Funding, cost Recovery, Sustainability of large irrigation schemes experiencing Capacity under Utilization in Nigeria : An Appraisal

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Introduction

Irrigation is expensive business anywhere. The investment costs in irrigation development will include the cost of design, construction/supervision of the dam (or a proportion of it if the dam is multi-purpose), headwork, distributory system (including night storage reservoirs where these are included), drainage system, land clearing and leveling, agency offices and other associated physical structures, etc. In pumping systems, the cost of procuring and installing the power supply and pumping systems will have to be added on. If, in addition, the distribution system is based on piping then the cost of the pipes will need to be included. The same is true of sprinkler based systems. The cost of building an irrigation scheme, obviously, will change as the level of sophisti9cation of the design. Concrete lined canals, for example, will require a higher initial capital outlay than unlined, or clay lined canals. As a further example, high technology control structures will cost more to incorporate than simple manual ones.

The relationship between adopted irrigation technology/design, and investment cost/operation and maintenance costs are not a straight toward one. For example, concrete lining of irrigation canals may appear expensive at first, but this may turn out to be the cheaper alternative in the long term, especially if the capacity for providing adequate O&M is not guaranteed. This is also true of the use of expensive control structures in a situation of deficient Operation and Maintenance. However, the use of the more expensive sprinkler irrigation system in a situation where the users lack the absorptive capacity for that level of technology may result in rapid scheme deterioration, its level of water use efficiency not withstanding. Also, the use of electro-mechanical equipment in a setting where its repair and maintenance can not be guaranteed is not advisable.

The costs of operating a scheme with include personnel costs, and fuel costs in pumping schemes. However, the actual cost of maintaining a scheme will only be known as the scheme is run and all the factors play out. However, this may be estimated as percentages of the various components of the system. These percentages would differ depending on the design of the scheme. That is, a concrete lined canal will have a different percentage from a clay-lined canal, etc. A phasing scheme is usually applied to the maintenance costs to recognize the fact that maintenance will be minimal during the initial years after construction. Internationally, the average cost of maintaining one hectare of irrigated land ranges between $50 - $100.

Cost recovery may be categorized into three levels depending on what costs you want to recover. These are the total cost recovery, the capital cost recovery and the Operation

and Maintenance (O & M) cost recovery. The total cost recovery implies that all investment and O & M costs plus any accruing interest will be recovered. Capital cost recovery implies that the historical costs of irrigation development will be recovered while O & M cost recovery means that only the cost of operating and maintaining the scheme will be recovered. Any combination of these is, of course, possible. For example, it is possible to recover Capital plus O & M cost, etc. In this study, we shall address O & M cost recovery.

There are three main options of O&M cost recovery in an irrigation scheme. One is for the Government, through the Irrigation Agency, to bear the full cost of O&M. The second is for the responsibility to be shared in some predetermined proportion between the Agency and the users, while the third is for the users to bear the full cost of providing irrigation services. Each option has its merits and demerits but as this paper will show, whichever option is adopted, it is important to determine the capacity of the irrigation system to bear these costs.

Costs and Funding

Operating costs include staff salaries, overheads (transport and housing), electricity (NEPA and diesel) charges and dam superintendence. Maintenance costs include those incurred on the maintenance of the am and the irrigation and drainage infrastructure. As with most activities in Nigeria in the 20th Century, record keeping has been very weak on O&M costs largely because information on staff movement, budgetary allocations, funds releases, expenditures and so on is not easily available. For example, the O&M analysis carried out in the ACS (1999) study had to extrapolate, deduce or project using the FAO rates of 1.5% and 0.75% of capital investment as the maintenance cost for irrigation system and the dam respectively. The operating costs of pumping was set at 45 – 55%, staff salaries and overheads at 6.5-9% and dam superintendence at 0.1% of the capital investment.

It was found that the real O&M costs for most projects were more than 40 times the revenues generated from water (and land) service charges. The reasons for this are:

- large overheads for the large staff population mostly administrative rather than O&M proper;
- low recovery rate from the users probably as a result of inadequate services and absence of mobilization; and
- high operating costs especially in pump-based schemes consuming large amount of energy (NEPA or diesel).

The difference between the real O&M cost and revenues generated is the government subsidy, which started declining over a decade ago and virtually stopped completely a few years ago. With persistent inadequately O&M subsidy annual maintenance is normally neglected and the project infrastructure deteriorates, necessitating rehabilitation. Government funding of two of the major projects dropped by about 40% between 1983 and 1989. In KRIP I however water fee and other revenues rose four-fold from 1983 to 1989 largely due to extra effort put into water charge collection by the project

management. Unfortunately other projects have not recorded comparable achievements and even KRIP has not been able to sustain its water charge collection drive.

At this point it is pertinent to state that the ACS (1999) study did discover a particularly significant development. It showed KRIP could remain viable and be so sustained without any government O&M subsidy. A closer examination of many other projects, particularly those in the KRIP category (100% gravity) shows that they too can be sustainable if certain measures are put in place.

O&M Responsibility Sharing

Most public sector irrigation schemes were designed originally to have strong and well-staffed authorities to operate and maintain them. Naturally as noted earlier, there was hardly any role expected of the farmers other than to direct water from the tertiary canals or ditches into their farm plots, operate their respective farm plots and pay their irrigation water charges. There were no farmers' organizations institutionalized to execute any activity concerned with irrigation water management and system maintenance.

The situation is now changing. Most projects are now aware of the need for, and some are already, mobilizing the farmers into functional WUAs, which can partake of O&M, responsibilities. The management of such projects controls, operates and maintains the primary and secondary canals systems as well as the gates and other hydraulic structures within the two levels. Farmers are in turn responsible for the control, operation and hopefully maintenance of gates to their field channels as well as field drains. Thus far this arrangement has not been sustained yet in any project. Efforts at making this arrangement work are continuing through research and advocacy.

Key issues in System Design and Sustainability

The study confirms earlier findings by OED that there is normally no link between higher water charges and better operation and maintenance. Revenue from water charges generally goes to the general treasury and is not earmarked from O&M. Studies by the Asian Development Bank, ford foundation, Institute for Philippine Culture, International Irrigation Management Institute, and the Philippine National Irrigation Administration suggest that financial autonomy results in major improvements in quality and cost effectiveness. Financial autonomy often takes the form of turning operation and maintenance over to irrigators, but there are other arrangements as well. When financial autonomy prevails and irrigators pay O&M costs and arranges O&M themselves, O&M improves.

The Bank has promoted irrigators' groups and turnover of systems to them in a variety of ways, but disappointment has been more common than success. Success requires more than covenants in which borrowers agree to set up users' groups. Empirical studies have identified the conditions that lead irrigators to create users' groups that endure.

A Selective Review of Cost Recovery Practices

A review of cost recovery practices in 20 developing countries with significant irrigation sectors indicates that all have policies to recover some costs from the irrigators. Some nations aim for greater levels of recovery than others do but there appears to be no clear relationship between levels of economic development and desired levels of recovery.

With respect to operations and maintenance costs, a summary of the 20 countries surveyed includes the following:

- Five imposed an annual extraction charge, which amounted a a license to extract water from the system.
- Ten made an attempt to recover at least some of the cost. The partial assessments varied from 15 to 70 percent of the total operations and maintenance requirement.
- Nine made an attempt to recover all of the costs.
- One recovered O&M costs indirectly.

One of the five countries that imposed an extraction charge reported that the water charges absorbed as much as 33 percent of the farmers' gain in net income. Another reported that the charges were as low as 1 percent. For the same five countries, the water charges, as a percent of total production cost was in the range of 1 to 4 percent.

Apparently only 10 of the twenty countries had explicit policies with respect to the recovery of investment costs. Of those 10, seven had explicit policies not to assess farmers for any part of that cost and three and policies to recover some of the cost.

Formal cost recovery policy does not necessarily reveal a complete picture of what actually takes place. For example, Thailand is reported to have a policy not to collect a water charge. Yet, during the dry season when water is needed for rice cultivation, the government-set price of rice is reduced as much as 30 percent.

If there is one lesson to be learned from this sketchy review, it is that policies of irrigation cost recovery are so deeply imbedded in the totality of agricultural and national policies that a detailed analysis of all factors is necessary to determine who pays and now much in any given setting.

Evidence of Selection Criteria

The sources were examined for evidence of criteria other than the collection of revenues. Since the reports had been prepared largely by public irrigation managers, it is very likely that they had not been party to the determination and so would not have had a strong awareness of the factors that entered the original decisions regarding selection criteria. Other than the mention that the charges were for management services rendered, there was little indication that efficiency was an important criterion influencing the choice of cost recovery mechanisms.

There was considerable evidence that equity was an important factor in managing cost recovery mechanisms and that it might have been a factor in the choice of a given mechanism. However, the importance of equity was raised mainly in the context of the fairness of area-based fee structures for crops with greater water requirements such as rice and sugarcane.

There was little mention of administrative convenience as a factor in choosing the mechanisms. Authors of country papers did not dwell on discontent or difficulties with what their agencies had asked them to administer. There was some complaint about the time it took to get approvals for changes in procedures and fee structures. This suggests that they did not generally have that authority. Their concerns were with the administration of assessments and revenue collection, especially for operations and maintenance.

Approaches to Fee Assessment

This section deals with the advantages and disadvantages of methods for assessing charges that are applied throughout the world, with some case-to-case variation. These methods include:

- Fees according to the area allowed to be irrigated. The fee might vary by crop and by season.
- Fees according to the volume of water used regardless of the purpose. The fee might also vary by season.
- Administered water allocations with duties assessed per farm, per share, or per family to grant license for the use of water.
- Betterment levies on windfall gains resulting from publicly financed irrigation improvements.

Volumetric Pricing

This method is usually the one preferred by economists, since it is the one that offers the best opportunity for obtaining economic efficiency. That is, the rates are assessed at a level that approximates a price determined by supply and demand. Pricing water according to the quantity used makes farmers give strong consideration to the cost of water as a factor in production. This leads to optimal use of that resource. All things being equal, this would also optimize the output from the entire command area.

It is claimed that a major problem with this approach in many developing countries that there is no practical way to measure and police the diversion of water from the distribution system to the farm. This might be an important reason for the widespread use of area pricing.

Area-Based Pricing

This approach involves pricing water per hectare or per feddan irrigated, with minimal control of the amount of water supplied. If any semblance of efficiency and equity is to be achieved, this approach must be considered in light of the delivery system and the ability to control the amount of water diverted to farms in different parts of the command area.

Especially in times of water shortage, there is a need to limit the amount each farmer can obtain. Control in a scheme that uses area-based assessments is usually achieved through arrangements among farmers to alternate in skipping a turn or to cut back on the time allowed opening the ditch. Equity depends upon farmers' discipline in adhering to the control schedules.

There is a tendency in area-based assessments to apply uniform rates to all parts of the command area. However, there are very few, if any, large publicly operated irrigated systems in the world that can deliver water uniformly to all parts of a large command area without incurring a great deal of cost. This creates a dilemma. If the costs are incurred to ensure equal water delivery to distant points, equity suggest that these added costs be assessed on the distant farmers. Whether they would be better off than before the improvements is a moot question. One solution would be to adjust the fees to approximate the services received, but this could add considerably to the complexity and cost of administration.

Administered Water Allocation

This approach depends largely on the enforcement of very tightly administered turn controls to deliver water in accordance with the number of shares held by each of the farm families in the command area. The number of shares is usually associated with the amount of irrigable land held and an annual duty is assessed accordingly. Usually there is no additional charge.

The mechanism is completely neutral with regard to its impact on water use either seasonally or by crop. It is, in effect, a variant of area-based pricing and it emphasizes the need for effective allocation of water across all water availability scenarios. It provides more authority to the irrigation system managers in terms of effecting schedules and rules for distributing water than many countries would find acceptable. The primary check against abuse is to have the managers responsible to a representative body of shareholders or water users who also develop the rules.

Strict regulation of water turns is the key to ensuring equity and efficiency whether water supplies are tight or plentiful. If water is abundant, management could act as if there was no water surplus and, if other beneficial uses or storage were available, efficiency gains would be possible. The water duty is usually assessed on the basis of area.

Betterment Levies

Such levies are a form of taxation often discussed as a mechanism for recovering some of the unearned capital gains that result from public investments. In the case of irrigation improvements, such levies usually have nothing to do with the use of water but they do isolate one of the important beneficiaries, the landowner. Such levies are commonly assessed to recover, for the public, windfall gains in land values that are directly attributable to a public investment, such as an irrigation improvement, a road or some other infrastructure.

Farmer Participation

A broad consensus seems to be developing that in order to obtain long-term commitments by farmers to cost recovery, the farmers must be able to identify continuing tangible benefits. A dependable water supply, accompanied by adequate funding for operation and maintenance, is the key to obtaining such support. There is no doubt that profitable farming is necessary for a successful cost recovery program and a reliable water supply is necessary for profitable farming.

Few irrigation projects are conceived, designed, built, and operated with farmer input into the decision-making process. It is contended that if the views of farmers in developing countries were considered in the design of irrigation improvement projects and cost recovery approaches, these measures would be no less successful than other approaches. A long-term commitment by farmers to cost recovery can only be developed on the basis of their cooperation and voluntary participation in design, construction, and management. Most public water authorities have not made a serious effort or provided incentives to encourage farmers to be full partners.

The absence of farmer participation not only fails to develop in them a sense of responsibility, it can also subject them to abuse by the authorities and by the contractors who are responsible to those authorities. A recent example concerns an irrigation improvement project in Egypt. In the construction of a water by pass, soil was taken from the farmers' fields without their permission and used for construction. In another case, excavated material was piled in a wide band on the field side of the conveyance causing considerable crop damage when it could have been piled on the other side, causing little to no damage. This type of action only tends to strengthen the opinion of some farmers that the government agents and their contractors are inconsiderate, uncaring, and incompetent. It certainly does nothing to establish the trust and confidence between farmers and government that is necessary for a successful cost recovery program.

Farmer participation is thought to be an important factor in developing a willingness to pay for adequate operations and maintenance and even for an equitable share of improvement costs. But willingness quickly fades when farmers develop the perception that the feeds are absorbed by inefficient administration or diverted to other public uses.

The risk of diversion to other public uses is high as long as there is a fiscal requirement that any funds collected automatically belong to the public treasury. To avoid this requires an extension of the notion of farmer participation to include the right to retain

funds collected within the scheme for the purpose of operations and maintenance. It means that associations of water users must be granted the right of contract to handle funds on behalf of the farmers that they represent. It is likely that this would not occur without some fiscal and audit requirements.

Most attempts to recover improvement and adequate operation and maintenance costs have lacked adequate commitment by donor agencies and host countries to the foregoing requirements for success. The typical scenario finds little effective farmer participation, inadequate allocations to operations and maintenance, deterioration of the irrigation infrastructure, loss of productivity, and unwillingness of farmers to pay. For publicly operated irrigation systems, this cycle needs to be broken by establishing a covenant between farmers and public authorities for sharing the management and fiscal responsibilities.

Table 4.29: WUAs' Financial Viability to shoulder Operation and Maintenance Responsibilities in HVIP (1997-2000)

Year	No of land Owners	No of WUA Members *	Revenue Items ($N10^3$)					Percentage of Collection(%)	
			Membership Fee**		Annual Dues***		Total ($N10^3$)	Membership fee	Annual dues
			Expected	Collected	Expected	Collected			
1997	3220	656	6440.0	3658.7	16400.0	8087.8	1175.0	0.57	0.49
1998	3768	867	11305.0	6556.7	21675.0	9875.0	1643.0	0.58	0.46
1999	3768	1019	15072.0	8742.3	25475.0	12116.0	2086.0	0.58	0.48
2000	3768	1169	17898.0	10381.0	29225.0	13818.5	2420.0	0.58	0.47
Total			50715.0	29338.7	92775.0	43897.3	7324.0		
Mean			12678.8	7334.7	23193.8	10974.3	1831.0	0.58	0.47

* Commulative summation of members for all the WUAs existing in each year
** N50.00 is the membership fee for each registered member in all WUAs in HVIP
*** N25.00 is the Annual Dues for each registered member in all WUAs in HVIP