An integrated approach for operational excellence in water supply schemes

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Introduction

With the partial completion of augmentation of the Anuradhapura Group Water Supply Scheme in the year 2004 to cater to the Anuradhapura city and its immediate suburbs, it has been required to plan the management of water supply schemes to avoid repetition of service deterioration experienced in the past by the consumers in Anuradhapura.

A study was carried out on state of affairs on the successes and failures in management of 10 major and medium water schemes in operation for last 10 years in Sri Lanka. The study reveals that absence of a system approach in management focusing on sustaining a quality service to the customer since the commissioning of the scheme is the main cause for the scheme deterioration, resulting in poor quality and inefficient water service.

Interviewing of customers and operational staff of these water schemes reveals that despite many government and donor interventions the efficiency and quality of water service has gone down remarkably since the commissioning, where:

- 50% of schemes served less than 10 hrs. per day.
- In two schemes the consumers use water for all purposes other than drinking, while in the balance the quality is not acceptable.
- In 90% of the schemes the expenditure is more than the revenue.
- In all schemes plants and equipments need overhaul very badly.

The sad part of the story is the continuous repetition of the same situation as a vicious cycle in many water schemes completed during the last two decades with enormous investments. The analysis of the study results reveals the following as the main root causes for the system failure.

a) The service areas of the water schemes had been extended on ad hoc basis without confining to the originally planned geographical area.

b) Absence of required skilled human resources particularly as a result of generation mismatch with the technology advancement.

c) Poor technology transfer to the medium & low level employees.

d) Absence of allocation of funds in the operation & Maintenance required for scientific Asset Management.

f) Fast deterioration of Raw water quality and quantity over many years from the original levels due to changes in the environment.

g) Decreased Customer participation, where their role has been confined to just crying for water or criticizing the system only.

A new management plan for AGWTSSP

The management plan for AGWTSSP was prepared to address the above root causes, diagnosed in the study, focusing on delivery of the best value for money for the customer in terms of level of service from a longer term perspective.

Human resource management plan

Accordingly, the human resources strategy which is the most vital component was planned to optimize the number
of persons deployed and maximize their level of competence and skillfulness.

The total manpower requirement of the AGTWSSP on both quantity & quality terms was assessed on Zero based approach on work study principle to match with the technologies used on the water supply system. Accordingly new recruitments were made for skilled grades with the increase of skilled percentage and even creating a new generation operator technician position to match with the modern technology used in the water treatment plant.

The strategy adopted consisted outsourcing almost all the unskilled labour which is identified as a good solution to the fast aging problem of the workforce, leading to non productivity with time. Also all the non core functions and quantifiable functions were outsourced giving the opportunity for the middle level management to focus their attention on more technical matters related to operation of the water scheme. Based on the experience gained during the first year outsourcing contracts were reviewed and modified to improve their output performance. The outsourcing was done on the main policy that there will be no redundancy of the existing workforce. However this was received with mixed reactions by the workforce even at middle level management which took time to realize and work in a partnership culture.

The other important achievement is introducing multi-skilling approach within the entire workforce which was successful for new recruits, while the present cadres met it with mixed reactions. However studies carried out later shows that level of satisfaction for the employee is much more with multi-skilling where the employees are mainly accountable to the customers on the physical outputs while the supervisory management role is mainly concentrated on managing the financial and technical aspects.

The most challenging task had been effective technology transfer to the lowest level. An extensive on the job training programme was planned and implemented as an immediate measure. Standard Operating Procedure Manuals (SOP) were developed for each water scheme in native language in more simplified version with cartoon type illustrations. Class Room training also was held for all the field staff with the objective of improving their theoretical knowledge under the theme ‘Knowledge Workers for the Knowledge Society’. Refresher training programmes had been planned to be conducted and followed-up, as a part of annual Training plan.

Assets management plan
The objective of the assets management plan is to maintain equipment and other structures throughout the economic life period maximizing their useful life with the principle of ensuring zero interruption of the water service to the customer. This plan consists following activities.

- Planned preventative maintenance of all Mechanical & Electrical equipments and civil structures, is carried out to ensure cost effective operation and monitored for quality and timely completion
- Corrective maintenance also arranged with minimum lag periods after each break down.
- Special attention had been paid to increase the standby arrangements with the degree of technical complexity and the probable lag period for completing the repair.
- The maintenance of all specialized equipments such as chlorinators, Generators were outsourced to their local agents and monitored through annual performance contracts.
- Assessment of the Performance and condition of assets at regular intervals and identifying investments required either for replacement or refurbishments.
- Collection of reliable, adequate and up to date data on above which are recorded and processed for future planning and proper execution of maintenance of assets.

Water loss and leakage control plan
The objective of the water loss and leakage control programme is to reduce the percentage of non revenue water to 20% by the year 2011, from the present level of 32%. Under this plan, the following activities had been identified as priority activities for implementation.

- Water main replacement has been implemented as a priority & is nearing completion, programmes are underway to commence replacement of existing AC pipe lines under NRW reduction fund of the NWSDB.
- Arresting leakages from Reservoirs had been identified as a priority activity and will be solved after introducing the level signal system.
- Zonal metering has been implemented under the AGTWSSP. Regular checking of Bulk meters has commenced concentrating basically on accuracy. Similarly special emphasis is paid to maintaining the accuracy of meters at customer premises, with fast replacement of defective meters with maximum of 02months lag period.
- The time lag between reporting on pipe bursts and arresting the leakage is the main critical factor that determines the extent of water loss due to pipe bursts. In this respect public co-operation on reporting leakages is essential as such to facilitate public reporting of leaks complaint desk and 16 hour on-call service is maintained with publicity for easy contact numbers.
- An intensive Leakage Detection Programme was launched under the phase I of which a passive leakage control programme is carried out. All the water mains above 100 mm diameter, and transmission mains up to 600 mm diameter were inspected at least twice a year for visual leakages as a regular programme and repaired subsequently.
- With the purchase of leak detection equipment under the phase II of the programme a more intensive leak detection and repair programme will be commenced.
- An intensive programme to detect illegal tapping by carrying out a house to house survey once a year is launched to identify present water use patterns and potential thefts.
Demand management and water conservation plan
The objective of the demand and water conservation plan is to reduce the per capital water consumption of the water supply system to 100 lpcd by the year 2011. The following activities are under implementation under the above plan:
- Carrying out awareness on school children through school programmes.
- Awareness of school children and General public through special programmes conducted by a Resource center dedicated to Demand Management & Water Conservation with physical exposure to different products on water conservation technologies.
- Awareness and promotion of Rain water harvesting Technologies particularly the “Zero run off” concept at house hold level.
- Planned activities to recirculate effluents from both treatment plants in Thuruwila and Nuwara Wewa.

Environmental management plan
The objective of the environmental management plan is to identify the catchment characteristics of the four water sources, namely Nuwara Wewa Thuruwila, Malwathuoya, and Tissa Wewa. Accordingly risk factors in the catchment had been identified and mitigatory measures are planned in order to conserve and improve the environment of the catchment, through the active involvement of the Community Based Organizations who has organized themselves as strong pressure groups to protect the environment and look after the interests of customers. This approach had been very successful where many government and non government organizations are supporting and carrying forward the environmental management plan.

Water quality management plan
The purpose of water quality management plan is to ensure planned output water quality on longterm perspective from the three treatment plants by:
- Carrying out Water Quality Surveillance in the catchment.
- Identifying risk factors in relation to raw water quality and taking mitigatory measures under the Environmental Management Plan.
- Monitoring, raw water quality to observe the catchment changes.
- Monitoring the output water quality
- Optimising the chemical use with stringent Process Management
- Monitoring the quality on the distribution to avoid any post pollution.

Safety and security plan
Safety and Security concerns had been addressed under this programme and following activities had been identified.
- Implementation of safety drills for the employees
- Introducing modifications of the layouts of all the key premises as a outcome of safety and security audit
- Awareness of employees on safety and security measures.
- Increased coordination arrangements with the security establishments.

Finance management plan
The financial management plan focuses to improve the financial health of the water supply scheme to become financially self reliance on a longer term perspective complemented by other management plans while maximizing short term performance ratios on each of following activities:
- Reduction of the operation costs through optimizing deployment of personnel.
- Optimizing use of chemical with stringent supervision.
- Carrying out energy conservation.
- Optimize the Stock levels with improved procure ment efficiency
- Improving of the billing and collection by increasing the supply level
- Reduce the lag time on collection against billing to one month.

Customer management plan
The sole objective of the customer management plan is to ensure a satisfied customer on longer term perspective supported by all other plans mentioned above. The activities are:
- A customer charter which has being developed and to be published to be effective for the AGTWSS defining service standards due to the customers and their obligations to maintain the service level
- Establishment of a customer care unit to improve the present level of customer handling.
- Carrying out Periodic customer surveys on level of satisfaction and suggestions for improvements.
- Empowerment of the customers in the management of the WSS through their participations in a Management Board for the WSS.

The preperience in AGTWSS shows that and phased out implementation of a Management Model through a intergraded planning approach with active participation of all the stake holders had enabled achieving excellence in operational performance. Sustaining the success of the plan is completely dependent on the commitment of the stake holders for making continues. Improvement of the system to avoid repetition of system deterioration a common fate of many water schemes.

References
NWSDB (2006–April) MIS report.