SOCIO-ECONOMIC PERFORMANCE OF BRAC DTW PROGRAM

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C O N T E N T S

A C R O N Y M S

1. AM - Area Manager
2. BADC - Bangladesh Agricultural Development Corporation
3. DTW - Deep Tubewell
4. PA - Program Assistant
5. PO - Program Organizer
6. RDP - Rural Development Program
7. REB - Rural Electrification Board
8. RRA - Rapid Rural Appraisal
9. SMC - Scheme Management Committee
10. SOC - Scheme Operation Committee
11. STW - Shallow Tubewell
12. VO - Village Organization

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EXECUTIVE SUMMARY

BRAC launched its irrigation program in early 1980s with low lift pump and then introduced the DTW program in 1984-85. Since 1990-91 BRAC has gone through a large-scale expansion of the program. In the last 1994-95 boro season 632 DTWs were operated in 89 RDP areas. The majority of these were not profitable during the season of operation. The cumulative loss of the BRAC DTW program up to 1995 was Tk. 53,716,151.

The present study tries to investigate the viability of DTW program to: 1) determine the profitability of the schemes; 2) investigate the program feasibility; and 3) investigate social impact of the schemes.

For the study seven RDP areas from seven regions were selected. A total of 22 schemes were taken as sample where every second scheme was non-profitable according to the 1993-94 program documentation. Schemes in operation for at least three years were selected and a total of 310 respondents were interviewed using open ended checklists. Respondents included: BRAC field staff, shareholders, dropout shareholders, farmers (user of DTW and non user), elites and other respectable persons of the villages.

Quantitative data was taken from different program documents. Qualitative information was collected through interviews group discussions. To assess the social benefits RRA techniques were applied.

In 25 schemes of which 22 were in operation in the 1994-95 boro season only 9 were profitable in gross amount. The remaining 13 were not profitable on the basis of the actual revenue to be collected and the total cost of operation. Fourteen DTWs could be made profitable if total expected revenues were collected. The average command area of the schemes was 28.16 acres, only 60% of the target. Due to capacity loss in area coverage, averaging 18.8

acres per scheme, earnings from the actual command area covered only 95% of total operational expenses. Because of shortfalls in collection, and high operational costs Tk. 89 per acre expected profit (if the collection was 100%) turned to a loss of Tk. 91 per acre. These losses have been shifted indirectly as a subsidy to growers.

Major factors affecting demand-supply behavior for water were: 1) low area coverage; 2) high water intake of the sandy land; 3) kutcha drain; 4) diesel operated DTWs having less water lifting capacity; 5) installation of the DTW in the wrong location; 6) access of non BRAC DTWs/STWs within or nearby the command area; and 7) mismanagement in water supply.

The majority of shareholders in the schemes were female, which in the early stages of operation helped raise social status and create employment opportunities. These benefits could not be sustained, however, as systematic losses of the schemes made the shareholders inactive.

Share surrender was common among shareholders for a variety of reasons: dropout from VO membership, non-profitability and uncertainty of the schemes, share price increases, inability to pay more than one installment per week, misunderstanding among shareholders about leadership, conflict with the members of the DTW management and operation committee, and dissatisfaction of family members. Shareholders surrendering their shares did not get any compensation from BRAC for their paid installment and did not wait for getting back the amount.

Operation of BRAC DTW brought about a change in cropping patterns and increased paddy production. Increased cropping intensity and HYV boro cultivation created new employment opportunities in the lean season. But today cultivation of HYV boro is considered less cost-effective than cultivation of Robi crops like pulses, mustard, and wheat due to high prices of agricultural inputs.

1. INTRODUCTION

1.1. BACKGROUND

BRAC launched its irrigation program in the early 1980s with the low lift pump and followed by the Deep Tubewell (DTW) Program in 1984-85 under the BRAC-CARE pilot project "LOTUS" which officially ended in July 1991. Since 1990-1991 BRAC has gone through a large scale expansion of irrigation. BRAC helps to obtain the DTW, arranges its operation, assists members to construct irrigation channels and provides other technical inputs and services. Loans are provided to cover operating costs and the initial capital expenditure. BRAC takes a 20% share itself and the remainder has to be paid by members in weekly installments over a five year period. Members negotiate a fee for water with the irrigating farmers, which generally ranges between 25-33% of the final yield. BRAC helps farmers secure the seeds, fertilizer and other inputs which they require.

Objectives of the program

The major objectives of the DTW program were to:

* increase agricultural productivity through crop intensification,
* create income earning opportunities and generate new employment for the landless;
* introduce new technology in agriculture,
* provide new managerial and technical skills packages to rural landless poor,
* improve proper distribution of resources through crop sharing system,
* help the rural poor gain control over resources (material and social) essential to enter and compete in the water market, and
* enhance social, political and economic power and prestige of the disadvantaged poor by applying group irrigation management.

Process of installation

Project identification starts with the VOs expressing their interest in undertaking an irrigation scheme. BRAC staff in charge of the Vos undertake a feasibility study on the technical, agronomical and financial aspects of project appraisal. This study determines whether a number of potential difficulties could be avoided such as: 1) whether groups would be able to repay the capital loans in view of the fact that income from the DTW would only accrue once a year; 2) whether groups would be disciplined enough to repay their capital loans in view of the near universal practice of default among non-BRAC DTW groups; 3) whether women would be able to participate effectively, given the firm location of the new technology in an exclusively male area of production; 4) whether the strategy of promoting DTWs could be pursued in the long run with the expansion of the Rural Credit Program, which was built upon the principle that groups would have to meet the full cost of any services provided to them.

After evaluating the study findings and ensuring its positive results, a loan proposal is prepared by BRAC staff indicating the expected input-output of the schemes. The schemes then become operational if they get the approval of higher authority.

Stages of operation

In this initial stage VO members themselves and the BRAC staff mutually select a DTW group from male and female Vos taking 50-60 members from each. After selection, the members purchase shares of capital investment: 80 percent of the ownership rights are with the group members and the remaining 20 percent with BRAC. The BRAC shares act as a safeguard for the poor against rich shareholders and outsiders. One shareholder is eligible to purchase 5 to 30 shares. Price is related to the capital cost of the scheme which is obtained by dividing the capital investment by the number of shares. The overall operation and maintenance(O&M) costs of the program are divided among the shares proportionally.

To purchase shares BRAC offers a five year capital loan of up to Tk. 2000 that covers the value of each share and one year operational loan up to TK 1000 for each shareholder to cover the operational cost. The duration of capital and operational loans are five years and one year respectively. The interest rate for the capital loans was 20 percent. Operational loans the flat rate of interest was 20 percent. As soon as the total loan is repaid by the shareholders, BRAC will hand over its 20% share to the group so that they can run the scheme independently.

For smooth implementation of the scheme a management committee (MC) comprising 10 percent of the shareholders and scheme operation committee(SOC) with 5-7 members are formed. SOC is composed of a chairman, a vice-chairman, a manager and 2-4 members. The SOC appoints a driver and a lineman - depending on area coverage: one line man is required per 40 acres of land covered. During the operational period BRAC provides technical and other service supports for which it charges Tk. 120 per acre for boro and Tk. 60 for wheat and T. Amon.

Members of the SOC negotiate water price with user farmers either in cash or in crop. Generally, for in cash payment the price of water covers the operational costs (fuel, salaries of driver and lineman, repair and maintenance cost etc.). For in crop payment the water is priced at 25% to 33% of the final yield harvested by the farmers. Beginning in the 1994-95 Boro season, management decided to charge for water supply in cash only because water pricing in crop was subject to corrupting influences regarding actual crop production and administrative inefficiencies.

In the last 1994-95 boro season 632 DTWs were operated in 89 RDP areas. Majority of the schemes did not make any profit during the

season. The cumulative loss up to 1995 from DTWs was Tk. 53,716,151 (Table 1). The present study tries to investigate the factors responsible for this loss.

1.2. OBJECTIVES

The purpose of this study is to investigate the viability of the DTW program from which 5 objectives have been identified:

1) -to determine the profitability of the schemes;
2) -to investigate the program feasibility by checking the target and actual capacity of DTWs with respect to revenue and command area;
3) -to elicit the opinions of shareholders, BRAC staff, dropout shareholders, user and non user farmers, manager, driver, linemen, elite and other respectable persons about water management and marketing system of the BRAC DTW program;
4) -to investigate the social impact of the DTW program;
5) -to focus on future possible directions of the DTW program identifying the potential return from the DTWs.

1.3. METHODOLOGY

For the study we selected seven RDP areas from seven out of the fifteen regions where the BRAC DTW program is still in operation: Betila (Manikganj), Paglapir (Rangpur), Bhayadanga (Sherpur), Navaron (Jessore), Mirzapur (Tangail), Boilor (Mymensingh), and Ahladipur (Faridpur region). Twenty two DTW schemes from these 7 regions were selected as sample schemes.[1] Among these 22 schemes,

[1]Twenty two DTW schemes with four each from Betila, Paglapir, Navaron and Bhayadanga and two each from Mirzapur, Boilor and Ahladipur which were in operation in the last 1993-94 Boro season were selected for the study. Subsequently, three more schemes (two from Navaron and other one from Boilor) were taken because three of the earliest selected schemes were out of operation in the last 1994-95 season due to shortage of command area and bad quality of soil.

50% were profitable and the remainder not profitable according to the documentation of DTW program.

Two different types of areas were selected: 1) areas with a high or medium concentration of DTWs and 2) areas where the economic performance of these schemes was deemed "reasonable" (not very good and not so bad). Furthermore, it was felt that DTW viability would only be assessed in schemes that were operating for at least 3 years.

1.4. Limitations of the study

BRAC's DTW program is at great concern to the rural elite as well as the landless poor. The positive impact of the program in the rural society depends not only on its profitability but also on positive results in food production, creation of new income earning opportunities, more involvement of women in wage- and self-employment, and empowerment of the rural poor in general.

The time constraint of this study, however, required as to focus mainly on the economic aspects of DTWs with less emphasis on qualitative issues. But the findings of the study on social impact of the program are not less important in understanding the current situation of the DTW program as a whole. This study creates a new field for further study in this vast areas of BRAC sector program.

1.5. Data collection

A vast range of information, both qualitative and quantitative, was required from different groups of respondents. Quantitative information on command area coverage, investment, operational and capital costs, water income, number of active and dropped out shareholders, was taken from different program documents. Qualitative information was collected using open ended checklists and from group discussions. The respondents of the study in each DTW scheme were: a) BRAC staff (AM, EIG PO, PA incharge);

b) 2 user-farmers; c) a non user farmer having land in the command area; d) a driver; e) a lineman; f) a member from SMC; g) 2 active shareholders; h) 2 dropout shareholders; i) an elite/respectable person in the village. Fourteen from each scheme, making a total of 310 respondents were interviewed using different checklists. Group discussions with farmers, shareholders and BRAC staff had given a general idea about the different problems and perspectives encountered in DTW schemes.

Rapid rural appraisal (RRA) technique was also employed to assess social benefits. The following steps of RRA approach were adopted: 1) documentation review; 2) key informants interviews with BRAC staff based on Dhaka Head Office and in the field; and 3) actual field investigation.

1.6. Problems in data collection

Due to time constraints, one day was allotted for interview in each schemes. As such, all the interviewees could not be interviewed due to their absence on the day of interview. There were some schemes which were closed for one or more seasons. Some persons involved with those schemes could not be located.

2. FINDINGS

2.1. Profitability of the schemes

By Rapid Rural Appraisal (RRA) assessment on 22 DTWs in 7 regions in the 1994-95 boro season we found 9 DTWs to be profitable and 13 not to be profitable on the basis of actual revenue collected and total cost of operation (Table 2). Three schemes were not in operation in the last boro season and therefore could not be assessed for profitability. If we consider the expected (instead of actual) revenue to be collected estimated by area officials, then 14 DTWs are profitable while 8 remain not profitable (Table 3). The average targeted command area in the 1994-95 boro season was 47 acres per DTW but the actual command turned out to be 28.16 acre,

or 60% of the targeted command area (Table 4). Potentialities to achieve targeted command area are in 18 schemes which is shown in Table 5. Due to these shortage in area coverage an average 18.8 acres per scheme, earnings from water supply could not cover the total operational expenses to the scheme. Moreover, 91% of revenue from the supplied water were collected during the season. The expected per acre profit of Tk. 89 resulted in an actual loss of Tk. 91. These losses became an indirect subsidy to growers.

Risk and uncertainty factors in the DTW program which reduce the expected profit are:

(1) Capacity loss in area coverage;
(2) High operating cost; and
(3) Capacity loss in revenue collection.

1. Capacity loss in command area coverage

The majority of DTWs under BRAC supervision face losses in command area coverage. BRAC officials set a target command area but due to other related risk factors the actual command area remains far beyond the expected command area. The major reasons for capacity loss in command area coverage are:

a) Diesel powered DTWs have less water lifting capacity than electric DTWs and can not cover the command area properly. They also face mechanical difficulties which interrupts operation;

b) Thirty to forty percent misuse of water because of "katcha" drains which can not bear the force of water during the water supply. Holes made by rats also contribute to water loss;

c) DTWs are often not installed in suitable places because of instructions given by BRAC head office to set up DTWs immediately;

d) In several areas non-BRAC DTWs and STWs pumps are operating nearby, thereby reducing the demand for BRAC DTWs. STWs pumps are more economic because they can be used in power tillers, also small boats and the rural cinema hall as power generator. Rich farmers prefer the STW for its year round multiple use possibilities;

e) Half of the land in the command area is sandy/loam (Table 5) which due to its high water holding capacity increases the demand for water which also increases overall the operating cost of DTW. For irrigation, loam type of soil is more efficient. The feasibility study was done by BRAC and BADC before DTW installation in an urgent basis, where the technical experts were mostly from BADC and they were interested only in its early installation.

f) Tends to decrease the BRAC's expected command area year by year.

2. High operating Cost

Most of the BRAC DTWs are powered by old engines which due to their age have mechanical troubles and need frequent repairs. The spare parts are costly and not available in rural areas. For these reasons diesel engines run with high operating and maintenance cost. Moreover, the water lifting capacity of diesel DTWs is less

than electric DTWs. Farmers always report that the water supplied by diesel DTW is not sufficient for them. The cost of operation in electric DTWs are less than diesel DTWs but also face troubles such as load-shedding, and corrupt practice by some staff. The performance of REB in rural areas is good but they give less emphasis to irrigation projects as they are required to supply electricity to them at a subsidized price. If government withdraws the subsidy in agriculture as suggested by the World Bank, then per unit electricity cost would be increased.

3. Capacity losses in revenue collection

Prior to the 1994-95 boro season, in all of the sampled schemes except in Navaron, revenues were collected through crop payment. The user farmer had to pay for the water by one third of the crop they produced using the DTW water. The crop payment is better for poor farmers as they have little cash in hand, however rich farmers are in favor of cash payment because they have enough liquid cash in hand to pay the water price.

In crop pricing systems losses occur because farmers tend not to report the actual crop production. A moral hazard is created: farmers feel no pressure to raise production because they think of 1/3 crop is outgoing from their stock to BRAC. This creates losses for DTW share holders. Moreover corruption among SMC/SOC members, drivers and linemen shares is severe which increases losses.

A cash payment system is relatively better because it is administratively simpler and farmers are under pressure to increase production as they have to pay a fixed amount of cash for water supplied.

Marginal farmers however face dis-economies of scale as they cultivate small land areas and can cover the production costs of the crop. Consequently their revenue earnings from crop production

are very low and they have no capacity to pay for water supply. On the other hand, large farmers always show their power in buying water even they break the serial of water supply provided by the linemen and driver. The rich farmers always become irregular payee of water price and sometimes they do not pay at all.

Demand supply behavior of BRAC DTW

Demand for water by user farmer depends on water price, regular delivery of water, the number of DTWs and STWs operating nearby, an optimal command area, the actual command area in previous season, monopoly on irrigation facilities, the quality of land (suitable soil and topographical characteristics), uniform cropping preferably paddy, adjoining plots, homogeneity among the water buyers, high paddy prices, good marketing and transport facilities and low input prices.

Supply of water by BRAC DTW depends on water price, fuel and other operating costs, number of DTWs/STWs operating nearby, expected command area, actual command area in the previous season, underground water level, proper management of DTW, efficiency of driver and linemen.

If we consider other factors affecting supply and demand remaining the same ("*cetiris paribus*"), we can take demand for water as a function of the price at which the water is offered to him and the prices of his product, and other inputs. Similarly, the supply of water is a function of the price of water and operating and maintenance cost of the machine. The interaction between supply and demand function determines the price of water demanded or supplied.

We can at least minimize the risk and uncertainty to determine the optimal price of water demanded or supplied if we address the problems like:

a) area coverage should be raised more than 40 acres. Pukka drain should be more cost effective than kutcha to eliminate water misuse;

b) corruption in the supply of power which affects the proper distribution of water in rural areas where there is no Rural Electrification Board (REB) should be abolished;

c) REB buys electricity at the rate of 2.10 per unit from PDB which is subsidized from 3.15 in other electric motors. This subsidized price include sales tax of Taka 0.15. If government waives this tax price will come down to 1.95;

d) to ensure the smooth engine operation, spare parts of good quality should be stored for quick use nearby;

e) Most diesel engines are not profitable and they always need repairs for ensuring smooth operation. Electric motor should replace the diesel engine for cost minimisation purpose;

f) rich farmers should be given incentives to buy water from BRAC DTWs and not to use their own STWs during the operation of DTWs;

g) management of BRAC should be improved;

h) regular supply of water should be ensured;

i) prohibit operation of STWs within the command area:

j) eliminate nepotism in distributing water. Sometimes driver or linemen give water to bribe and at other times they give water to the rich farmer being afraid of their social power. This mismanagement should be abolished.

2.3 Impact on shareholders

In all of the sample schemes the majority of shareholders were female. The purpose of women's involvement is to raise the low status of women in society and the household by reducing their economic dependence.

Employment

Operation of each DTW creates salaried employment for one driver and a minimum of one lineman, depending on area coverage. Boro cultivation is a labor intensive crop. Findings of an early study Halder (6) shows that per acre boro cultivation needs at least three times more labor than cultivation of wheat, pulses and mustard which were available before irrigation during the season. The landless were mostly enjoying the surplus labor demand in the period of harvesting and post harvesting operations. Self-employment also tended to increase among farmers.

Employment and women

Salaried employment accrues mostly to men. Women's employment benefits, were concentrated in post harvest activity including the collection of shares from the field, threshing, and winnowing. But in most of the schemes males were involved in post harvest activities. Village tradition does not allow women to work outside their homes. The overall employment effect on women was found to be smaller compared to men.

Impact on empowerment

Empowerment of the rural poor was one of the main objectives of the program. Empowerment: increasing solidarity among group members through the process of acquiring and maintaining control over the DTW and increasing the ability to meet challenges and survive conflicts. In the early stages of operation, the SMC faced conflicts frequently related to water distribution, collection of water charges and encroachment of STWs in the command area. Through meetings and resolving conflicts, the group acquired a new sense of power and confidence. From the last boro season the SMC became functionless due to those reasons which were mentioned above.

Dropout

When the shareholder transfers his own share and moves from the DTW groups intentionally, the shareholder drops out. Two types of dropout shareholders were found: 1) shareholders who lost their VO membership, automatically lost their right to own share; 2) shareholders who surrendered their share to BRAC for any reason. Major reasons for dropout were:

1) an increase in the price of shares which increases the value of weekly installment. The cause of increasing the value of share is - capitalization of accounting loss of the scheme, overdue loan and their redistribution among shares;

2) non-profitability and uncertainty of the scheme. Maximum schemes of our studied sample were not profitable. Some schemes were making a little amount of profit, distribution of this amount among shares were not quite enough to pay their installation. Moreover income from DTW is also seasonal. All the shareholders are poor and they have not enough earning to pay these installment with their own savings;

3) inability to pay DTW instalment with other BRAC program loan instalment. All the shareholders are BRAC VO member and maximum of them have taken another program loan from BRAC. To pay installments of all their loans with their small earning is not quite enough;

4) misunderstanding between shareholders for leadership;

5) conflict with the members of SMC/SOC. General shareholders think that members of the SMC/SOC worked for their own interest but not for all. Earning from DTW they distributed improportionally;

6) death/migration of the shareholders;

7) misunderstanding between husband and wife;

8) dissatisfaction of family members not to go to the field to collect the paddy from the farmers;

These were the major reasons why shareholders dropped out. The main reason, however, was that the shareholders were not making profit from the DTW. We did not have actual figures on how many shareholders dropped out during the period of installation. This data was not available in RDP area offices. Today all the shareholders except a few in Dulla Begum and Kumar Jani (Mirzapur area) are inactive. They are also not interested in DTWs shares. All the interviewed shareholders (inactive and dropped out) will not return to DTW if any incentives will be offered by BRAC.

The question why they dropped out or why they are now not interest about DTW (this is for inactive shareholders) everybody answered that they had got less than they paid by weekly installments. In another question about BRAC compensation for the paid amount, all

the dropout shareholders answered that BRAC never tells about compensation and the majority of dropout shareholders are not waiting to get that amount. But in Dulla Begum and Kumar Jani dropout shareholders are paying more than half of their total capital loan instalment and strongly believe that if BRAC will sell DTW then BRAC will repay their paid amount.

2.3. Farmers' performance

All of the interviewed farmers reported that BRAC DTW schemes changes the cropping pattern in the rural areas. Before irrigation in the boro season local boro, robi crops like mustard, pulses, wheat and tobacco were cultivated. In some cases lands were fallowed in the boro season. With irrigation, farmers started HYV boro cultivation which increases the paddy production in per acre cultivable land on an average of 50%. HYV boro cultivation increases crop intensity at least 1.5 times. It also creates new wage employment in the lean season.

In the last few years HYV boro cultivation became expensive due to increasing the fuel cost, seeds price and labor cost. For these reason Robi crops production is more cost effective than HYV boro cultivation. Capital and labor productivity of boro cultivation is less than those of robi crops. It was one of the main reasons for reducing the command area. Other causes were: irregular water supply, group conflicts among farmers. For these reasons rich farmers are not interested in boro cultivation. Poor farmers are more interested in boro cultivation to meet their needs of rice consumption.

If BRAC's DTWs were not in operation then there would be a mismanagement of water supply and the price of water would be high and dependence on STW would rise. The poor farmers would fall in a critical position as STWs ownership is out of their capacity and also Tk. 30-40 per hour for the STW water price is too much for

them. But they will have no alternatives and they will be bound to pay higher price of water from STW.

2.4. View of the rural poor

To know the neutral opinion about the socio-economic performance of BRAC DTW program an elite/respectable person from each scheme was interviewed. All the respondents acknowledged that the program has positive impact in the rural economy and it should be continued.

3. Discussion and Conclusions

Difficulties in water management system are an increasingly common constraints of irrigation projects from reach in their potential. Management problem limits the potential economic benefits of irrigation. Exogenous factors outside the control of management are, inflation, shortage of spare parts, failure of agencies to supply electricity on time, and high prices of agricultural inputs. Remedies for rehabilitating the malfunctioning of irrigation systems are:

(1) **Technical improvements:**

- replace the diesel DTWS by electric DTWs;
- ensure proper electricity supply;
- construct pucca drain to prevent the misuse of water;
- reestablish the DTWs that were set up rapidly in unsuitable places to suitable places.

(2) **Organizational changes:**

- grow the awareness of the shareholder so that they can understand the shareholding system;
- create a formal "water - user" association;
- help the farmer to increase agricultural production through the seed (HYV), fertilizer and irrigation package.

(3) Economic/Financial measure:

- reasonably higher water price;
- minimize operation and maintenance costs;

(4) Operational procedure:

- improve the technique of water supply;
- abolish the illegal use of water.

Charges made for irrigation are generally well below the cost which leads to losses in the DTW program. There are many varied reasons for this.

In an economic sense the price charged is not equal to the society's valuation of resources utilized in producing services. In this situation water is cheaper to the farmer than the real economic cost. This leads to demand excising supply at the going price.

In a financial sense, the water rate should cover the cost of the service. In this case inflation also has to be taken into account.

If we want to fulfill all of these above mentioned requirements to rehabilitate DTWs then we could actually cover the targeted command area (which was on an average 47 acres per scheme in 1994-95 boro season) only in 18 schemes. But to make a scheme profitable, the scheme should cover at least 60 acres of land[2].

For those above mentioned reasons it is more or less impossible to earn profit from DTW program. To minimize the cost (mainly fuel), surface water irrigation at macro level (GK project for example) is more effective then the underground water based micro DTWs and for BRAC it is not feasible to operate the DTW program and better to disinvest.

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[2]Van Koppen Barbara, Mahmud Simeen. 1995. Female Irrigation Groups in Bangladesh. BIDS, Annexure. 2. p. 1.

REFERENCES

1. Halder S.R. 1995. BRAC's Achievements in Generating Employment in Jhikargacha RDP Area: A Quantitative Study. BRAC
2. Material on Workshop on the study on privatization of minor irrigation in Bangladesh. Vol. 1, BARC, 1995
3. Mustafa, S. et. al. 1991. Technology Development and Diffusion. A case study of collaboration between BRAC and the Government of Bangladesh. BRAC
4. Rapid Rural Appraisal Field Training and Research Exercise including an assessment of the impact of a Deep Tubewell Group, BRAC, 1994
5. RDP Annual Report 1993, 19946.
6. Van Koppen Barbara, Mahmud Simeen. 1995. Female Irrigation Groups in Bangladesh, BIDS

ANNEXURE 1.

TABLE 1. BRAC DTW PROGRAM AT A GLANCE

REGION	NO. OF RDP AREAS	NO. OF DTW	TOTAL VALUE OF MACHINE (Tk.)	CUMULATIVE DEPRECIATION UP TO JULY '94 (Tk.)	WRITTEN DOWN VALUE (Tk.)	CUMULATIVE PROFIT/LOSS (Tk.)
Jamalpur	7	46	8,912,195	1,737,225	7,174,969	-2,930,081
Mymen-singh	5	29	6,199,201	849,069	5,350,131	-1,286,745
Pabna	3	24	4,749,041	752,866	3,996,174	-2,257,027
Bogra	2	35	7,116,971	1,225,044	5,891,926	-2,088,308
Rangpur	7	89	17,517,692	3,432,469	14,085,222	-4,467,093
Faridpur	9	51	10,755,305	1,541,180	9,214,124	-8,565,017
Jessore	10	97	19,730,254	3,490,265	16,239,988	-2,264,899
Sherpur	11	95	20,123,337	3,174,585	169,487,511	-11,496,640
Comilla	2	10	2,030,420	283,938	1,746,481	-22,2636
Syedpur	2	6	1,273,570	143,933	1,129,637	-4,467,093
Hobiganj	3	26	5,265,990	712,717	4,553,273	-5,560,822
Manikganj	11	42	7,260,477	1,412,677	5,847,799	-5,543,836
Rajshahi	5	33	7,312,058	1,176,666	6,135,391	-434,930
Jhinaidah	5	35	6,130,000	936,150	5,193,850	-8,645,070
Norsingdi	6	14	1,935,152	380,598	1,554,553	-1,266,517
Total	89	632	1263,116,639	21,249,389	105,062,274	-53,716,151

Source: Schemewise Profit and Loss Statement - 1993-1994,
and Assets Register of DTWs Machines as on April 1994,
BRAC RDP/Irrigation Program

TABLE 2. SCHEMEWISE GENERAL INFORMATION

SL NO	SCHEME	1ST YEAR OF OPERATION	PURCHASING PRICE (Tk.)	NO. OF SHARE HOLDERS AT THE BEGINNING	NO. OF SHARE HOLDERS (CURRENT)	PRICE OF EACH SHARE AT THE BEGINNING (Tk.)	COMMAND AREA (acres)		
							1993	1994	1995
1.	Sammuk Boilor	92-93	175000	32	n/a	2000	51	70	55.00
2.	Boxipara	91-92	175000	80	65	2000	58	35	35.50
3.	Bilnayabad	91-92	175000	n/a	60	n/a	50	60	40.00
4.	Joypur	91-92	175000	n/a	n/a	n/a	44	50	26.00
5.	Dulla Begum	89-90	126000	n/a	n/a	1500	43	40	39.00
6.	Kumar Jani	89-90	65000	n/a	n/a	1500	40	29	22.00
7.	Baghyia-1	n/a	n/a	n/a	n/a	n/a	42	50	18.00
8.	Malakucha	91-92	175000	100	33	1000-1500	20	30	21.71
9.	D.Bilbhorat	90-91	175000	115	16	1000-1500	33	36	23.00
10	Asandipara	89-90	51500	151	20	1000-1500	31	46	19.51
11	D.Bhayadanga	92-93	175000	100	30	1000-1500	n/a	50	21.14
12	Kaitora	90-91	175000	90	n/a	2000	49	69	22.57
13	Hashli	91-92	175000	85	n/a	2000	53	53	21.94
14	Arongabad	91-92	175000	101	n/a	2000	52	50	20.09
15	Dhalla	90-91	84250	n/a	n/a	2000	n/a	n/a	-
16	Fakiran	88-89	32150	28	n/a	1000-1500	57	63	52.20
17	Bottola	90-91	53850	110	n/a	2000-3000	42	60	41.00
18	Der Halia	90-91	175000	130	n/a	1500-2000	79	64	49.29
19	Motial Para	91-92	8000	34	n/a	1500-2000	43	75	24.00
20	Amini	89-90	175000	150	11	1000	23	45	31.00
21	Mati Kumra	90-91	175000	112	n/a	1500	34	31	15.00
22	Uttar Deuli	90-91	175000	104	n/a	1500	14	21	12.00
23	Shial Ghona	90-91	175000	n/a	n/a	1500	n/a	28	-
24	Kashia Danga	91-92	175000	78	n/a	1500	n/a	31	-
25	Panchpota	91-92	175000	78	0	2000	16	30	10.00

TABLE 3. PROFITABILITY OF THE SCHEMES AS ON 30 JUNE 1995

SL NO	SCHEME	COMMAND AREA (ACRES)		OPERATING COST (Tk.)	SERVICE CHARGE (Tk.)	TOTAL EXPENSES (Tk.)	REV.COLLECTION 1. EXPECTED 2. ACTUAL 3. RATE (%)	GROSS PROFIT (8-5-6) (Tk.)	DEPRECIATION (Tk.)	NET PROFIT (9-10) (Tk.)	CUMULATIVE LOSS (Tk.)
		TARGET	ACTUAL								
1	2	3	4	5	6	7	8	9	10	11	12
1.	Fakiran	63	52.22	50441	6624	57065	69192.00 66140.00 95.50	9075	8010.25	1064.75	72974
2.	Matialpara	65	24.00	41310	2850	43160	33250.00 20585.00 61.90	-23575	4420.50	-27995.50	104979
3.	Derhalia	88	49.29	61084	5915	66999	69006.00 61402.00 88.98	-5597	11250.00	-16847.00	39412
4.	Bottola	68	41.00	42442	4921	47363	57414.00 57144.00 99.53	9781	11250.00	-1469.00	162520
5.	Kaitora	55	22.59	65509	2708	68217	76177.00 67000.00 87.95	-1217	11250.00	-12467.00	278686
6.	Hashli	55	21.94	50103	2633	52736	54850.00 49000.00 (87-11) 29.33	-3736	8915.00	-12651.00	280908
7.	Arongabad	55	20.09	55630	2411	58041	57000.00 57000.00 100.00	-1041	8448.00	-9489.00	175562
8.	Dhalla	-	-	-	-	-	-	-	-	-	359468

SL NO	SCHEME	COMMAND AREA (ACRES)		OPERATING COST (Tk.)	SERVICE CHARGE (Tk.)	TOTAL EXPENSES (Tk.)	REV.COLLECTION 1. EXPECTED 2. ACTUAL 3. RATE (%)	GROSS PROFIT (8-5-6) (Tk.)	DEPRECIATION (Tk.)	NET PROFIT (9-10) (Tk.)	CUMULATIVE LOSS (Tk.)
		TARGET	ACTUAL								
1	2	3	4	5	6	7	8	9	10	11	12
9.	S. Bhayadanga		21.14	7899	3137	11036	14798.00 13602.00 91.91	2566	9046.90	-6480.90	5242
10.	Mala Kucha		21.71	6151	2845	8996	15497.00 14420.00 93.05	5424	9843.75	-4419.75	0
11.	D. Bilbhorat		23.00	6307	3060	9367	7850.00 7230.00 92.10	-2137	9000.00	-11137.00	245010
12.	Ashandipara	-	19.51	4641	2467	7102	6507.00 6140.00 94.35	-962	11250.00	-12212.00	210166
13.	Kamar Jani	-	22.00	54849	2966	57815	55000.00 51420.00 93.49	-6395	3243.00	-9638.00	12029
14.	Dulla Begum	-	39.00	66605	5172	71777	97500.00 92245.00 94.61	20468	4409.10	-4409.57	21057
15.	S. Boilar	70	55.00	27402	6600	34002	44000.00 38927.00 88.47	4925	8784.20	-3859.20	7024
16.	Boxipara	50	35.00	18954	4200	22854	28000.00 24812.00 88.61	1658	11250.00	-9592.00	62225

SL NO	SCHEME	COMMAND AREA (ACRES)		OPERATING COST (Tk.)	SERVICE CHARGE (Tk.)	TOTAL EXPENSES (Tk.)	REV.COLLECTION 1. EXPECTED 2. ACTUAL 3. RATE (%)	GROSS PROFIT (8-5-6) (Tk.)	DEPRECIATION (Tk.)	NET PROFIT (9-10) (Tk.)	CUMULATIVE LOSS (Tk.)
		TARGET	ACTUAL								
1	2	3	4	5	6	7	8	9	10	11	12
17.	Bil Nayabad	50	40.00	74141	4800	78741	80000.00 79225.00 99.03	284	11250.00	-10966.00	92541
18.	Joypur	35	26	38807	3120	41927	33682.00 52000.00 64.80	-8245	11250.00	-19495.00	161676
19.	Amini	50	31	86753	3720	90473	102300.00 101671.00 99.38	11198	111250.00	47.95	82370
20.	Uttar Deuli	40	12	45722	1440	47162	50400.00 46811.00 92.87	-351	11250.00	-11601.00	0
21.	Shial Ghona	-	-	-	-	-	-	-	-	-	35220
22.	Kashia Danga	-	-	-	-	-	-	-	-	-	34720
23.	Matikumara	30	15	68000	1800	69800	65000.00 64645.00 99.45	-3355	11250.00	-14605.00	35230
24.	Punch Potta	25	10	38029	1200	39229	39000.00 33754.00 86.54	-4275	11218.35	-15493.35	31487
25.	Baghyia-1	20	18	52625	2160	54785	37795.00 43200.00 87.50	-16990	-	-	-
TOTAL											

TABLE 4. PER ACRE PROFITABILITY STATEMENT 1994-95

SL NO	AREA	COMMAND AREA (Acres)		PER ACRE TOTAL COST (Tk.)	PER ACRE REVENUE (Tk.)		PER ACRE GROSS PROFIT (Tk.)	
		ACTUAL	EXPECTED		EXPECTED	ACTUAL	EXPECTED	ACTUAL
1.	Fakiran	52.22	63	1093	1325	1267	232	174
2.	Matialpara	24.00	65	1798	1385	858	-413	-940
3.	Derhalia	49.29	88	1359	1400	1246	41	-113
4.	Bottola	41.00	68	1155	1400	1394	245	239
5.	Kaitora	22.54	55	3020	3372	2966	352	-54
6.	Hashli	21.94	55	2404	2500	2233	96	-171
7.	Arongabad	20.09	55	2889	2837	2837	-52	-50
8.	Dhalla	-	-	-	-	-	-	-
9.	S. Bhayadanga	21.14	42	522	700	643	178	121
10.	Mala Kucha	21.71	30	414	714	664	300	250
11.	D. Bilbhorat	23.00	28	407	341	314	-66	-93
12.	Ashandipara	19.50	46	364	334	315	-30	-49
13.	Kumar Jani	22.00	29	2628	2500	2336	-128	-291
14.	Dulla Begum	39.00	40	1840	2500	2365	660	525
15.	S. Boilor	55.00	70	618	800	708	182	90
16.	Boxipara	35.00	50	653	800	709	147	56
17.	Bil Nayabad	40.00	50	1974	2000	1981	26	7
18.	Joypur	26.00	35	1612	2000	1295	388	-317
19.	Amini	31.00	50	2918	3300	3280	382	362
20.	Uttar Deuli	12.00	40	3930	4200	3900	270	-30
21.	Shial Ghona	-	-	-	-	-	-	-
22.	Kashiadanga	-	-	-	-	-	-	-
23.	Matikumara	15.00	30	4653	4333	4310	-320	-343
24.	Punch Potta	10.00	25	3803	3900	3375	97	-428
25.	Baghyia-1	18.00	20	3043	2400	2100	-643	-943
TOTAL		619.44	1034	43095	45041	41097	1946	-1998
AVERAGE		28.16	47	1959	2047	1868	89	-91

Table 5. TRANSECT CALENDAR OF THE SCHEMES

SL NO	SCHEME	TOPOGRAPHY			SOIL			CROPPING PATTERN		DRAIN CONDITION	POTENTIALITY TO ACHIEVE TARGETED C/A
		LOW	MEDIUM	HIGH	SANDY/ LOAM	LOAM	CLAY/ LOAM	BEFORE BRAC DTW	AFTER BRAC DTW		
1.	PAGLAPIR										
	1. Fakiran	0.20	0.60	0.20	1	-	-	Aus/local Boro, Amon	Boro-Amon	Kutcha	Yes
	2. Bottola	-	1	-	1	-	-	Tobacco-Amon	"	"	Yes
	3. Derhalia	0.25	0.50	0.25	-	1	-	Tobacco-Amon	"	"	No
	4. Matialpara	-	1	-	1	-	-	Tobacco-Amon	"	"	Yes
2.	BETILA								"		
	1. Kaitora	0.70	0.30	-	0.25	0.25	0.50	Pulse/Must, Amon (Aus Amon mixed)	Boro-Amon	Kutcha	Yes
	2. Nashli	0.25	0.25	0.50	0.50	0.25	0.25	Boro-Amon	"	"	No
	3. Arongabad	0.50	0.25	0.25	0.30	0.45	0.25	Aus Amon mixed	"	"	Yes
	4. Dhalla	-	0.25	0.75	0.75	0.25	-	Fallow-Amon	Robi-Amon	"	No
3.	BHYADANGA										
	1. Mala Kucha	0.50		0.50	0.50	0.50		Aus ,Amon	Boro (Gazi-HYV) Amon	Kutcha	Yes
	2. D. Billbhorat	-	0.50	0.50	-	1		Aus, Amon	"	"	Yes
	3. Ashandipara	-	0.50	0.50	0.75	0.25		Aus, Amon	"	"	Yes
	4. D. Bhayadanga	-	1	-	-	1		Aus, Amon	"	"	Yes
4.	MIRZAPUR										
	1. Dulla Begum	-	1	-	-	1	-	Boro, Amon (Tobacco)	Boro (HYV, Amon)	"Kutcha	Yes
	2. Kumar Jani	-	0.75	0.25	1	-	-	Aus, Amon	Boro, Amon	"	No
5.	BOILOR										
	1. Shonnuk Boilar	-	1	-	-	1	-	Aus, Amon	Boro, Amon	Pucca & Kutcha	Yes
	2. Boxipara	-	1	-	1	-	-	Wheat, Aus, Amon	Boro, Amon, Wheat	Kutcha	No

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Table 5. continues

SL NO	SCHEME	TOPOGRAPHY			SOIL			CROPPING PATTERN		DRAIN CONDITION	POTENTIALITY TO ACHIEVE TARGETED C/A
		LOW	MEDIUM	HIGH	SANDY/ LOAM	LOAM	CLAY/ LOAM	BEFORE BRAC BTW	AFTER BRAC BTW		
6.	NAYARAN										
	1. Amini	-	1	-	-	-	1	Aus Pulse/ Wheat/Jute/Amon	Boro/Amon/Jute/ Mustard (Robi crop)	Kutcha	No
	2. Uttar Deuli	-	1	-	-	-	1	Fellow, Amon	Boro, Amon	-	Yes
	3. Shial Ghona	-	1	-	-	-	1	Boro, Amon	-	-	-
	4. Kashiadanga	-	1	-	-	-	1	Fellow, Amon	-	-	-
	5. Matikumara	-	1	-	-	-	1	Boro, Amon	-	-	-
	6. P. Potta	-	1	-	-	-	1	Amon,Pulse,Potato	Amon, Boro/Aus	-	-
7.	AHLADIPUR										
	1. Bilnayabad	-	1	-	-	1	-	n/a	Boro, Amon	-	Yes
	2. Joypur	-	1	-	-	1	-	n/a	-	-	No

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ANNEXURE 2.

CHECKLISTS

I. Shareholder

1. When did you buy the DTW share?

2 What was the instalment at the beginning?

3. What is the price of your share?

4. From what source you get the support to pay the instalment?

    (1) own income
    (2) family income
    (3) loan from
        a) BRAC
        b) Other NGO
        c) Mohajon
        d) Bank
        e) Others
    (4) DTW profit

5. How many shares do your family possesses? What is the price of each share?

6. What is the occupation of the shareholders? What is the source of income?

7. Information on General Meetings (GM)

    (1) How many GM were held in the last season?
    (2) No of GM in which the respondent participate?
    (3) Role of respondent in decision making?

8. What is the amount of profit you get from the share in the last season?

9. Who bore the operating cost in the last season? Was there any GM held to show the profit/loss statement?

10. Do you want to continue the share holding till the end of the scheme? What do you want to do if the scheme is finished?

11. Do you want to sell it?

12. Who will be the possible buyer if BRAC decide to sell the DTW? What would be the possible price of what DTW? Do you support the BRAC's DTW selling?

13. Do you believe that it is necessary to increase or decrease the command area?

II. Dropout shareholders

1. Before giving up the BRAC DTW shares -

    1) What was the price of each share? How many shares did you have?
    2) How much was the instalment?
    3) Could you regularly pay the installments?
    4) How much did you pay in total as instalment?

2. What were the reasons behind your giving up the share?

3. Have you received any compensation after giving up the shares?

4. Has BRAC ever offered you any sort of compensation in this regard?

5. What incentives should be provided to encourage you to buy the shares again?

III. User - Farmer

1. Have you ever experienced any sort of bitterness from the side of the lineman/driver/BRAC personnel? of what sort?

2. From when are you using BRAC DTW?

3. Have you ever used any DTW/STW other than BRAC DTW (before using BRAC DTW)?

4. What did you use to grow before using BRAC DTW? What crops are you growing now?

5. How many crops could you grow before using BRAC DTW? How many are you growing now?

6. Is there any change in cropping pattern? Why is it so/

7. What was the maximum and minimum yield per acre that you get before and after using BRAC DTW?

8. If you used non-BRAC DTW/STW, what was the price of water? What is the price supplied by BRAC DTW? Did/do you pay in cash or in crop? Which system is better? Was/is there any other condition attached?

9. Did you use your own STW before using BRAC DTW? Why did you stop using?

10. Which irrigation group serves you better in terms of costs and its benefits?

11. If you find BRAC DTW unsatisfactory, why are you using now? Are you planning to leave it?

12. What are the problems of BRAC DTW?

13. What problems would you face if BRAC scheme is shut down?

14. Do you regularly get water supply? If not, why?

15. What is the nature of your plot of land/ What was the weather like in the last season/ What is your opinion about the overall climate?

16. Are women engaged in management of water supply in your area? Do you take water from their DTW? Do you find it difficult to deal with women? How do you view the idea of women managing water?

17. Is there any potential buyer of the BRAC DTW? What do you think about the price if could fetch?

IV. Non user - Farmer (within the BRAC command area)

1. What is the source of water for irrigating your land/

2. If you buy water from others (from DTW/STW) -

    a) How much do you pay for the water? [Tk./acre]
    b) Do you pay in cash/crop?
    c) Do you pay in instalment? How many installments?
    d) Is there any other condition attached?

3. Why are you not using BRAC DTW?

4. Are you interested in joining the BRAC DTW program? If yes, why? If not, why not?

V. Manager/Driver/Lineman

1. What was the target command area this season?

2. What was the actual command area this season/

3. If actual area is less/greater than target area, why is it so?

4. Could you cover the target area in the previous season? Why, or why not? Detail the obstacles.

5. What is the nature of land in the area you supply water?

6. Was there any influence in nature of land or whether on the performance of DTW?

7. Is there any DTW/STW inside or outside the BRAC DTW's command area? What is the price of water of those wells? Who are the buyers? Why are they buying?

8. How is the biggest land owner within the command area of the DTW meeting his demand for water?

9. Is there any obstacle in increasing the current command area of the DTW? What sort of obstacles?

10. How did you get the job of driver/lineman? Did you receive any training for this purpose? Do you have any relative in the management committee?

11. What is your salary? Do you have any other job beside this? What type of job? Which is more important to you? Why? What do you do during the off-season?

12. Would you face any problem if the BRAC DTW scheme is shut down? What type of problem? Will it be a problem to the farmers?

13. Is there any potential buyer for the BRAC DTW? What price can the DTW fetch?

VI. Management Committee

1. Is your scheme profitable this season? How much profit did you get last season?

2. How many shareholders are there in your scheme? Is there any dropout? If any what were the reasons behind?

3. Could you able to collect all the money last season?

4. What is the area covered by the water supply?

5. What do you think about the expansion of command area?What is the barrier of that expansion?

6. What do you think about making profitable of the non-profitable scheme?

7. After five years if it would be the asset of the shareholders what you will do with your share? Sell it or continue it and operate it as previous?

8. How much time do you spend in DTW management activities and how much time in other activity?

9. Do you consider the time spending in management activity is profitable?

VII. Elite

1. How do you look over the BRAC DTW program? Give your opinion

   - supporting
   - opposing

2. Is there any impact of BRAC DTW on your economic activity? Do you have any DTW/STW? If yes, - is it affected by the BRAC DTW?

3. Is there any special impact of the scheme on female agricultural worker?

4. If BRAC wants to sell DTW do you eager to buy it? If yes, what would be your rate?