CHAPTER 7
EVALUATION OF THE MASTER PLAN AND RECOMMENDATIONS

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7.1 Evaluation of the Master Plan

7.1.1 Technical Aspect

The most significant problems of the Vientiane water supply were identified, and to solve these problems, the Master Plan was prepared. The most significant problems are,

(1) Production capacity is not enough to meet current and future water demands,
(2) Deterioration of the existing Kaolieo Treatment Plant, and
(3) Unstable water transmission and distribution systems from the existing Chinaimo Treatment Plant because of a mixture of the transmission and distribution systems

Expansion of the existing Kaolieo Treatment Plant with an additional capacity of 40,000 m3/day in the 1st Stage, and construction of the new Thangone Treatment Plant with a capacity of 60,000 m3/day in the 2nd Stage, were planned as a result of a comparative study of alternatives. The plan is for increasing the production capacity to meet the projected water demand in 2015, which is the target year of the Master Plan.

For the deteriorated Kaolieo Treatment Plant, rehabilitation work is recommended to restore the plant to maximum efficiency. Separation of the transmission and distribution systems will be implemented by constructing additional distribution reservoir capacity, construction of a new pump station, and the installation of a transmission pipeline at the Chinaimo Treatment Plant.

To implement these projects, special construction methods or technologies will not be required. Advanced skills or technologies also will not be required for the operation and maintenance of the expanded WTP's, and staff assigned for the operation and maintenance for the new facilities can exploit their accumulated experience learned from their routine work at the existing system.

7.1.2 Socio-economic Impacts

According to the economic evaluation, the economic internal rate of return (EIRR) of the project proposed was 12.8%, taking into consideration the economic growth in the service areas in the future. This means the project is viable from the economic point of view because the EIRR exceeds the opportunity costs of capital (12%). Thus, the project should be implemented as soon as possible.

In the financial analysis, the production cost of potable water was estimated at around five times the present average production costs, in the case that the financial sources are procured in the same manner as were used in the Chinaimo expansion project. Even if the financial sources for capital investment are procured with no financial costs, the production cost of water would be almost three times of the present average production cost. Thus, revision of the water tariff will be inevitable after the project is implemented, taking the policy of full cost recovery into consideration. Fortunately, the water consumers understand the need for reasonable costs for the improved quality water for potable use. The NPVC procures the financial sources with cheaper financial cost. At the same time, the NPVC makes its water tariff less expensive for water consumers through a mutual understanding between the consumers and the NPVC.

Financial simulations indicate that the waterworks management faces a cash flow deficit during the construction period. Just after the inauguration of the water supply system, however, the waterworks will obtain sufficient revenue, so the net income turns profitable in the first year, as shown in the table. This is because there are enough water consumers already living in the water service areas which will help the expansion of the network to become viable. Once the waterworks expand their system, water demand will increase immediately. This situation is favourable for the waterworks' management.

The commencement of the project will stimulate the regional economy in Vientiane Capital City. It will directly affect the sectors related to construction works as well as the construction sector itself. At the same time, it creates opportunities for temporary jobs during the construction period. Thus, the project will have a great impact on the Vientiane community. However, the project is a huge capital investment to implement. In this context, the project could not proceed without the support of government finance. The project is a major influence for the public finance sector, although the project is managed as an independent autonomous entity. For the implementation of this proposed project, there would be no other way that the capital cost could be raised without foreign financial assistance.

In Prime Ministerial Decision (37/PM), the domestic water charge for low-income people should be set at a maximum of 3% of household income, in section 4.6 in article 4 of the Prime Ministerial decision. In the case that a water supply company sets a higher water rate in its service areas, the charge of domestic water should be not more than 5% of household income taking into consideration the internal subsidisation among categories in the areas. In the World Bank Report of "Investing in Development, 1985", it's suggested that the price of a minimum block of water is commonly set at 3

to 5 % of household income which is deemed to be an affordable expense. As discussed in the financial analysis, the lowest rate of 3.9% seems to be within the block, because it is located at a medium position in the block. The new tariff might appear to be expensive for the present domestic consumers in the water supply service areas. In this situation, it would be impossible to introduce these increased rates to water rates immediately. The NPVC strives to attain these objectives based on the mutual understanding between water consumers and NPVC.

A new water consumer has to pay an average of US$ 105 for connection installations at the time of application, although the installation charge for a domestic consumer is smaller than the average cost. In particular, the connection charge seems to be a serious issue for a new water customer who is a low-income earner. Thus, it would be recommended that a system of lending and/or subsiding new connection fees is established with some regulations, such as a loan program in accordance with household incomes. The introduction of such a system could make lower-income families access the water supply system more easily than at present.

7.1.3 Environmental Impacts

The possible effects of the project on the environment are confirmed as a result of an initial environmental examination through the screening and scooping, in accordance with the checklist provided by the JICA, as described in Chapter 6. The necessity of the Environmental Impact Assessment (EIA) is confirmed in the screening, and precise items to be addressed in the EIA are also determined in the scooping.

While the EIA report will be prepared in the F/S stage of this study, the Initial Environmental Examination is conducted in the preparation of the Master Plan for a preliminary examination of the environmental impacts by the proposed project, including the preparation of the TOR for the EIA.

The key environmental issues and terms to be addressed in the EIA are:

(1) Transportation & Infrastructure

Issue: Construction of treatment plant and installation of main pipes will cause increased traffic congestion, but the impact will be temporary.

Further Study: Selection of the pipe route and / or alignment and construction method will reduce this impact.

(2) Sanitary

Issue: Water supply conditions will be improved, however, an increase of discharge water from the water supply will deteriorate the drainage system.

Further Study: To prevent this impact, further study will be required.

(3) River

Issue: Raw water intake structures at Kaolieo will be constructed on the Mekong River. Raw water intake structures in the river may change the stream and cause erosion to banks or revetments

Further Study: Building an intake structure which is less erosive, and providing protection against erosion to the bank.

(4) Noise & Vibration

Issue: Noise and vibration will be generated from construction equipment during the construction and operation of pumps and other equipment in the WTP.

Further Study: Employing heavy equipment and construction methods which generate less noise and vibration. In operation, the selection of equipment, location and structure for the equipment will be considered during the design of the WTP and pumping facilities.

As s result of the IEE, it could be concluded that the proposed project will cause some negative impact to the environment. However, the magnitude of the impact will not be large and the impact will be mitigated by applying appropriate construction methods, modifying the use of equipment, and the correct design and layout of the facilities.

7.2 Recommendations

7.2.1 Institutional, Organisational, and Legislative Aspects

(1) Expansion of the autonomous status of General Manager

According to the 'Regulation of Enterprise' (1999), the operation and management of water supplies are run based on commercial principles. The O&M of the systems are required to achieve the targeted performance indicators (PI). As a top management of water enterprise, the General Manager is responsible for achieving the targeted performances. To achieve the targeted performances the

GM requires a certain amount of autonomous status. The amount of autonomy should be as broad as possible.

The Administrative council (AC) allows the GM to design basic policy and decide the direction of the company. It seems preferable to have a concrete method which realises the judgments and deeds of the GM. When the AC carefully supervises top management in detail, who will take the final responsibility for the decisions that are made? In general, employees who carefully follow the direction of their superiors do not have the ultimate responsibility in the decision making process. It is natural that only the AC should intervene in the daily business of the GM who should be allowed to work without other external distractions.

(2) To consider positively an introduction of Public Private Partnership in water utility

When we consider various forms of public private partnership (PPP), some French models are persuasive from a view point of a situation where the established company is maintained by the public sector. It is useful that a public water utility may utilize the private sector's funding, management know-how, technological abilities, and their efficiency and creativeness of management strategies. According to the Prime Ministerial Decision 1999, ensuring open and effective competition is favourable. It has been suggested that if a PPP is adopted, the level of water service will decrease, investment will be reduced and, as a result, the interests of community will not be protected because the private sector is eager to chase profits. However, it should be remembered that the water utility is defined as a public utility, like electricity, gas and railroads etc., and is subject to strong public regulation.

Even if economic deregulations are executed as much as possible, social deregulations are required to strengthen, because the social regulations are closely related to the safety of human lives and public health of society. It is a global trend that water tariffs, water quality standards and water service levels must be strictly monitored and controlled to maintain and protect the consumer's interests. When we consider the future management of the water utility, the introduction of a PPP must be taken into consideration as a favourable alternative.

(3) To consider the roles of Drinking Water Factory from a view point of water supply mission

To secure a safe and potable water supply at an affordable price to the inhabitants of the community is the mission of the water utility. The survey indicates that the most of customers have complaints relating to water quality. Water quality is considered enough when it meets the minimum guidelines

of the WHO. It does not seem necessary to produce special quality bottled water with names like Crystal, when the price is taken into account.

7.2.2 Technical Aspect

(1) Coordination with AFD Study

Unfortunately, because the procurement procedures of the AFD consultants to execute the study on the distribution system and household connections were delayed, the JICA study team could not exchange information with the AFD consultants during Phase I and II. As described in the previous chapter, the priority projects selected by the JICA Study Team do not include the distribution facilities. However, this Master Plan is prepared as an entire system plan, which includes the distribution system. Although priority projects for the distribution system will be selected by the AFD consultants, it is recommended that the NPVC explain the results of the JICA Master Plan to the AFD consultants. It is also recommended that the AFD consultants prepare future plans conforming to the JICA Master Plan.

Although no priority projects for the distribution system were selected in the study, the minimum requirements of the distribution pipelines were identified to distribute water from the expanded Kaolieo WTP in this report. The JICA Study Team discussed with JICA about possibility of the inclusion of the minimum distribution pipelines into the forthcoming feasibility study, and finally the minimum requirements of the distribution pipelines were judged to be included in the priority projects.

(2) Reduction of UFW

Water supply conditions will be improved by the implementation of projects which are planned under the master plan. Increased pressure in the distribution system will secure a stable and continuous supply to the whole service area. Therefore, as a side effect, water leakage will increase after completion of the 1st Stage project. It is strongly recommended that the NPVC concentrate fully on leakage detection for visible leakages upon completion of the 1st Stage Project. In the current situation, many underground leakages are not found because of low supply pressure. Upon improvement of water supply pressure, these underground invisible leakages will become above ground, visible leakages. This will be a chance to find and repair current underground leakage. If the leakage repairing work is not implemented by the NPVC, the ratio of UFW will increase rapidly from the pressure increase in the system. Action should be taken, as described in the previous

Section 4.6. To implement these necessary actions, it is recommended to do a budgetary arrangement and staff assignment for the leakage repairing work.

At the completion of the 1st Stage project in 2007, the total production capacity of the system will be 140,000 m3/day, the same as the daily maximum water demand in 2007. This means that from the time of the 1st Stage completion, production capacity is less than the water demand until 2012 when the 2nd Stage project will be completed. Reduction of UFW and water conservation promotion, which is discussed below, will be a key factor for the alleviation of water shortages up to 2012.

For the reduction of UFW, the JICA will carry out project type cooperation for capacity building. As part of the cooperation, a Japanese expert in UFW reduction will be assigned and will be great help for the future NPVC UFW reduction activities.

(3) Monitoring water quality and quantity

Quality of the NPVC services should be monitored by itself in aspects of quality and quantity. The sound operation of the water supply system will be achieved by feeding back actual situations of the NPVC services. To understand the actual situation, the monitoring of its service is invaluable. Water quantity production, transmission, and distribution from the respective treatment plants should be always measured and recorded. These quantity data are the basis of the evaluation of UFW conditions and the financial situation of the NPVC.

Water quality should be analyzed at the respective treatment plants to decide adequate chemical dosage rates and to supply safe water to customers. Water quality monitoring is recommended not only at the treatment plant but also at service connections periodically selected within the service area.

(4) Promotion of water conservation

The capacity of water production against future water demand will not be sufficient even with the completion of the 1st Stage project, as mentioned above. It is recommended to promote water conservation to relief severe water shortages. The promotion of water conservation should be implemented from the various aspects such as public relation activities for reduction of wastage, or tariff increases may also reduce water consumption.

Future per capita water consumption in this master plan was planned to reduce to 170 lpcd in 2010, from the current level of 174 lpcd, since the current per capita water consumption level is rather higher than other south east Asian countries', and more than 20 % of households have in-house

leakages. It is recommended that the NPVC promote water conservation to reduce the per capita water consumption as outlined in this master plan.

For non-domestic water demand, wastage should also be reduced by the NPVC. About 20 % of the total water consumption is consumed by public institutions/offices and military facilities. Water conservation in these categories will be a key to reducing water consumption.

(5) Recruiting and training of additional staff

Additional staff for the expanded Kaolieo Treatment Plant, the new Thangone Treatment Plant, and the expanded pipeline system will be required. It is recommended to start arrangements for recruiting additional staff and provide training for them. The detailed training program will be presented in the following feasibility study.

(6) Feasibility Study and Review of the Master Plan will be required

Upon completion of the 1st Stage, a feasibility study will be required for the 2nd Stage for its implementation. At the same time, a review of the Master Plan will also be required. The master plan is the long term plan, and the Vientiane water supply situation will change because of unforeseen factors. Therefore, the master plan should be reviewed at every turning point during the progress of the water supply development.

The scale of the 2nd Stage is rather large for international institutions or the Lao PDR's own funding even though the economic and financial viability is confirmed, as described in the previous chapter. Therefore, in order to adapt the 2nd Stage Project to an appropriate capital investment scale, efforts in water conservation and the reduction of UFW are indispensable by the NPVC. After completion of the 1st Stage Project, a feasibility study will be required to implement the 2nd Stage. During the feasibility study for the 2nd Sage, the scale of the 2nd Stage will be reviewed. If the situation is that the maximum water demand is reduced by the promotion of water conservation, and the reduction of UFW is greater than estimated by the study, implementation of the 2nd Stage will be able to be divided into two phases, a production increase of 30,000 m3/day in two phases, or to reduce the planned increase to 50,000 m3/day from 60,000 m3/day. Such modification of scale in the 2nd Stage will reduce the financial impacts to the NPVC. These options for the scale of the 2nd Stage should be reviewed during the feasibility study for the 2nd Stage.

7.2.3 Managerial Aspect

(1) Maintenance of good customer relations

Building and maintenance of good customer relations is vital for the water utility. Relations between a water utility and its customers are not simply that of a provider (seller) and buyers in a market. Transactions – the selling and buying of a product in a market, is conducted by the balance of price and quality. For the customer, if the price is high and quality is low, he will not buy the goods or services. In that case, a customer looks for a better deal and tries other alternatives. However, the customers of a water utility cannot go to another water utility, even if the water rate is too much and the water quality is not good. This is because the water utility is a public utility, i.e., a monopoly. The water utility is the only provider (seller) in the service area.

As it is a regulatory authority, the water servicer provider has a government mandate to protect the customers' interests. For these reasons, when we consider relations between water the utility and customers, the water utility is superior. In order to protect the customer's interests, governments impose regulations on water utilities.

For the building of good relations between the two parties (they are not free and equal) requires that the water utility should pay the greatest attention toward customers. The water utility should provide information to customers in a positive manner in order to maintain the customer's cooperation and to build good relations with them. It is useful to maintain a transparency of the management of water utility toward the customers (As the results of the Household Survey conducted by JICA Study Team shows). This is known as the 'release of information'. The releasing of information from water utility side is obviously important, but listening to customers is also an important communications mechanism. This is the underlying principle of 'two way communication'.

(2) Strengthening of billing relating works

1) Put the top priority on domestic customers

Top priority should be placed on domestic customers. The water enterprises should cast their greatest resources and energy to this group and pay more attention to individual domestic customers than to commercial consumers. Among customer groups, domestic consumers number in the majority, but consume less water than non-domestic consumers. Efficiency towards domestic customers may not be compared with other groups when their meters are read, and the billing and collection of water rates are done.

However, the mission of the water utility exists mainly for this group. As such, the water utility should make domestic users the top priority. The business related to domestic customers should be conducted kindly, fairly, carefully, and adequately without errors, not delayed and timely. The water utility is often apt to turn attention to big customers, but big customers pay too much attention to their consumption of water, electricity, telephone, because these consist of costs, as the water rates of these services may affect the profit of the business. It is not an exaggeration to say that the results of water utility management in their dealings with non-domestic consumers is unsatisfactory, as their primary focus for business transactions should be aimed at the domestic consumers.

2) Process management Plan

The commercial section of the NPVC uses a process management plan for all meter reading / bill collecting staff and shows the plan to all branches including Thangone, Thadeua and Headquarters. This plan is used to prepare the schedule of meter reading and bill collection of all the branches and is also useful to programme the unified handling of business. This plan has been widely adopted in other countries.

However, some branches cannot always follow this plan. Divergence from the plan appears to be common. For example, meter reading is done from 26th - 10th over the month, and the bill collection is done from 11th to 25th, so each task is done over a half month period. However, this plan is not always followed. Often, the staff reads the meter and collects the bill at the same time.

In such cases, the commercial section needs to study the causes of difference (at the workplace) and to analyse the causes of the difference to minimize the impact, and to instruct the staff to follow the plan. When making a plan, the person in charge of drafting the plan, should be required to examine the actual situation in branches and hear the opinions of staff so then the plan reflects the actual condition at the workplaces. A plan that does not conform to the actual conditions of the branches does not lead to an improvement of the business.

3) Meter reading

When the meter readings are done over a 15-day period during a month, an average reading of 74 meters per day are read which appears to be a very low amount of meters read. When the meter reading is done over a 20-day period, the average number of meters read is just 56 meters a day, an even lower figure.

*44,588 (No. of total connections) / 43 (No. of meter readers)=1,111(meters/month/person)

1,111 /20 (days) =56/day or 1,111 /15 (days) =74/day

The meter reading books should be kept in the respective branch office, after the staff goes home.

Tasks for staff that read meters and collect bills should be delineated carefully. The tasks should be separated, with some staff allocated for reading meters, and other staff allocated to collect bills. The two tasks - meter reading and bill collection by the one person is not preferable. Some problems suggest that such a system lacks efficiency, concentration and the possibility of false actions by staff members, etc.

In general, it is not ideal for the person reading meters to be also responsible for the collection of money. While this system does have various advantages, the disadvantages should be recognized. The advantages and disadvantages of the present system are as follows.

- Advantages:
  - i) When contact between customers and staff increases, the customer's information increases and the relationship between the two parties matures (A good customer relations and two-way communications will be promoted).
  - ii) A meter reader can convey customers' general complaints and opinions to water utility directly.
  - iii) The collection efficiency increases based on a mutual reliance between two parties.
- Disadvantages:
  - i) Meter reading efficiency will fall.
  - ii) Some tensions between the two parties will persist.
  - iii) Motivation toward improvement of work will often be blocked.
  - iv) The possibility for false actions by staff members increases.

4) Regular meter reading by the fixed date

The customer's water consumption over a month is to be measured at certain regular periods, so if the length of period is changed occasionally, the water rate will change. In other words, if the meter reading is not conducted on a fixed date of the month, in case of progressive block tariff, the customer's interest will be damaged. Regular meter reading is an important practice.

However, in reality the fixed date meter reading will be often delayed due to a variety of reasons, such as heavy rain or sick leave. In such cases, some adjustment practices are necessary.

5) The special zone system is to be reconsidered.

A combination of various customers' meter reading is necessary in each branch office. Meter reading of various diameters and categories is useful to prevent boredom for the meter reader . As for the big customers, they usually use a lot of water and often pay without delay, so they are often

categorized as excellent customers. Many water utilities are apt to consider that non-domestic consumers are special and important customers. Often, they are called 'priority customers'. However, the water utility should pay the greatest attention to domestic customers who occupy the majority of the customer base. A big customer is important for the water utility, but it is not appropriate to treat them especially.

6) Bill collection

It is advisable to consider abolishing a direct collection system. In place of direct collection, when a bill is delivered to customer, they can pay the bill at various financial institutes, such as a bank or a post office, rather than the NPVC (including branch) offices.

The system of keeping the collected bills in the meter reader's house overnight and paying the collected money the following morning to the cashier at the branch should be terminated. The amount of collected bill can amount to 800,000-1,000,000 Kip on an average day.

7) Outsourcing of meter reading and bill collection

Outsourcing of meter readings and tariff collections are recommended. Meter readers are categorized as permanent staff, but they depend largely on allowances rather than a basic salary. Because of the salary system, most of the meter readers work on weekends and they take only about 4 holidays and 15 days of annual leave per year. Working conditions for the staff should be improved. Otherwise, out sourcing is recommended to be introduced, because the current system of meter reading and bill collection is almost same as out sourcing.

8) Setting of an internal inspection system

An internal inspection within the NPVC is necessary in order to investigate a mistake in meter reading. A self-inspection system of the accurate consumption and calculation of the customer's water rate is a method to secure a reliable water service for the customers. An inspector may check the date of the meter reading, whether the calculation was done correctly, and whether the figures were entered correctly into the system. Inspection of meter reading is an internal check system which all water utilities should have. With this system, mistakes, errors and abnormal delays can possibly be prevented. When an intentional calculation error of water consumption is detected, it should not be overlooked because it is a criminal offence.

It is not necessary for an inspector to check all meter readings but inspecting random samples ensures that the system is working effectively. It should be clearly stated that inspectors are not

employed to police meter readers, but to assist them in their tasks. It is always better to have an external, objective opinion in assessing mistakes, and this is the role of the inspector.

9) 100% bill collection can be achieved with:

i) Quick billing after meter reading
ii) Chase the arrears continuously
iii) Making arrears a subject of top management concerns
iv) Making of a manual for arrears collection procedures
v) Employing personnel with specific roles as either meter readers or tariff collecters
vi) Some incentives may be necessary for collectors
vii) Immediate disconnection, after repeated urging for consumers to pay their arrears

(3) Human resources development

The training is carried out for the improvement of the vocational ability of the staff. The manager of the workplace should make a training record of staff members with the cooperation of the training centre, and it must be kept in the custody of the personnel section. The training record should be continuously updated and utilised as a document of personnel management during the staff members employment with the water utility.

7.2.4 NPVC Financial Aspect

To improve financial conditions, the NPVC would rather incorporate in its management policy.

(1) For safety management, NPVC should expand its equity instead of long-term liabilities to improve the fixed asset ratio as much earlier as possible.
(2) To improve a value added ratio, NPVC increases water sales revenues and reduces production costs as much as possible.
(3) To cut back water production costs, NPVC has to make an endeavour to purchase the raw materials such as chemicals, pipes and fixing tools.
(4) To shorten the collection period of account receivable, NPVC has to make endeavours to earn peoples full understanding of waterworks management through public relation.
(5) To develop versatile worker as well as specialists, NPVC must make programs to cultivate men of ability.

Economic evaluation recommends that the project be implemented in the water supply service areas because it is viable from the economic point of view. However, there are several financial issues

that NPVC make the project substantial in actual services areas. NPVC procures the financial sources with cheaper financial cost. If NPVC received financial sources with no financial cost, it could propose the least water tariff to the water consumers, i.e., around 3.8 times of the present rates.

NPVC strives to attain reasonable water rates for sound management. In Prime Ministerial Decision (37/PM), domestic water charge for low-income people should be set up to at most 3% of household income in section 4.6 in article 4. Furthermore, in case that a water supply company sets up a higher water rate in its service areas, the charge of domestic water should be not more than 5% of household income taking into consideration of internal subsidisation among categories in the service areas.

In the World Bank Report of "Investing in Development, 1985", its staff's experiences suggest that price of the minimum block of water is commonly set at 3 to 5 percent of household income which is affordable. On the other hand, water consumers in Vientiane recognise that the cheaper water charges are not always the best solution for their social life, according to the JICA household survey conducted in March 2003. They are substantially aware of importance of water supply in their living circumstance. Considering these circumstances, NPVC make endeavour to set up reasonable water tariff based on the mutual understanding between water consumers and the water supplier.

It is said that the price elasticity of water supply leads to little practical effect for water conservation. In fact, the revisions of water tariff in the past had little effects on decrease in water consumption. As discussed in the affordability of water, the water price in Vientiane is too cheap as compared with other provinces and with other developing countries. This cheap water price might make the water consumers lesser effective for water conservation. It is recommended, thus, that the rational water price could give them some motivation for water conservation.

7.2.5 Improvement in Public/Customer Relations

As is observed from the household survey, users' dissatisfactions are mainly concentrated on management/operation issues relating to public/customer relations, such as the "manner in which defects are repaired", the "manner in which claims are treated", the "manner of public relations", and, the "manner of notice". These complaints should be solved with the highest priority in order to build a mutual confidence between the service provider and the consumers. The effort and expression used by the NPVC also facilitates to increase users awareness and cooperation in the use of the public water supply.

Among users' dissatisfactions, manners in which defects are repaired and how claims are treated should be regarded as a management/operation field of priority for improvement. It might be difficult to solve those complaints in the short term because of the complexity of causes such as budget limitations, human resource limitations, claim/request and information management system, transportation, other equipment and material difficulties, and so forth. A staged list of activities should be implemented by the NPVC, as follows;

1) Establish a database of complains,
2) Categorize location of claims,
3) Analyze the causes of claims,
4) Explain the causes to users,
5) Develop staged plans (countermeasures, budgets, time schedules) for improvement,
6) Promote the plan to consumers,
7) Implement the plan, and,
8) Monitor and evaluate the plan.

For improvement in the manner of public relations and notices, a committee or taskforce specializing in publicity should be established in the NPVC as the first stage. It is recommended to include members from civic organizations, other public service providers, and experts/consultant in the field for the full consideration and diversification of possible approaches. Along with the implementation of the plan to mediate the claims and complains explained earlier, the committee/taskforce should develop a strategy for publicity, and its task should correspond to users' demands for what they want to know.

In the household survey, it is revealed that a high percentage of users expressed concerns about the accountability of the service provider in "how the water rate is decided" (86.7%), followed by "how

the water rates collected are utilized" (54.7%). Other concerns concentrated on "water quality control"(48.0%) and, "what is water source and how water is transmitted, treated, and distributed" (40.0%). A publicity package should be developed taking into consideration the users' interests in management. The publicity should utilize a selection of media such as radio, TV (infomercial), and P.R vehicles.

It shall be also noted that only 8.0% and 17.3% of households connected to the public water supply service, and those not connected, respectively, in the household survey, managed to answer that the NPVC is the institution which has the jurisdiction for the provision of public water supply services. On the topic of the responsibilities and awareness of consumers in use of public water supply, 13.3% and 24.0% of households connected, and those not connected respectively; perceive that the repair of in-house/yard leakages is NOT the responsibility of users.

Furthermore, as was observed earlier, the household survey revealed that 22.7% of households connected to the public service ignore in-house/yard leakages from defective pipes and/or taps. 64.7% of households that ignore leakages answered that repairs are the responsibility of the NPVC. Clearly, the NPVC are not responsible for in house leakages. As such, consumers need to be made aware of their responsibilities, and this issue needs to be incorporated into the publicity strategy.