3.6 Summary of Water Supply Services in Tashkent City

3.6.1 Major Issues

With respect to the current issues regarding the water supply services in Tashkent City mentioned so far in Chapter 3, the future scenarios anticipated can be summarized as shown in Figures 3.3. These current issues can be tackled at both the central and local government level.

(1) Management Problems

1) High Volume of Water Consumption by the Population

The current water consumption in Tashkent as a whole, including consumption by industries, exceeds 1000L/capita/day. In particular, the results of the study showed that the general public consumes 534L/capita/day. This figure far exceeds the level of the daily worldwide standard, which is 200 to 250L/capita/day. A leading cause for this is the water leakage (waste of water) in residential premises including toilets. To tackle this problem, a plan is now underway to install meters in all households; however, this plan has not worked out effectively as it puts an enormous load on the users. This burden also applies to the users in individual houses. Meters have not yet been installed in most of the city's apartment buildings.

Table 3.10 Progress in the Installation of Meters in Tashkent during 1999

	Target	Accomplished	Collection of Installation Cost
Number of Households with Installed Meters	18,000	7,000	1,500

The type of meter installed for the population is a standard size with a diameter of 20 mm and the likely cost of 18,000 sum per meter. The local government believes that all users have to bear the total cost. However, given that the average income per month for the general public in Tashkent City is 18,000 sum and the nominal income is 13,000 sum, and the survey results indicate approximately 16,000 sum, this puts an enormous financial burden on the population.

Because of this, the central government is willing to allow the population to pay by installments over a year in order to collect the cost. Nonetheless, a large number of individual users still cannot afford the cost, and this will lead to a poor record of installation cost collection. The income level of the people living in apartment buildings is even lower than that of the general public who live in private houses. This means that their ability to afford the installation cost of the meters is even less and, thus, this issue is more serious for the residents of apartment buildings.

2) Cross subsidy

Unless meters are installed, there is no way to collect water tariffs other than by imposing a fixed rate on the population. Needless supply costs are also being generated because there is a low level of awareness of the need for water conservation among the population.

Also, this issue has created a situation involving cross subsidy for water supply costs between the population and the corporations as the fixed rates charged to the population have been deliberately set at a lower level as a governmental policy. Therefore, a shift of the cost to the corporations has resulted and they are charged metered rates.

Although the central government has enumerated targets to resolve this cross-subsidy issue, the gap has tended to widen as a result of the fact that most of the meters have not yet been installed.

3) Incomplete Self-Supporting System

Vodokanal has been preparing for the implementation of a self-supporting system within the existing system. The local government is planning to divide up the current Vodokanal into 11 Rayon-Vodokanals and regards them as income units in order to step up progress toward achieving a self-supporting system. However, Vodokanal still has to rely on the local government, because of the reasons outlined below, to operate as part of a market economy:

i) New investments from the government budget (reserving deficit funds)

ii) No function to operate on a self-financing basis

iii) No mid-term or long-term plans

iv)Presence of unpaid receivables from budget organizations

v) Problems with continuing water supply services to companies with outstanding overdue payments

vi)Problem of bearing the expense of the social safety net.

4) Shortage of Cash for Salary Payments

The reasons mentioned below are the causes for the deterioration in Vodokanal's cash flows, which have caused a shortage of cash for salary payments and late payments to suppliers.

i) Presence of unpaid receivables from budget organization

ii) Problem in continuing water supply services to the companies with outstanding overdue payments

5) Low Consciousness of Accountability

The public enterprises which operate public utilities such as waterworks, have a certain accountability for the fact that the local government as the owner and the public as the recipients have delegated them to operate the business. In so-called developed countries including Japan where the waterworks business operates under a market economy, disclosure of information is an important issue in response to such accountability. In the case of Vodokanal, it also discloses information through reports prepared at the regular meetings and at the time of revising the utility charges, as well as by preparation of P/L and B/S. However, these are not adequate measures because of the following factors:

i) A Vodokanal newsletter to introduce its waterworks services has not yet been prepared.

ii) An annual report with particular emphasis on its financial condition has not yet been issued

iii) No cash flow statements are prepared.

As outlined above, certain improvements in disclosing information on Vodokanal are needed, not only to fulfill its accountability as a public enterprise, but also to enable it to operate on a self-financing basis when investments in plant and machinery are required.

6) Inefficient Operating Activities

Vodokanal is making an effort to operate under many constraints, such as collecting charges while many meters are yet to be installed, using deteriorating facilities built in the time of the FSU, as well as operating its business as efficiently as possible within a limited budget.

With respect to tariff collection, the use of automatic deductions from bank accounts, would essentially mean reduced collection costs and a stable income. However, unless more individuals (in the population) open bank accounts, there is a limit to the usefulness of implementing such banking services.

In addition, Vodokanal has been introducing a new computer system in order to operate more efficiently. In spite of the limited number of computers and the manual operations still used in calculating, summing up and preparing the documents, it is expected to improve efficiency significantly. Delays in the introduction of the computer system have become yet another obstacle in introducing management accounting for budget-actual variance analysis, etc. and thus using a standard cost system to control costs. Although Vodokanal is aware of the need for budget-actual variance analysis as part of implementing a standard cost system, it has not adopted this because the introduction of its computer system has lagged behind and because it is difficult to set standard costs given the background of the high rate of inflation in the ROU.

Apart from the issues of management accounting, ROU is now in the process of moving towards a market economy, and has not used the standard components generally installed in waterworks companies and other manufacturing industries in so-called developed countries. In addition, its manufacturing techniques have not been standardized and manuals outlining these techniques have not yet been prepared. Moreover, it has not adopted certain management methods such as quality control procedures and is not experienced the effective use of such methods. These factors could enable them to improve efficiency.

Deteriorating facilities and the delay in automating its operations have led to a reliance on manual operations and that is why they have more employees than in Japan, for example. At this point, there is a great scope for improving the efficiency of operations, assuming that the number of workers at the operating sites can be reduced.

On the other hand, considering the level of the wages paid for such a large number of employees, the total expenditure for employees' salaries is certainly not high by any means compared to level of income in Tashkent. It seems that there are problems in terms of securing excellent human resources and in providing incentives for the workers.

(2) Technical Problems

1) Economically Inefficient Water Supply System

Although the present water works facilities were built during the time of FSU, the water supply is basically distributed by direct pump pressure. Generally, there is a gap between the volume of water consumption during the day and at night, and thus the waterworks facilities are operated on a smaller scale at night. Reservoirs are build on higher ground and use natural gravity to deliver the water supply. According to the current survey, however, no clear disparity in water conservation between the day and night volume was found especially in Tashkent, and this means that there is either some level of use at night or considerable leakage or waste of water equivalent to the water consumption in the daytime, although the flow rate has not been measured each year and conclusions cannot be drawn as a result of the current measurement. However, considering the change in the original water consumption required during the daytime, the present system of water supply by direct pump pressure consumes a large volume of electricity and operates in such an inefficient way that the maximum power of the operations required has increased.

2) High Rate of Leakage

As mentioned above, the extremely high percentage of leakage and wasting of water in Tashkent City shown as a result of the current survey is due to leakage inside various facilities, e.g. leakage from water pipes and wasting of water from the water tanks. Although JEK should be in charge

of maintaining and repairing any leaks inside the facilities, the results indicate that there have been problems with their ability to maintain these facilities and repair the leaks.

3) Aging Facilities

Many of the current facilities were build in the time of FSU and have either already exceeded their period of durability or will exceed this within the next ten years. Although Vodokanal is trying hard to maintain and repair these facilities, the estimated costs are less than the actual costs for the upkeep and renovation. Furthermore, maintenance costs for these facilities are expected to increase exponentially in the future.

4) Concrete Measures for Future Investments

There is no reliable data on the period of technical durability remaining for the aging facilities which are currently in use. Without such information, no concrete measures for investment can be drafted to meet the actual situation.

5) Technical Agenda for the Installation of Meters

In the current survey, a meter was installed at each household surveyed and the water consumption was measured for these a pilot cases. Ten to twenty percent of the meters were out of order within two months of their installation. This is an extremely usual phenomenon, but the cause is not readily apparent and should be investigated. Also, it is necessary that the meter installation project proceed only after selecting the most reliable type of meter and after standardizing the procedures for installation based on these results.

3.6.2 Analysis and Simulation of Future Scenarios for Water Supply Services

The points below are a summary of future issues which water supply services in Tashkent will face if management keeps on ignoring the current issues discussed so far.

(1) Management Problems

1) High Volume of Water Consumption by the Population

The increasing volume of water consumption as well as the problems of water leakage and waste of water by the population, in addition to the projected growth of the population will, in the end, require further development of the city's water resources in future. In addition, increasing the water supply to cope with this increase in water consumption will hasten the deterioration of the already old facilities, thus increasing future maintenance costs requiring an even earlier replacement of these sites. At present, these costs have not been estimated and the government could face an enormous financial burden.

Any increase in water supply will cause a rise in overall manufacturing costs. If these expenses were to be financed by water utility charges, as is now being considered to remedy the present situation, the water tariffs would have to be increased much higher than necessary and would possibly far exceed the level deemed fair by the public.

2) Cross subsidy

It is regarded that the presence of cross subsidy can be rationalized to a certain extent by comparing the level of wages in the population with the ability of corporations to afford water tariffs given the present economic conditions in the ROU. However, any unreasonable shift of the cost burden to the corporations will weaken the competitiveness of these industries in the global economy and, in the end, could lead to a decline in the economic power of the country. Furthermore, if the waterworks business relies primarily on income from corporations, this could be an element in impeding the stability of the financial operations of Vodokanal. If the cross subsidy system continues and is unreasonably burdensome, this will involve an even heavier

burden for the corporations and could initiate a vicious circle.

3) Incomplete Self-Supporting System

If the situation remains the same, the low level of the self-supporting system today indicates that it will not be able to be implemented in the water works business in a market economy in the future. In short, Vodokanal may tend to rely on the government to raise capital and to assume the responsibility for management and, in this way, will not become a completely self-supporting corporation.

4) Shortage of Cash for Salary Payments

If unstable conditions persist, under which the payment of salary to the employees is sometimes delayed, Vodokanal will not be able to maintain its credibility with outside investors and will face difficulties in implementing a self-supporting system.

5) Low Awareness of Accountability

In order to achieve its aim of establishing a self-supporting system in the future, Vodokanal must agree to a substantial disclosure of information with a particular emphasis on its financial condition in order to gain credibility in the eyes of outside investors. At this point, information disclosure is not adequate and it is difficult to operate on a self-financing basis under the current conditions. In implementing substantial disclosure of information, Vodokanal would make its own management status clear and encourage self-help efforts to improve its own management. Apart from the issue of disclosure of its financial condition, issuing newsletters could also be an important way of disclosing information and enhancing the population's understanding of the waterworks business. If the current conditions remain the same, Vodokanal will lose an opportunity to communicate with the population. This is not desirable in terms of improving the level of the user awareness of the need for water conservation.

6) Inefficient Operating Activities

The current level of inefficient operating activities shows that it will be difficult for Vodokanal to operate on a self-supporting basis in a future market economy. Thus, it seems that some type of subsidy by the government will be needed.

(2) Technical Problems

1) Economically Inefficient Water Supply System

If leakage from facilities inside the houses is reduced after metered rates are introduced, this would create a change in the amount of water consumed during the day and at night. On the other hand, as the current water facilities are manually operated, the capacity of the reservoirs is too small to adjust the volume. Also, if the current way of distributing water by direct pump pressure is continued, the facilities must be maintained at the maximum level of operating power and this would produce idle costs. These costs will eventually rebound in the form of water tariffs.

2) High Rate of Leakage

Ignoring the high rate of leakage could lead to a rise in water supply and production costs. New water resources development will likely be required because of a rise in the demand for water and the wasting of water resources. Useless operations of the water facilities will lead to a further deterioration and a steep rise in maintenance costs.

3) Aging Facilities

Ignoring aging deteriorating facilities without providing sufficient repairs and maintenance will involve a steep rise in maintenance costs in the future and is likely to impede a stable supply of water.

4) Concrete Measures for Future Investments

There is no statistical data on the remaining period of technical durability of the aging facilities in current use. This means that stable water supply services in the future cannot be guaranteed and it is likely that no capital allowance will be provided for investments.

5) Technical Agenda for the Installation of Meters

If the meter installation plan proceeds without solving the technical problems encountered in installing the meters, the condition of the meters will soon deteriorate and collection of charges based on a metered rate will become overdue. Other new meters will then have to be installed. This would interrupt the stability of waterworks services and would also imply that the investment in installing the meters had been wasted.

3.6.3 Approach for Progress and Improvement of Water Supply Services in Tashkent City

The following approaches have been taken to determine the measures to deal with the issues outlined above.

Vodokanal should realize that the water services business is a delicate balance between public services operated to promote public welfare and an economic venture to be run under efficient management and sound operations in a market economy in the ROU. The former, the public nature of the operations, means that Vodokanal should operate the waterworks business to supply water under a certain pressure and of an acceptable, safe quality for the users and that the water tariffs for these services should be fair and appropriate. The latter, the economic nature of the operation, means that Vodokanal should operate its business on a self-supporting basis in preparation for privatization.

However, based on the current circumstances in the ROU, it will be difficult to achieve this final goal in one stage. Therefore, the following stages would seem to be appropriate as this process unfolds:

(1) The First Stage (from the Year 2000 to the Year 2005)

Determination of the requirements for a self-supporting system.

(2) The Second Stage (from the Year 2006 to the Year 2010)

Establishment of business operations on a self-supporting basis and preparation for privatization.

(3) The Third Stage (after the Year 2011)

Operating a self-supporting system and examination of various aspects of privatization

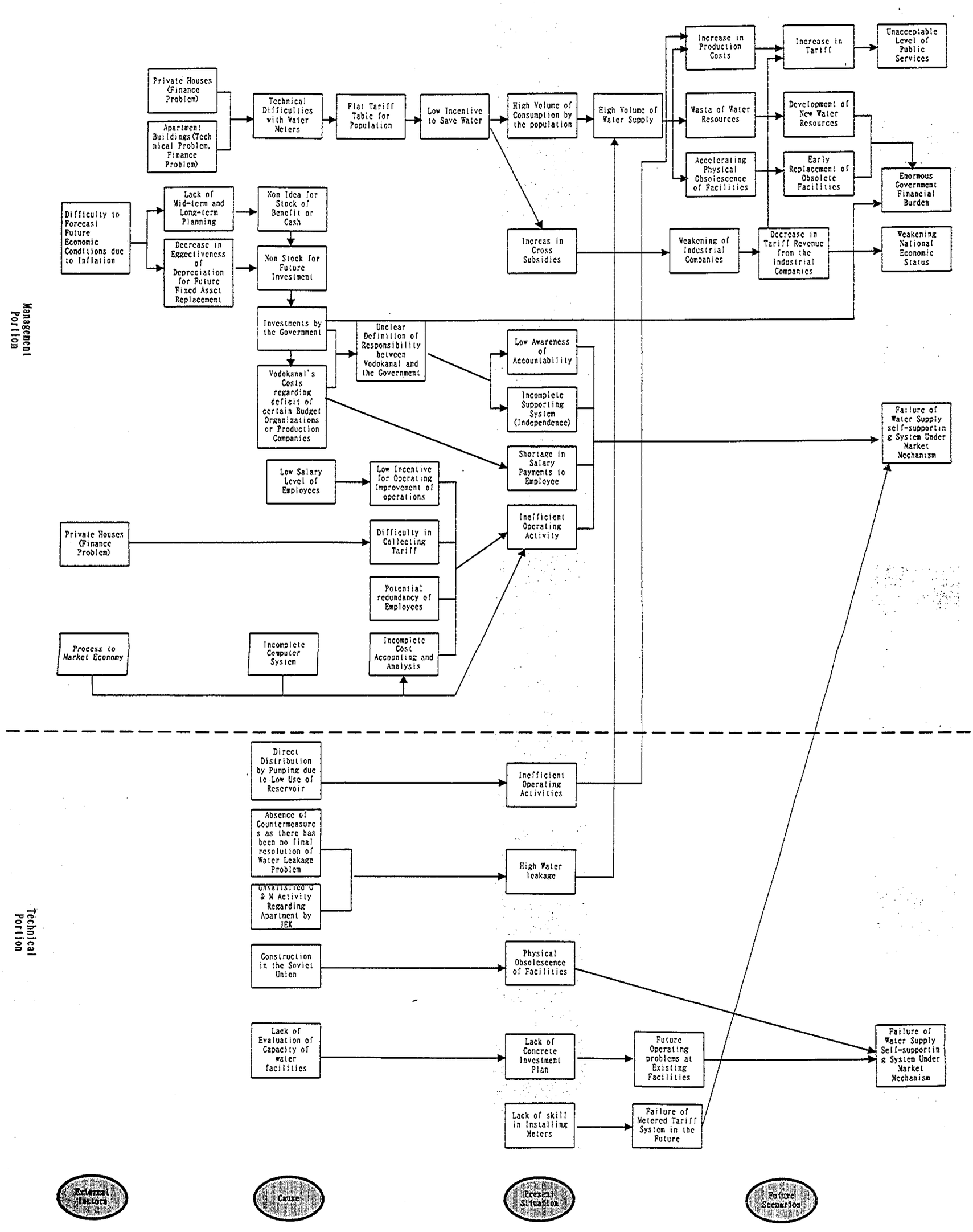


Figure 3.3 Issues of Water Supply Services - Tashkent

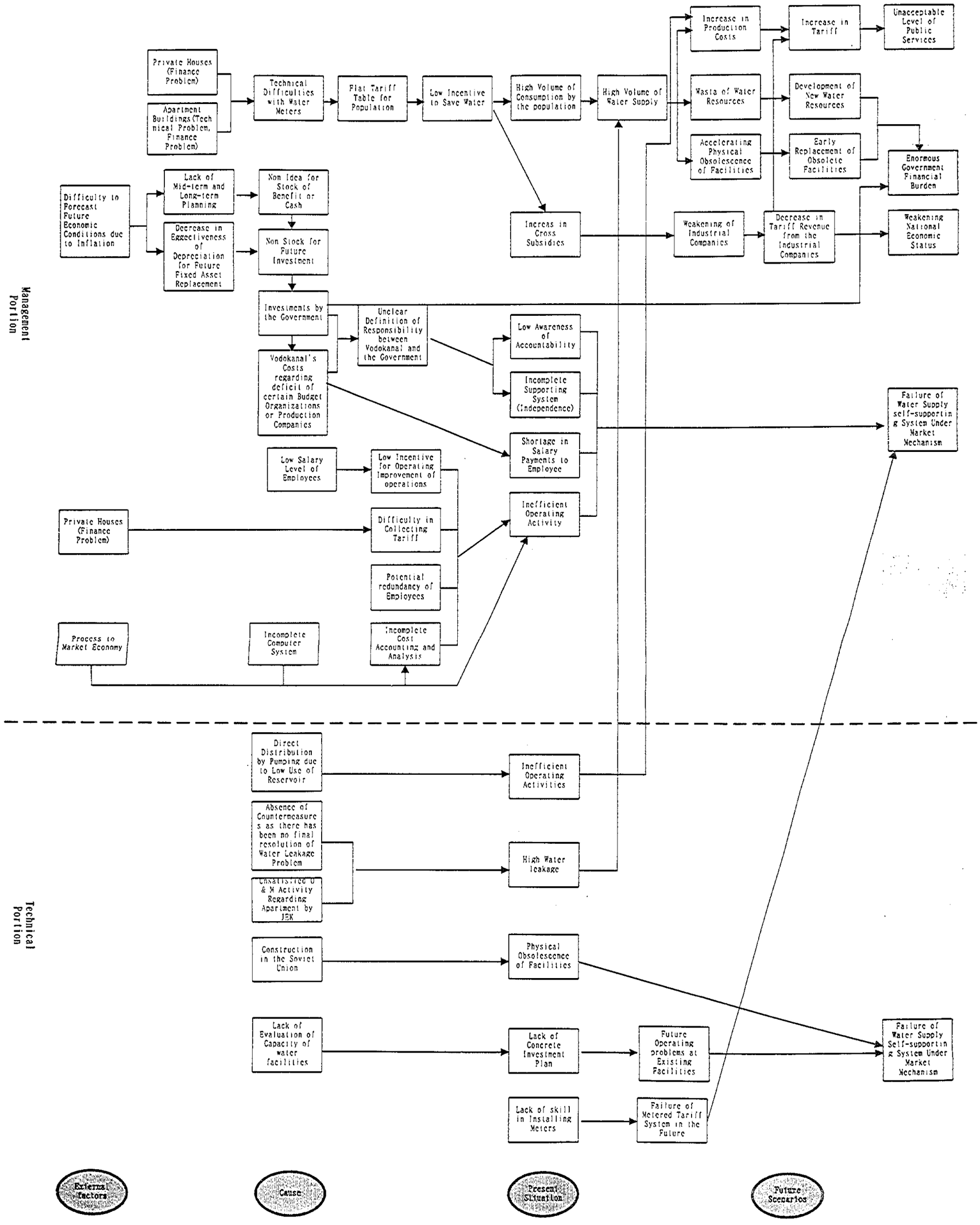


Figure 3.3 Issues of Water Supply Services - Tashkent

3.7 Overview of Tashkent City Vodokanal

3.7.1 Outline of Water Supply Services and Facilities

An outline of water supply services is presented in Table 3.11.

Table 3.11 Outline of Water Supply Works and Facilities

Item		Units	Value	Remarks
Service Area		sq.km	340	
Population Served		People	2,260,000	estimated
Rate of Service Coverage		%	98.55	
Number of Service Connections		Number	568,768	
Total Length of Pipes		Km	3,652	January, 1999
Total Production Capacity		cu.m/day	2,296,000	Nominal
Total Annual Water Supply Volume		10^3cu.m	899,706	Aug.'98-Jul.'99
Maximum Daily Water Supply Volume		cu.m/day	2,830,000	
Average Daily Water Supply Volume		cu.m/day	2,465,000	Aug.'98-Jul.'99
Water Supply Volume per Capita	Maximum	L/cap./d	1,252	
	Minimum	L/cap./d	1,091	
Staff Numbers of Water Supply Service		People	3,341	
Water Pressure in the City		Kgf/cm^2	1.0 to 2.5	
Water Sources		Boz-su Canal and Groundwater		
WTPs		Surface Water WTP:2, Groundwater WTP:5		

It is estimated that 2,260 thousand people were served with water supply in 1991, which population was determined by that the total population of the city; 2,160,000 in 1996 multiplied by the annual population growth rate; 2%. 2,160 thousand $\times$ $(1.02)^3$ $\times$ 0.9855 = 2,260 thousand.

The major character of water supply services of Tashkent is that the volume of water supply per capita is extremely large and the average annual volume is 1,091 L/capita/day.

3.7.2 Financial Conditions and Cost Analysis

Vodokanal has been increasing the rate of water tariff almost every year up to the present because of an increase in costs due to inflation. Thus, the annual profit and loss has been positive. However, as presented in Table 12, the proportion of depletion and repair costs are fairly small, compared with those of Japan. On the other hand, the proportion of power costs is taken up largely.

In spite of a change in the currency and inflation occurred due to its independence in 1991 from the former Soviet Union, Vodokanal's assets were not properly re-assessed. As a result, the valuation of fixed assets, that is a basis of depletion costs, on balance sheet became lower than actual valuation, and thus the depletion costs were earmarked low. As for repair costs, Vodokanal has been trying to maintain the degrading facilities and equipment on the lowest costs, but it is estimated that Vodokanal will need greater investment on these facilities and equipment in future. As the technical parts stated about power costs, the type of original operation system has been consuming large volume of electricity and thus the percentage of power costs became high.

Vodokanal's investment costs on water supply facilities and equipment have been covered by the local government and Vodokanal did not need to raise funds. As the result, Vodokanal is clear out of debt, i.e. borrowing and the investment costs covered by the local government have been earmarked as capital stock or capital reserve. This way of settlement lacks the concept of capital accumulation and reservation. This means, in other words, Vodokanal has no financial plans with clear future visions.

Table 3.12 Compositions of Costs

Costs	Unit	Uzbekistan		Japan
		Tashkent	Chirchik	Tokyo
Rate of labour	%	10	4	16.7
Rate of Depreciation	%	10	3	18.9
Rate of Electiricity	%	48	72	2.9
Rate of Materials	%	6	5	0.6
Rate of Repairs	%	4	2	21.4
Rate of Orders made to third parities	%	0	0	6.7

3.7.3. Tariff Policy and Charge Collection

The current status of revenue from collection of charge is analyzed as follows:

Vodokanal increased tariff of corporate users in August, 1998 and of general public in February, 1999 respectively. Thus, unit cost of revenue is lower than the one in the current tariff table. Also, as installation of water meters has not proceeded, the actual volume of water consumption can not be measured and had to be estimated by calculation. This means that Vodokanal cannot grasp the actual volume of water intake. As presented in Table 3.13, the sales unit of general public is less than the unit cost, and the sales unit of production industry and other users far exceeded than those of the unit costs. The Study Team defines this status as cross subsidies for the general public. The rate of tariff disparity among the users in the ROU is 4.5 and is fairly high compared to that of international standard, which is around 2%.

As mentioned before, tariff of the general users is not calculated by metered rate, but by fixed rate system which pay water bills no matter how much volume of water is consumed. Therefore, this system does not generate an incentive of conserving water and does not lead them to take any positive actions even if water leakage was found inside an apartment blocks.

Table 3.13 Revenue from Collection of Water Charge- Tashkent Vodokanal

	Annual volume Of water consumption	Revenue (1,000 thousands in Sum	Sales unit (sum/m^3)	Unit cost (sum/ m^3)
General users	289	210	0.7	2.1
Public organizations corporations i.e., restaurants	341	1,482	4.3	2.1
Production industry	58	373	6.4	2.1
Subtotal	687	2,065	3.0	2.1
	212	0		
Total	899	2,065		

Unit cost was determined as:

Annual costs on water works services/volume of accounted water

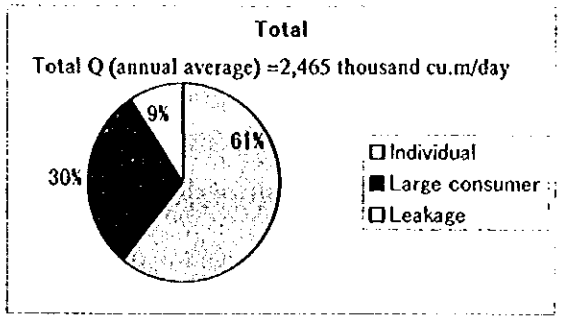
=1,447 million sum/687 million m3 = 2.1 sum/ m3

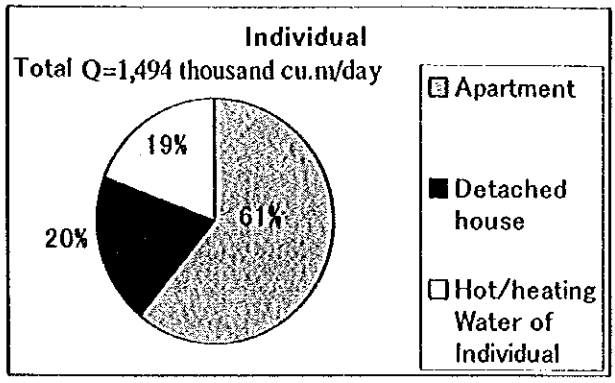
3.7.4 Analysis of Water Supply and Consumption

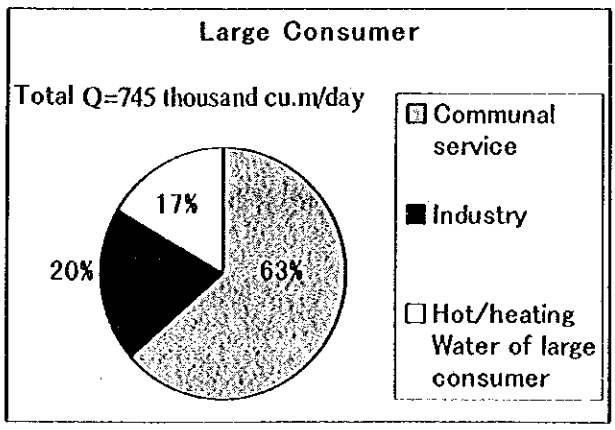
The element of water supply and consumption is analyzed in chapter 5.3, however the overview is described below and the status of the whole water supply works should be presented in this section.

The composition of water consumption is segregated into three categories; individual, large consumer and leakage of pipeline as presented in Figure 3.4. The compositions of water supply volume by individual and large consumers are also shown.

Figure 3.4 Composition of Volume of Water Consumption



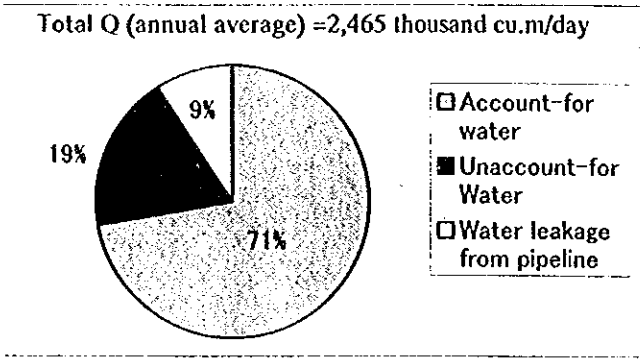




As presented in the figure, 9% of the total volume of water supply is consumed by leaking pipelines, 61 % by individual, and 30% by large consumer. It also presents that water supply is largely consumed as hot water and for heating.

Basically, most of the large consumers (the distribution volume of hot and heating water distributed by supply factories is calculated in large consumption) is charged based on meter-rate system, however, individuals living in apartment blocks and detached houses are not charged based on mater-rate system but fixed charge rate of 330 liter per capita a day. (total distribution volume = 0.33 cu.m/capita/day x 2,260,000 population served = 745,800 cu.m/day.) Therefore the difference between the actual volume and fixed volume of water consumption by individuals is defined as unaccount-for water volume. The rate of this unaccount- and account-for water volume by individuals, and also water volume consumed by water leakage are shown in Figure 3.5.

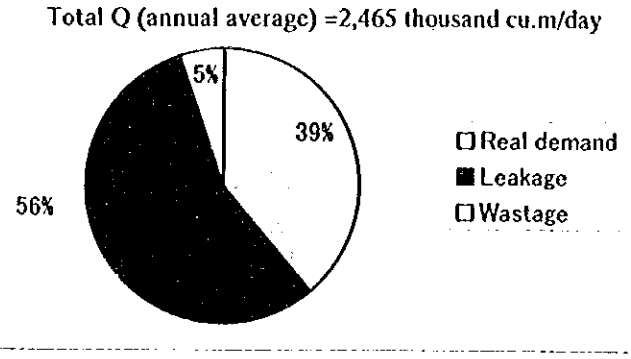
Figure 3.5 Account-for and Unaccount-for Water - Tashkent



It is assumed that the volume of water consumption due to water leakage include the leakage from water equipment and pipes in housings and buildings, and pipeline laid under roads. Regarded the level of excessive volume of water consumed by consumers in Japan as a volume of wasting water, the volume of actual water demand is determined by deducting the volume of water leakage and wasting water from the total the volume of whole water supply.

Based on this point of view, the composition of the actual volume of water demand, water leakage and wasting water is presented in Figure 3.6. The figure presents that 61% of the current volume of water supply can be reduced in the future.

Figure 3.6 Actual Volume of Water in Demand - Tashkent



3.7.5. Facilities of Water Supply Service, and its Operation and Maintenance

The location of WTPs and other facilities of Tashkent Vodokanal is presented in Figure 3.1.

The capacity of WTPs shown in the figure is 2,326,000 cu.m/d and this rate falls below the annual average of water supply volume, that is 2,465,000 cu.m/d. Thus, it is clear that the facilities have been operating beyond these capacities.

Many of these facilities are aging and replacement of these facilities tends to stagnate because of lack of funds. The annual budget prepared for repair and improvement of Tashkent Vodokanal is approximately 50 million sum which is less than 1/10 of the costs actually needed.

The degrading condition of water distribution pipes network is especially serious and nearly 4,500 cases of interruptions caused by intensive water leakage, were annually recorded.

3.7.6. Issues

Vodokanal is facing many issues to be solved as mentioned in 3.6 and especially following issues should be focused for managerial improvement.

1) General users are not encouraged to conserve water as a meter installation program at general users' sites have not been proceeded and tariff system of the general users employs fixed rate. Also, there is a large disparity of charges between general users and corporate users.
2) As the above point, precious water resources have been largely wasted and this generates waste of expenses on water treatment and supplying.
3) As the tariff policy is lagged as above, charge to offset the costs can not be reserved. The financial foundation is vulnerable and the essential facilities are not prepared.

In the ROU, a further transition to a market economy is expected to take place and it is assumed that Tashkent City as a capital will develop as the center in future. Therefore, it will create greater changes such as a population movement into the city and various conditions i.e. price of commodities. Concerned these points above, ignoring the issues pointed out will hinder the operation of water supply services to a large extent.

In conclusion, ignoring the issues pointed above will bring about financial and technical situations as follows:

1) Collapse of the budget balance and the financial failure

a. Overdue payments and outstanding by corporation due to a steep rise in water tariff
b. Lowering rate of collecting operational costs of water supply services
c. Shortening Vodokanal's funds, lowering ability to pay off the debts, and unable to pay the employees' salaries
d. Conceding to operate a self-supporting system under the market economy

2) Worsening the quality of water supply services due to the lagged preparation of improving facilities

a. Frequent cut off in water supply

b. An increase in running costs due to inefficient operation system

c. Fear of worsening water quality due to the lagged preparation of improving facilities and equipment

d. Conceding or worsening the concept of public nature in water supply services

3) Increasing demand for development of new water resources

a. A need of developing already marginal water resources and the development costs

b. No integration with environment aspects

Vodokanal would face the above three crisis such as financial failure, a collapse of service, and a collapse of water resources, and needs to deal adequately with those issues.

Chapter 4 Present Status of Water Supply Services in Chirchik City

4.1 Organizational Management

There are five big cities, and towns and villages located in the 15 districts of Tashkent Province. The province is currently being provided with drinking water by regional Vodokanals. All 17 Vodokanals in the province are prepared for a comparison of their scale and efficiency

The administrative structure of the water supply services of Chirchik City was reviewed, with emphasis on the relationship between the City Vodokanal and the Provincial TCMA. The organization and function of the Chirchik City Vodokanal were analyzed.

4.2 Managerial and Financial Status

4.2.1 Structure of the Chirchik City Vodokanal

Organization of the Chirchik Vodokanal is basically similar to the organization of the Tashkent Vodokanal even though it is simpler than the organization of the Tashkent Vodokanal because of the lower number of plants.

The Chirchik Vodokanal has prepared its financial statements since its restructuring in the year 1997. Before the year 1997, the Chirchik Vodokanal had been part of the Tashkent Province Vodokanal. The Chirchik Vodokanal has beard administration costs, which amount to 3% of the total revenue of the Chirchik Vodokanal, for Tashkent Province.

4.2.2 Managerial Status

The following (1)-(6) are similar to the cases of Tashkent Vodokanal except for management control by Tashkent Province (refer to the 3.2.2).

(1) Property (ownership)

(2) Investment plans

(3) Accountability

(4) Cash flows

(5) Business operating status

Vodokanal of Tashkent Province hold a monthly meeting. This meeting is attended by the president each Vodokanal, including the president of Chirchik Vodokanal in the province of Tashkent. The main purpose of this meeting is to discuss management strategy for the next month.

(6) The Concept of a planned economy

4.2.3 Financial Status

Table 4.1 presents the income statement of Chirchik Vodokanal for the years ended December 31, 1998.

Table 4. 1 Chirchik Vodokanal Income Statement (Unit : thousands of Sum)

	12/31/98		12/31/97	
Sales	350,047	%	251,225	%
VAT	(47,785)		(32,551)	
Net sales	302,262	100	218,674	100
Cost	(190,889)	63	(163,966)	75
Gross Margin	**111,373**	**37**	**54,708**	**25**
Administrative expenses	(14,594)		(8,655)	
Other	(59,021)		(25,454)	
Income Before Income Tax	37,758		20,599	
Income tax	(34,797)		(18,691)	
Net income	**2,961**	**1**	**1,908**	**1**

(1) Cross Subsidy

There is a cross subsidy between the population and other users, similar to the Tashkent Vodokanal. However, the cross subsidy of the Chirchik Vodokanal is larger than that of the Tashkent Vodokanal.

Water sales to the population (in terms of sum) represent only 17% even though their percentage of the water supply volume is 72%. On the other hand, the proportion of water sales to users excluding the population and the budget organization is 46% even though their percentage of the water supply volume is 13%.

(2) Tariff collection status

Balance of accounts receivable as of Dec. 31, 1998 is 20,351 thousand sum and the sales volume is 350,047 thousand sum. The turnover period for tariff collection is approximately 0.7 months and may not be financially, far off the global level.

Table 4.2 Composition of Water Supply Services - Chirchik Vodokanal (Units : thousand of sum)

	Unit	December 31, 1998	%	
Water Supply Services				
Volume of water supply and distribution				
Volume of water supply	million m^3	38,768		
Volume of water distribution		31,062		100
Population	million m^3	22,337		72
Communal Enterprises	million m^3	4,685		15
Industry, Transportation and Construction.		4,040		13
Revenue	million sum	**186,689**	**53**	**100**
Population	million sum	31,635		17
Public organizations,	million sum	68,502		37
Industry, Transportation and Construction.	million sum	86,552		46
Water sewage services				
Revenue	million sum	**163,358**	**47**	**100**
Total revenue	million sum	**350,047**	**100**	

(3) Compositions of Costs

The details of the production costs are presented as follows:

Table 4.3 Detailed Production Costs

	Water supply system			Sewage system		Total	
Costs composition	Million Sum	%	Sum/m^3	Million Sum	%	Million sum	%
Chemical costs	6,230	5	0.20	5,532		11,762	
Power costs	87,647	72	2082	23,299	38	110,946	61
Payment for the Production Dept.	5,192	4	0.17	3,328	5	8,520	5
Social insurance costs	2,077	2	0.07	1,331	2	3,408	2
Repair Cost	2,697	2	0.09	11,498	19	14,195	8
Depletion	4,237	3	0.14	1,605	3	5,842	3
Other	13,555	11	0.44	14,288	23	27,843	15
Sub-total	121,635	100	3.92	60,881	100	182,516	100
Shared cost						8,373	
Total						190,889	

(4) Production costs and unit cost

Costs of water production is estimated by the amount of money shown on financial statements and unit cost of production is 3.9 sum per m^3. Of this, variable costs include chemical costs and power costs and is 3.0 sum/m^3.

(5) Financial condition

Nextly a balance sheet of Tashkent Vodokanal is presented in Table 4.4.

Table 4.4 Balance Sheet of Chirchik City Vodokanal (Units: million sum)

	12/31/1998	12/31/1997
ASSETS		
Fixed Assets:		
Acquisition Costs	88,573	82,991
Accumulated depreciation	(33,133)	(27,169)
Net Book Value	55,460	55,822
Total Fixed Assets	55,460	55,822
Current Assets		
Inventories etc.	14,386	22,160
Accounts Receivables	33,267	24,122
Total Current Assets	47,653	46,282
Total Assets	**103,113**	**102,104**
CAPITAL		
Charter Capital	48,119	48,119
Additional Capital	26,159	31,827
Total Capital	**74,278**	**79,946**
LIABILITIES		
Accounts Payable	28,835	22,157
Total Liabilities	**28,835**	**22,157**
CAPITAL AND LIABILITIES	**103,113**	**4,103**

(6) Future investments

Today there is an investment plan on maintenance of sewage system, but no plans on water supply system in Chirchik City.

4.2.4 Communication with Users

The present situation and problems with the public relations activities for educating users' awareness of water c and user participation management style in Chirchik City Vodokanal are basically the same as those of Tashkent City Vodokanal (refer to 3.2.4).

4.3 Tariffs

4.3.1 Current Water Tariffs and Tariff Policy

(1) Current Tariff Table

The current tariff table in Chirchik City is presented in Table 4.5.

Table 4.5 Current Tariff Table - Chirchik

Tariff system	Users	Water Supply	Water Sewage
Fixed rate	Population Item	72 sum/m^3 = 3.0 sum/ m^3 × 0.4 m^3×30日 + 3.0 sum/ m^3× 0.4 m^3×30日	
Metered rate	Public resident	3.0 sum/m^3	3.0 sum/m^3
	Budget organization	23.4 sum/m^3	5.25 sum/m^3
	Public organizations operating based on a self-supporting system	23.4 sum/m^3	5.25 sum/m^3
	Corporations	23.4 sum/m^3	5.25 sum/m^3

In practice, 20% of VAT(Value Added Tax) is added on this charge and charged.

The current water tariff policy of Chirchik City Vodokanal is basically similar to that of the Tashkent City Vodokanal. The tariff for the general population is determined politically and is currently 3.0 sum/cu.m. However, a calculation of the production unit cost based on the revenue statement as of December 31, 1998 came to 3.91 sum/cu.m and, thus, the tariff for the population cannot fully cover the unit cost. There is presently a differential of approximately 7.8 times between the utility fees charged to the users in the general population and the other users. This, in effect, amounts to a " cross subsidy" for the population.

(2) Government Plan regarding Improvement of Water Tariff Policy

The government of Tashkent Province has developed a plan regarding improvement of the water tariff policy which is based on the plan of Tashkent City (refer to 3.3.1 (1)).

4.3.2 Tariff Collection System

The present situation and problems in Chirchik City, being in a transitional period to a metered rate system, are described below.

(1) Present Situation

1) As for the tariff collection system, a fixed rate system is mainly adopted for the resident (population) category while a metered rate system (100%) is adopted for the communal services and industry categories. The metered rate system, however, is not got functioning since it was adopted only recently. Furthermore, the meter reliability is very low due to the poor quality of the meters installed. The location of the meters is also a problem as many of them are installed where access is difficult.

2) Unlike Tashkent, in the apartment category, the Chirchik Vodokanal conducts tariff collection while JEK conducts only apartment interior repairs and maintenance services for water supply. The commission to JEK for repairs and maintenance is 25% of the amount collected, which seems high, compared with the cost of the services.

3) Users' payments are received at post offices (25%), the resident's banks (19%), social banks (10 %), and the Vodokanal (46%).

4) For the tariff collection rate, the communal service category is 61%, which is the lowest of all categories.

(2) Problems

1) In the case of a fixed rate system, the water consumption of each user cannot be measured so that the water tariff cannot be set at a proper level.

2) Computerization is still far below the required level so that the efficiency of the computation is very low and inaccurate.

3) Although transition to a metered rate system is in process, the progress is slow mainly due to the various constraints in the budget.

4) For the metered rate system, which at present is only partially enforced, the system itself is not trusted by the users and the operation of the system is not stable because of the lack of installation standards and the poor quality of the meters.

5) The collection is mainly done by Vodokanal collectors and this has resulted in poor efficiency. Settlement by offset, which does not have cash income, is common and has had a serious influence on the salary payments to Vodokanals' staff.

6) As for JEK, their commission for repairs and maintenance of apartments is rather high thus JEK has had a big influence on the business management of the Vodokanal.

4.3.3 Water Tariff Setting Process

Water tariff setting process and the related solutions are the same as the case of Tashkent City (See 3.3.3).

4.3.4 Tariffs for Other Communal Services

All tariff fate changes decided from 1991 to the present in Tashkent Province were collected from TCMA Tashkent Province. Based on this data, the JICA Study Team developed a table and figures showing the tariffs for communal services at the end of each year, from 1994 to 1999 (July).

4.4 Present Status of Computerization

4.4.1 Computer Systems at Chirchik City Vodokanal

The Study Team studied three computerized systems at Chirchik City Vodokanal and reviewed the collection system (the computerized tariff collection system) in particular detail.

The computerized collection system is utilized by the sales department. Two computers are installed for the collection system for apartment users. The other two computers are installed for the collection system for house residents and enterprises. The information on all users is input into the systems. The system has a tariff table so that it can calculate the water tariff automatically simply by entering the number for each water meter. The rates can be modified easily if there is any legal revision of the tariffs.

4.4.2 Tariff Collection Procedures

Refer to tariff collection procedures at Tashkent City Vodokanal. (refer to 3.4.2)

4.4.3 Analysis of Tariff Collection Systems

(1) Analysis of Present Computer Systems

In addition to the findings at Tashkent City Vodokanal (refer to 3.4.3 (1)), the systems are maintained by only one external computer specialist who renders services to other organizations as well. A separate computer section should be established.

(2) Analysis of Tariff Collection Procedures

Refer to the analysis of tariff collection procedures at Tashkent City Vodokanal (refer to 3.4.3).

4.5 Water Supply System and Operation and Maintenance ("O&M")

4.5.1 History and Outline

The centralized water supply system of Chirichik City was built in 1930. It has a supply capacity of 75,000 cu.m/day uses groundwater sources in the Chirchik River basin, excluding surface water sources.

The construction of the Chirchik Surface WTP began in September 1990 and was completed in December 1991. The City's demand for drinking water is estimated to reach 250,000 cu.m/day in the near future. The project was designed in 1991 to serve for future water demands and to be implemented step by step. However, the City's water demand was not increased as planned. At present, the distribution volume of Vodokanal is about 120,000 cu.m/day. Thus, construction of the Chirchik surface WTP was delayed and operates only at the first step capacity of 59,000 cu.m/day.

The outline of Chirchik water supply system is shown in Table 4.3.

Table 4.6 Outline of Water Supply System in Chirchik City

Item	Units	Value	Remarks
Service Area	sq.km	30	
Population Served	persons	146,000	
Water supply service ratio	%	100	
Number of Service Connections	number	46,339	
Total Length of Pipes	km	248	1998
Total Production Capacity	cu.m/day	179,000	Nominal
Total Annual Water Supply Volume	10^3cu.m	38,700	Feb.'98-Mar.'99
Maximum Daily Water Supply Volume	cu.m/day	196,000	
Average Daily Water Supply Volume	cu.m/day	106,000	Feb.'98-Mar.'99

4.5.2 Water Supply Systems

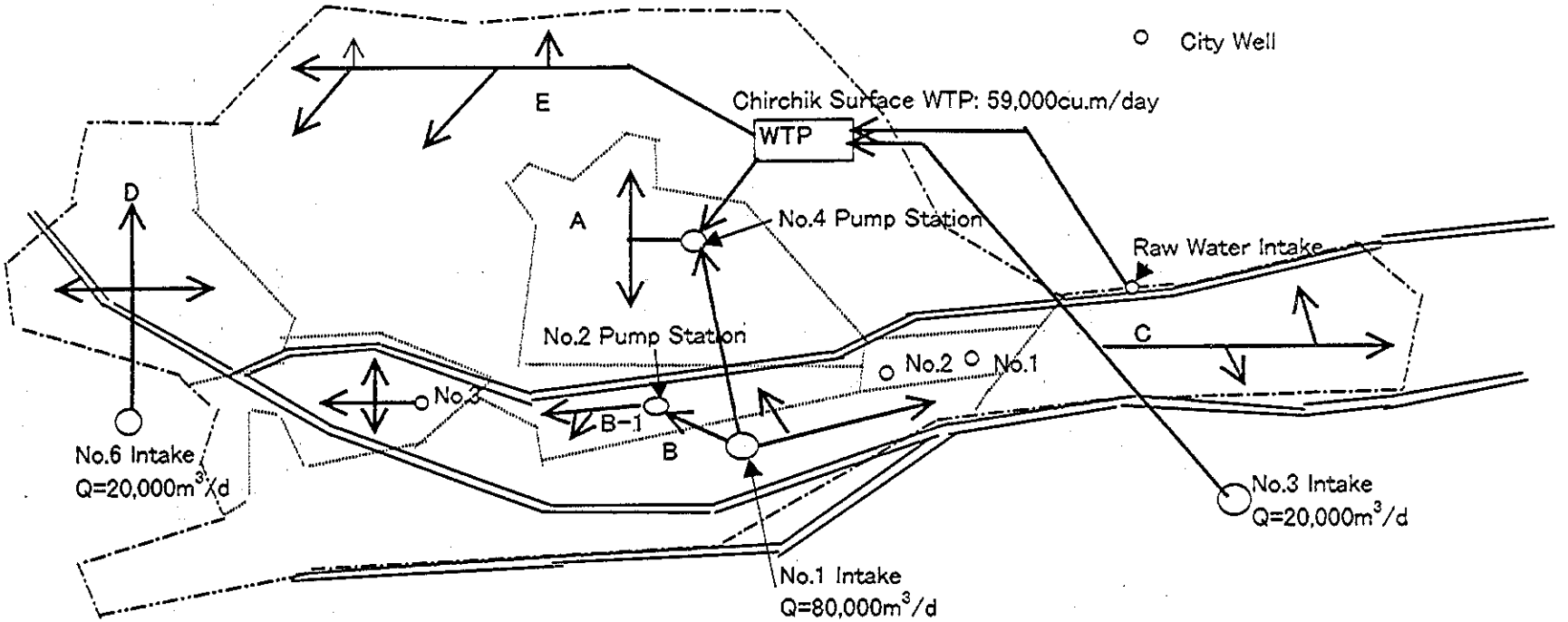
The location of the WTPs and the water sources in Chirchik City are shown in Figure 4.1. The existing water sources consist of one surface water intake PS at the surface WTP, three groundwater intake facilities and three city wells. The capacity of each of these sources is shown in Table 4.7.

Distribution pumps are provided at the WTP and the respective intake facilities, aside from two buster PSs.

Table 4.7 Existing Water Sources and Treatment Plants

Name	Capacity (cu.m/day)	Usual Capacity (cu.m/day)	Measured Flow (cu.m/day)	Water Sources	Site Area (ha)
Chirchik WTP	59,000	59,000	112.460	Surface water	14.6
No.1 Intake	80,000	19,200	34,860	Groundwater	70.0
No.3 Intake	20,000	12,000	18,220	Groundwater	18.0
No.6 Intake	20,000	18,000	27,440	Groundwater	4.32
City Wells	3,000	3,000	(3,000)	Groundwater	
Total	179,000	111,200	195.980		

The flow chart for the surface WTP of Chirchik City is shown in Figure 4.2.

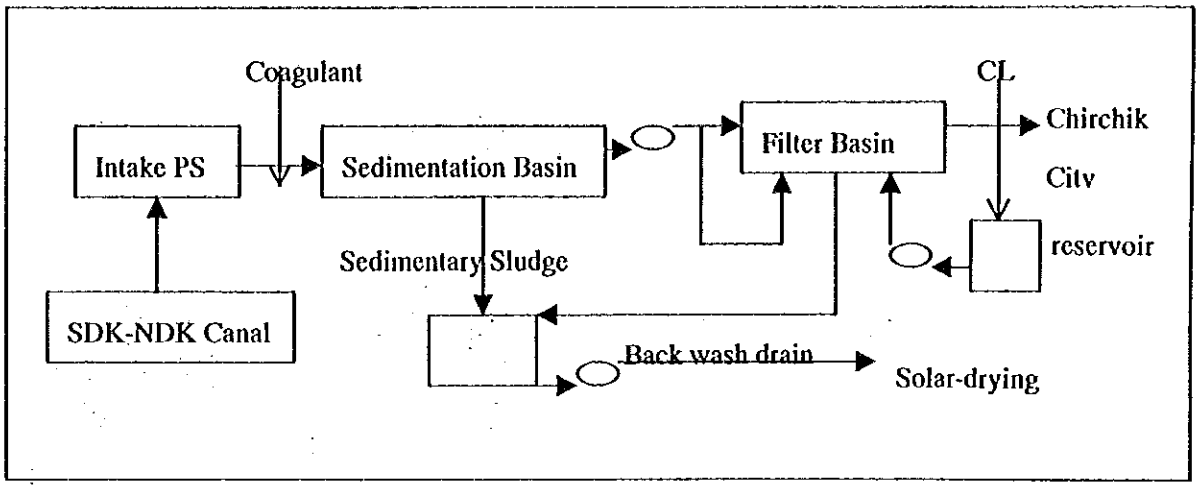


Existing Water Source

Name	Nominal Capacity cu.m/day	Water Source
Chirchik WTP	59,000	Surface water
No.1 intake	80,000	Groundwater
No.3 intake	20,000	Groundwater
No.6 intake	20,000	Groundwater
City well		Groundwater
Total	179,000	

Figure 4.1 Location of Water Supply Facilities in Chirchik City

Fig 4.2 Flow Chart of Chirchik WTP



The distribution pumps are provided at each plant, the intake PSs and the Chirchik WTP, and the two booster PSs. The location of the two booster PSs is presented in Figure 4.1, the capacity of the No. 2 PS is 500 cu.m/hr whereas that of the No. 4 PS is 650 cu.m/hr.

The total length of the distribution pipeline was 212 km in 1998. The configuration of the distribution pipeline by diameter, material and age is shown in Table 4.8.

Table 4.8 Diameter, Materials and Age of Pipelines

Diameter Range		Unit	50 to 100	150 to 200	300 to 400	≧500	Total
Material	Steel	km	55.79	22.36	16.21	12.82	107.18
	Cast Iron	km	37.24	45.41	7.48	0	90.13
	Asbestos	km	0	12.95	2.2	0	15.15
	Total	km	93.03	80.72	25.89	12.82	212.46
Age	>18 years	km	41.94	41.1	17.88	12.3	113.22
	>42 years	km	10.76	18.51	12.3	0	41.57

4.5.3 Operation and Maintenance ("O&M")

(1) Staff

A total of 194 staff are allocated for O&M and repair work in the WTPs, Intake Plants and PSs and Vodokanal. The number of O&M staff at Chirchik Surface WTP is 74, while the repair staff at Vodokanal member 69. O&M staff are classified into the following levels; Managers, Electricians, Mechanics, Operators, Repair Technicians, Laboratory Technicians, Clerks and others.

(2) Water Volume Control

Water volume is calculated based on the pump capacity and operation time. The average volume distribution is 112,000 cu.m/day, whereas the transmitted volume from the Chirchik WTP is 64,000 cu.m/day, which is equivalent to 57 % of the total volume distribution. On the basis of nominal capacity, the distribution volume ratio handled by the Surface WTP is estimated to be 59,000/179,000 x 100 = 33%. Thus, the average volume of water distribution of the Surface WTP exceeds its nominal capacity. When the raw water turbidity is low, the raw water is only disinfected and is then pumped to the reservoirs without any sedimentation or filtration.

(3) Water Quality Control

Water quality control in the surface water WTP and the groundwater Intake Plants is handled in the same manner as that described for Tashkent City (refer to 3.4.3 (3)).

(4) Operation and Maintenance Costs

Table 4.9 presents the major data for O&M costs incurred by the WTP and the Intake Plants (including PSs and others) in 1998. Based on this table, the annual costs for electricity and chemicals are estimated at 94 million and 9 million sum, respectively.

Table 4.9 Cost of Electricity and Chemicals

Item		Units (x 1000)	Chirchik	No.1	No.3	No.6	City Wells	Total
Distribution Volume		cu.m	21,600	5,100	4,080	6,000	1,200	37,980
Electricity Consumption		Kwh	18,360	4,335	3,485	5,100	1,020	32,300
Cost	Electricity	sum	53,244	12,572	10,107	14,790	2,958	93,670
	Chemicals	sum	6,911	542	390	1038	173	9,054
	Total	sum	60,155	13,114	10,497	15,828	3,131	102,724
Unit Cost	Electricity	sum/cu.m	2.465	2.465	2.477	2.465	2.465	2.466
	Chemicals	sum/cu.m	0.320	0.106	0.096	0.173	0.144	0.238
	Total	sum/cu.m	2.785	2.571	2.573	2.638	2.609	2.705

The repair and improvement costs incurred by Chirchik City Vodokanal in 1998 totaled approximately 6.1 million sum, in excess of the budget of 38.7 million sum.

4.5.4 Study of Present Water Supply System

(1) Water Sources

The water source of the Chirchik WTP is the SDK-NDK Canal located in the upstream area of the Boz-su Canal and downstream of the irrigation canal which starts from the Charvak Dam Lake.

The intake volume by the Chirchik WTPhas only a minor effect on the canal, in contrast to that of the Kadirya WTP. However the intake volume cannot be increased sharply due to the scarcity of water resources in the entire area.

In this respect, the limited capacity of the local groundwater resources also presents a difficulty in coping with the rapid growth of the water demand for water.

(2) Present and Future Problems of Plants, Facilities and Users

The problems which relate to the present facilities are almost the same as those observed in Tashkent City (refer to 3.5.4 (2)). Problems other than those in Tashkent City are presented below.

1) The electricity cost for the distribution PSs is very high.

2) The distribution pressure to the users is irregular, it is too high at more than 5 kgf/sq.cm, or too low at less than 1 kg/sq.cm.

3) Although much leakage exists in the distribution network, the leaks cannot be repaired effectively.

4) If the electricity charge increases, the cost of water supply will sharply increase owing to the large consumption of electricity required.

5) If gravity distribution and a more effective rearrangement of the distribution pipes can be introduced, the PSs will not be needed.

(3) Countermeasures for Improvement

The countermeasures for improvement are almost same as those for Tashkent City (refer to 3.5.4 (3)). Countermeasures other than those for Tashkent are presented below.

1) Reduction of the volume of distribution will be realized by repairing water leaks in houses and apartment buildings, by repairing the distribution pipelines, and by promoting water conservation.

2) When the volume of distribution in Chirchik City decreases, some of the small capacity intakes can be abandoned.

3) A distribution system which uses gravity flow should be introduced.

4) Two PSs should be sheet down after the introduction of the gravity flow distribution system.

4.6 Summary of CWS

4.6.1 Summary of Issues in CWS

With respect to the current issues relating to the water supply services in Chirchik City mentioned so far in Chapter 4, the future scenarios anticipated are similar to the case of Tashkent Water Services and are summarized in Figures. The current issues Chirchik is facing are basically the same as those in Tashkent, too. Individual, the issues generated by the differences between Chirchik City and Tashkent

City are outlined below.

(1) Management Problems

1) High Volume of Water Consumption by the Population
2) Cross subsidy
3) Incomplete Self-Supporting System
4) Shortage of cash for salary payments
5) Low Consciousness of Accountability
6) Inefficient Operating Activities

(2) Technical Problems

1) Economically inefficient water supply system
2) High rate of leakage
3) Aging facilities
4) Concrete measures for future investments
5) Technical agenda for the installation of meters

4.6.2 Analysis and Simulation of Future Scenarios for CWS

The issues which CWS will face in future are basically similar to the cases of TWS if the Chirchik city keeps on ignoring the current issues discussed so far.

The issue of old facilities needs to be tackled as a first priority. Also, as Chirchik Vodokanal has not introduced a computer network to increase efficiency of operations, it is expected to gain an enormous effect by its introduction. On the other hand, the fact that a computer system has not been introduced means that the Chirchik Vodokanal can draft an overall integrated plan for the introduction of computerization.

4.6.3 Approach for Progress and Improvement of Water Supply Services in Chirchik City

We take the following approaches to determine measures to deal with the issues outlined above. These approaches are basically similar to the case of TWS.

(1) Final Goal

Vodokanal should realize that the water service business is a delicate balance between public services operated to promote public welfare and an economic venture to be run under efficient management and sound operations in a market economy in ROU. The former, the public nature of the operations, means that Vodokanal operates the water works business to supply water under certain pressure and of an acceptable, safe quality for the users and that the water tariffs for this service should be fair and appropriate. The latter, the viewpoint of the economic nature of the operation, means that Vodokanal operates the business on a self-supporting basis in preparation for privatization.

However, based on the current circumstances in Uzbekistan, it will be difficult to achieve this final goal in one stage. Therefore, the following stages would seem to be appropriate as this process unfolds:

1) The First Stage (From the year 2000 to the year 2005)

Development of the requirements for a self-supporting system.

2) The Second Stage (From the year 2006 to the year 2010)

Establishment of the business operation on a self-supporting basis and preparation for privatization.

3)The Third Stage (After the year 2011)

Operating a self-supporting system and examination of various aspects of privatization.

4.7 The Current Status of Water Supply

4.7.1 Outline of Water Supply Services and Facilities

An outline of water supply services is presented in Table 4.10.

It is estimated that thousand people were served with water supply services according to the data of Chirchik Vodokanal. The major character of water supply services of Chirchik is that the volume of water supply per capita is extremely large and the average annual volume is 777 liter per capita a day.

Table 4.10 Outline of Water Supply Works and Facilities in Chirchik City

Item		Units	Value	Remarks
Service Area		sq.km	30	
Population Served		People	146,000	estimated
Rate of Service Coverage		%	100	
Number of Service Connections		Number	466,339	
Total Length of Pipes		Km	248	1998
Total Production Capacity		cu.m/day	179,000	Nominal
Total Annual Water Supply Volume		10^3cu.m	38,700	Feb. '98-Mar.'99
Maximum Daily Water Supply Volume		cu.m/day	196,000	
Average Daily Water Supply Volume		cu.m/day	113,400	Aug.'98-Jul.'99
Water Supply Volume per Capita	Maximum	L/cap./d		
	Minimum	L/cap./d		
Staff Numbers of Water Supply Service		People	295	
Water Pressure in the City		Kgf/cm^2	1.0 to 4.5	
Water Sources		SDK-NDK Canal and Groundwater		
WTPs		Surface Water WTP:1, Groundwater WTP:3		

4.7.2 Financial Condition and Cost Analysis

The financial condition of Chirchik Vodocanal's water supply services is similar to the case of Tashkent Vodocanal presented in 3.7.2. Especially, the rate of the power costs is extremely high.

4.7.3 Tariff Policy and Charge Collection

The Chirchik Vodocanal's current status of revenue from charge collection is examined as below. The status follows the similar way as Tashkent Vodokanal introduced in 3.7.3 part from the actual price of the revenue.

Vodocala increased the tariff rate in 1988 and 1999 and unit cost of revenue is lower than the one in the current tariff table. Also, as installation programme of water meters has not proceeded, the actual volume of water consumption can not be measured. Thus, unit cost was to be determined by the volume of accounted water. As presented in Table 4.11, the sales unit of general users is less than the unit cost. On the other hand, the sales unit of production industry and other users far exceeded than those of the unit cost. The rate of tariff disparity amon the users in Chirchik is 7.8 and this rate is fairly high compared with to that of international standard, which is around 2%.

As mentioned before, tariff of the general users is not calculated by metered rate, but by fixed rate system which pay water bills no matter how much volume of water is consumed. Therefore, this system does not generate an incentive of conserving water and does not lead them to take any positive actions even if water leakage was found inside an apartment blocks.

Table 4.11 The Status of Revenue from Collection of Charges - Chirchik Vodokanal

	Annual volume Of water consumption	Revenue (1,000 thousands in Sum	Sales unit (sum/m^3)	Unit cost (sum/ m^3)
Volume of accounted water				
General users	22,337	31,635	1.4	3.9
Public organizations corporations i.e., restaurants	4,685	68,502	14.6	3.9
Production industry	4,040	86,552	21.4	3.9
Subtotal	31,062	186,419	6.0	3.9
	7,706	0		
Total	38,768	186,419		

Unit cost was determined as:

Annual costs on water works services/volume of accounted water

=1,447 million sum/687 million m3 = 2.1 sum/ m^3

4.7.4 Analysis of Water Supply and Consumption

The water supply and use is analyzed in chapter 6.3, however the overview is described below because the situation of the whole water supply works should be presented in this section.

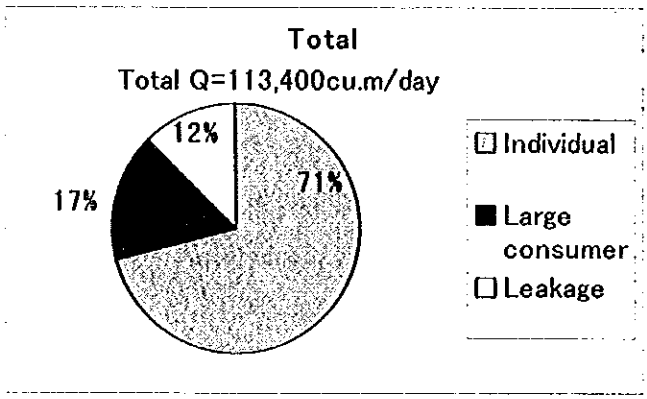
The composition of water supply volume is shown in Figure 4.3 to be divided into individual, large consumer and leakage of pipeline, and that of individual and large consumer is also shown.
As shown in the figures, the water leakage rate of pipelines is 12 %, the water supply volume to individual is 71 % and that to large consumer is 17 %. It is also shown that the usage volume of hot/heating water within the supply water is relatively large.

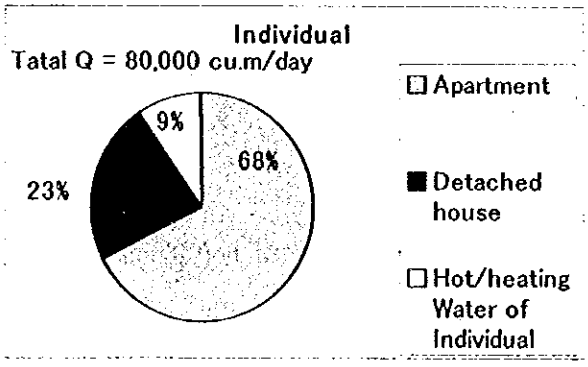
Basically, the water charge of large consumers (the distribution volume of hot and heating water distributed by supply factories is calculated in large consumption) is collected by mater-rate system, however individuals living in apartments and detached houses are not introduced mater-rate system and are collected fixed charge of per capita by norm volume of 330l/capita/day (calculated total distribution volume = 0.33 cu.m/capita/day x 146,000 population served = 48,180 cu.m/day). Therefore the difference of real and norm distribution volume of individuals is calculated at unaccount-for water

volume. The rate of this unaccount-for water, water leakage from pipelines and account-for water are shown in Figure 4.4. It is assumed that the water leakage is consist of the leakage from water equipment and pipes in housings and buildings and that from pipeline laid into road. The excessive volume of water consumption to Japanese consumption is assumed wasting water volume, and the real water demand volume is assumed that the wasting volume and aforementioned the water leakage volume is deducted from whole supply volume.

Based on this point of view, the composition of the real water demand, water leakage volume and wasting water volume is shown in Figure 4.5. As shown in the figure, the total volume of leakage water and wasting water which can be deducted in the future occupies 51 % of the whole supply water volume.

Figure 4.3 Composition of Water Consumption by Groups - Chirchik





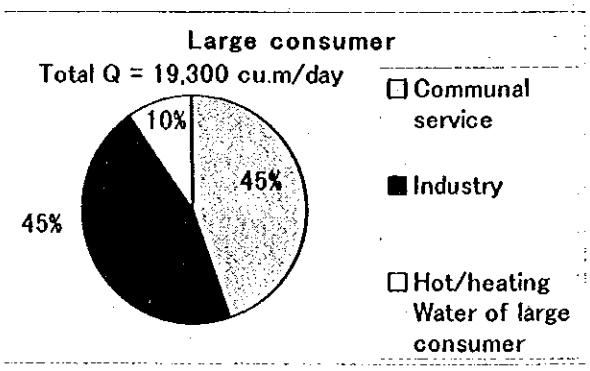


Figure 4.4 Compositions of Account-for and Unaccount-for Water - Chirchik

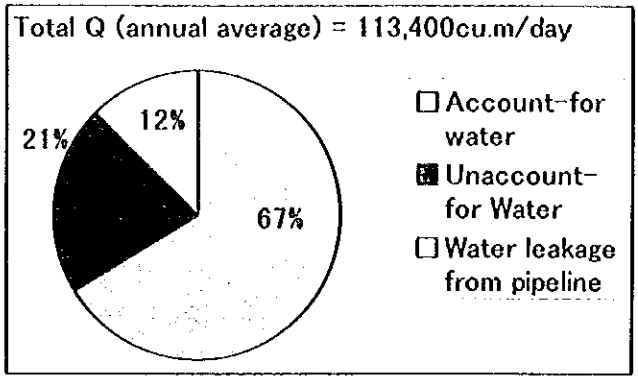
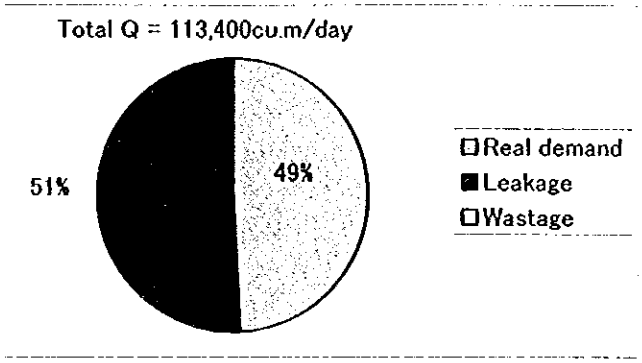


Figure 4.5 Actual Volume of Water in Demand - Chirchik



4.7.5 Facilities of Water Supply Service, and its Operation and Maintenance

The location of WTPs and other facilities of Chirchik Vodokanal is presented in Figure 4.1.

The capacity of WTPs shown in the figure is 179,000 m/d and this rate falls below the maximum volume of supplying water, that is 196,000 m^3/d. Thus, it is clear that the facilities have been operating beyond these capacities.

Many of these facilities are aging and replacement of these facilities tends to stagnate because of lack of funds. The annual budget prepared for repair and improvement of Chirchik Vodokanal is approximately 6 million sum which is less than 1/10 of the costs actually needed. The degrading condition of water

distribution pipes network is especially serious and more than 100 cases of interruptions caused by intensive water leakage, were annually recorded.

4.7.6 Issues

Chirchik Vodokanal confronts important issues that are similar to those of Tashkent Vodokanal and please refer to 3.7.6.

Chapter 5 Field Survey in Tashkent City

5.1 Questionnaire Surveys on User Awareness

5.1.1 Outline

The first and the second questionnaire surveys (the surveys) on the users' awareness of waterworks improvement in connection with this study were carried out as follows by the Study Team in cooperation with the MCS.

Table 5.1 Outline of Questionnaire Surveys in Tashkent City

	The First Survey		The Second Survey	
Survey Area	Tashkent City			
Object of survey	Individual Users	Corporate Users	Individual Users	Corporate Users
Survey methods	Distribution/collection of questionnaires to/from households and company offices selected by random sampling			
Number of samples collected	800	300	900	350
Date of implementation	August 1999		November 1999	

The main purposes of the study are: 1) to reflect the Study results in the policies of the improvement plan both for the water tariff system and for water supply management from the participating users' point of view, and 2) to reflect the Study results in designing practical education programs to enhance users' awareness of the need for the conservation of water..

The objectives of the survey are to evaluate in Tashkent individual users' awareness and the corporate users' awareness of the following key issues:

(1) Water conservation

(2) Public participation

(3) Willingness and ability to pay the present water tariff and future tariffs under the improvement program

(4) Water leakage

(5) Potential for improvements in service areas.

5.1.2 Conclusions for Key Areas of the Surveys

(1) Awareness of Water Conservation

1) Individual Users

80% of the individual users understand the need for water conservation. Their awareness of water conservation is regarded, and appropriate as 50% of the users will take practical action to reduce their expenses even if a new water tariff collection system is implemented. However, the individual users seem to consume or waste enormous amounts of water in daily life under the current fixed rate system that does not reflect the effect of water conservation.

2) Corporate Users

89% of the corporate users as a whole understand and are fairly concerned about the need for saving water. They are much more concerned about water conservation than the individual users because they try to keep the water cost low as a financial management strategy under the tariff collection system based on their meter readings.

(2) Public Participation

1) Individual Users

88% of the individual users express a high interest in Vodokanal's need to disclose information on its financial condition and in issues of public interest including water tariffs. 84% of the users are positively concerned about receiving water supply information, e.g. the users are willing to communicate with Vodokanal. This supposes that good communication is currently lacking between Vodokanal and the users. Therefore, users' awareness of the need for public participation is evaluated as positive.

2) Corporate Users

91% of the corporate users also showed a high interest in Vodokanal's financial condition and in

issues on public interests including water tariffs. 78% of the users thought that Vodokanal should be more positive about disclosing information. This also supposes that they currently lack in good communication with Vodokanal. Therefore, we may conclude that the awareness of the need for public participation among corporate users is also judged to be as positive.

(3) Opinions on Current Water Tariffs

1) Individual Users

50% and 8% of the users answered that the current water tariffs are appropriate and cheap, respectively. 58% of the uses are happy with the charges. On the other hand, 38% of the users regarded then as expensive and 4% answered that they cannot afford to pay. Therefore, a certain level of increase in water tariffs in the future would possibly be accepted. Although 18% of the users requested a cut in the water tariffs as an improvement, that is regarded as a low priority item, compared to 44% of the users who requested safe water and 28% who wanted a stable water supply as improvements.

2) Corporate Users

60% of the users regarded the current charges as appropriate and 6% as cheap. The corporate users as a whole showed that 66% are happy with the current charges. On the other hand, 31% regarded these as expensive and 3% answered that they can afford to pay. Moreover, although 14% of the users requested a cut in the water tariffs as an improvement, it is a low priority item, considering that 45% of the users requested safe water and 32% wanted a stable water supply as improvement items.

However, the results clearly indicate that 51% of the corporate users from manufacturing industries showed their discontent with the current charges; 45% of them answered that these were expensive and 6% of them answered that they cannot afford to pay. It is supposed that the cross subsidies account for the presence or absence of dissatisfaction between the users from the manufacturing industries which consume enormous amounts of water and other users whose charges are calculated at a fixed rate. Therefore, in case of an increase in water tariffs in the

future, a certain level of increase could be acceptable, but this is expected to meet with the disapproval of the users in manufacturing industries which consume enormous volumes of water.

(4) Opinions on Future Water Tariff System Based on Meter Reading

1) Individual Users

71% of the individual users considered that calculating and charging on the basis of water consumption is a fair concept. Moreover, 58% of the users, or more than half of the individual users interviewed, agreed that they should pay water tariffs according to their actual metered consumption. 72% of the users who oppose the system of reading meters answered that they will agree if a safety net in the system for the poor and the pensioner is ensured. 24% of the users answered that they will agree on condition that the charges be cheaper than the current ones. The opponents are not disagreeing with the new charge system simply because of the rise in the charges, but also because of insecurity about how the new charge system will consider and ensure a system of social justice while maintaining their basic standard of living.

64% of the individual users prefer to pay the meter installation cost by dividing it and adding it to the monthly charge. On the other hand, 30% of the users would like to pay the meter installation cost in one lump sum after installation.

2) Corporate Users

79% of the corporate users regard that calculating and charging for water based on the volume of water consumed is a fair charge system. 76% of the users agree with the charge system as a concrete measure that they pay according to their actual water consumption based on their meter readings.

55% of the individual users prefer to pay the meter installation cost by dividing it and adding to the monthly charge. On the other hand, 41% of the users would like to pay the meter installation cost in one lump sum after installation.

(5) Awareness of Water Leakage

1) Individual Users

After implementing the new tariff table system, it is expected that the level of conservation consciousness among the individual users for saving water will increase, and that they will try to check whether there is water leakage inside their houses. At the same time, this will create an increasing need to repair the leakage. However, it is expected that discontent with the repairmen and their skills will clearly exist. 43% of the individual users answered that they had noticed water leakage from water distribution pipes inside their houses. In general, 61% of them are discontented with the repair services for water leakage. 60% of the interviewed individual users felt the quality of the repairmen's services whom they hired needed to be improved. It was found that only 29.1% of the apartment resident users were content with JEK's services, and the remaining 70.9% showed their discontent.

2) Corporate Users

43% of the interviewed corporate users answered that they had noticed water leakage from water distribution pipes inside their companies. It was found that the corporate users were very concerned about water leakage. 65% of the companies replied that they need more improvement in the quality of the repair services for water leakage. In addition, 13% of the corporate users expressed the need for Vodokanal to provide information on concrete ways of preventing water leakage.

(6) Improving Water Supply Services in the Future

1) Individual Users

The highest consideration for improvement from the individual users' point of view, is the issue of safe water quality for health reasons. 44% of the interviewed users chose the item of safe water quality for health as needing improvement. Their second consideration for improvement is the issue of a stable water supply, including water interruptions and low-water pressure. 28% chose the item, a stable water supply. Their third consideration for improvement is the current

charge system including the price. 18% of the users want to cut or improve the current water tariffs. 5% of the users answered that they would like to have an improved charge system. 5% of the users expressed their need for better communication with Vodokanal.

2) Corporate Users

The highest consideration for improvement from the corporate users' point of view is also the issue of safe water quality for health reasons. 45% of the interviewed companies want to improve water quality. The second consideration for improvement is the issue of stable water supply, and 32% of them would like to have a more stable water supply. This includes issues of water interruptions and low water pressure. The third consideration is the current water tariff system including the cost. 14% of the companies expressed their wish to cut the charge or improve the charge system. 5% of the users expressed their need for better communication with Vodokanal including information on public relations. 4% of the users indicated that they want to improve the tariff table system.

5.2 Water consumption research

5.2.1 Meter Installation

Detached houses and apartment buildings were selected in the Sergeri district, and the installed meters are shown in Table 5.2.

Table 5.2 Number of Installed Meters

Type of Housing	No. of Meters	Diameter
Detached Houses	50	20 mm
Apartment Buildings (4 to 5 stories)	10	50 to 80mm
Apartment Buildings (9 stories)	5	50 to 80 mm

Ultrasonic flow meters were attached to one detached house and two apartment buildings for recording 24-hour water flows.

5.2.2 Measurement of Water Consumption with Meters

(1) Detached Houses

Selected houses (Group A) were not connected to the sewer line (the number of detached houses connected to the sewer line comprises only 25% of the houses in Tashkent City). Thus the Study Team measured other detached houses (Group B) which had already installed meters and were connected to the sewer line. After the meter installation, a metered rate system was applied to these houses in Tashkent City.

The average basic data for the detached houses in Groups A and B are shown in Table 5.3.

Table 5.3 Average Basic Data for Detached Houses

Group	Number of Houses	Number of Occupants	Total Area (x 100 sq.m)			No of Taps	Possessions	
			Total	House	Garden		Car	Livestock
A	48	5.1	6.0	1.9	2.3	2.7	56.30%	41.70%
B	17	7.1	6.6	2.4	0.9	3.5	94.10%	41.10%

Measurement of water consumption at detached houses in Group A was conducted three times, and that of Group B was conducted twice. The results of these measurements are shown Table 5.4.

Table 5.4 Water Consumption Volume Per Capita

Water Consumption/Measurement		First	Second	Third
Measured Month		Aug.	Sep.	Dec.
A-Group: (cu.m/cap./d)	Overall Average	0.617	0.714	0.250
	Omit too Large and Small	0.279	0.326	0.173
	Omit too Small	0.688	0.755	0.302
B-Group: cu.m/cap./d	Overall average	0.341	0.323	
	Omit too Large and Small	0.322	0.359	
	Omit too Small	0.463	0.359	

(2) Apartment Buildings

Table 5.5 shows the basic data of apartment buildings, and Table 5.6 shows the measured results.

Table 5.5 Average Basic Data of Apartment Buildings

Item	Occupied Units	Occupants	Average		
			Unit area (sq.m)	(person)	(sq.m/ capita.)
Value	59.7	214.3	82.7	3.6	22.9

Table 5.6 Water Consumption Volume Per Capita

Item	Measurement		
	First	Second	Third
Consumption (cu.m/capita/day)	0.617	0.603	0.501

5.2.3 Estimate of Water Consumption

The estimated results are presented below:

(1) Detached Houses

1) In general, detached houses consume a large volume of piped water, and only 10% of the houses consumed 60% of the total amount consumed by the metered houses.

2) The water consumption in the first two measurements showed the same large consumption tendency, but the consumption in the third measurement carried out in November, which was three months after the installation of the meters, showed a sharp decrease.

3) The consumption results in the third measurement were approximately same as for Group B.

Therefore, it can be concluded that the water consumption at detached houses will sharply decrease following the introduction of a metered rate system.

(2) Apartment Buildings

1) The two measurements carried out in September showed approximately same tendency, but the consumption in the third measurement in November decrease to 80% of the previous measurement.

2) Therefore, a decrease in water consumption may not be expected by the introduction of metered rate system.

3) Water consumption in summer measured by the ultrasonic flow meters revealed that the daily consumption pattern is almost constant through the day. This result indicates the presence of water leakage in the apartment buildings.

(3) Per Capita Water Consumption

When a meter has not been installed at a detached house, the volume of water consumption per capita is estimated to be 650 L/capita/day maximum and 500 L/capita/day in November.

The actual volume of water consumption per capita is shown in Table 5.7.

Table 5.7 Actual Volume of Water Consumption Per Capita

Item		All	Apartment Buildings	Detached Houses
Maximum	L/cap./d	300	270	390
Average	L/cap./d	240	230	300

5.3 Water Leakage Detection

5.3.1 Measurement of Water Flow and Pressure

The ultrasonic flow meters were attached on the distribution pipes of the Kadirya, Boz-su, Kibray and South WTPs. The measured water flow is shown in Table 3.5 (refer to 3.5.2). This flat flow pattern revealed the occurrence of a huge amount of leakage or wastage in the water distribution network.

The pressure gauges were also installed at three points in the city and on the distribution pipes of Boz-su and South WTP. The result of pressure measurements showed fluctuations, i.e. 1 to 1.5 kgf/sq.cm during the daytime and 1.5 to 2.5 kgf/sq.cm during the night in Tashkent City.

5.3.2 Water Leakage Detection

The acoustic leakage detection method and the relative acoustic leakage detection method were selected for the Study. Detection points were selected the Study Team basically in response to the various requests made to Vodokanal. However, the Study Team finally selected other target areas such as a

2.5 km.length on Umarov Street and three 4.5 km-length (with three pipes) distribution pipelines from the Kibray WTP.

The acoustic leakage sound detection survey was conducted at 20 points over a total pipe length of 25 km in Tashkent City. During the survey, technology transfer was made to the officials of Tashkent City Vodokanal who worked together with the Study Team. They became aware of leakage detection (especially after September), changed their attitude and began to study this aggressively.

5.3.3 Estimate of Water Leakage Volume and Rate

Based on the field measurements of the distribution water flow and of household water consumption, etc., a water use profile was estimated as expressed in per capita amounts. The overall average water supply was calculated at 1,091 L/capita/day of the total, of which 661 L/capita/day was for individual consumption (including hot water and heating water), another 330 L/capita/day was used by large scale users, and 100 L/capita/day represented leakage from the pipelines.

From the viewpoint of water leakage in Tashkent City, some 609 L/capita/day, or 55.8% of the above-mentioned overall average water supply (1,091 L/capita/day), was attributed to leaked water.

This water volume consists of 356 L/capita/day from individual consumption (including hot water and heating water), 153 L/capita/day from large scale users, and 100 L/capita/day from the distribution pipelines.

Chapter 6 Field Survey in Chirchik City

6.1 Questionnaire Surveys on User Awareness

6.1.1 Outline

The first and the second questionnaire surveys (the surveys) on the users' awareness of waterworks improvement in connection with this Study were carried out as follows by the Study Team in cooperation with MCS.

Table 6.1 Outline of Questionnaire Surveys in Chirchik City

	The First Survey		The Second Survey	
Survey Area	Chirchik City			
Object of survey	Individual Users	Corporate Users	Individual Users	Corporate Users
Survey methods	Distribution/collection of questionnaires to/from households and company offices selected by random sampling			
Number of samples collected	600	150	600	200
Date of implementation	August 1999		November 1999	

The main purposes and objectives of the study are the same as those in Tashkent (refer to 5.1.1).

6.1.2 Conclusions for Key Areas of the Surveys

(1) Awareness of Water Conservation

1) Individual Users

81% of the individual users understand the need for conservation water. Their awareness of water conservation is regarded as appropriate, and 60% of the users will take practical action to reduce their expenses even if a new water tariff collection system is implemented. However, the individual users seem to consume or waste enormous amounts of water in daily life under the current fixed rate system that does not reflect the effect of water conservation.

2) Corporate Users

91% of the corporate users as a whole understand and are fairly concerned about the need for saving water. They are much more concerned about saving water than the individual users because they try to keep the water cost low as a financial management strategy under the tariff collection system based on their meter readings.

(2) User participation

1) Individual Users

88% of the individual users express a high interest in Vodokanal's need to disclose information on its financial condition and in issues of public interest including water charges. 72% of the users are positively concerned about receiving water supply information, e.g. the users are willing to communicate with Vodokanal. This supposes that good communication is currently lacking between Vodokanal and the users. Therefore, users' awareness of the need for user participation is evaluated as positive.

2) Corporate Users

77 % of the corporate users also showed ar high interest in Vodokanal's financial condition and on issues of public interest including water charges. 70% of the users thought that Vodokanal should be more positive about disclosing information. This also supposes that they currently lack good communication with Vodokanal. Therefore, we may conclude that the awareness on user participation of the need for among corporate users is also judged to be as positive.

(3) Opinions on Current Water Charges

1) Individual Users

47% of the users answered that the current water charges are expensive and 18% answered that they cannot afford to pay. 65% of the users are unhappy with the charges. On the other hand, 28% and 7% of the users regarded the charges as appropriate and cheap, respectively. In

particular, 72% of the apartment residents without meters are unhappy with the fixed rate (51% and 21% answered expensive and cannot afford to pay, respectively). Considering that the fixed rate in Chirchik is 1.7 times higher than the fixed rate in Tashkent City, and that the average income of the users in Chirchik is lower than that in Tashkent City, we understand why most users have complaints about the tariff. Although 16% of the users requested a cut in the water charges as an improvement, it is a low priority item when compared to 50% of the users who requested safe water and 32% who wanted a stable water supply as improvements. Therefore, if there is a need to increase the utility charges, Vodokanal should examine this carefully and consider the needs of the apartment residents and an improvement in services for them.

2) Corporate Users

62% of the users regarded the current charges as appropriate and 8% as cheap. The corporate users as a whole showed that 65% are happy with the current charges. On the other hand, 30% regarded these as expensive. Moreover, although 16% of the users requested a cut in the water charge as an improvement, it is a low priority item, considering that 46% of the users requested safe water and 31% wanted a stable water supply as improvement items.

However, the results clearly indicates that 80% of the corporate users from manufacturing industries are discontent with the current charges and 80% of them answered that the charges are expensive. The charges based on the metered rate in Chirchik are three times as expensive as in Tashkent City. However, the average returns of the companies in Chirchik are relatively low. That is why more companies in Chirchik answered that the water utility charges are expensive.

As for the situation of cross subsidies, there was a high level of discontent among both the individual users living in apartment blocks, who pay charges based on a fixed rate, and the users in manufacturing industries which consume high volumes of water and pay their charges based on the volume of consumption measured by meters. The presence or absence of a disparity in the level of discontent between the individual users and corporate users was not remarkable compared to that in Tashkent City. Therefore, if Vodokanal considers an increase in the rate of

water charges in the future, a certain level of increase could be acceptable, but it is expected that the users in manufacturing industries which consume enormous volumes of water will rebel against any such increase.

(4) Opinions on Future Water Charge System Based on Meter Reading

1) Individual Users

81% of the individual users considered that calculating and charging for water on the basis of consumption is a fair concept. Moreover, 63% of the users; or more than half of the individual users interviewed, agreed that they should pay water charge according to their actual metered consumption. 53% of the users who oppose the system of reading meters answered that they will agree if a safety net in the system for the poor and the pensioners is ensured. 43% of the users answered that they will agree on condition that the charges be cheaper than the current ones. The opponents are disagreeing with the new charge system not only because of the rise in the charges, but also because of insecurity about how the new charge system will consider and ensure a system of social justice while maintaining their basic standard of living.

79% of the individual users prefer to pay the meter installation cost by dividing it and adding it to the monthly charge. On the other hand, 15% of the users would like to pay the meter installation cost in one lump sum after installation.

2) Corporate Users

68% of the corporate users regarded calculating and charging for water based on the volume of consumption is a fair charge system. 62% of the users agreed with the charge system as a concrete measure that they pay according to their actual water consumption based on their meter readings.

44% of the individual users prefer to pay the meter installation cost by dividing it and adding it to the monthly charge. On the other hand, 53% of the users would like to pay the meter installation cost in one lump sum after installation.

(5) Awareness of Water Leakage

1) Individual Users

After implementing the new tariff collection system, it is expected that the level of consciousness among the individual users for saving water will increase, and that they will try to check whether there is water leakage inside their houses. At the same time, this will create an increasing need to repair the leakage. However, it is expected that discontent with the repairmen and their skills will clearly exist. 41% of the individual users answered that they had noticed water leakage from water distribution pipes inside their houses. In general, 71% of them are discontented with the repair services for water leakage. 60% of the interviewed individual users felt the quality of the repairmen's services whom they hired needed to be improved. It was found that only 16.2% of the apartment resident users were content with JEK's services, and the remaining 83.8% showed their discontent.

2) Corporate Users

It was found that the corporate users were also very concerned about water leakage. 22% of the interviewed corporate users answered that they had noticed water leakage from water distribution pipes inside their companies. 51% of the companies replied that they need more improvement in the quality of the repair services for water leakage. In addition, 12% of the corporate users expressed the need for Vodokanal to provide information on concrete ways of preventing water leakage.

(6) Improving Water Supply Services in the Future

1) Individual Users

The highest consideration for improvement from the individual users' point of view, is the issue of safe water quality for health reasons. 50% of the interviewed users chose the item of safe water quality for health as needing improvement. Their second consideration for improvement is the issue of a stable water supply, including water interruptions and low water pressure. 32%

chose the item, astable water supply. Their third consideration for improvement was the current charge system including the cost. 16% of the users want to cut or improve the current water charges. 1% of the users answered that they would like to have an improved charge system. 1% of the users expressed their need for better communication with Vodokanal.

2) Corporate Users

The highest consideration for improvement from the corporate users' point of view is also the issue of safe water quality for health reasons. 46% of interviewed companies want to improve water quality. The second consideration for improvement is the issue of stable water supply, and 31% of them would like to have a more stable water supply. This includes the issues of water interruptions and low water pressure. The third consideration is the current water charge system including the cost. 16% of the companies expressed their wish to cut the charge or improve the charge system. 3% of the users expressed their need for better communication with Vodokanal including information on public relations. 3% of the users indicated that they want to improve the tariff collection system.

6.2 Water consumption research

6.2.1 Meter Installation

Detached houses and apartment buildings were selected in the highlands district, and the installed meters are shown in Table 6.2.

Table 6.2 Number of Installed Meters

Type of Housing	No. of Meters	Diameter
Detached houses	50	20 mm
Apartment buildings (4 to 5 stories)	10	50 to 80 mm
Apartment buildings (12 stories)	1	50 to 80 mm

6.2.2 Measurement of Water Consumption with Meters

(1) Detached Houses

Half of the selected houses were not connected to the sewer line (the number of detached houses connected to the sewer line is only 20% of the houses Chrchik City). After the meters were installed, a metered rate system was not adopted for these houses in Chirchik City.

The average basic data for the detached houses is shown in Table 6.3 and the water consumption data calculated is shown in Table 6.4.

Table 6.3 Average Basic Data for Detached Houses

Item	No. of Occupants	Total Area (x100 sq.m)			No of Taps	Possessions	
		Total	House	Garden		Cars	Livestock
Value	3.7	4.9	1.0	0.5	2.2	8.7%	0%

Table 6.4 Water Consumption Volume Per Capita

Water Consumption/Measurement		First	Second	Third
Measurement Number		24	46	34
Measured Month		Aug.	Sep.	Dec.
Consumption : cu.m/cap/d	Ocerall Average	0.636	0.748	0.507
	Omit too Large and Small	0.479	0.281	0.374
	Omit too Small	0.636	0.794	0.507

(2) Apartment Buildings

Table 6.5 shows the basic data of apartment buildings, and Table 6.6 shows the measured results.

Table 6.5 Average Basic Data of Apartment Building

Item	Occupied Units	Occupants
Value	55.7	153.4

Table 6.6 Water Consumption Volume Per Capita

Item		Measurement		
		First	Second	Third
Consumption (cu.m/capita/day)	All	0.685	0.455	0.508
	Omit too small	0.685	0.516	0.569

6.2.3 Estimate of Water Consumption

(1) Detached Houses

1) Meter installed detached houses consumed a large volume of piped water, but 13% of the houses consumed 47% of the total water.
2) Compared with the second measurement, water consumption of the first one was low, but only 24 meters were installed before the first measurement. Thus the first and the second measurements indicated the same tendency.

Water consumption recorded in the first and the second measurement was estimated at over 700L/capita/day, and that in the third measurement was about 500L/capita/day, a decrease of 30%, to 70%.

(2) Apartment Buildings

Water consumption in the first measurement in August was as large as 685 L/capita/day, and the second and the third consumption showed a decrease to about 80% at 500 to 550L/capita/day.

(3) Individual Consumption

1) Individual consumption is estimated at 650 L/capita/day maximum, and at 500 L/capita/day for November.
2) Actual individual consumption is estimated as shown in Table 6.7.

Table 6.7 Actual Volume of Water Consumption Per Capita

Item		All	Apartment Buildings	Detached Houses
Maximum	L/cap./d	300	260	420
Average	L/cap./d	240	230	300

6.3 Water Leakage Detection

6.3.1 Measurement of Water Flow and Pressure

Ultrasonic flow meters were attached at the distribution pipes of Chirchik WTP, No. 1 Intake, No. 3 Intake, and No. 6 Intake. The measured records are shown in Table 4.3 (refer to 4.5.1)

The pressure gages attached at four points in the city WTP. The results indicate large fluctuations in pressure, i.e. 4 to 4.5 kgf/sq.cm in the daytime and 1.2 to 3.7 kgf/ sq.cm at the night for consumers in the city.

6.3.2 Water Leakage Detection

The sonic detection method and the relative sonic detection method were selected as methods for detection of water leakage the study. The detection points were selected from viewpoint of low interference with traffic and possibility of leakage.

According to Chirchik City Vodokanal, water leakage is easily found since the ground is adhesive and has slopes and thus leaked water spurts out of the ground. Based on the Study Team's discussion with Vodokanal staff, there is little need for water leakage detection.

6.3.3 Estimate of Water Leakage Volume and Rate

The average water consumption is estimated as 777 L/capita/day of the total, 548 L/capita/day for individuals (including hot water and heating water), 132 L/capita/day for large consumers and 97 L/capita/day for water leakage from the pipelines.

Water leakage is estimated as 396 L/capita/day (51% of the average of volume consumption in Chirchik City) of the total, 260 L/capita/day for individuals (including hot water and heating water), 39 L/capita/day for large consumer and 97 L/capita/day from the pipelines.

Chapter 7 Proposed Solutions for Tashkent City Vodokanal

This chapter refers to the proposed solutions to the issues in water supply services in Tashkent City stated in chapter 3. Firstly, the awareness of the issues and basic elements of solutions are discussed in 7.1. The detailed solutions are stated according to certain factors; finance and management in 7.2, tariff collection in 7.3, tariff table in 7.4, introduction of a computer system in 7.5, public participation in 7.6, and maintenance and operation in 7.7. A summary of the solutions is finally identified according the level of importance in chapter 7.8.

7.1 Overview of Proposed Solutions

7.1.1 Issues on Water Supply Services in Tashkent City

The current issues of water supply services in Tashkent City are roughly summarized as below.

(1) A project of installation of water meters at public users' sites has not proceeded as planned, and the users in general public are charged water bills based on fixed rate system. Also, there is a large gap in charges between the general public and corporations.

(2) As the result, large extent of precious water resources have been wasted and Vodokanal has spent on the costs of wasted water treatment and supply.

(3) A lag in water tariff policy creates that the financial foundation becomes weak because sufficient water charges can not be collected to offset these wasted costs and the facilities and equipment are not adequately maintained as required.

7.1.2. Step-by-step Approach

The Study Team set up three stages so that each stage has an aim to be targeted in order to draft solutions to the above issues.

(1) The First Stage - Provision of Requirements for a Self-Supporting System

The targets for the 1st stage are :

1) To change the collection system from a fixed rate to a usage-based rate
2) To reform the charge policy
3) Clear clarification of the division of responsibility between the government and Vodokanal and establishment of a system
4) Introduction of the concepts of capital reservation and profit reservation – developments of mid- and long-range management plans
5) To design and implement an improvement program for efficient management
6) To design and implement an introduction program for computer system
7) To enrich information disclosure on accountability
8) Introduction of sound accounting principles
9) To employ standard and specified parts
10) To inaugurate domestic liaison meetings on reforms in the water works business in Uzbekistan
11) To carry out technology transfer from overseas including the introduction of management techniques.
12) Maintaining and repairing apartment buildings
13) To implement an evaluation of the current facilities and to design an investment plan for new facilities with the aims of improving both the services and the efficiency of management operations
14) Improving other water supply services
15) To prepare and implement an enlightenment and education program to promote water conservation
16) To reform and establish the organization and legal systems which would enable these targets to be achieved.

(2) The Second Stage - Establishment of Business Operations on a Self-Supporting Basis and Initial Preparations for Privatization

The targets for the second stage are as follows. With respect to certain of these targets, preparations for a financial system and credit market are stressed as essential external environmental

elements, which are too difficult to achieve during the first stage.

1) To establish an efficient system of the collection using bank accounts
2) To implement the collection of charges reflecting mid- and long-term investment costs
3) To raise capital locally through Vodokanal and abroad on overseas credit markets
4) To implement investments on plant and equipment in order to improve the efficiency of management
5) To introduce computerization with the aim of achieving labor-saving automation
6) To examine and implement a policy to excessive personnel
7) To stabilize the financial condition of Vodokanal

(3) The Third Stage - Operation on a Self-Supporting Basis and Examination of Privatization

The targets for the third stage are :

1) To examine privatization and conduct deliberations with the unions
2) To transfer technology to other cities and countries

7.1.3 The Proposed Solutions by Stages

In order to achieve the above stages and targets, we propose the following measures to ensure reforms.

(1) The First Stage – Requirements for a Self-Supporting System

1) Converting the Charge System from a Fixed-Rate to a Usage-Based System

Converting the charge system for the collection of utility charges from a fixed-rate to a usage-based system is necessary so that water consumption is controlled and the water works business can operate as a self-supporting system. However, this has not proceeded as expected due to problems with the method of collecting the meter installment costs, as outlined in Section 3.6.1. The following solutions to this problem are proposed.

Proposed solutions:

i) The costs for the installation costs of the meters should be included in the basic utility charges and be collected uniformly from all the water users. A period of 5 years will be necessary to complete the installation which the government has designed.

ii) In this first stage, meters to apartments shall be initially installed only on shared tap. Whether or not a meter is installed for each household depends on the decision of each apartment block.

iii) Vodokanal shall manage the apartments blocks with the shared taps and collect the charges based on the readings of the meter on the shared taps.

2) Changes in Charge Policy

A new charge policy should be introduced as outlined below along with the conversion of the charge system from a fixed-rate basis to a usage-based system.

Proposed solutions;

i) The revised charge system is designed to facilitate conversion from a fixed-rate to a usage-based rate.

ii) The usage-based system will employ increased block rates in order to encourage the conservation of water.

iii) Portion of the fixed costs including the meter installation costs is collected at a basic rate

iv) The charge system has been carefully designed to consider various aspects of the social safety net.

v) It is necessary to design a charge policy from mid- and long-term point of view as well as a policy which will operate from the present through 5 to 10 years in the future. In this first stage, a period of approximately 3 years is the target period for calculation of utility charges.

vi) The disparity between the charge for the general public and for corporations is regarded as appropriate compared with international standards although the living conditions of the population are a concern.

3) Clear Clarification of Responsibility between the Government and Vodokanal and Establishment of a System

It is necessary to clarify the roles played by the government as an administrative body and Vodokanal as a waterworks business body play. The following points can be stated.

i) A plan for plant and equipment investment has already been designed and established. For this purpose, Vodokanal should raise the initial funds and handle the construction.

ii) The government should be in charge the expenses related to the various aspects of the social safety net.

iii) In cases where the government exempts certain existing form water tariffs, the government should bear the related cost.

4) Introduction of the Concepts of Capital Reservation and Profit Reservation – Developments of Mid- and Long-Range Management Plans

It is necessary to prepare mid-term and long-range plans for the introduction of the new charge policy for future operation based on a self-supporting system. Therefore, it is necessary to develop mid- and long-range management plans incorporating the concepts of capital reservation and profit reservation to replace the current management strategy which emphasizes single fiscal year accounts.

5) Designing and Implementing a Program for the Improvement of Management Efficiency

i) Managerial accounting should be introduced. This would include the introduction of an analysis of standard cost and actual budget variance which will lead to cost reduction.

ii) This system aims at an improvement of the incentives for employees which can be achieved by a reexamination of the current personnel evaluation system, the establishment of a proposal system, and the introduction of uniform and the enforcement of quality control activities, and so forth. Moreover, if the results of a comprehensive evaluation of personnel are duly reflected in their wages, a result of a rise in present wage levels should be regarded as inevitable.

6) Designing and Implementing the Introduction of Computerization.

i) As the method of collection is to be changed as a result of the installation of meters, a new computer system needs to be designed and phased in.

ii) With the shift to usage-based charges, the system for the collection of charges employing portable terminals.

iii) Improvement of the banking system in Uzbekistan is necessary for the introduction of computerization regarding tariff collection. However, at present, the banking system is not enough and the general public does not use the bank account so much. And so tariff collection is a difficult for Vodokanal from the viewpoint of workload and cost. On the other hand, the introduction of an advance payment system would decrease the workload of tariff collection. If Vodokanal offers a discount for advance payment, the number of users who make payments will increase. Thus discounts are used to make advance payments as attractive option. The introduction of such discount system may be considerable until the banking system is improved.

7) Disclosure of Information for the Purpose of Accountability

i) It will be necessary to introduce a new charge system based on sound financial operations and mid- and long-range plans and prepare cash flow statements for self-financing in the future.

ii) To clarify the entrusted responsibilities of management, it will be necessary to enhance the documents which support water works business report. Reference should be made to various reports including the annual reports disclosed by water works organizations in other countries.

8) Introduction of Fair Accounting Principles

The following points assume that the current system of accounting does not present the reality and should thus be improved.

We propose that :

i) An allowance for repairs be provided based on an evaluation of the current facilities.

ii) The introduction of proper inflation accounting be taken into consideration.

iii) Disclosure of net amounts be charged to disclosure of accounts receivable and advances

iv) Unrecoverable claims be treated as bad debts and covered by an allowance for bad debts.

v) Evaluation of retirement pension property and debt

State-owned retirement pension trustees already exist and the following issue concerning retirement pensions does not apply only to Vodokanal. This will become an information disclosure item in the future.

9) Employing Standardized and Specified Parts

The ROU has industrial standards of the Soviet Union, but they do not suit the actual needs in the current water supply services. The standards can not match the parts needed for repairing of water pipes and facilities in apartment blocks. Thus, this problem often generates inefficient work and bad conditions in the works. Although Vodokanal has planned to build a factory to produce standard parts at home and adopt unified and standard parts, it has not been realized in reality. Therefore, Vodokanal should speed up to realize this plan and examine whether or not to import the standard parts that can not be covered in this plan.

10) Inaugurating Domestic Liaison Meetings to Promote Reforms in the Waterworks Business in Uzbekistan.

The managerial and technical problems have much in common although the locations may differ. Therefore, it is necessary to promote exchanges primarily at the level of the personnel in charge and to inaugurate domestic liaison meetings.

11) Carrying out Technology Transfer from Other Countries Which are at Forefront of the Introduction of Management Techniques

Further technology transfer from overseas should be promoted in order to facilitate the shift to operation on a self-supporting basis. Continuous technology transfer with various countries, including Japan, will be required.

12) Maintaining and Repairing Apartment Buildings

JEK is in charge of the maintenance and repair of apartment buildings, a current survey shows the need to improve the practice of maintenance and repairs.

13) Conducting an Evaluation of the Current Facilities and Designing New Investment Measures for Plant and Equipment Aiming at Improving Services and the Level of Efficiency in Business Operations

Many of the present water works facilities were built in the time of the Soviet Union and have already exceeded their period of durability, or will exceed within the next 10 years. Although Vodokanal is trying hard to maintain these facilities, there is no statistical data on the remaining period of technical durability. Therefore, a technical re-evaluation of the facilities is required.

Due to the introduction of usage-based rates, water consumption is expected to decrease and the level of the water supply will be also reduced. However, this will create a surplus in terms of the use of the facilities. Therefore with regard to the facilities after water consumption has been, constructing a water reservoir and scrapping outdated plants should be examined. In addition, the reconstruction of certain facilities will be required so that the level of operating efficiency can be improved. Consequently, concrete investment measures for plant and equipment need to be designed.

14) Improving Other Water Supply Services

The results of the questionnaire show a great deal of dissatisfaction by the population with the cloudy appearance of the drinking water. Vodokanal has the responsibility to deliver safe water to the end users as part of its water services, it is necessary to establish a organization, i.e. a water quality management section to settle this type of issues. The improvement of water quality and water supply services is necessary to justify increasing the water tariffs.

15) Designing and Implementing an Enlightenment and Training Program to Raise Public Consciousness Concerning Water Conservation

Vodokanal is taking an active role in publicizing on water conservation. However, there is much room for improvement in the substance and means. For example, introducing a way to spread the information, establishing the necessary organization, and carrying out a training program for water conservation an early age could be added to accomplish this goal.

16) Reforming and Establishing Organization and Legislation to Enable the Above Targets to Be Met

Measures to meet the targets above would involve changes and the establishment of an organization. In addition, the preparation of legislation is necessary to realize the solutions.

(2) The Second Stage - Establishment of Business Operations as a Self-Supporting System and Preparation for Privatization

The targets for the second stage are as follows. In the second stage, the implementation of the measures for improvement adopted in the first stage are continued and, thus, the second stage primarily involves a credit market and a financial system which would be difficult in the first stage as they are external elements.

1) Establishing an Efficient Tariff Collection System Using Bank Accounts

If the general public open bank accounts in the future, an automatic deduction system could be introduced. Transactions between the banks and Vodokanal should be dealt with by electronic data processing.

2) Implementing a Tariff Collection System Reflecting Mid- and Long-Term Investment Costs

After meters have been installed, this system of measurement should reinforce the fundamental rule that the water supply users as beneficiaries bear their own costs so that water tariffs can be rationally reflected in the investment costs of each business operation. Therefore, by designing concrete mid- and long-term investment plans, the sum of such legitimate costs can be incorporated into a usage-based table of utility charges.

3) Implementing Fund-Raising at Home by Vodokanal and Abroad through Overseas Credit Markets

Vodokanal needs to raise funds on its own for the legitimate costs involved in future investments in its water works operations. Vodokanal should be able to raise funds by issuing bonds if a domestic credit market is well established. However, if this kind of credit market is not available, Vodokanal needs to look to other parties for financing. In any case, this would

require financial stability and some form of guarantee by the government, etc. so that loans can be obtained.

4) Introducing Investments in Plant and Equipment in Order to Improve the Efficiency of Business Operations

Investments in plant and equipment should be undertaken with a view to improving the efficiency of business operations based on the measures designed in the first stage.

5) Introducing a Computer System to Achieve Labor-Savings Automation

A computer system aimed at achieving labor-saving automated should be introduced based on the plan designed in the first stage.

6)To Examine and Implement a Policy to Excessive Personnel

It is anticipated that a large number of personnel would be redundant as a result of the changes mentioned above. Therefore, the following measures could be taken to cope with this situation:

i) As a Result of Improvements in Management, Redundant Personnel could be Absorbed into Newly Established or Expanded Sections.

The following sections can be identified as newly established or expanded:

- Cost management section
- Capital section
- Accounting section
- Information management section (computing section)
- Central monitoring center
- Public relations section
- Water quality research section
- Environment section

ii) Introducing a Retirement System

7) Financial Stability of Vodokanal

As a requirement for privatization, the financial condition of Vodokanal must be stabilized by implementation of the reforms outlined above.

(3) The Third Stage – Self-Supporting Operations and Examination of Privatization

1) Examination of Privatization and Holding Deliberations with the Unions

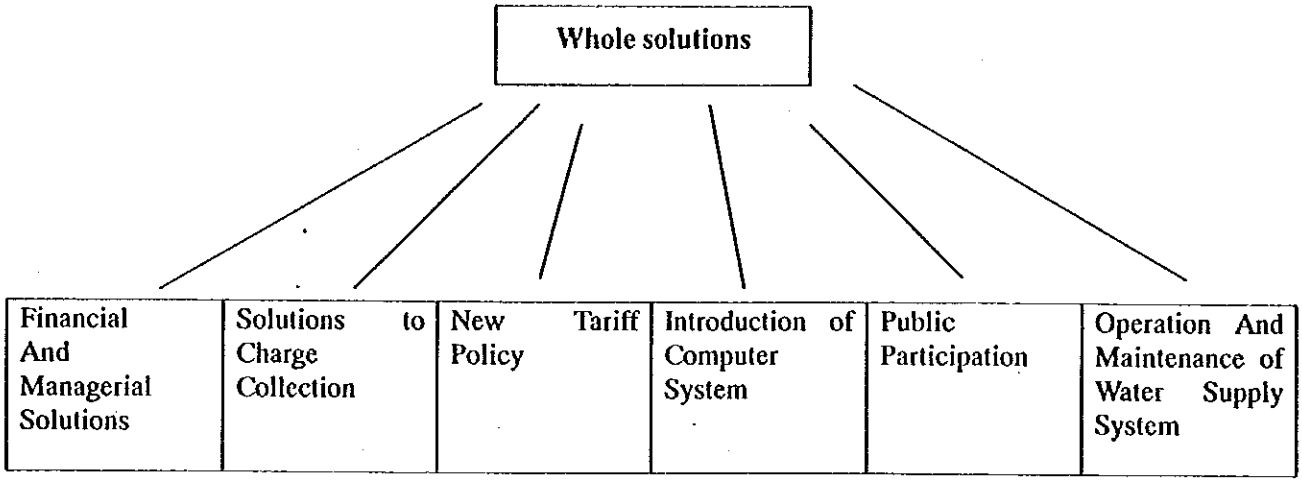
Any decision on privatization with the implication of forming joint-stock companies will require much circumspection. This issues would raise significant problems in reaching agreement with the various unions involved.

2) Technology Transfer not only with Other Cities but also with Other Countries

It can be safely said that the original goals in reforming the water works business should have been achieved by the third stage. By this time, it should be possible for Vodokanal to transfer technology not only to other cities in Uzbekistan but also to other countries, thus making use of their experience.

7.1.4 Solution to Each Factor

Detailed factors are stated according to the factors as follows.



7.2 Solutions to Finance and Management

We propose the following items regarding finance and management portion.

(1) Reconsideration of Procedures Regarding Installation of Meters

1) Cost

In Tashkent, the users currently buy the meters, and related regulation officially issued by the Mayor states that payment should be completed within one year of purchase. Chirchik is also following this system. Basically, it would be preferable if the local government loan Vodokanal for the costs to purchase the meters and lend meters to the users. In such case, the total cost would be covered by the water tariff generally and gradually.

2) Technical Problems

There are cases where water is supplied to an individual house through multiple pipes. In the end, a house - one water pipe system would be ideal. An estimate of the costs is necessary to make this possible and to solve any problems that may occur during this period. Furthermore it will be necessary to make new laws in this respect. Even if a multiple pipe system is approved in order to obtain a higher total consumption of water, there should be a difference between a shingle pipe and a multiple pipe system. Furthermore, those who do not cooperate in collect the total water consumption will be penalized. In the case of apartment buildings, a single water pipe system shared by a number of units is recommended at first and this will eventually lead to a one house - one water pipe system. As for the payment of water tariffs, there will be based on the number of family members. The details will be determined by Vodokanal. It is necessary to elect a leader at each apartment building who will control the water usage and savings.

(2) Conservation of Water

At present, Vodokanal is making an effort to promote water conservation among the users. The tariff collection is based on a revised tariff table after the installation of the water meters. Those who installed meters can expect great savings in their water consumption. However people are required to conserve much more water.

To enable the public to understand the necessity of water saving information, the disclosure of a summary of costs, entries on invoices and newspaper articles on electricity quoting various international figures are required.

Collection of more data and a further analysis of water consumed during the night so that an excessive amount of water is not be used at night by Vodokanal (especially in Tashkent) is further necessary.

(3) Management

1) Introduction of Reserves

It is essential that the public gain a clear understanding of the concept of reserves. The new tariff system is based on 3 year total costs. Therefore, initial funding is abundant, but a separate reserve should be kept for future wage payments. Parameters used at the time when the new tariff system was set up should be used for this gradual payment.

Introduce tariff provisions for large and medium-scale maintenance and repair costs. Vodokanal should calculate an estimate of future repairs.

The current depreciation expense based on acquisition costs is too small to replace the water supply facilities due to recent inflation. Although it is said that the Government of Tashkent will reconsider provisions for replacement costs and large-scale repair costs by 2010, it is necessary to evaluate fixed assets and to reflect the necessary cost of reserves in the water tariff.

2) Clarification of Responsibilities between the Government and Vodokanal

Currently, new investments for the expansion of facilities and large-scale replacements are made by the government. In the future, however, Vodokanal needs to reserve capital, the reason being that it is a Vodokanal which must function n a self-supporting basis.

On the other hand, budget organizations under the government control costs relating to the social safety net, water tariff exemption for certain enterprises under government policy. The unpaid receivables of these budget organizations should be paid by the government, and not by Vodokanal.

It is necessary to revise the present tariff system if Vodokanal is to take part in any investment program. A revision of the tariff system is required. At first, Vodokanal will pay a certain percentage of the investment. The government will set up a special account for this purpose.

3) Improvements in Management Control

Management accounting should be employed.

Currently no management target figures or indicates have been determined. The Vodokanal compares actual costs with budget costs and tries to control expenses by keeping to the budget. However, Vodokanal has not established standard costs and, thus even if actual costs exceed budget costs, Vodokanal substantially cannot analyze the reasons for the overrun. As a result, no analysis by classifying cost into variable and fixed costs has carried out. Vodokanal says that they understand that it is necessary to analyze costs as outlined above, but it is difficult to establish standard costs, especially standard prices due to the high rate of inflation. We believe that cost analysis is important to provide feedback on the business operations and to improve operating efficiency. As it is necessary to establish standard costs for an effective cost analysis. We propose the following:

i) Vodokanal should employ the management accounting as a mentioned above, and classify the differences between actual costs and the budget costs to the price and quantity differences. Generally speaking, a quantity difference indicates operating efficiency and the Vodokanal can improve its operations by analyzing the quantity differences and feeding this data regarding operation back to each department. As a result, if Vodokanal succeeds in improving business operations and can achieve certain business targets, the benefits from the improvement should be returned to the employees or to the users. Employees would be given some incentive if this system were adopted.

ii) In addition, information on this process should be disclosed to the public.

iii) In order to carry out this type of analysis the Department of Capital Construction or the Planning Department should be expanded or a new Cost Management Center should be established.

iv) The present situation of the water supply facilities should be ascertained. In particular, a thorough assessment of the aggregate amount of the water supply needs to be undertaken.

v) Drawings need to be organized and retained on file.. For shortage and retrieval, microfilming might be considered as an option.

vi) The system for disclosing information regarding Vodokanal's business activities should be improved. This can be achieved by publishing a newsletter and an annual report. An awareness of the publications and methods of disclosure employed in foreign countries would be useful for Vodokanal to improve disclosure.

vii) Tariff collection is a difficult for Vodokanal from the viewpoint of workload and cost. On the other hand, the introduction of an advance payment system would decrease the workload of tariff collection. If Vodokanal offers a discount for advance payment, the number of users who make payments will increase. Thus discounts are used to make advance payments as attractive option..

viii) The aggregate amount of cash collected in advance and accounts receivable should be kept separate. At present, Vodokanal nets amount of advance payment against accounts receivable and as a result, these figures are not correctly presented in the balance sheet. It is necessary to segregate these figures in order to accurately ascertain Vodokanal's financial position.

4) Increase in the Level of Motivation among Employees

i) Uniforms are provided to all staff in Vodokanal. This gives the staff self-confidence. This also ensures safety ,as staff and outsiders can be clearly distinguished . Moreover, any claims from the community can be dealt with promptly. For these reasons, the uniforms should display a logo and should be a distinctive color. Ideas on selection can be collected from the community so that mutual understanding is deepened.

ii) A system should be implemented to encourage suggestions from the staff which would motivate them. Compensation for such suggestions ciykd be given in cash or through a point as a further incentive. Vodokanal says there is already a similar organization in within Vodokanal. If this is the case, it may be necessary to improve how it function. . It would be useful to consider the incentive systems methods employed in foreign countries to improve the suggestion referral system of Vodokanal.

iii) A new section to examine suggestions offered by employees will be set up.

5) Improvement in Services

As a result of revisions to the tariff table, the water tariff will increase. Thus, it is necessary to improve water services as follows as follows for the increased utility charges:

i) A section to listen customers' comments set up to improve the customer service.

ii) A public hearing on the revision of the tariff should be held in the community.

iii) As a result of our questionnaire, it would appear that many users have complaints and are concerned about the cloudy appearance of the water. Therefore, a report on water quality for the end users is extremely urgent. A survey section should be formed.

6) Improvement in Computer System

Ideas for the improvement of the computer system are outlined in Chapter 7.5.

(4) Facilities and Equipment

The aspects of the facilities and equipment are outlined in 7.7 in detail. In future, there will be a need to examine whether or not reservoir should be constructed.

(5) Technology Exchange Meetings

In order to implement suggestions, technology exchange meetings involving both management and technical experts should be held on a quarter or semiannual basis between Japan and Uzbekistan.

(6) External Factors

The points below are external environmental factors related to the water supply project, although they exceed the scope of our suggestions.

1) The present situation of the double exchange rate should be eliminated, in order to reconstruct industries and improve the financial system. It has been estimated that this problem can be solved by the year 2000.

2) In order to foster the growth of the computer industry, improvement of the leasing market, the protection of intellectual property rights and the strict laws for preventing hackers are necessary. A program for technology exchange and meetings to recruit technicians would also be desirable.

3) The entire communications infrastructure needs to be upgraded. At this point, satellite communication, mobile telephones and "intelligent" terminals can be introduced.

7.3 Tariff Collection

To achieve healthy management and to innovate appropriate technology by building a water conserving society, the following solutions are proposed for Tashkent City.

Solutions to tariff collection are as follows;

(1) Solutions to Metered Rate System

1) It is necessary to establish a system for inspecting the meters and meter installation standards, which will lead to an improvement in public acceptance of the proposed metered rate system.

2) It is important to build up an efficient meter reading system using hand-held terminals/loggers.

(2) Solutions to Tariff Collection

1) JEK's commission should be reconsidered as a more appropriate and cheaper commission for the fee collection should be found from the viewpoint of management.

2) Billing and collection should be simplified by introducing the mailing of water bills.

3) It is required to reduce the settlement sum in order to ensure stable salary payments to Vodokanal's staff.

4) At the second stage of the improvement plan, an automatic deduction system from the users' bank accounts should be introduced for the payment of water utility bills.

7.4 Introduction of Suitable Tariff Table

The Study Team considered a long-term tariff policy and goals for a self-supporting system under a market economy. Fig 7.1 shows our proposed tariff policy.

7.4.1. Revised Tariff Policy

We proposed a revised tariff table for a middle- and long term period shown by Fig 7.1.

Our consideration for the revised tariff table is as follows;

1) Promotion of meters instruction system

2) Incentives of water conservation

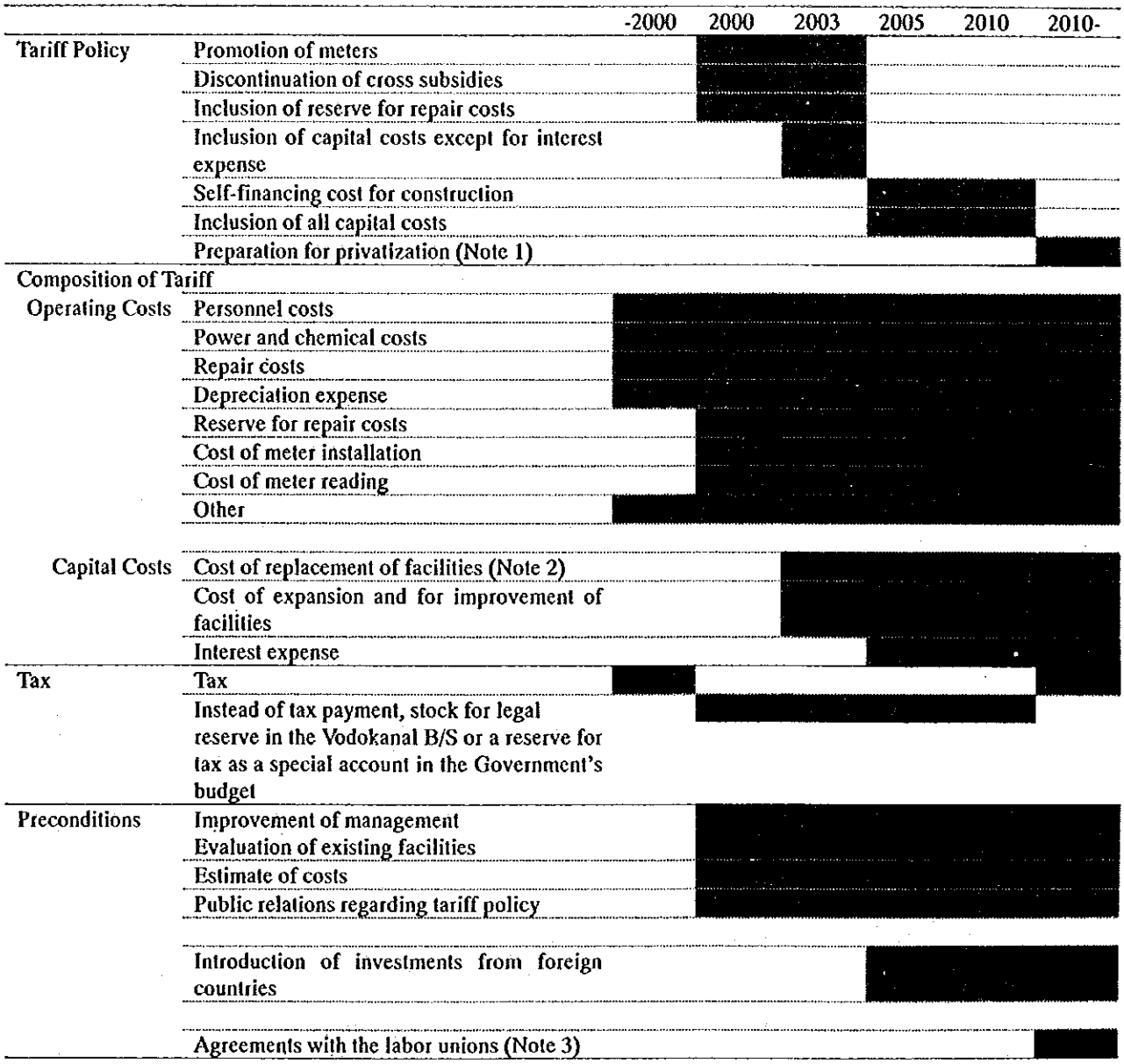
3) Covering the cost for the installment of meters by collection of tariffs

4) Consideration for low income families (Social Safety Net)

5) Percentage of water tariff to total cost of living

6) Elimination of cross-subsidies with consideration of affordability by population, referring to global standard.

Figure 7.1 Proposals for New Tariff Policy



Note 1: The government authorities have already considered the introduction of private financing of Vodokanal. Therefore this "preparation for privatization" means that the Vodokanal will be reconstituted as a joint-stock company and the government will draft a concrete plan for reforming Vodokanal.

Note 2: The government authorities say some of the costs for replacement have already been included in the composition of the tariff.

Note 3: The government authorities enter into agreements every year with the labor unions regarding the conditions of employment. Therefore the purpose of "Agreement with Labor Unions" is to more towards privatization.

7.4.2 The Revised Tariff Table

In order to revise tariff table, the progressive charge including a basic charge was chosen as metered rate system. The following table presents the revised tariff table applicable for the period of from 2000 to 2002.

Table 7.1 Proposed Revised Tariff Table for Tashkent City (Applicable Years : 2000-2002)

	Users		Water supply
Norma	Population 80 sum		Sum/month/person =5 Sum/m30.534m330 days
Metered	Population 0~10m3 11~20m3 21~30m3 31~40m3 41~50m3 51m3~		Basic payment 40 Sum/month 4.5 Sum/m3 5 6 7 8.22
	Budget Organizations		5 Sum/m3
	Self-accounting Communal Organizations		8.22 Sum/m3
	Production, Transportation, Construction, etc.		8.22 Sum/m3
Collection of costs of the meters	For all users		55 sum
Social Safety Net	Norm	Monthly living expenses 0-5,000 sum	A Cost of the meters amounting 55 sum is free. Sum/month/person =40 sum
		5,001-10,000	A Cost of the meters amounting 55 sum is free.
	Metered	Monthly living expenses 0-5,000 sum	A Cost of the meters amounting 55 sum is free. A Cost of basic payment amounting 40 sum is free.
		5,001-10,000	A Cost of the meters amounting 55 sum is free.

Value Added Tax (VAT) is charged on the above prices.

7.4.3 A Method to Set Up Revised Tariff Table

Setting up a new tariff policy followed the following procedure:

(1) Total costs in relation to water supply services from 2000 to 2003 are estimated based on the new tariff policy presented in 7.4.1. The total costs are 11,597 million sum (A).

(2) Nextly, the volume of demand water in total from 2000 to 2002 is determined and it is 2,382 million m^3 (B). Using the value of A and B, the average unit cost(sum/ m^3) is determined and it is approximately 5 sum/ m^3.(C)

(3) Water charges needed to be collected of offset the necessary costs(A), is determined(D). At this point, the unit of fixed rate system and unit of metered rate system based of progressive charge is determined by the average unit cost.(B). thus, metered rate system is established as follows.

With reference to the Global average, we set the standard volume of consuming water per one family is 20m3 /month and we consider it is necessary for tariff to cover the average unit cost at the standard point. Therefore we determine 5 sum/m3 from 21m3/month to 30m3/month, volume of consuming water.

We propose progressive tariff for the metered rate system to make users to save water, however in the case of exceeding 50m3 /month, the tariff almost becomes flat tariff and equals to every users on the Global average. We determine the same tariff level as the enterprises in case of exceeding 50m3 /month, which is 8.22 sum/m3.

On the other hand, we care a percentage of living expenses and we set the percentage approximately 2.0 % at the standard volume of consumption. Monthly income of Tashkent City in Dec. 1998 is approximately 13,000 sum on the official report and we suppose living expense, 80% of monthly income. This means the water tariff should be less than 208 sum/month at the approximately 40m3 which is standard volume of consumption. These figures are calculated as follows;

Reasonable water tariff

=Monthly income x 0.8 x 2%=208sum/month

Standard volume of consumption per one family

= 330Liter/person/day x 30days x 4persons =40m3/month/family

As a result of examining conditions mentioned above, we determine metered rate each volume of consumption as follows:

0-10m3	Base payment	40 sum
11-20m3	4.5 sum/m3 x 10m3= 45 sum	
21-30m3	5.0 sum/m3 x 10m3= 50 sum	
31-40m3	6.0 sum/m3 x 10m3= 60 sum	
	Total	195 sum (approximately 2% for living expense)

(4) The value of the D should be adjusted into appropriate level compared to the level of international standard.

(5) The value of D also should be examined in terms of whether or not the concept of social safety net is incorporated.

7.4.4. Revenue and Expenditure under the Revised Tariff System

The revenue and expenditure for the period from year 2000 to 2002 under the revised tariff system is estimated as below. Level of the revenue earned from the charge paid by the residents in private houses and residents in apartment blocks is estimated and examined in the following three cases. As the result of any of the three cases, the earned surplus can be reserved up to year 2002 and this means that the Vodokanal would not reach standstill for another three years without increasing the water charges. In other words, any losses that may occur in future can be covered by the revenue gained in the beginning.

The volume of water consumption per capita after the installation of meters is estimated in the following three cases.

Revenue – Case A

360 liter among the residents in private houses and 350 liter among residents in apartment blocks (inferred from the data gained by Vodokanal)

Revenue – Case B

390 liter among the residents in private houses and 270 liter among the residents in apartment blocks

(inferred from the result of the Study Team's survey on water consumption)

Revenue – Case C

250 liter among the residents in private houses and 250 liter among the residents in apartment blocks (considered as the possible level referred to the international standard)

The impact of revised water tariff on the livelihood of the general public is examined in terms of their cost of living as presented in Table 7.2. Also as for the level of water consumption, the case of C was employed. As for the percentage of the charge by fixed rate system to living costs, the reason why the rate of the private residents is higher than that of the residents apartment blocks may be because the number of family members in private houses is more than that of residents in apartment blocks.

Figure 7.2 Revenue and Expenditure - Tashkent Vodokanal

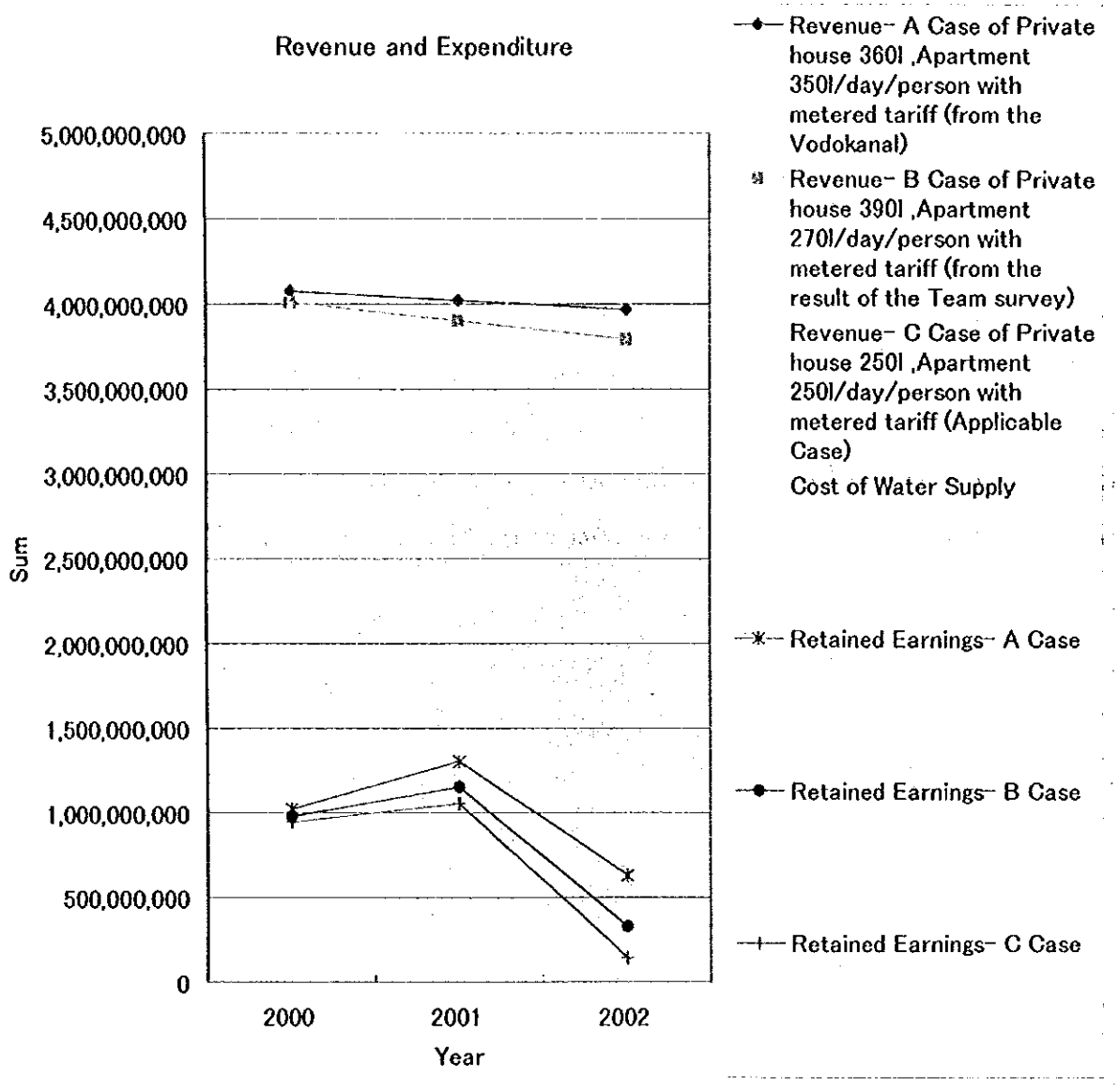


Table 7.2 Impact of Revised Water Tariff on Livelihood

Monthly living costs (sum)	Ratio to the living costs		
	Fixed rate system		Metered rate system
	Residents in apartment blocks	Residents in apartment blocks	
0-5000	6%	16%	4%
5,001 – 10,000	4%	5%	2%
10 000 – 25 000	2%	2%	1%
25,000 – 35,000	1%	1%	1%
Above 35,000	1%	1%	0%

7.5 Computer Aided Tariff Collection System

7.5.1 Proposed Tariff Collection Procedures

We propose that Tashkent City Vodokanal change some of its tariff collection procedures. For example, changing the roles of the controllers by separating them into those in charge of meter reading, those in charge of tariff collection, and those in charge of overdue tariff collection, so that tariff collection may be conducted more efficiently and under effective internal controls.

7.5.2 Proposed Computer Systems

It is important to design and develop an effective computerized tariff collection system which can process more data transactions with fewer human resources.

(1) Replacement of the Current Tariff Collection System

We propose that almost the entire current tariff collection system be replaced by a new computer system. New technology must be adopted which incorporates expandability, adequate capacity, and multiple functions.

(2) Introduction of Hand-Held Terminals for Meter Reading

The introduction of hand-held terminals for meter reading would reduce the workload of meter reading and tariff calculation, which is expected to increase with the installation of more meters.

(3) Data Exchanges with Financial Institutions

We propose that data exchanges between Tashkent City Vodokanal and various financial institutions be undertaken electronically, probably by storing data of floppy disks, instead of paper correspondence as in the current system. This change is possible only with the cooperation of the banks.

(4) Enhancement of Statistical Functions

With a versatile database, for example, Tashkent City Vodokanal would be able to obtain an aging analysis of overdue accounts so that the collection of overdue accounts can be conducted more swiftly.

(5) Replacement and Enhancement of Computer Equipment

In terms of computer equipment, we propose that a powerful and robust database server be installed to process more data transactions.

(6) Development of Training Programs

We propose that training programs be developed for systems analysts and programmers, systems administrators, and the end-users.

7.5.3 Master Plan and Feasibility Analysis

(1) Master Plan towards Year 2005 and Long Term-Strategy towards Year 2010

We developed a master plan for the refurbishment of the tariff collection system at Tashkent City Vodokanal by 2005 (development of systems to be finished by 2004), and a long-term strategy for the overall computerization of Tashkent City Vodokanal by 2010. The master plan suggests that the implementation of computerization be divided into six stages: Specification of Requirements, Fund Raising, Detailed Design, Procurement, Development & Testing, and Transition Arrangements and Training. The timetable specified in the master plan is tentative and subject to various factors, namely, the progress of the installation of the meters, the availability of funds, etc.

(2) Refurbishment of Other Computer Systems

As for the long-term strategy towards 2010, we propose escalated refurbishment to improve the computer systems excluding the tariff collection system of Tashkent City Vodokanal. The current computer systems are separated by function, but the implementation of an integrated database, which will encompass all computer systems and ensure the smooth transmission of information is recommended. It is particularly important that the tariff collection system feed various statistics to the accounting system for timely and effective financial management.

7.6 Users' Awareness on Water Conservation and User participation

We identify the following objectives in our proposals for Tashkent City Vodokanal in order to improve the present condition.

7.6.1 Objectives

(1) To exhort users to save water and at the same time implement the metered rate system in order to decrease the total annual volume of water consumption to approximately half of its present level by conducting a publicity campaign from various points of view (i.e., environmental protection, entranced efficiency of public services, economic benefits for the users, ethical issues, etc.).

(2) To make a concerted effort to introduce the concept of user participation into the present system of management in order to develop both the quality and the efficiency of the public services in the water works sector, and to move towards self-supporting for Vodokanal, by introducing mutual communication with outsiders such as the users and by disclosing information on water works management. This approach will enable management to reflect the needs of the users and to respond to valuable outside suggestions for improvement.

7.6.2 Main Proposals

We present the following six proposals in order to attain the above objectives:

(1) Establishment of a Public Relations Section to implement management strategy
(2) Disclosure of issues in Vodokanal's annual management report
(3) Effective campaign for water conservation
(4) School education for young users to understand the need for saving water
(5) Social education and forums for community leaders to express their opinions
(6) Provision of useful information to increase users' satisfaction

7.7 Water Supply System and Operation and Maintenance

7.7.1 Present and Future Problems and Countermeasures

Present and future problems and countermeasures related to Tashkent's water supply are presented in 3.5.4.

7.7.2 Proposed Improvement Plan

This improvement plan is proposed for ultimate implementation by 2010 and for interim implementation by 2005. The concrete plan and the effect of the improvements are described below.

(1) Reduction of Volume of Water Supply

1) Target

The average distribution volume in 2005 will be decreased to 60% in spite of a population increase to 1.13 times (the increase rate of population is 2%/year) the level of 1999, and that volume in 2010 will be decreased to 88% from the level of 2005 with the same rate of increase in the population.

2) Countermeasures

i) Repairs to pipes and water equipment should be conducted in detached houses, apartment buildings, and buildings for communal services/ industry and the hot water supply systems should be completed by 2005.

ii) A loan system for repairs should be introduced for the owners.

iii) Repairs to the distribution pipes should be conducted more efficiently.

iv) Meters should be installed at all detached houses and apartment buildings by 2004 or 2005.

v) A water conservation campaign should be conducted by Vodokanal.

vi) A progressive tariff rate system to prevent waste of water should be introduced.

(2) Estimate of the Effects of the Reduction of the Volume of Water Supply

1) If the volume of distribution decreases, it is thought that by 2005 the only WTPs needed will be Kadirya and Boz-su. Moreover, because the flow rate in the pipes will decrease, most of the PSs will become unnecessary because of rise in water pressure in the city.

2) Due to the abolition of the plants, the number of O&M members will decrease but the staff of the Repair, Improvement and Construction Department and the Service and Sales Department will increase.

3) The total cost of chemicals and electricity will sharply decrease by 2010 to 326 million sum/ 860 million sum = 38% of the cost in 1999.

4) Repair and improvement costs in 2010 will be decrease to 70% of the budget for 1999, after the reduction in the volume of distribution and the resulting effects on the plants.

5) The volume of surface water cannot increase because of the limitations in intake rights while the capacity of the groundwater resources is limited. Therefore it cannot cope with a rapid increase in demand.

6) The average distribution volume in 2005 will be decreased to 60% in spite of a population increase to 1.13 times (the increase rate of population is 2%/year) the level of 1999, and that volume in 2010 will be decreased to 88% from the level of 2005 give the same rate of increase in the population.

(3) Improvement of System, Facilities and O&M

1) Automatic operation by the use of sensors (such as flow meters, level meters and pressure gauges) and proper technical information must be introduced as part of any plans for improvement.

2) Pipelines should be renewed at regular intervals and a replacement plan should be developed for the entire city.

3) A service reservoir is required to regulate fluctuations in the flow. A volume of 200,000 cu.m will be needed by 2005 and an additional 100,000 cu.m will be needed by 2010.

7.8 Summary of the Immediate Solutions

The following is a summary of the solutions.

1. Revised tariff policy
    1. Early transition into metered rate system in order to give an incentive of conservation of water
    2. Setting up the adequate repair costs and metered rate system in order to offset the new investment costs including a policy on maintenance and improvement of water supply services which will mention in 4
    3. Improvements in cost management and the efficiency of operation
    4. Tariff system which incorporates the concept of social safety net
    5. On a premise condition before implementing metered rate system, reexamining the way to collect the costs of meter installation and the method to install the meters, and investigating technical aspects, for example, improvement in reliability of the structure of water meter

6. Introduction of computer technology in order to improve the level of efficiency in collecting the water charges

2. Fair accounting system

7. Introduction of accounting system which conforms to the actual situation and implementing an adequate measure of disclosing financial information
8. Reexamination of introduction of inflation accounting in order to adequately earmark depletion

3. Cost management and improvement in the level of efficiency in operations

9. Introduction of computer technology in order to improve operation
10. Introduction of management accounting
11. Introduction of improvement in the other operations

4. Improvement and Maintenance of water supply services

12. Improvement of water pumping and constructing water distribution network, e.g. construction of in order to deal with decrease in the volume of water distribution in future.
13. Improvement in water quality and reconstruction of aging facilities and equipment in order to prevent from water leakage.

5. Improvement in awareness of water conservation

14. Strengthening of publicity on water conservation to general public
15. Enlightenment and education