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Benefit monitoring and evaluation of urban water supplies

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SANITATION AND WATER FOR ALL

Benefit monitoring and evaluation of urban water supplies



Mohammad Sajjad and Farooq Khan, Pakistan

IT IS SOMETIMES worth stating the obvious. " Projects which are developed to suit the institutional capacity of the managing organizations stand better chances of sustainability and effective >utilization by its customers." Conversely institutional capacity of organizations require enhancement if they are to manage projects which are unmanageable with their existing setup. Either of these two arguments is to be satisfied for effective and efficient operation and maintenance of systems.

Not understanding the obvious is hallmark of our infrastructure planning, design, implementation and operation and maintenance strategies. Even if it is really understood by our infrastructure planners then why the obvious gets blurred while transforming from paper to reality in a project cycle? In the specific context of the PMU, this study provide some "food for thought" for identifying the reasons for not realizing the obvious.

Background

The study of water supply systems was carried out in three cities of NWFP, namely, Abbottabad, Peshawar and D.I.Khan. These projects were to ease the existing water supply situation for large populations in the urban centers of the Province, as the existing systems were inefficient in meeting the ever-growing demand of expanding population.

Implementation Strategy

The outside consultants were to design the systems and act as top supervision agency as well. The "important" responsibility of implementation was assumed by the MPU itself while administrative decision was made to hand-over the systems, once they are built, to the respective Municipal Committees. The modalities of the MCs-PMU-Consultanst cooperation and division of responsibilities were never clearly spelled out, which, as we shall later see, had the most >important implications towards non-optimum system utilization.

Planning Strategy

It was proposed that, to achieve the objective of sustainability, PMU would adopt mechanisms to involve the beneficiaries as fully as possible in the project cycle i.e. from planning, design and implementation to maintenance of the facilities. In order to achieve this, the Community Liaison Unit (CLU) was established within the framework of PMU. The anticipated benefits of this strategy have been reproduced from the project documents in the box below.

1. Better designed programs which are responsive to the community perceived needs and which utilize community knowledge.
2. Better maintained infrastructure due to community participation and interest and sense of ownership.
3. Greater impact on environmental health as a result of accompanying improvements in health practices and improved facilities.
4. More cost effective programs due to the mobilization of human and financial and capital resources in the community and creation of household and community self-reliance.

Source: Project PC-1

The WSS Abbotabad

The WS system in Abbottabad covers most parts of the city such as Khola Khiyal, Malik Pura, Kunj, Diggi Mohalla and Karim Pura areas. These areas were previously been supplied through a gravity flow system, later on taken over by Military for its own exclusive use. There were very few tubewells, which were located in only known Stoney Jheel aquifer. At the time of project planning most of the city was supplied for less than half-hour. The reason lied not only in low source potential but lack of storage capacity, electricity outages and frequent damage to the sole transmission line were also the major contributing reasons. An economically viable and cost effective alternative was rightly singled out to be the gravity flow system from the nearby Beran Gali river or Dor river. The lack of financial resources made the planners look for other alternatives in tubewells based system. As is sometimes the case, the short sightedness of decision makers prevailed and a system having low capital cost but exceptionally high life cycle costs was opted against a the gravity flow system which involved high capital cost but low life cycle cost. This was not the end of the story. As we shall see later, a bad decision was implemented with even mediocre planning and without any attention paid as to who will be responsible for various roles during the project cycle.

The present water supply system consists of some 6 tubewells situated mainly in the two well fields, two larger and many smaller storage reservoirs, two transmission lines from the two well fields of Narian and Stoney Jheel and an extensive distribution system.

There are however many discrepancies in the system. The long AC transmission line from Stoney Jheel well field is subjected to high water levels and vibrations along the Karakorum Highway which are causes of its frequent bursting. The Narian transmission line was provided with a temporary unsupported river crossing while a permanent crossing was promised to be in the offing but the plan never materialized. The high floods last summers washed the crossing and is a permanent hazard. Moreover, both the well fields, being the only known in Abbottabad, are already cluttered with tubewells dug by various agencies without any attention to excessive draw down which might result in ruin the built up assets.

Currently, the system has almost no positive impact on the residents of the project area. Despite a very high WTP for improved services, they are receiving a less than 30 minutes of supply and in some areas as low as for ten minutes or even less. Why then the system is not delivering after so much of investment and long years of labor? might be the question every one is troubled with. Answer to this is simple yet very painful.

As mentioned earlier there was no clarity on division of responsibilities between various agencies. The PMU provided every thing from tubwells to reservoirs to transmission lines to an extensive distribution system. What is missing, however, now is that there are no house connections made to the thousands of suffering consumers from the new system. The MC simply does not have the capacity, in terms of manpower and funds, to award such a large number of connections. Nor does this come under the PMU scope of work. The "obvious" that who will award the connections, some how evaded the planners for nearly a decade and it finally dawned on all and sundry that this was important too for consideration.

The dispute is lingering on for more than last one year now with no apparent signs of an amicable solution, resulting in an end to the deprivation of benefits of the citizens from the huge investment made out from the national exchequer.

The WSSwalled city Peshawar

The WS project in Peshawar was to improve and augment the existing system in the walled area of Peshawar, falling roughly into five different zones. The constituting areas are Gulbahar, Shahadand, Sheikh Abad, Akhundabad, Phundu road, Afridi Abad, Tauheed Abad, Shaheen Muslim Town, Rashid Garhi, Wazir Bagh, Muslim Abad, Islamabad Colony, Anwar Asad Colony, Nazir Abad, Haider Colony, Zaragar Abad, Kakshal, Murshid Abad and Kohat Road.

At the time of inception of the project, existing water supply system in Peshawar was deficient, as the production was 112500 m3/day short of maximum daily demand of 243,000 m3/d (53.5 mgd). Based on the experiences with the existing tubewells and available data on the nature of the aquifer underlying Peshawar, it was proposed by the consultants that the deficiency be made up by sinking twenty five additional tubewells and constructing 11 over-head reservoirs, accompanied by distribution system, in and around the Peshawar city of which 6 falls in the Project area. However this total number was later on increased to 25 but the number of tubewells in the project area remained the same.

The specific actions proposed by the consultants to improve the efficiency of the existing system and to invest more in this sector were:

- Construction of 6 number Tubewells, two each in Wazir Bagh, Gulbahar and Akhundabad areas.
- Construction of 2 x 50,000 and 1x 100,000 gallons capacity reservoirs.
- Laying of distribution network.

Both the tubewells of Wazir Bagh and one in Akhundabad area have been handedover to the Peshawar MC(PMC). The tubewell at Afridi abad (which comes under Akhund Abad) is still not operational although handed over to the PMC. Construction work at both the tubewells at Gulbahar has also recently been completed. The over-head reservoir of 100,000 gallon capacity at Wazir Bagh is nearly completion and will be handed over to PMC shortly. PMC has been requested to takeover the 50,000 gallon capacity reservoir at Gulbahar while the other over-head reservoir of same storage capacity at Kohat Road is under construction.

The distribution network of Gulbahar, Shahadand, Sheikh Abad, Akhundabad, Phundu road, Afridi Abad, Tauheed Abad, Shaheen Muslim Town has been handed over to PMC while the distribution network of Rashid Garhi, Wazir Bagh, Muslim Abad, Kohat Road were not been taken over by PMC till the submission of this paper. The tubewell at Wazir Bagh has temporarily been connected to the surface laid distribution system for Zargar Abad area, because of long lag time between tubewell completion and laying of new distribution system, due to land acquisition problem, severe water problems were faced by the community.

The MC in Peshawar, the largest and most resourceful of all the MCs, is facing serious problems with operation and maintenance of the water supply schemes. For example the actual operation and maintenance cost incurred by PMC per house connection per month is far greater than the actual revenue from each house connection per month. The big gap between expenditures and revenues is apparently bridged by cross subsidies from within PMC or other subsidies from GoNWFP. Other effectiveness and efficiency indicators for MC are not admirable as well. It has very high ratio of "staff per thousand connections", excessively high" unaccounted for water" figures, large number of water quality and breakdown complaints and a very long response time in emergencies or breakdown which is indicative of state of its management and institutional capacity.

The MC management and was not properly involved in the project planning, design and implementation stage. It is why that they have not taken over the possession of some of the infrastructure under WS-03 contract and are not going to take it over until it is handed over to them in working condition. They recount with bitterness that PMU damaged the roads and streets during the lying of pipes and this has to be repaired by PMC from their own budget

WSS D.I.Khan

The proposed system in D.I.Khan composed of five tubewells, a transmission line, two elevated reservoirs of 50000 gallons capacity each and a distribution system for Basti Ustrana, one of the threeproject settlements. Two out of three tubewells were located along the river Indus, the only sweet water zone in the city, while the rest of the two were located at an offset of some hundred meters from the river bank.

The system in D.I.Khan city is also not yet made operational. Except the reservoirs, the rest of the infrastructure has been handed over to the M.C under the "administrative" orders issued to M.C. Neither M.C nor PMU had any interim arrangement to fully utilize the newly installed tubewells till the time of completion of the reservoirs, which required only minor modification in the distribution system.

Some localities in the project area were planned to be provided with a distribution system while nothing was in fact provided on the ground.

Due to severe and humid summers in the area, scarcity of potable water becomes even harsher suffering for the community. Extensive utilization of hand pumps, pumping water from a very shallow ground water table, and dug wells is very common. So is the case with water borne diseases that are taken for granted and considered as an unavoidable associated evil with water.

Urban water supply systems

Commonality of problems and shortcomings

Although the urban centers, which were focus of this study, were geographically diverse but the WS systems had some commonality of shortcomings, mentioned below:

Planning, Design and Implementation

Site specific shortcomings have been elaborated in the description of individual WS projects. However, some other shortcoming, which were common to all sites have further been explained below:

Lack of pertinent information

Pertinent information such as strata chart, a distribution layout, a seasonal pumping schedule etc was missing at most sites. Moreover reports like D&T, Bearing capacity, Disinfection and Pressure & Leak Testing were also not available with either the PMU, MCs or consultants.

Integrity of Source

The tubewells in most instances were located in such areas which were least suitable for the purpose, i.e. sites were populated, encompassing in its probable "well head protection zone" large low lying built up area or a graveyard. Additionally it was observed that there was:

- No proper drainage around and in the immediate vicinity of the tube well;
- Gland Packing were slightly leaked;
- Out of order ampere meter at the panel board or the electrical installations posed a safety hazard;
- There were no, or, below specification pressure and flow meters.

Surface laid mains and distribution system

Invariably in all the WSS, the distribution systems were found to be surface laid G.I pipes, criss-crossing the drainage ditches and a source of constant pollution and diseases. Many of these were badly repaired (in many instances pipes were welded altogether) by the community on self initiative when MCs staff could not respond in time to repair those leaks/bursts caused due mainly to the very reason of being surface laid.

Neither the terrain in many instances nor any other compulsion made it essential to provide the GI pipes on the ground level. Moreover at numerous places, the system could have been looped, to avoid lots of dead ends and facilitate efficient circulation and distribution of water.

In almost all the cases, people complained about the aftermath of the pipe installation. The dilapidated streets and roads were excavated by the PMU for laying of pipes and the contractor usually would leave sites without proper backfilling which caused problems for the pedestrians and the traffic.

Land acquisition problem

In many instances the site once selected by the PMU on the basis of MC's identification could not be possessed at the earliest to avoid price escalation and later prolonged litigation and delays.

Community participation and awareness

To judge the degree, to which the local communities were involved in the various project stages, a sizeable number of respondents were specifically asked a list of questions in various project areas. To conclude with, the public consultation efforts were apparently very limited to non-existent and no one remembered any one from CLU meeting them. However, given a very small sample size, non inclusion of female respondents in the interviews and some other factors which might have affected there response, no concrete con-

clusion can be drawn in this regard. Still however, it was apparent that objectives and expected benefits of the projects, as enumerated in Box #1, has so far not been achieved.

Evidence of lack of community participation was ominous in running taps, numerous illegal connections and provision of uniform level of WS service. The illegally taken stand posts did indicate that at planning and design stage, a consideration of better mix of service level based on an inquiry into the consumers requirement, affordability and willingness to pay was not made. This would have resulted in sustainable and effectively utilized systems, living upto the expectations of the consumers. A gross generalization of the consumers into two categories (poor and middle income)has not hold truth and a bottom or marginal group of consumers had to be considered as a third category.

Institutional capacity of M.Cs

MCs were least prepared to take over and manage such a vast inventory of additional WS assets. Currently, they are facing a multitude of problems, as mentioned below:

Water quality monitoring

No regular water quality monitoring is being practiced by MCs at present to check the integrity of the source and distribution system. Given the presence of many polluting hazards, at all the sites visited by the team, such as location of tube wells in graveyards, refuse dumps, poor drainage in the probable well head protection zone and crossing of mains through drains, there are strong chance of water pollution. Considering the fragility of the water system and to ward off any danger of large-scale water pollution specially during summers are very real.

There is no system in place for a regular Sanitary Inspection by staff of MCs which could assure the apparent integrity of the system by pin pointing the apparent hazards such as dherans around tube well site or pipe running through the drains or leaked and badly repaired mains.

Record keeping

Very few tubewell operators kept the record of operations, such as meter reading and timing of the pumping hours. No record of discharge was available either at any of sites. Moreover no pump station were provided with a register for keeping records about each components such as tube well, distribution system and over-head reservoir. The record book could contain information regarding Preventive maintenance activities undertaken by the operator, in addition to the repairs made, their nature, shut down time and reasons. Such a system would have made it possible for the MCs to rectify some recurrent problems and breakdowns in the system resulting in increased consumer satisfaction and low O&M costs to MCs.

Training of the pump operators

At some tubewell sites, the operational staff was found to be lacking the proper understanding of various pump operations. They were also not properly aware of the utility and readings of the volt meter and ampere meter. It is also relevant to note there is no formal training system at any of MCs.

Lack of maintenance culture

MCs maintenance and repair staff responds only to emergency situations. The concept of preventive maintenance is almost non-existent due to shortage of funds etc.

WAPDA bills

Another common observance was out of order or malfunc

tioning WAPDA energy meters at some sites. The meter reading by WAPDA personnel is rarely made and bills are charged to MCs on arbitrary basis. An internal arrangement of avoiding the excessive bills could have been the joint signing of meter reading cards by the Operator and meter reader.

Flat rate billing

Currently water supply customers are charged at a flat rate. Collection is thus both difficult and unjust. A block pricing system or pricing based on plot size could be a more rational approach. The second options could more easily be developed, as relevant data is already available with MCs. At those locations where the revenue collection has been contracted to private contractors, the same shall be made mandatory to be followed for the reasons of social justice.

MCs at Peshawar and D.I.Khan have contracted out their revenue collection to private contractors. However this is not enough and other areas of MCs business needs to be opened to Private Sector (PS). By contracting out the revenues, MCs has both made a loss in profit and savings in losses.

Way forward

The way out and forward for the existing as well as new projects lies either in Institution Capacity building of MCs or to opt for private sector participation (PSP). The recent experience with the first option has been variable, however, the second option is hotly pursued in many countries, both developed (UK and France) and developing (Chile, Mexico) (Franceys. R, 1998). Private Sector Participation is not a panacea to overcome the problem of inappropriate technology demanding unsustainable institutional support for which consumers are not expected to pay. However, with a system of cross subsidies in which the poor, availing only life line water supplies, are charged lowest while the rich, availing larger amounts of WS well above the life line supplies for convenience purposes would be charged on full cost recovery basis. To ensure smooth and justifiable operations, keeping in view the monopolistic nature of water supplies, presence of a regulatory authority would

also be essential to look after PS operations. Various types of possible PSP, employed around the world by WS sector are:

- contracting out, services contract;
- management contracts;
- lease/affermage
- concessions;
- BOT/BOOT;
- Divestiture; and
- Multi mode PSPs. (Franceys. R, 1997)

The big challenge in urban environmental health has always been to operate effectively at all levels in the Province. Each of the players needs to learn how best to work with others This shall be true for Engineers at MCs, Private sector, Communities and householders.

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MOHAMMAD SAJJAD, Lecturer, Institute of Environmental Science and Engineering. NUST, Rawalpindi.
FAROOQ KHAN, OPCV-CIP, Peshawar.