Planning and Project Appraisal:
a brief on the Deep Tube Well (DTW) Irrigation Programme of BRAC

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Contents

Summary

1. BRAC and some other leading NGOs, in early 1980s, in consonance with their goal of empowering the rural poor, identified small and medium scale irrigation systems as areas which can be utilised to achieve growth with equity. From a begining of three, STWs in 1980-'81, presently (at the end of 1988) 56 DTWs, 54 STWs, 2 LLPs and 13 hand tubewells are being controlled and managed by landless groups supported by BRAC. The present paper is based on the experience gained over this period.
2. A brief, impressionistic evaluation of the DTW programme, the paper considers the planning process with particular emphasis on the components of project appraisal. The basic objective is to ascertain the adequacy of project planning at the Area level, with the feasibility part as the focus. The paper synthesises, comments and makes recommendations based on the experience of five Area Offices. These are: Rangpur, Darshana, Boraigram, Bankra and Jhikargacha.
3. In planning studies three to five stages are identified to account for the varying degrees of complexity associated with project appraisal. For the present purpose three stages are identified: a) identification; b) feasibility (institutional, technical and financial), and c) implementation and operation. This categorisation may imply neat dividing lines, in reality project planning is a process with overlapping stages.

Projects are identified with reference to the goals and objectives of the entity in question. In BRAC's case, identification at the Area level is based either on the recommendations of CARE or on targets (numbers) set by higher management. When targets are set other considerations may be neglected; in case of CARE, their policy objectives may not always coincide with that of BRAC.

The institutional part of the feasibility stage is concerned with judging the capability of the VOs to undertake a DTW scheme. The internal maturity of the groups is indicated by a generally high level of maturity of group members, an absence of intra-group conflict, repayment rate, record keeping, and so forth. The expertise at the Area level on technical aspects is not as strong as that on institutional. Presently CARE provides some assistance but difficulties remain. Many important aspects are left out of planning, such as assessing the machine condition and fuel and spares requirement. Financial analysis presupposes the physical inputs and outputs identified at the technical stage. Presently, some faulty profitability analysis is done by either CARE or Area Office. Profitability analysis differs from accounting in terms of principles, assumptions and methodology.

4. The present ad-hoc basis of project planning needs to be replaced by a more systematic approach. This means decentralisation of planning and management. This is the basic thrust of the recommendations of the present study, which are summarised below.

5. Monetary and other resources at the disposal of BRAC is limited with competing demands on them. The purpose of planning is to allocate funds efficiently, and to ensure that these are systematically combined with other resources to produce the desired effects. Therefore it is essential that the desired effect are delineated as clearly as possible, for this has implications for planning as well as management efficiency. Higher programme management often sets targets in terms of identifying either numbers or particular DTWs, to be attained by the Areas. This tends to indicate to them that the numbers are more important than quality of the schemes. Aspects of benefit to participatory VOs or the self-sustenance of the projects, in such situations, may be neglected. This may in turn lead to weak project appraisal with the result that targets are met but at below optimum level of efficiency.

6. The technical aspects of the project are troublesome which is aggrevated by market conditions. Although the price of fuel is fixed by the government, during irrigation season it becomes scarce and price increases substantially. In exceptional situations such as the drought of this year, the market become very unstable interms of availability and price. Same is the situation with spare parts. There is at present a lack of expertise on methods to assess machine condition and to estimate fuel and spares requirement.

Within a decentralised framework, the establishment of regional technical - mechanical and agronomic, back-up service system should be given active consideration. With this the Area Offices will be better placed to plan, manage and supervise the schemes.

7. Presently the crop-share received by the schemes as revenue is primarily sold to traders; in one Area paddy huskers have been given loans to utilise this source of supply. Similarly, loans may be given for activities that are related or linked with irrigation. Programming of funds allocation to schemes that are inter-related or inter-linked with DTW programme, may include powertiller, cultivation and paddy husking or trading. Making available the 'seed-fertiliser-water' technology by the landless to the farmers in a command area is also a possibility.

8. The DTW programme, or any other BRAC programmes, is not a conventional programme in that it is controlled and managed by the landless. They are mobilised - by conscientisation, group formation, training and credit, by BRAC to undertake a scheme that is high risk and involves an important means of production. By their exclusion from hitherto state sponsored programmes, they are unfamiliar with such a scheme, at least to start with. It is the responsibility of the supporting agency to ensure that there is adequate planning, management and supervision until such a time when the projects become self-sustaining.

1. Introduction

The characterising feature of under development in Bangladesh is landlessness of the rural population. Land is the primary factor of rural production and the consequent social relations. In the recent years it has emerged that access to and control of other productive resources is also important. One such resource - especially in the context of low technology agrarian system, is water, particularly irrigated water. In a food deficit country - with high population pressure on land, so far dependent on rain-fed agriculture, improved cultivation practice is essential for growth in food production. Among all inputs such as HYV seeds, fertiliser, pesticide, etc. water is only second to land in importance. For various reasons state sponsored initiatives to generate growth in agricultural and food production did not achieve the declared results. Neither yield nor cropping intensity was favourably affected, due to inter alia failure to ensure adequate supply of water.

BRAC and some other leading NGOs, in early 1980s, in consonance with their goal of empowering the poor, identified small and medium scale irrigation systems as areas which can be utilised to achieve growth with equity. Mismanagement of existing such systems is the primary cause of its failure to attain its intended objectives - increased food production. On the other hand the poor and the marginal farmers were left out of the purview of the institutions promoting this technology. By motivating the landless groups supported by BRAC, to take control of the management and operation of tubewell irrigation

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systems - on rental or ownership basis, it was thought that there will be growth in output and part of the income will accrue to the poor. The success of this effort lay in the planning and management of the projects.

1.2 BRAC's Irrigation Programme

There were three shallow tubewells being managed by the landless groups in 1980-'81; in 1982-'83 the numbers increased to five DTWs,50 STWs and one LLP. At the end of 1988 there were 56 DTWs, 54 STWs, 2 LLPs and 13 hand tubewells, BRAC has gathered considerable experience in the management and supervision of tubewell irrigation systems in a number of regions in Bangladesh. The present paper draws on this experience to prepare a brief synthesis of this experiences.

1.3 Objectives

The present paper is a brief, impressionistic evaluation of the DTW irrigation programme. The paper considers the planning process with particular emphasis on the components of project appraisal. The basic objective of the paper is to ascertain the adequacy of project planning at the Area level. It will attempt to identify the process of project planning with emphasis on the major constituent elements therein. However, during our field visits it appeared to us that certain programme design issues may be worth commenting on. These observations and comments may be considered for the purpose of training and, inthe light of its future expansion, of programme design. In scope the paper is divided in six main sections: section two deals with the theoretical aspects of project planning with

reference to DTW programme; and section four comments on certain observation within the framework of project appraisal. The profitablity analysis is presented seperately for the complexity of its constituent elements in section three, and recommendations are made in section five.

1.4 Limitation

As the title (sub-title) suggests this paper is a 'brief' and should be considered as such and not as a theoretically sound and methodologically rigorous research paper. The main limitation derives from the very short time period in which it was prepared. Methodologically, it relied on discussion with Area Staff and records maintained by the projects.

2. Project Planning and Present Practice

2.1 Planning delineated

The purpose of planning is to utilise scarce capital and other resources in the most efficient manner. Given the reality that resources are limited and have competing demands on them, the objective of planning is to ensure that these are combined systematically and consistently to produce the desired effects. Planning involves making decisions regarding the mix between current and future effects, based on an analysis of the present reality. It comprehends the whole or parts thereof, and reflects the goals and objectives of the enti .ty in question. In pursuance of the empowerment goal of BRAC, it would consider the objective - as well as subjective, conditions of the poor, that they live in a determinate

society where the distribution of resources is inequitable. Planning considers the future - the goal of empowerment, it involves action - the DTW programme within the institution building strategy, and it specifies responsibility - planning and supervision of projects at the field level.

2.2 Project defined

Little and Mirrlees define project as being any scheme for investing resources which can be reasonably analysed and evaluated as an independent unit. A project can be broken down into parts for assessment, each part would then be a project (1974). Another definition: "A project is an organism for converting resources (inputs) into end products (output)" (Conyers and Hill, 1984). This may be in the field of non-formal primary education or the supply of irrigated water to farmers. Therefor, a project involves investment of resources, transformation of inputs into effects, and it is amenable to analysis and evaluation as an independent organism. Evaluation or appraisal is a constituent element of projects.

2.3 Project appraisal defended

Simply because some projects are more efficient than others in converting the resources. The basic aim of project appraisal is to measure the inputs and outputs involved, to identify a system to relate them to each other, and to assess whether the value of the effects is lower than that of the resources invested. Projects thus defined are considered and evaluated at all levels and at all depths. Area staff and expatriate donor consultants represent different levels

and depths of project appraisal. It may take the form of a thumbs nail sketch to a theoretically and methodologically rigorous research exercise.

The objective of project appraisal is to identify and select those schemes that are most promising; the process consisting of data collection and analysis, and the elimination of alternatives to arrive at a decision to select the most efficient.

2.4 The planning of deeptubewell (DTW) projects

Projects are undertaken with reference to wider goals and objectives set at policy level. It has often been argued that projects are "cycles", its life-span going through different stages from its inception to completion. Three to five stages - reflecting the varying degrees of complexity, in a project's life are suggested in the literature. For the present purpose - low powered planning, three stages would suffice, viz.:

a) identification;

b) feasibility (institutional, technical and financial);

c) implementation and operation.

The above categorisation imply neat dividing lines between the categories; in reality this is rather misleading. There is considerable overlapping and 'hopping about' from one stage to another. Project planning in reality is a process, and the stages identified above are analytical which do not reflect reality. The objective of planning is to identify and select those schemes that are most promising; the process consisting of data collection and

analysis, and of elimination whereby the number of alternatives are narrowed down to arrive at a decision to select the most efficient.

2.4.1 Identification

In development planning the aggregate growth model sets the growth rates for the economy, and an inter-industry model indicates a feasible and consistent set of output targets for each sector. The basis of project identification includes such sectoral information, as well as class interest and/or donor preference. In BRAC's case, RDP's goal of empowering the poor is consistent with supporting the efforts of landless groups to own and manage a very important rural means of production.

At the Area level it appears that the identification stage involves not whether to undertake DTW schemes, but 'how many'. The decision to start, and presently expand, the programme was taken at policy level with the Area Offices left to implement it. As indicated in the introductory section the present paper is concerned with Area level planning process.

Project identification is based on either CARE recommendation where the Lotus programme is operating, or on the basis of numbers (targets) set by higher management.

In some cases, the VOs themselves may express an interest in undertaking a DTW project. It should be noted that the policy objectives of CARE may not coincide with that of BRAC. It has been argued that CARE staff often show disregard for BRAC's objectives, viz. empowerment. In their recommendations, brief technical and financial analyses are used as evidence of viability of a particular

scheme. Management (scheme level) and equity concerns are accorded little importance.

Project identification at Area level - which is basically a combination of identification and pre-feasibility, involves locating of groups which are capable of managing a DTW scheme. Assessing the possibility of taking over an unused or poorly managed existing DTW is also part of this stage. Operators of the existing scheme are approached to adjudge their willingness to transfer control and management over to the landless groups. Possible reaction of local elite to the prospect of take-over of a DTW scheme by the landless, is also ascertained. The attitude of the state agency sponsoring the DTWs - BADC, has been found to vary between regions. In some regions outright purchase of used or new machine and equipment is possible more readily than in others. In some places the BADC staff prefer rental arrangements, particularly for old, weak quality machines with large overdue rent. (The overdue rent must be paid by the new operators as part of the rental agreement).

2.4.2 Feasibility

Parts of the aspects considered in the identification stage are strictly speaking the areas of concern in the pre-feasibility stage. When there is very little doubt as to the viability of a scheme, skipping detailed feasibility is a recommended strategy. The basic difference between pre-feasibility and feasibility is the amount of work necessary: a decision on a proposal may be given with very little work. Depending on the decision - either outright rejection or

acceptance or recommendation of detailed feasibility study, the next steps will be taken. (In Appendix A, a pre-feasibility/ identification checklist is provided. Those schemes scoring 120 will be recommended for acceptance).

The feasibility stage of project planning has three constituent parts, viz. technical, financial and economic. At the enterprise or scheme level economic profitability analysis - from the perspective of society, may not be necessary. Other two parts are very important. A complex project such as the Jamuna Bridge will go through many sub-stages of feasibility studies. For the present purpose, where pre-feasibility may suffice in certain conditions, simpler procedure will suffice.

For the purpose of appraising a DTW project controlled and managed by the landless, it is necessary to incorporate an 'institutional' component in the feasibility study. Then, this stage is composed of three parts: institutional, technical-agronomic and financial. The institutional part is concerned, firstly, with assessing the capability of the VOs to undertake a DTW scheme. Other areas may be termed as follows: 'group members (GMs) as water buyers', 'share croppers and owner-cultivators', 'grower motivation'. These components are necessarily judged by all Area Offices but with varying degrees of depth and rigour. These terms are used analytically and should not be considered as neat components that fit all specific situation.

Group strength or internal maturity is evaluated on the basis of certain criteria: coverage; management capacity; group cohesion;

leadership; and relationship with elite. A group's scheme management capability is indicated by repayment rate of past loans, regularity of savings, attendance at regular meetings, and record keeping. Coverage is indicated by 60 percent coverage of the target population of a village in the VO. An absence of intra-group conflict, selfishness, etc. reflect group cohesion. Maturity of individual members will ensure leadership accountability, which is wide-based, and presnece of secondary layers (or tiers) of potential leaders. A perpetually conflictual relationship with the elite is to be avoided. The groups' position viz-a-viz the social structures will be such that their existence, rights and role in village affairs, are given due consideration. The group as a whole or the members individually may not be under strong 'social bonds' of the village powerholders. Returning to the scheme, it may often be necessary to reorganise one or more groups in order to strengthen them. How successful reorganising groups have been is a matter of further research. An incidence where this did not produce the intended result may be cited here; however, this should not be viewed as an argument against this practice but lessons should be taken therefrom. Reorganisation in this example took the form of replacing the leadership of one group, and some female groups were involved in the management of the scheme. The new leadership was 'captured' by the previous one, with the help of the driver - a non-member, at the instigation of some local elite. When the female members of the committee protested the mismanagement and other misdeeds by the male members the former were treated with abusive suggestions.

Physically there may be an area which is perfectly suited to DTW irrigation. Whether or not it can be actually covered will depend on such social/institutional issues as the willingness of the landowners to buy water from the landless. Other issues are the presence of group members , share-croppers and owner-cultivators within the potential command-area. The issues that the Area Offices are concerned with in this respect include: whether or not the GMs will behave as water buyer or seller; the tenancy relations which will influence the number of growers willing to buy water and their willingness to adopt 'good agricultural practice'. These components are further dealt with in section four.

One component that is related with the tenancy relations and the competiveness of the irrigated water market, is the mode of payment. With the little data that is the base of this report, it is difficult to evaluate the meaning and implications of the form and rate of payment. Out of five Areas, in three the form of payment is in cash with the rates varying, in Boraigram, the rates vary from Tk. 1800 to Tk. 2400 per acre. In Jhikargacha the rate is high at Tk. 2400 per acre. A one-fourth share of the crop produced is the common rate for payment in kind projects.

The technical part of the feasibility exercise concerns both mechanical and agronomic. This is a difficult area for the non-specialist, an area where the Area Offices require coordinated and systematic assistance. Presently, technical feasibility studies are conducted by CARE in Lotus areas. In other areas, data is gathered from local farmers and others, with a 'commonsense' method, or on the

advice of BRAC staff stationed elsewhere. Components here include: command area, topography, cropping pattern and yield, and drain condition.

Aspects of the command area (CA) that are considered are site of boring (existing and potential) viz-a-viz the shape and slope of the CA. Ideally, the pump site is to be such that water can be distributed in more than one direction from where the machine discharges water. For this the CA is to slope away from the pump site; the latter is to be situated at the height of two-and-a-half feet from the field level. Quality of water is another aspect: good quality of water means low, or nill, sand content. There is confusion as to the optimal size of the command area; presently it appears that the determining factor is the potential size. More importance is attached to the possibility of enlarging the actual size (under irrigation) in future season than the present. Often a scheme begins operation with as small a CA as 30 acres. On the whole 50 acres appears to be the average size of CA.

A determining technical component concerns the topography of a CA, in that attempts are made to ascertain the soil's yield potential and water retention capacity. Related with this is the cropping pattern in the locality. In crop share schemes particularly, the cropping pattern is to include the cultivation of HYVs of paddy. The feasibility task is to ascertain the growth output that can be achieved under irrigation. Soil type is an important consideration: for yield sandy-loam is suitable whereas clay-loam has higher water

retention capacity. Cost and revenue considerations will influence the trade-off that is necessary between operating costs and yield (revenue).

Mechanical aspects such as machine condition and spare parts, and operating aspects such as fuel, appear not to receive as much attention as these merit. Area staff are at lost to judge the fuel and spares requirement, sources of supply and prices. These components are further dealt with in sections under 'comments' and 'recommendation'.

The technical-mechanical and agronomic, stage of feasibility study establishes the physical inputs and outputs of the scheme. These physical elements are presupposed by the profitability or financial analysis part of feasibility study. In Lotus areas CARE prepares a simple, one year budget - not accounting for the remaining years in the project's life-span. This budget and the calculations done by the Area Office to prepare the loan proposals, are based on the previous year's prices. Items used in budget preparation - other than loan proposals in some areas no budgeting was done, include: cost of machine and equipment; drain construction; fuel; salaries; other expenses; and revenue from water sale during main season and for some other crops.

The theory and methodology of financial analysis is discussed in the following section.

2.4.3 Implementation

This very important stage in the project cycle has been left out of the focus of the present paper - purely for lack of time available.

However, aspects regarding this stage will be considered in the section on recommendation. It suffices to say that a viable scheme may often go wrong for weak implementation and management. On the other hand, a weak project may be very efficient in producing the desired effects as a result of innovative and competent management.

3. Financial Profitability Analysis

Financial analysis provides clear framework within which all the broad aspects of a project can be evaluated. It also indicates ways of improving the benefit generating capacity of the project.

The starting point of the analysis is to specify all the expected physical inputs and outputs of the project, and to put a price to each item. In financial analysis, market price is used. In this way one arrives at anticipated expenditures and receipts. These have to be spread over time from the inception of planning to the economic demise of the project (that is, when it ceases to be profitable to operate it). For example, in Deep Tubewell Irrigation project (DIP) those for rental agreements, the demise is limited to five years according to the terms of agreemnt, though the project will not cease to be profitable after that time. For old/used deep tubewell purchase agreements, the economic demise will vary according to the age and condition of the machine. For new tubewell purchase agreements, one can set the economic demise upto the generally prescribed life-time of the machine which will have a salvage value at the end year (say 12-15 years).

As the receipt and expenditure payments will take place over time, the best method for comparing future streams of benefits and costs is to discount them to arrive at their present value. The principle upon which DCF evaluations are based is that money has a time value. There is, however, no fixed discount rate to be used to arrive at the present value (PV). Some arbitrary discount rate rather higher than the market rate of interest, is certainly useful, but cannot be regarded as better. It is thus, useful to calculate a second measure of profitability, the internal rate of return (IRR), that is the yield of the project. Judgement for chosing a project, therefore, can be made keeping in consideration both the measures of profitability.

For judging the suitability of a single version of a project (if not considering a lot of alternatives), there always remains an implicit alternative, that is "not to do the project" or "without" the project situation. In DIP, the areas which will be covered by deep tubewell operation as command area will remain uncultivated during dry season in the absence of any irrigation facilities. Consequently, when there will not be any DIP, the landowners will not obtain any benefit from their land and the groups will not obtain an income therefrom.

In this paper, the decision to evaluate the financial viability of the DIP is focussed only from the view point of single beneficiary, that is the samity members alone. An example of a cost-benefit statement is given in Appendix-B for a given irrigation project. In this example, income and expenditure streams for the members of the samity (shareholders) is considered alone.

The basic component which is included in the financial analysis include (i) Inflows, (ii) Outflows and (iii) Net benefit to the shareholders.

Inflows: Inflows are positive resources flowing to the project some of which will have to be repaid. The items included under inflows are:

(1) The value of the share of production received by the project.

(2) The income received from the sale of water in other crop (mainly tobacco).

(3) Loan receipts (a) for acquiring machineries
(b) for incurring operating costs of machines
(c) salvage value of machineries and equipments.

Outflows: Outflows are negative resource flows which include the following:

(1) Machinery and equipment,

(2) Drain construction and repairs,

(3) Spare parts and repairing,

(4) Fuel cost (diesel, mobil, gear oil/greese),

(5) Salaries (manager, driver and linemen),

(6) Cost for collection, threshing and sacking,

(7) Miscellaneous cost,

(8) Debt services in principal and interest on
(a) machinery and equipment
(b) projects operating expenses.

Value of the share of output:

The estimation of the gross value of output is the result of the continuous process of projection of per acre yield and irrigated area extending over the years. The projections of area depend upon the technical feasibility and availability situation of land. Projection of per acre yield has to be made carefully keeping in view the actual yield in the current year and past trend of yield of that area. Use of inputs by the growers can be assumed to remain constant with the adoption of improved technology and farm experience to ensure increasing per acre yield. The volume of production each year is arrived at by multiplying the projected per acre yield with the projected land area under irrigation. And the value of production is derived by multiplying the output each year by the farmgate price. The price level of both inputs and outputs can be assumed to remain constant throughout the project period.

Contingencies:

Contingency costs are normally not included for the operating cost once the initial investment period is passed. No contingency allowances may be made for price inflation on the assumption that such inflation will equally affect both cost and revenue.

Loan receipts:

Loans are taken by the group members for the purchase/renting of machineries and for defraying the operating costs of the machines. Loan for acquiring machineries either for old-purchase or renting has to be repaid within a period of 4 to 5 years with interest according to the terms of contract. And loan for defraying the operating costs

has to be repaid within the year (7-8 months) with interest according to the terms of the contract.

Salvage value and Depreciation:

After the expiry of the project, the capital do not get used up and have a residual asset which is treated as the salvage value of the capital goods. This value is to be treated as benefit in the last year of the project (if the machine is purchased). In determining the gross cost stream for calculating the discounted measure of project worth, depreciation do not enter as a cost. Depreciation is essentially an accounting problem and not an economic one. If a hypothetical project earns no profit, its internal rate of return, net present value and hence the discount rate will be zero. But the money will come back and depreciation will be covered and fully accounted for when the project earns an internal rate of return equal to zero or greater.

Outflows:

Investment cost here represent the machinery and equipment cost. The operating costs are the costs exclusive of debt services incurred by the project during the operational period of the project.

Net Benefit:

The net benefit is thus the difference between the inflows and outflows. Since the land remains uncultivated during winter season before undertaking the project the beneficiaries will not have to forego any alternative costs; so, the difference between inflows and outflows is their incremental benefit.

Sensitivity Analysis:

Sensitivity analysis can be done to see what happens to the profitability if something goes wrong. Projections are subject to high degree of uncertainty, and it is done to deal with this reality of the project analysis. It can be done with respect to costs and yields.

4. Comments on selected components

In section two the components considered in project planning/appraisal have been indicated. In the present section comments are made on observation regarding these components and some other pertinent issues. Based on the practice of project planning and the comments of this section, some recommendations will be made in the following section. For the sake of convenience, this section is organised in three sub-sections under the heads of institutional, technical and financial.

4.1 Institutional

This sub-section deals with issues that are influenced by different institutional considerations. The institutions are organisational such as the village organisations, and some are social such as local practice regarding payment.

4.1.1 Group strength

A technically and financially viable project may go wrong for a variety of reasons. In BRAC's case, the strength and capability of VOs is perhaps most crucial. There is very little example of landless

groups taking control of and managing an important asset, from which to draw guidlines. Management and operational aspects at the group level have not been considered here but this does not belittle its importance in terms of success or otherwise of the schemes. For both purpose BRAC is on its own to devise a consistent and feasible set of guidlines, based on its own experience (the experience of Proshika may be considered). It is essential that a group's maturity and management capability are assessed very carefully. It may perhaps be advisable to postpone operation to the next season should there be reasonable doubt regarding the groups' strength.

4.1.2 **Group members as water buyers**

The experience with this group of water customers is varied. In some Areas GMs behave as water 'buyers' and attempt to reduce price of water at the negotiating phase. There is a tendency among some programme personnel to accept this as being natural. That is, it is taken as given that the GMs are naturally motivated by self-interest. This ready acceptance is surprising for it is part of BRAC philosophy that target group development can be achieved through the unity of and cooperation between the landless poor. Furthermore, at the feasibility stage one of the indicators of group maturity is the absence of selfishness which is behaviour on action motivated solely by self-interest, which may be detrimental to the interest of others in the same situation.

With adequate motivation - beginning in the conscientisation phase, the GMs can and do behave to uphold the interest of their group or class. It has been argued that it is possible to impress upon the GMs

that the individual gain from lower water price will reflect in lower net benefit from their share of project earnings. As the GMs by definition own or operate small portion of land viz-a-viz the command area , lower price of water will retrun smaller earnings from the project. The benefits of owning an asset in terms of its social and economic - in short power, implications may also be emphasised. The benefits received by the participants or shareholders in a scheme can play a motivating part in strengthening group interest.

4.1.3 Share croppers and owner cultivators

It is not yet clear as to who is better water buyer and who is 'good' agricultural practitioner. This aspect needs to be understood clearly in terms of the implications for DTW scheme managed by landless groups. On the whole, it appears that the tenancy relation is an important determining factor of the responsiveness of the growers. Where the costs of irrigated water is shared by the land owner, the tenant - usually a sharecropper, will be more responsive than where it is borne by the tenant alone. A related aspect is the category of farmer who is responsive to supply stimulus. It was suggested by the staff at Rangpur Area Office that a marginal farmer (with landownership between 0.75 to 1.0 acre) is responsive to good agricultural practice. The number of tenants will also influence the form of payment.

4.1.4 Mode of payment

This is in part related with tenancy and in part with the competitiveness of the irrigated water market. The common practice is

to pay in crop share, cash payments - local practice in Boraigram, Jhikargacha and some parts of Bankra Area., discourages tenants for by definition these are poor farmers who can not (or will not) pay by installemnts in advance of harvesting; similarly, marginal and small owner-cultivators prefer crop share. When parts of the payment are in advance the loan requirement of the project is reduced as operational costs are met by advance earnings. Interest payment on operational loans is also saved.

In Bishnupur, Bankra, the local practice of payment in cash was not applied to the landless scheme - the composition in terms of tenancy and farm size may explain this. In Jhikargacha, the cash rate is very high at Tk. 2,400 per acre, and there is for obvious reasons no possibility of changing to crop share. The competitiveness of Jhikargacha water market may explain this, as it does in Boraigram. With about 54 DTW's in the Area the landless groups of Boraigram Area were unable to influence the price - they were price takers in a competitive market. Aspects of, other than competitiveness of the market, the societal arrangements may be helpful in explaining the experiences of Jhikargacha and Rangpur.

4.2 Technical

In this sub-section components that can be classified as mechanical and agronomic are presented. Some of these have been cited in section two, and the implications of the comments here in terms of programme design and management, are presented in the following.

4.2.1 **Drain layout**

An area that requires a skilled person - some one who has scientific training and experience of designing channel layout. A faulty layout and badly constructed channel network will result in uneconomic distribution of water. There may be water logging, and reduced flow of water will lead to increased costs from additional fuel consumption. Machines may also need to be operated for time periods longer than that recommended. This may adversely affect machine efficiency, its longevity, cause breakdowns, and thus increase costs. Customer confidence will suffer.

4.2.2 **Topography**

Although there are many constituent elements of this heading, the present paper concerns soil type and its implications for yield. Sandy-loam is ideal for yield whereas clay-loam retain water better. The trade off necessary between yield and costs needs to be assessed on the basis of the net balance. Should the average yield potential of soil be high then low retention soil may be considered if the increased cost of fuel is compensated by greater yield (assuming payment is in crop share). In cash payment areas, high retention soil type may be prefered as it saves fuel. Where the soil is sandy-loam and rate of payment is not high then cost reducing measures must be taken as well as expanding the actual land area covered by the scheme.

4.2.3 **Cropping pattern and yield**

The cropping pattern in any area is given in the immediate future. To undertake a DTW scheme the pattern should include HYV paddy

cultivation in dry seasons. Often it has been possible to convince farmers to change to new practices including HYV crop. In Rangpur, it has been argued that in the second season onward there is a marked possibility of some tobacco growers changing over to paddy (HYV) cultivation. As tobacco season runs into the irrigation season, in these areas growers cultivate a short gestation variety of paddy the yield potential of which is not high. The farmers should be given enough time to prepare for HYV paddy cultivation, and the requirement here is early start of scheme operation. Confidence of growers regarding the ability of the landless groups to deliver the goods must be strengthened by implementing the project in advance of the irrigation season.

In planning or appraising schemes it has been noticed that there is a tendency to overstate local yield potential. Yield estimates - essential physical input into the estimation of returns, must be done very carefully. It is better to underestimate the yield potential than overestimate it. The aim of project appraisal is to select healthy schemes which requires a careful estimation of the yield potential: there is no point in making up numbers if these are cripples.

4.2.4 Machine condition

In case an old machine is being assessed its condition must be ascertained by a skilled person. Purchase of older machines should be considered as second best option for these require large investment in replacement of, say the engine, and cause operational difficulties. If an old machine is rented there may be frequent breakdowns resulting

in increased expenditures and a weakened grower confidence. In addition, certain brand names are notorious for their high fuel consumption, unavailability of spare parts, etc. Often an old machine's manufacturer rated capacity is not met in practice. In a high water level area such as Rangpur, machines with two cusec capacity actually discharges as little as 1.75 cusec of water. This will increase fuel cost.

Surprisingly, the aspects of machine condition, rated capacity, spares and fuel requirements, are given inadequate considerations in project planning. Financial implications associated with these is clear.

4.2.5 Diesel price fluctuation

Fuel is the largest component of operational costs, and fluctuations in its price may well turn a potentially surplus scheme into deficit. An example of fluctuation is a scheme in Rangpur where expenditures on fuel (diesel and lubricant) increased from Tk. 20,761 in the first season of operation to the third season total of Tk. 43,787. It should be noted that the third season has been adversely affected by drought forcing the machine to be operated for longer hours. Unit price of diesel has also increased from the regulatory Tk. 7.15 per litre to Tk. 13.20 in the Darshana Area.

While cost calculations are made, the possibility of increased fuel cost should be accounted for. In some areas such as Bankra, prices of all inputs increase during irrigation season. This can be further aggrevated in certain conditions, e.g. drought. In order to reduce the effect of market fluctuation affecting project outcome, advance

planning of fuel requirement and sources of supply (including carrying and storage) should be considered.

4.2.6 Spare parts and maintenance

Comments regarding spares are related with and similar to those made about machine condition and fuel. During the irrigation season spares are not readily available in the market, even at an inflated price. In Bankra, it was sometime before a replacement crankshaft could be found at a very high cost of Tk. 17,000. In order to reduce the effect of such situations it is necessary to ascertain in advance the spares requirement as thoroughly as possible.

On the maintenance front, presently the programme is dependent on external expertise - it is provided by BADC in a limited way but with its 'usual problems', by CARE upto 1991, and by local mechanics who are something like 'quack doctors'. The importance of maintenance services cannot be over emphasised, given its specialised nature.

4.3 Financial

Project as arrangements for converting resources into and products, that are technically sound may produce outcomes that can be achieved by different arrangements at a lower cost, are inefficient. In other words, a technically sound project may not be financially viable - i.e., resources deployed in one project may generate more benefits in another. Ascertaining the profitability - the positive difference between earnings and expenditures, of alternative projects and arriving at a decision regarding the most efficient, is the purpose of financial analysis. The theoretical and related aspects of

profitability analysis have been dealt with in an earlier section, the present is concerned with the aspects that are to do with programme objectives.

4.3.1 Demand analysis

Any project that is by its nature engaged in the exchange sphere of the economy, should very carefully locate and assess the demand for its output. It appears that, like yield estimation, the potential demand for irrigated water is not thoroughly analysed. There is a tendency to translate potential command area size into demand for water. That is, there is a confusion between what land area may be physically covered and what the actual demand would be.

What is emphasised here that impressionistic considerations of water demand may overstate the actual demand, which in turn will affect projects financial performance. The demand for water ought to be considered along with other related components, viz. potential and actual size of the command area, the yield potential and the price of paddy in the locality.

4.3.2 Marketing of crop share

In schemes where payment is in kind, the GMs share of the crop need to be sold. At present, in most Areas the share is sold primarily at the point of threshing. Wholesale traders are the main buyers. In some Area Office there is an emphasis on cash sales, that is the participants are encouraged not to sell their share in credit. It is argued that it is difficult to realise the credit payments. In Darshana, the practice is some what different in that share-paddy is

sold to the participants in paddy husking scheme. This is a sound practice as the value added at the processing stage will accrue to the VO members. This is further considered in the next section.

4.3.3 **Benefits to group members**

It is a fact that entrepreneurs - be they large scale or rural landless, take risks that are proportional to the returns/benefits. An irrigation scheme is, by its location and nature, a high risk project. As there are risks, the participants in the project would also require compensating, potential benefits from the projects. The question of direct benefits to the participants - who are by definition in the low income group, may on the whole be given inadequate consideration. Area staff do agree that the participants must 'see' some profit to maintain their morale.

The benefits in the form of profit share, accruing to the group members is an indicator of the 'quality' of the schemes. The decision rule of selection from alternatives, may consider benefits to the participants (this implies that in financial analysis the NPV measure is better than the IRR) - both direct and indirect as well as present and future.

The problem here is that, on the one hand, the lower is the income group the higher will be the pressure for present consumption, on the other hand, development entails future consumption. From the self-sustenance point of view, quality of schemes interms of profitability should be weighed carefully against the tendency to achieve higher quantity. Balancing all these aspects is not going to be easy!

5. Recommendations

It has already been indicated that resources are never unlimited! these are scarce and have competing demands on them. The purpose of planning is to effectively allocate funds, and ensure that these are systematically combined with other scarce resources to produce the desired outputs. The objective of appraisal is to attempt to narrow down the member of alternatives to arrive at a decision to select the most efficient. Acceptance and rejection of schemes must be based on facts and, in BRAC's case, the social reality and the organisation's strenth and limitation.

Monetary, human and physical resources at BRAC's disposal is not unlimited, with competing -often these may be contradictory, demands on them. Therefore, funds are to be allocated/invested with utmost care to get the best possible results. One way to measure results is by the repayment rate; with 93.77 percent on time cumulative principal repayment rate this is not a problem (BRAC,1988:1). Now, the task or the challenge is to measure it by quality of the schemes. Quality may be assessed by many indicators: profit share to the participants; outright ownership by them and the seef-sustaining ability of the schemes; etc. What is important here is that quality should be achieved either by reducing variable inputs- fuel maintenance, or by increasing output- command areea coverage, higher yield, sale of water for secondary purpose (seedbed preparation, other crops in addition to the main one), or both. For this to happen, in the context of landless development, the role of planning, management and supervision is vital.

5.1 **Target setting:** When target (numbers) are set by programme management, this tends to indicate to the Areas that the numbers of DTW schemes undertaken are more important. Aspects of benefit to the participatory VOs or the self-sustenance of the projects, in such situations, may be neglected. This may in turn lead to weak project appraisal. The result may be that in meeting the targets set by higher management, a number of cripples are produced.

Targets may be necessary in the context of learning or experience gathering, but at the present time the irrigation programme has (or should have) graduated from the "learning by doing" phase. To continue in the present adhoc, "instructed from above" basis means a lack of programme maturity. This may be an opportune time to effectively decentralise the identification, selection and management of DTW schemes to the regional level (field based).

5.2 **Decentralisation** of planning, management and supervision - in a systematic manner with accountability, will add substance to the argument that BRAC management is based on participatory principles. In the context of the DTW irrigation programme identification, selection and implementation of schemes ought to be better planned and coordinated at the field level. Since regional management is presently being stationed at the field level, a closer, more integrated approach may be taken to the related aspects/stages of planning DTW schemes as well as funding of others. Field based technical services units will strengthen the process of decentralisation at the same time filling in a gap in the programme design.

5.3 **Funds programming:** Irrigation project straddle the exchange and the production spheres of the economy. It is primarily in the exchange sphere as it sells water, and its output is utilised as an input in production. BRAC funding encompasses schemes in both areas of the economy. At the present time "programming" of funds allocation should be considered at the programme level. By programming it is meant that funding of schemes should be coordinated so that different stages of exchange and production are linked. It means allocating funds to those schemes which are related with each other either vertically or horrizontally. If there is a potential command area that stretches out in such a way that two, for example, DTWs can be undertaken to cover the land area, then funding of both can be considered. Example of vertical integration will include power tiller, cultivation and processing/trading of paddy/rice, in the context of a DTW scheme. Funding may also be considered for group member farmers to apply the "seed-fertiliser-water" technology package, as being contemplated at Boraigram. A successful project of this kind will have demonstration effect on other farmers. Possibility of supplying (selling) such package by group members to irrigation project customers, may also be considered (see Imam, 1983).

By programming funds allocation it can be ensured that the group members derive a share of the value added at each stage- or from each component in the chain, of production and exchange. The decision to programme scheme funding is a policy concern which involves design aspects. At what level is the programming to be implemented? Within a

decentralised planning and management frame work the Regions are the ideal places for this.

5.4 **Implementation:** There are two other aspects that should be considered on regional basis. This involves the implementation stage (DTW schemes) and planning of input supply. As stated in the introductory section the focus of this paper is the feasibility stage in planning, the implementation has been left out. The importance of this stage is no less than the focus of this paper. To make amends, a brief and sketchy consideration of this may be made here.

By implementation it is meant the time period from the petitioning of BRAC office to the commencement of operation. It is a peculiarity- from inexperience or faulty planning, of development projects - at all levels and scales, that the implementation period is underestimated. This may result in an under achievement of the predicted figures in inputs and outputs. In the context of BRAC's irrigation programme, it is not clear how the Area Offices consider the time frame, particularly that required for implementation. As an outcome of delays in implementation many schemes start operation well into the irrigation season - as late as March, producing outcomes that are below the efficiency mark. A delayed start has efficiency implications in terms of the size of the actual command area and crop yield- thus profitability, and adverse effect on customer confidence . In a different context, STWs funded by Proshika, Novembor has been suggested as the month when operation should start (Wood, 1983). For BRAC, the difficulties and benefits of targetting November/December as the deadline for implementation needs to be considered.

5.5 **Input supply:** The difficulty faced with the availability of inputs and their prices, have been discussed in previous sections. By inputs fuel and spare parts are meant. Both are related with the age and condition of the machine and equipment. The Area staff face difficulty in assessing machine condition leading to inadequate planning of spares and fuel requirement.

It is necessary, in advance, to identify the spares that would be needed (potential) and the fuel requirement-particularly in the case of old machines and certain brand names. It is also necessary to locate the sources where these can be availed and their prices. Having done this for each scheme, the total requirement of a region can be planned and managed at the field level. Region based (decentralised) planning and management of input supply should be given adequate consideration.

5.6 On the **institutional** front two concerns need brief elaboration Customer confidence and alliance between the landless and others. For a farmer to agree to buy water from a landless group he must be confident of the ability of the suppliers (of water) to deliver the goods. The timing here is important for the farmer may wish to see that the landless - hitherto excluded from management and operation of any asset, will supply as claimed. Timing of identification, feasibility and implementation is vital.

The group's ability to manage the project without much difficulty will encourage the growers to adopt good agricultural practice. In places where the payment for water is in crop-share it is essential that they

are motivated/trained to employ modern technologies. After all, with higher yield both the buyers and sellers benefit. Group members who are participating as growers (water buyers) may take a leading role in demonstrating the benefits of scientific cultivation practice.

5.7 **Alliance between the landless and others:** One aspect that has not been dealt with so far is the possibility of conflict with elite in relation to DTW schemes. Farmers - usually of powerful nature, may forcibly take water in exceptional situations as drought or simply being greedy. The possibility of such eventualities should be considered at an early stage. One mechanism to prevent such incidents may be the formation of a "watch dog" group the members of which should include water sellers and buyers. This group with the consent of all concerned may be responsible for enforcing previously arrived at norms of seller and customer behaviour.

The participatory farmer should give an undertaking that they are not to take water by force. An understanding between marginal and small farmers and the landless groups may be developed to this end, prior to involving the larger farmers in the group. Once this understanding has stood the test of time - perhaps couple of seasons, and that of conflict with others- avoidance should be preferred, it can evolve to become an alliance where wide ranging issues are incorporated. The alliance may become an institution whereby not merely the DTW scheme but on other issues there is concerted effort by the landless and their allies.

Once the landless and the landowners cooperate in an economic scheme that is beneficial to both, the tendency to create or sustain conflict situation may be reduced. It ought to be noted that a partnership between two unequal parties may very well benefit the larger/ stronger than the other. In order to prevent a situation where the powerful may take an undue share of the benefits - indirectly or directly, alliance of others less powerful may be effective in neutralising the advantage of the powerful (for a similar recommendation see Imam, 1983)

5.8 **Future research:** To wind up this section a brief note on future research related with the DTW irrigation programme. The present paper considered only a small part/portion of all the issues/concerns involved in the programme. At least for research, it has raised few issues that may be invessgated on their own or as part of other studies. At the level of specific issues/concerns the following are some.

- reorganisation of groups ! how successful?
- who are "good" farmers and who are more willing water buyers, with regional (agro-ecological) variations, tenancy, farm size, etc;
- management and operetion at VO level;
- self-interest vs. conscientisation;
- payment- cash vs kind: market competitiveness or social structure or agro-ecology?
- scheme failures: why do group members stay with the VOs?

At a higher/complex level the following may be considered for further study: the financial/economic and socio-political implications arising from either success or failure of schemes. Regional (agro-ecological as well geographic/administrative) variation influencing experience should be an important factor. The data should be both retrospective as well as continuous, which will be dictated by the conceptualisation of the research issue, the purpose of research and its use. These aspects along with theoretical perspective, will also dictate the methodology, including the focus (BRAC or VOs or society or all?), the time frame (from planning to end of second or third season?), tools and techniques of data collection and analysis, etc.

6. Conclusion

In the last few pages it has been attempted to delineate and discuss the process of project appraisal viz-a-viz the DTW irrigation programme, with particular emphasis on feasibility. Some programme design aspects have been commented upon where it was thought appropriate. Recommentations have been made which are based on the data presented and the authors' understanding of the conditions. In social science only an arrogant person claim to make final statements regarding a social phenomena. If this paper can help to raise questions regarding the programme or initiate a debate/discussion on the issue under consideration, then the efforts of the authors will have been worth their while.

As it is already apparent, the DTW programme of BRAC is not only going to continue but to be expanded. At this juncture the issues raised in

the paper may be considered for action, or referred to apppriate authority for further research and/or consultation. The aim of the paper has not been to make a judgement of worth on the schemes, but to identify areas and factors which may be manipulated/affected to strengthen the programme. Lastly, it remains only to reemphasise the role and responsibility of the supporting agency in planning management, training and supervision of the schemes. The programme is dealing with a class of the population, who have historically been neglected by all hitherto state sponsored institutions and programmes. They are the "outsiders" in the development effort, who have very little experience of managing higher level economic activities, particularly as important as DTW irrigation projects. The responsibility of the supporting agency in gathering knowledge, diffusing it among the landless, and supervising them applying the knowledge, can not be overemphasised.

Appendix - A

Pre-Feasibility (identification) Checklist for DTW Irrigation Scheme

		10 Pt	5 Pt	0 Pt
1.	Cropping intensity	/ / 3 (Tripple (crop)	/ / 2 (Double)	/ / 1 (Mono (crop)
2.	Yield/ac. a) Irrigated	/ / 40 mds.+	/ /25-39 mds.	/ /<25 mds.
	b) Non Irrigated	/ / 30 mds. +	/ / 20-29 mds.	/ /<20 mds.
3.	Soil type	/ / Sandy loam	/ / Clay-loam	/ / Sand
4.	Irrigation situation in the area	/ / Deficit Irrigation	/ / Optimum Irrigation	/ / Surplus Irrigation
5.	Potential Command area	/ / 60 ac.+	/ / 50-59 ac.	/ /<50 ac.
6.	Water charge per acre			
	a) Cash	/ / Tk. 1800+	/ /1500-1800	/ /<Tk. 1500
	b) Kind	/ / 25%	/ / 20-24%	/ / Good
7.	Present Irrigation management status (KSS)	/ / Poor	/ / Fair	/ / Good
8.	Nearby workshop and other back-up support	/ / Within 3 miles	/ / Within 3-5 miles	/ / More than 5 miles
9.	Number of STW existing in the potential area	/ / 1-2	/ / 2-4	/ / More than 5
10.	Whether owners of STW are willing to withdraw from the target area	/ / Yes	/ / May be	/ / No

11.	Existance of VOs in the vicinity of the target area	/ /	6	/ /	5-4	/ /	<4
12.	Group strength (identification stage)	/ /	Strong	/ /	Medium	/ /	Weak

If the total score of the answer:

(a) is 120, one or more DTW can be introduced without hesitation

(b) above 60, detailed feasibility needed

(c) less than 60, not to be introduced.

Appendix - E

COST BENEFIT STATEMENT FOR FINANCIAL ANALYSIS
(an example)

ITEMS/YEAR	1986-87	1987-88	1988-89	1989-90	1990-91
a. Area under paddy cultivation in Boro Seasons (acres)	53.36	61.50	60.55	62.00	62.50
b. Yield per ac. (maunds)	-	-	32	32	32
c. Total paddy production [Group's share] (maunds)	-	-	1937.6	1984	2000
d. Market Price (Taka/md.)	-	-	200	200	200
A1 Total value of paddy produced (Taka)	70,024	81,624	96,880	99,200	1,00,000
A2 Sale from straw (Taka)		1,119	2,000	2,000	2,000
A3 Water charge for irrigating other crops (Taka)		2,929	4,234	4,234	4,234
A. **Total Revenue from Irrig.** (A+A1+A2) (Taka)	70,024	85,672	1,03,114	1,05,434	1,06,234
B. **Fixed Investment cost (Taka)**	6,000	86,000	10,000	12,000	13,000
C. **Operating & Maintenance cost (Taka).**	51 499	68,528	89,299	89,299	89,299
a. Drain construction & repairs	11,158	9,885	10,500	10,500	10,500
b. Spare parts & repairing	3,602	2,391	5,542	5,542	5,542
c. Fuel cost: diesel	18,003	24,435	38,535	38,535	38,535
d. Mobil/gear oil.	2,758	3,195	5,252	5,252	5,252
e. Salary (Manager/Driver/ Linemen)	6,900	13,800	14,200	14,200	14,200
f. Collection/Threshing/ Sacking Cost	5,791	8,605	7,470	7,470	7,470
g. Miscellaneous	3,287	6,217	7,800	7,800	7,800
D. **Interest on loan (Taka)**	7,878	9,441	11,658	9,858	13,937
Net Benefit {A-(B+C+D)}	4,647	-897	-7,843	-5,723	-10,002

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