, credit to the cultivators. The various institutions which are delivering credit to the cultivators are : Bangladesh Krishi Bank, Bangladesh Jatiya Samabaya Bank, Nationalised Commercial Banks and Integrated Rural Development Programme. Agricultural and Fisheries departments of the Government are also providing credit to the farmers.

The above sources of credit are not active in all areas with equal efficacy. In some areas cooperatives may have more active role than the commercial banks while in many other areas the reverse may be true. The principal institutional sources functioning in Ekdala are: Commercial Banks, Multipurpose Cooperative Society, Agricultural department of the government, Bhumiheen Samity (Association of the landless) and Jubo Samity. There is a Krishi Samabaya Samity (KSS) in Ekdala, but it is at a dormant state. In Ramjibanpur, the principal institutional sources are

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[2] M. A. Majid Molla, op. cit., p. 2.

Commercial Banks, Sugarcane Growers' Cooperative. The Sugarcane Growers' Cooperative is well functioning in Ramjibanpur. There is also a branch of Krishi Bank in Puthia.

Table 5.1 gives the relative shares of the institutional and non-institutional borrowings of the sample households in our study villages. For comparison we included in the table the relative figures as disclosed by some other surveys conducted independently in different areas of the country at different times. It is seen that the institutional sources were even less significant as suppliers of rural credit before the sixties. At that time non-institutional sources virtually supplied about the whole of the credit. With the passage of time institutional sources have been gaining importance in some areas. In other areas, however, the relative importance of the non-institutional sources has continued basically unaltered. The increasing importance of the institutional sources is due, among other reasons, to changes in farming technologies like spread of irrigation facilities and use of modern inputs together with the setting up of formal agencies, which help spread agricultural knowledge and cater credit in cash and kind as well. Lower contribution of the institutional sources in other areas, as observed by

Table 5.1

Relative Shares of Institutional and Non-Institutional Loan in the Total Borrowings of the Farmers in Various Studies

Studies	Period	Percentage of total credit from	
		Institutional source	Non-institutional source
1. Dacca University Socio-Economic Survey Board, (Asaduzzaman and Hossain 1974)	1956	4.86	95.14
2. Socio-Economic Research Board, Rajshahi University (Hossain et al., 1962)	c.1960	23.60	76.40
3. Registrar of Cooperative Societies (Asaduzzaman and Hossain 1974)	1967	13.86	86.14
4. Asaduzzaman and Hossain 1974	1969/70	P 27.15 T 63.29	72.85 46.71
5. M. Hossain, 1977	1973/74	P 32.90 T 50.10	67.10 49.90
6. Quasem et al. 1979	1975/76	M 11.81 B 10.53	88.19 89.47
7. Our study	1977/78	R 43.71 E 40.14	56.29 59.86

P stands for Phulpur,
T stands for Thakurgaon,
M stands for Madanpure,
B stands for Bahalgachia,
R stands for Ramjibanpur, and
E stands for Ekdala.

Quasem et al., are, among other reasons "possibly because of their distant location from the Government Secretariat located at Dacca and the inaccessibility of the institutional sources to the areas".[3] These areas are also less exposed to development projects as evidenced in the installation and operation of deep tubewells compared to other areas.[4] In both of our study villages, however, the relative importance of the institutional sources is well recognised. Interestingly enough the share of institutional credit in the total credit of the sample househols in our traditional village was observed to be slightly higher than that in the irrigated village.

By comparing our results with the findings of Hossain et al., it is evident that the contribution of the institutional sources as a supplier of loans to the cultivators has increased over time. The institutional sources increased their advances from 23.60 per cent in 1960 to 43.71 per cent in 1977-78 in Ramjibanpur. Thus in Ramjibanpur in case of the non-institutional agencies, the percentage share in total

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[3] Md. Abul Quasem, Mahmudul Alam and Jadab Chandra Saha, "Rural Credit in Bangladesh: A Case Study at Patuakhali", Paper presented at the First National Conference of Bangladesh Krishi Arthanitibeed Samity, Dacca, 1979, p.6.

[4] ibid.,p.6.

finance decreased from 76.40 per cent in 1960 to 56.29 per cent in 1977-78. This indicates that in financing the agricultural sector, the institutional sources have made considerable progress over time.

Table 5.2 gives the percentage share of institutional and non-institutional borrowings of the sample farms out of their total borrowings in different size groups and technology types in our two study villages. It is seen that farm size and proportion of institutional credit to total credit are positively associated in case of the Ramjibanpur farmers. Such positive relationship is also found for the Ekdala sample upto 14.01 - 25.00 bigha size group of farms. For the very large farmers (25.00 bigha and above) in Ekdala the proportion of institutional credit drastically fell to 21.97 per cent. Though the relationship is largely a reflection of the borrowing behaviour of the Ekdala irrigated farmers, no definite pattern is observed for the Ekdala unirrigated farmers. For the unirrigated farmers, the proportion of institutional credit has a decreasing tendency upto the 3.01 - 5.00 bigha size category, but when farm size extends beyond 5 bighas the proportion tends to increase. Unirrigated farmers in Ekdala, however, had lower dependence on non-institutional credit than institutional credit.

Table 5.2

Share of Institutional and Non-Institutional Credit in the Total Borrowings of Farmers in Ramjibanpur and Ekdala

Farm size (in bigha)	INSTITUTIONAL				NON-INSTITUTIONAL			
	Ramjibanpur	Ekdala			Ramjibanpur	Ekdala		
		Unirrigated	Irrigated	All		Unirrigated	Irrigated	All
0	--	29.73	7.64	19.49	100	70.27	92.36	80.51
.01-3.00	--	16.71	11.33	12.98	100	83.29	88.62	87.02
3.01-5.00	--	--	29.34	20.24	100	100.00	70.66	79.87
Small	--	11.26	17.04	15.29	--	88.74	82.96	84.71
5.01-9.00	44.44	12.66	45.57	41.82	55.56	87.34	54.43	58.18
9.01-14.00	10.06	14.53	75.83	23.90	89.94	85.47	24.17	76.10
Medium	19.20	14.31	50.00	32.88	--	85.69	50.00	76.12
14.01-25.00	93.33	=	89.20	89.20	6.67	=	10.80	10.80
25.01 & above	100.00	=	21.97	21.97	--	=	78.03	78.03
Large	95.68	=	50.50	50.50	4.32	=	49.50	49.50
All farms	43.71	15.13	44.58	40.14	56.29	84.87	55.42	59.86

Source: Field survey.
Notes: '--' indicates nil.
'=' indicates no farm.

What indication we get from the above associations in our study villages is that larger farmers in both Ramjibanpur and Ekdala get a larger proportion of credit from the institutional sources while smaller farmers get larger proportion of their loans from the non-institutional sources.[5] Inspite of the decline in its importance over time (as has been found in Table 5.1), non-institutional sources were found to be still playing an important role in supplying agricultural credit to the smaller farmers in both Ramjibanpur and Ekdala. It is seen from the table that Ramjibanpur farmers upto 3.00 bighas of land procured 100 per cent of their loans from the non-institutional sources. In Ekdala also the availability of institutional credit is extremely limited for the smaller farmers as a result of which these farmers depended largely on the non-institutional sources of credit. The non-institutional sources supplied more than 80 per cent of the total credit of the smaller farmers in Ekdala. This shows that institutional agencies have not made much impact on the small cultivators. By comparing credit behaviour of the irrigated and unirrigated farmers in Ekdala, it is seen that the proportion of institutional

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[5] Similar pattern was also observed elsewhere, see Asaduzzaman and Hossain, Some Aspects of Agricultural Credit in Two Irrigated Areas in Bangladesh, Research Report (new series), No. 18, Bangladesh Institute of Development Studies, Dacca, 1974, pp. 10-11.

credit on the irrigated farms was 3 fold the proportion on the unirrigated farms, the proportions being 44.58 and 15.13 per cent of the total loans. It was, however, noted that irrigated farmers in the landless and very small categories had lower dependence on institutional credit compared to the unirrigated farmers in those categories.

So far we have analysed credit supply from two broad sources, e.g. institutional and non-institutional. Tables 5.3 and 5.4 are an agency-wise analyses of the disbursement of credit to different categories of farmers in our study villages. Table 5.3 shows that in Ramjibanpur, Banking Institutions made cent per cent of their disbursements to the two larger farm size groups and no farmer below 14.00 bighas of land obtained credit from Banks.[6] Sugarcane Growers' Cooperative also made 88 per cent of its disbursements to the two larger size groups and channelled the remainder to the medium farmers. Landless and small farmers remained unregistered in Sugarcane Growers' Cooperative.

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[6] Banking institutions in reality hardly disburse credit without securing sufficient security against the amount lent. As a consequence, small farmers who constitute a big proportion of the cultivating people who have been facing crises owing to inadequate amount of capital, get no assistance from the Banks. Moreover, small farmers are mostly illiterate and are ignorant of the efficient procedures and functions of getting loans.

Table 5.3

Distribution of Borrowings from Different Agencies on Various Farm Size Groups in Ramjibanpur

(Figures are in percentages)

Farm size (in bigha)	Banks	Sugarcane growers' cooperative	Land lords	Large farmers	Small/ medium farmers	Friends and relatives	Shop-keepers and traders	Others	Total
0	-	-	100.00	-	-	25.87	27.86	1.85	10.63
.01-3.00	-	-	-	67.84	50.00	33.57	51.76	30.77	25.46
3.01-5.00	-	-	-	-	-	4.20	12.05	36.92	5.78
5.01-9.00	-	7.27	-	-	10.00	11.19	-	-	4.14
9.01-14.00	-	4.55	-	32.16	-	25.17	8.33	26.77	11.43
14.01-25.00	75.00	47.27	-	-	40.00	-	-	-	27.61
25.01 & above	25.00	40.91	-	-	-	-	-	-	14.95
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Field Survey.
Note: '-' indicates nil.