3.9.2 Operation and Maintenance Plan

The management of water supply facilities covers management of water quantity and water quality, and operation and maintenance of facilities.

The purpose of maintenance of water supply facilities is to secure safe and efficient operation of the facilities for stabilized water supply of standard quality in adequate quantity and pressure.

It is itemized as follows:

- To operate effectively overall water supply system,
- To protect leakage in order to save the precious raw water resource,
- To produce and deliver safe water in quality aspect,
- To maintain stable water supply even when drought and natural disaster, and
- To pay attention to less energy consumption in water supply operation

The maintenance of facilities includes inspection, adjustment, and repair/replacement of equipment.

The following sections present management plan of above mentioned items.

(1) Management of Water Quantity

The purpose of water quantity management is to control water supply so that to meet a target water quantity by operating water supply facilities, and for the purpose, water quantity is measured and recorded at the whole process of water supply system ranging from raw water intake, raw water transmission, water treatment, treated water transmission, distribution to house connection.

The water quantity control is executed through;

- Operation based on the forecast of daily water demand
- Monitoring through measurement of water flow and water pressure at strategic points
- Open/close control of valves and alteration of the number of pumps in operation.

The operation guideline should be prepared to operate facility smoothly even when raw water accident including high turbidity, accident of facility and other emergency cases.

(2) Management of Water Quality

The purpose of management of water quality is to maintain tap water hygienic safe satisfying the established water quality standard.

The management of water quality covers water quality test of raw water, treatment process and tap water, and test result is to be feedbacked to management of water supply operation.

(3) Maintenance of Equipment

The management policy for equipment maintenance should be established as follows:

- Responsibility for maintenance must be clearly defined and vested in component personnel.
- Management must state its maintenance objectives.
- Proper tools, spare parts, test instrument, and maintenance shop facilities must be provided.
- Preventive action must be planed and scheduled according to the characteristics of the equipment.
- An adequate system of written records and report must be provided.

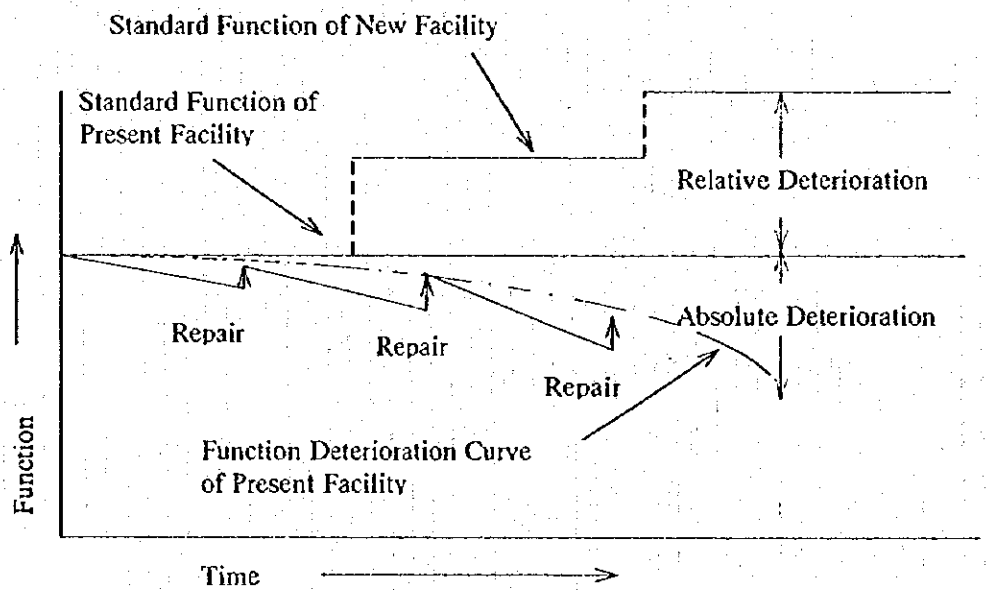
Generally said that the function of equipment gradually deteriorates in two categories as shown in the figure below, one is unconditional deterioration by time and the other is relative deterioration which is being out-of-date despite adequate maintenance.

Consequently maintenance is absolutely necessary to keep the function of equipment at a acceptable level, otherwise the function rapidly deteriorates and will be resulted in short life. The maintenance is consists of inspection, adjustment and repair in daily, weekly, monthly, annually and periodically.

The operation includes monitoring of designated quantity, quality, and operating condition and control. This operation covers management of water quantity, water quality, electric power consumption.

Also the maintenance of equipment is divided into two categories of preventive maintenance and maintenance after malfunction occurred (repair). The preventive maintenance is to inspect and adjust the equipment before malfunction occur. The selection of preventive maintenance or repair is depend on the characteristic of equipment.

Figure-392.1



(4) Management of Treatment Facility

1) General

The management of treatment facility includes operation and maintenance. The operation is production work of potable water through operation of equipment, chemical feeding, water quantity/quality control at sedimentation and filtration. Maintenance covers inspection, adjustment, and repair in order to keep facilities, equipment and devices in best functional condition.

2) Methodology of Management

For the accurate, secure, smooth, and uniform management, standardization of management methodology and training of operator and maintenance staff is essential.

a) Standardization of Management Method

The management method should be standardized executing the following preparations;

- Establishment of methodology for comparison of measured value and standard target prepared.
- Check list should be prepared.
- Guideline of maintenance should be established
- Drawing, specification of equipment should be prepared.

b) Secured Work

The management work should be secured through the following implementation;

- Information of management should be promptly transmitted.
- Operation and maintenance should be closely linked together.
- Management organization should be functioned in ordinary and emergency case.

c) Less Energy Consumption

Attention should be paid to such less energy consumption as electricity, chemical and fuel.

3) Management of Water Quantity

The water quantity should be controlled by the followings;

- Establishment of target (production, distribution, and/or transmission)
- Measurement of water quantity at each stage of treatment process
- Control of water quantity after comparison of target and measured value

4) Management of Water Quality

The water quality should be judged through the following steps;

- Measurement of water quality at each stage of treatment process
- Checking the deviation between the standard value and measured value
- Analysis and accumulation of data
- Judgment of water treatment process from water quality aspect

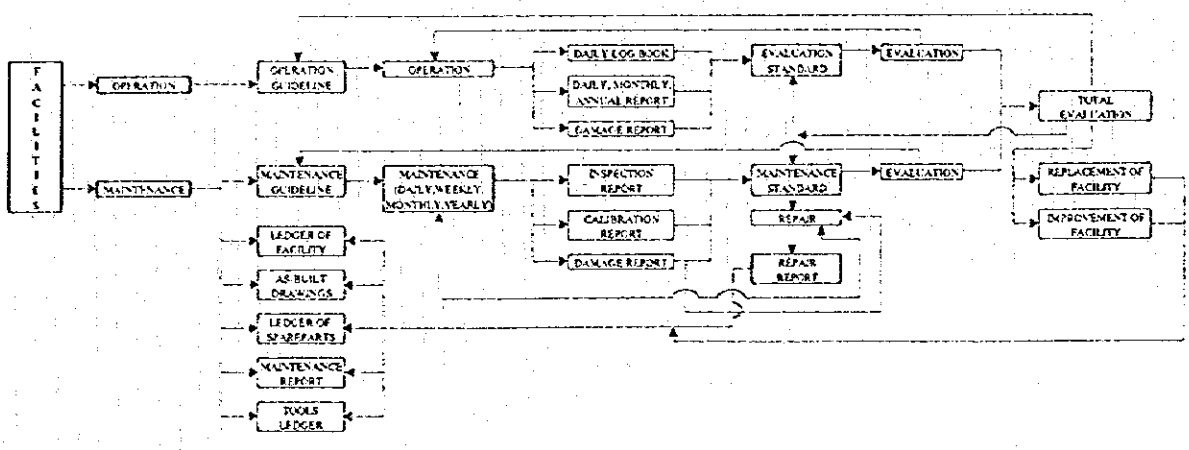
5) Management of Facility

The facility should be kept in good working condition by the implementation of the followings;

- Inspection of facility, equipment, and devices
- Repair and adjustment if necessary
- Provision of chemical, fuel if necessary
- To keep the facility in good working condition
- To protect the facility against hygienic pollution
- To investigate leakage periodically from the facility
- To protect the treatment plant against invasion of unauthorized person and beast
- To keep garbage storage, water closet, septic tank hygienically clean and protect these against leakage
- To pay special attention to the drainage not so as to reverse flow and/or overflow
- To keep environment of sedimentation and filter clean from hygienic view point
- To keep security device in good working condition

Figure-392.2 shows management cycle of facilities including relation among required guideline, kind of report, ledger, and evaluation.

Figure-392.2 MANAGEMENT CYCLE OF FACILITIES



a) Fundamentals of Operator

The operator should have the following fundamentals;

- Operator should be familiar with operation guideline, related power supply system, load condition, and operating circuit
- Operator should familiar with structure, movement, and characteristic of the facility
- Operator should operate the facility confirming the purpose of operation and operating sequence and anticipate the result before start operation
- Operator should pay attention such special monitoring items as electrical current, voltage when he control /monitor the equipment
- Operator should record and/or report an abnormal condition when he noticed
- Operator should inform of the special items to the successive operator when shift changes
- Related drawings, name and telephone number of personnel to be contacted when accident occurred should be provided so as to the operator easily available to refer
- Operation manual/guideline should be provided so as to the operator easily available to check

b) Fundamentals of Maintenance Staff

The maintenance staff should have the following fundamentals;

- Maintenance staff should be familiar with the operation manual and related equipment
- Records on operation, inspection, adjustment, repair, and list of equipment should be kept and utilized effectively
- Guideline of operation, inspection, adjustment and repair should be established and utilized effectively
- Equipment and its environment should be always kept clean
- Inside the building should be kept always clean
- Tools, materials, and spare parts should be provided sufficiently

c) Drawings and Maintenance Record

The drawings and records should be provided as follows;

- As-built drawings, manufacturer's test data, and operation/maintenance manual should be kept permanently
- As-built drawings should be arranged so as to retrieve easily
- Repair and improvement of equipment should be recorded together with data and reasons

6) Recommended Maintenance Period and Items

The recommended maintenance period and items of major mechanical/electrical facilities are listed in **Annex-39.**

(5) Management of Transmission/Distribution Facility

1) General

The Management of transmission/distribution facility is important because the facility is a large part of water supply facility and its malfunction affects directly water supply service.

Therefore the management of transmission/distribution facility should be considered the following;

- The facility should be protected from hygienic pollution
- The control of pump and valve for distribution control should be done in consideration of suitable pressure/flow supply.
- The leakage from the facility should be strictly protected because the leakage is loss of produced water and cause shortage of supply.
- The facility should be protected from corrosion.
- Monthly inspection is necessary so that accident can be discovered promptly.

2) Organization

The organization for the maintenance of transmission/distribution facility should be worked effectively not only for ordinary daily operation but also emergency case.

Ordinary

The organization for daily operation should be satisfied the following:

a) Working System

Day-time working and shift working should be properly assigned based on the characteristic of duty.

b) Drawings

An accurate drawings should be prepared.

c) Patrol Inspection

Periodical patrol inspection for leakage, condition of valve, pipe bridge, should be done in order to prevent accident beforehand.

Emergency

The organization which can be promptly worked in emergency case should be clearly established.

3) Drawings and Documents

It is indispensable to keep the drawings, statistics, and related documents to manage the sophisticated transmission/distribution facility.

a) Drawing of Pipeline

The drawing of pipeline should include diameter, kind of material, sluice valve, air valve, blow off valve, fire hydrant, pressure reduction valve, safety valve, pipe bridge, tunnel, kind of lining, and others.

b) Scale

The several kind of scale should be prepared as follows;

- 1/10,000-1/50,000
- 1/5,000
- 1/500

c) The drawing of plan and vertical section of transmission/distribution trunk main should be prepared.

d) Drawing of structure of important facility should be prepared.

e) The as-built drawing should be kept permanently.

f) The drawing should be corrected periodically to keep accurately.

The Information Management of Waterworks Pipeline is attached in **Annex-39**.

4) Recommended Maintenance Period and Items

The recommended maintenance period and items of transmission/distribution facilities are listed in **Annex-39**.

3.9.3 Monitoring Plan

The purpose of monitoring of water supply system is to ensure appropriate supply condition for all consumers, and monitoring of the supply condition should be made in respect of safety, flow rate, pressure, and continuity of supply. To fulfill this purpose monitoring of water quality and system operation are studied.

(1) Monitoring of Water Quality

To supply good quality water to all consumer is a must for a water supply business. In order to strengthen water quality control, mutual cooperation between PAM JAYA as a regulator and Consortium as a executant of management is indispensable. The duty of PAM JAYA is to monitor water quality of overall supplied water and Consortium's duty is to monitor raw water, treated water, and distributed water. For this monitoring, PAM JAYA needs to newly establish Central Laboratory and Consortium uses the existing laboratory at each treatment plant as shown in **Figure-393.1** The Central Laboratory is proposed in the Feasibility Study.

(2) Monitoring of Operation

1) Background

Generally, for the small and simple water supply system consisting of single raw water source, treatment plant, and distribution system, overall optimum operation can be achieved only by control of raw water intake and delivery flow-pressure at the treatment plant.

However in such a large scale and complicated water supply system as consisting of several raw water sources, treatment plants, and distribution systems, above mentioned simple control is unable to operate water supply system optimally.

This is because that in the large scale water supply system consisting of several sub-systems, even slight change of water supply condition in the sub-system affects other sub-system and will be resulted in chaos water supply situation.

Namely, Jakarta Water Supply System has been developing in both quantity and quality, and the system is going to expand with larger scale facilities and a more complex system. The system in the future will be the more complicated including several raw water sources, large scale water treatment plants at several locations, transmission system and distribution centers with distribution networks for several supply zones. Several transmission systems will connect water treatment plants and distribution centers with long distance pipeline.

This system should have an economical operation of the whole system as well as optimum distribution of water to the city in terms of even distribution of water to each zone, and also operation and maintenance of such large scale and complex system requires a sophisticated control system with an overall monitoring capability for safety and effective operation.

Thus, the computerized water supply operation system is indispensable in order to operate whole water supply system economically and optimally.

2) Monitoring Method

a) Integration of Existing Buaran SCADA System

In line with the idea of overall control of whole water supply system, under the Buaran II Project (Part I of Second Stage, Jakarta Water Supply Project) the SCADA (Supervisory Control and Data Acquisition) System was already constructed as a sub-system of overall PAM SCADA System which will be constructed in the near future.

The Buaran SCADA System is collecting/processing information/data such as pump operation condition, electric power failure, water level, flow rate, and pressure from Buaran Treatment Plant, Surge Towers No.1, 2, 3 and Distribution Center (R1) at the Monitoring and Control Room in Buaran Treatment Plant.

This data collection is being done by on-line, real time system using radio communication network system.

In consideration of current movement on Jakarta Water Supply System including a) Privatization of PAM JAYA enterprise divides the service area into two concession areas and b) future water supply should cover the area beyond the existing service area in Jakarta, both of which makes the system much more complex, it is very important to improve this SCADA System.

Introduction of the SCADA System comprising practice in Buaran II System and its improvement of Monitoring System for the Eastern Sector Water Supply System is employed.

b) SCADA System

Generally, Supervisory Control and Data Acquisition (SCADA) Systems is one of the computer control software and hardware system providing the following functions :

a) Collecting data from outstation
b) Data manipulation, display, and logging
c) Data archiving and report generation

d) System parameter setting and programming

Usually this system consists of the hardware of :

a) Central computer system and peripherals
b) Communication media and equipment
c) Telemeter equipment
d) Signal conversion device (Transducer)
e) Sensor (Meter)

When SCADA system applies into water supply system the following functions are performed.

a) Data collection at central station from various kind of waterworks facilities such as raw water reservoir, raw water intake, water treatment plant, booster pump station, distribution center, transmission main, and distribution main.
b) Data processing for statistics and display for monitoring
c) When the operator at central station finds the abnormal flow rate and pressure on monitoring, he will take action of ;
   i) to direct related treatment plant, distribution center or booster station to change present operation condition in order to normalize water supply condition, or
   ii) to direct related branch office to dispatch their crew to locate the accurate leak point and repair the damaged pipe
d) On the other hand, accumulated data as statistics will be analyzed and improved water supply technique
e) This analysis will be continued until the result of computer simulation is available for actual water supply operation.

c) Data to be Monitored

The data to be monitored at the central supervisory control center are basically as follows:

a) Treatment Plant
   - raw water intake flow
   - transmission/distribution flow/pressure
   - residual chlorine, turbidity, and pH of finished water
   - water level of clear water reservoir
b) Surge Tower
   - water level
c) Distribution Center
   - inlet flow
   - water level of reservoir
   - distribution flow / pressure

d) Transmission/Distribution main
   - flow and pressure
   - water quality

3) Proposed PAM SCADA System

By the announcement of the President of Indonesia on 5th January 1995, Jakarta water supply system is to be managed by two private consortia using Ciliwung river as its boundary. However, PAM JAYA is still responsible for the entire supply and works as the regulator.

Monitoring and operation and maintenance, both of which are essential portion of management for Jakarta water supply system, are studied hereunder the private sector participation into account.

Based on the above situation three (3) supervising centers of PAM JAYA, Eastern Sector and Western Sector as shown in **Figure-393.2** is proposed. Each Consortium executes the following:

(a) to monitor eastern/western water supply area for twenty four hours a day , and to maintain economical/optimum water supply operation through monitoring and control operation condition of whole water supply facilities,

(b) to detect leakage from main pipe by monitoring flow/pressure at strategic points of the system.

PAM JAYA's duty is as follows:

(a) to monitor intermittently and supervise water supply condition through eastern/western supervisory system so as to even supply water to each zone, based on the data/information collected from treatment plants, transmission mains, distribution centers, booster stations, and distribution pipeline.

The supervisory control system by PAM SCADA System will largely contribute to the followings :

a) to reduce UFW by Consortia's continuous monitoring of flow/pressure at the strategic points of transmission trunk main, distribution trunk main, and distribution system.

b) The Consortia's continuous monitoring is able to locate the leak part of pipeline, and expedite leakage repair by informing of repair unit.
c) to distribute water to each zone evenly in quantity and pressure by overall control by operating engineer of the Consortia's supervisory system.
d) to save consumption of electricity and chemicals at treatment plant through optimum/economical water supply operation including pressure control of pipeline,
e) consequently the revenue will be increased

Figure-393.3 shows the contents and merits of PAM SCADA System.

4) Procedure of Introduction of PAM SCADA System

The system operation requires not only the establishment of a data transmission system but also requires improvement or modification of the facilities including the existing facilities to meet the requirements of a totally integrated and sophisticated system, these system improvements will need gradual development through several phases including operation of whole water supply system. High reliability of the data transmission process equipment will be also required with sophisticated maintenance methods as well as establishing comprehensive data collection and analysis system.

The PAM SCADA System requires the following hardware :

(1) Consortium's System

a) The station which communicate with sub-system like Buaran sub-station and data transmission station of pipeline,
The station includes central computer system, peripherals of logging typewriter, CRT display, hard copy machine, event logging typewriter, console desk, and graphic panel,
b) Communication system which connect with out-station,
c) Remote terminal unit installed at out-station such as treatment plant, distribution center and pipeline data transmission station

Also the following software will be required.

a) Data collection from out-stations
b) Data manipulation, display and logging
c) Data archiving and report generation
d) System parameter setting and programming

(2) PAM JAYA Station

a) CRT display
b) Communication system which connect with Consortium's station

The PAM SCADA System will be suggested to phased improvement including facility, technology, and organization as follows,

a) Study on monitoring points
b) Detailed design of flow/pressure meter installation
c) Installation of flow/pressure meter
d) Accumulation of above data including outlet of treatment plant, transmission/distribution trunk main and distribution main of each supply subsystem.
e) Analysis of accumulated data
f) Establishment of water supply operation strategy
g) Study on PAM SCADA System and detailed design
h) Study on organization for central supervisory system and pipeline maintenance
i) Training of operating engineer
j) Installation of PAM SCADA System

Figure-393.4 shows Procedure of PAM JAYA Introduction.

5) Special Attention on PAM SCADA System Introduction

The following items of special attention should be taken for introduction of PAM SCADA System in order to effective operation of the System.

a) Construction Timing

The PAM SCADA System should be constructed after the completion of analysis of accumulated data for tentative establishment of water supply strategy, otherwise this System cannot be functioned effectively.

b) Establishment of Organization and Internal Regulation

The organization for PAM JAYA and Consortia should be established before commissioning the hardware system in order to function the system smoothly and effectively.

e) Special Training for Operating Engineer

The operating engineer who is engaging in monitoring and control in PAM JAYA and Consortia should be completely familiar with not only water supply technology but also detailed function of such water works facilities as pipeline network, treatment plant, booster station, and distribution center. Therefore the operating engineer should be sufficiently trained specially before commissioning of the System.

Figure-393.1 STRENGTHENING OF WATER QUALITY CONTROL

Name of Laboratory	Purpose	Activities
Central Laboratory (PAM)	Overall Water Quality Control (Cross Check of Distributed Water)	Periodical sampling/analysis at Tap Water, Distribution, Production, Raw Water
Laboratory at Treatment Plant (Consortium)	Water Quality Control for Production / Distribution	Daily/periodical sampling/analysis at Raw Water, Clarified Water, Filtered Water, Finished Water, Distribution, Tap Water

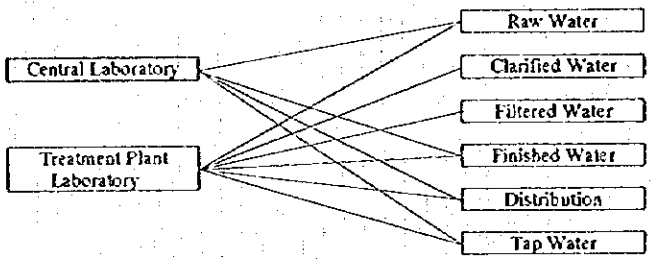
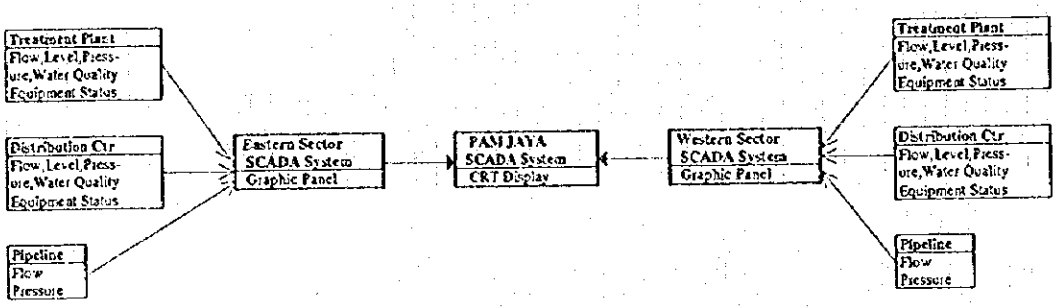


Figure-393.2 JAKARTA WATER SUPPLY SCADA SYSTEM CONCEPT



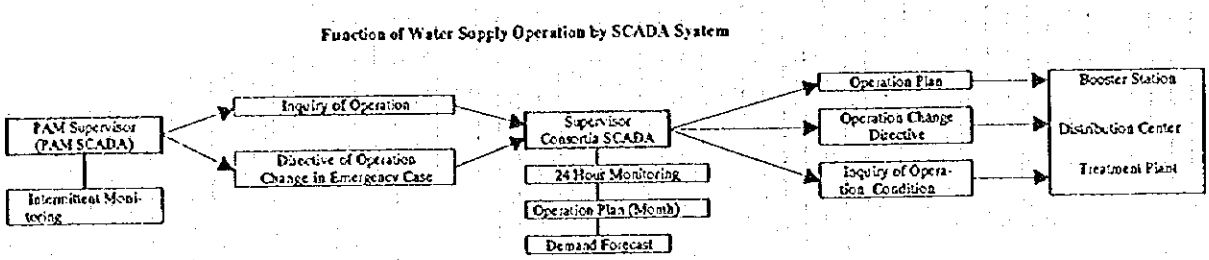


Figure-393.3 PAM SCADA SYSTEM

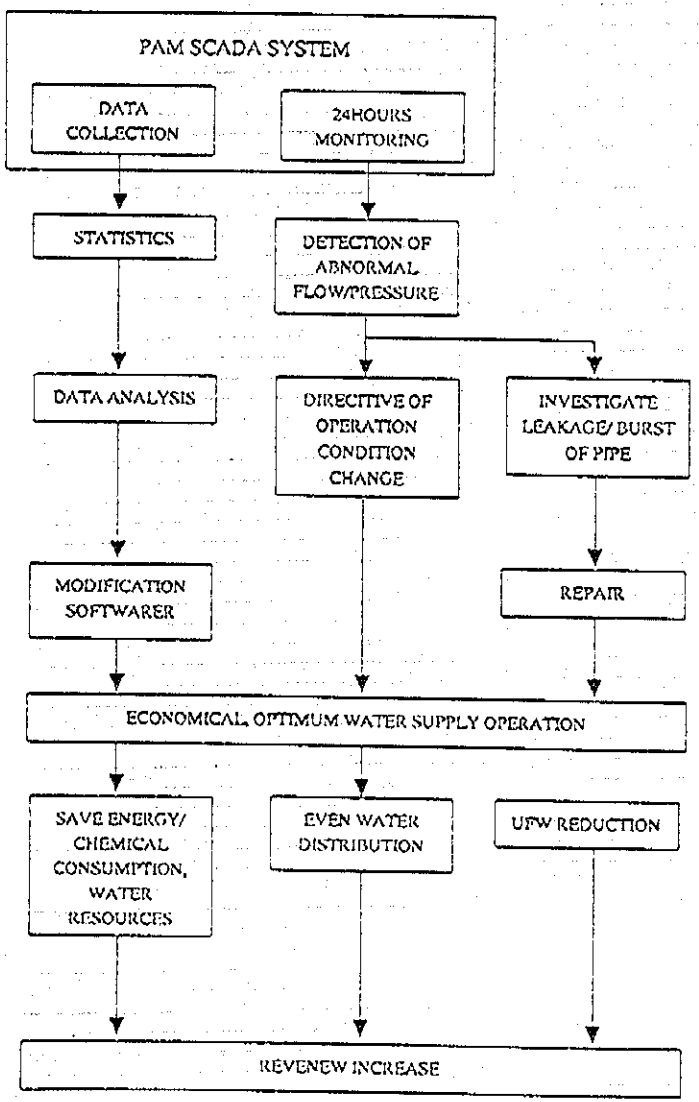
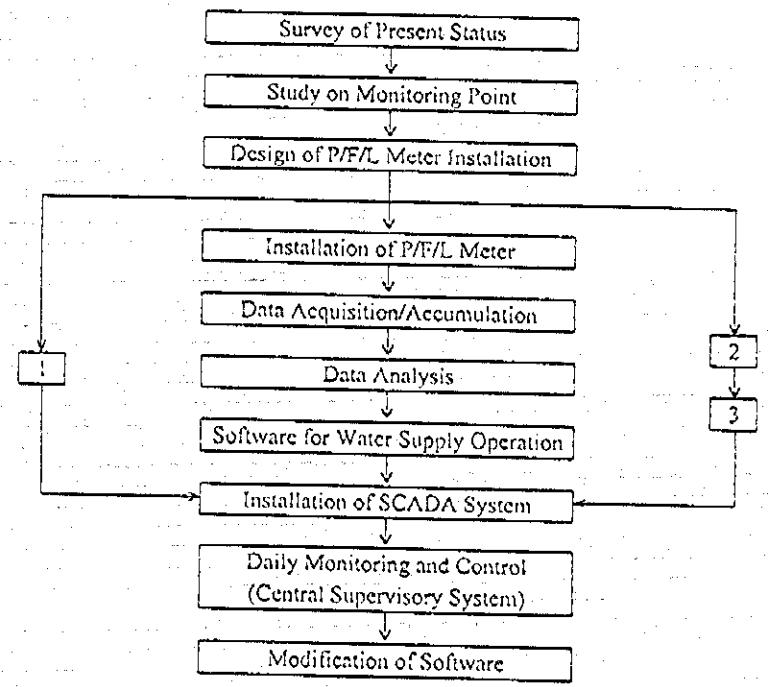


Figure-393.4 PROCEDURE OF INTRODUCTION OF PAM JAYA SYSTEM



1 : Study on Organization for Central Supervisory System and Pipeline

2 : Study on SCADA System

3 : Design of SCADA System

Note : SCADA : Supervisory Control and Data Acquisition
P/F/L : Pressure/Flow/Level

3.10 COST ESTIMATE

The project cost of the Master Plan is calculated and presented in **Table-3100.1**, with breakdown of foreign (yen) and local (rupiah) currency portion. The total costs of Master Plan including construction cost, land acquisition cost, engineering services fee, and physical contingency, amounts to ¥197,565,000,000 for foreign currency portion and Rp.4,026,548,000,000 for local currency portion, or ¥389,305,000,000 equivalent. The costs are estimated at the price as of 1996 without consideration of price escalation. For the estimation of the costs, costs for qprevious and on-going relevant projects, namely Buaran I & II, Cisadane, and PJSIP Projects, were referred to. The project cost excludes construction cost relating raw water transmission, material and installation costs for house connections, raw water charge, operation and maintenance costs, and value added tax (VAT). Costs for raw water transmission pipeline between Bekasi and Cipayung Treatment Plant were included.

Unit cost of land is referred to Jakarta Water Resources Management Study prepared in 1994. Physical contingency is estimated at 10 % of total cost of construction cost, engineering services fee, and land cost.

Table-3100.1 COST EATIMATES OF THE PROJECT

Unit : Million

Descriptions	TOTAL		
	F/C Yen	I/C Rp	Equivalent Yen
1 Construction Cost	167,857	2,900,972	305,999
1.1 Treatment Plant	28,841	593,881	57,121
Buaran III	6,726	115,479	12,225
Cipayung I	4,709	86,753	8,840
Cipayung II	8,032	180,747	16,639
Cisadane II	4,687	105,451	9,708
Cisadane III	4,687	105,451	9,708
1.2 Distribution Center	3,294	204,654	13,039
DC-R1 II (2,000 l/s)	390	16,434	1,173
DC-R1 III (0 l/s)		14,886	709
DC-R3 I (800 l/s)	156	16,799	956
DC-R3 II (1,300 l/s)	253	17,186	1,071
DC-R3 II (400 l/s)	78	310	93
DC-R4 II (2,600 l/s)	741	36,596	2,484
DC-R4 III (1,000 l/s)	195	17,601	1,033
DC-R4 IV (1,200 l/s)	234	17,756	1,080
DC-R4 IV (400 l/s)	78	310	93
DC-R5 II (1,600 l/s)	312	27,127	1,604
DC-R6 I (2,100 l/s)	409	37,869	2,212
DC-R6 I (800 l/s)	156	619	185
DC-R6 I (1,500 l/s)	292	1,161	347
1.3 Raw Water Transmission	7,608	54,332	10,195
Pipe to Cipayung	5,660	21,640	6,690
Pump Stataion	1,948	32,692	3,505
1.4 Treated Water Transmission Pipe	41,668	160,611	49,316
R1 - R6	7,203	31,993	8,726
Cisadane - R5, R4	9,666	41,276	11,632
East - R3, R5, R4, R6	24,799	87,342	28,958
1.5 Distribution Main (Primary)	54,848	421,596	74,924
1.6 Service Main (Secondary/Tertiary)	31,598	1,465,898	101,403
2 Engineering Services (D/D, S/V)	11,746	87,028	15,890
3 Land Acquisition Cost	0	672,500	32,024
4 Sub-Total	179,603	3,660,498	353,912
5 Physical Contingency	17,962	366,048	35,393
6 Total	**197,565**	**4,026,548**	**389,305**

Exchange Rate : 1 Yen = Rp. 21.00

3.11 FINANCIAL FORECAST OF JAKARTA WATER SUPPLY SECTOR

3.11.1 Preparing Forecasted Financial Statements

This section presents financial forecast of the whole water supply business by applying the concept of business combinations or consolidations which brings together a corporation and one or more incorporated businesses (in this case, PAM JAYA and two private consortia) into one accounting entity.

The objective of the forecast is to project the results of operations (profit or loss) and cash flows with a range of options incorporating different tariffs and sources of funds. In this financial forecast, fifteen scenarios as listed in the **Table-3111.1** are developed to examine the forecast's sensitivity to changes in the different assumptions noted above.

Base scenarios presented in **Table-3111.1** are identical to those of Section 3.10. We have set out three variables depending upon the average tariff increase rate: (1) tariff increase rate is lower than the inflation rate of Indonesia (in the case of A1, B1, C1, D1 and E1), (2) similar to the inflation rate (A2, B2, C2, D2 and E2), (3) higher than the inflation rate (A3, B3, C3, D3 and E3).

Table-3111.1 SCENARIOS FOR FINANCIAL FORECAST

Base Scenario	A	B	C	D	E
Variables	A1,A2,A3	B1,B2,B3	C1,C2,C3	D1,D2,D3	E1,E2,E3
Investment					
Treatment Plant	Private	Public	Public	Private	Public
Transmission Main	Private	Public	Public	Private	Public
Distribution Center	Private	Public	Public	Private	Public
Distribution Main	Private	Private	Public	Public	Public
Service Main	Private	Private	Private	Public	Public

Different assumptions used for each scenario are presented in **Table-3111.2,** and common assumptions underlying the financial forecast are as described in the **Table-3111.3.**

Table-3111.2 DIFFERENT ASSUMPTIONS OF EACH SCENARIO

Base Scenario	Facilities	Sources of Funds	Tariff Increase 20%/3 yrs	25%/3 yrs	30%/3 yrs
A	All Facilities	100% Commercial [CF & CL]	A1	A2	A3
B	Treatment Plant Distribution Center Transmission Distribution Main Service Main	80% [P], 20% [CL] 80% [P], 20% [CL] 80% [P], 20% [CL] 100% Commercial [CF & CL] 100% Commercial [CF & CL]	B1	B2	B3
C	Treatment Plant Distribution Center Transmission Distribution Main Service Main	80% [P], 20% [CL] 80% [P], 20% [CL] 80% [P], 20% [CL] 80% [P], 20% [CL] 100% Commercial [CF & CL]	C1	C2	C3
D	Treatment Plant Distribution Center Transmission Distribution Main Service Main	100% Commercial [CF & CL] 100% Commercial [CF & CL] 100% Commercial [CF & CL] 80% [P], 20% [CL] 80% [P], 20% [CL]	D1	D2	D3
E	All Facilities	80% [P], 10% [E], 10% [IF]	E1	E2	E3

Conditions of Finance

[CF] : Foreign Commercial Fund for Foreign Currency Portion : 10% annual interest rate, 10-year repayment period with no grace

[CL] : Local Commercial Fund for Local Currency Portion : 20% annual interest rate, 10-year repayment period with no grace

[P] : Public Fund by Aid Agencies : 9% annual interest rate, 30-year repayment period including 10-year grace

[E] : Equity

[IF] : Internal Fund

Different assumptions used for each scenario are presented in **Table-3111.2**, and common assumptions underlying the financial forecast are as described in the **Table-3111.3**.

Table-3111.2 DIFFERENT ASSUMPTIONS OF EACH SCENARIO

Base Scenario	Facilities	Sources of Funds	Tariff Increase 20%/3 yrs	25%/3 yrs	30%/3 yrs
A	All Facilities	100% Commercial [CF & CL]	A1	A2	A3
B	Treatment Plant	80% [P], 20% [CL]	B1	B2	B3
	Distribution Center	80% [P], 20% [CL]			
	Transmission	80% [P], 20% [CL]			
	Distribution Main	100% Commercial [CF & CL]			
	Service Main	100% Commercial [CF & CL]			
C	Treatment Plant	80% [P], 20% [CL]	C1	C2	C3
	Distribution Center	80% [P], 20% [CL]			
	Transmission	80% [P], 20% [CL]			
	Distribution Main	80% [P], 20% [CL]			
	Service Main	100% Commercial [CF & CL]			
D	Treatment Plant	100% Commercial [CF & CL]	D1	D2	D3
	Distribution Center	100% Commercial [CF & CL]			
	Transmission	100% Commercial [CF & CL]			
	Distribution Main	80% [P], 20% [CL]			
	Service Main	80% [P], 20% [CL]			
E	All Facilities	80% [P], 10% [E], 10% [IF]	E1	E2	E3

Conditions of Finance

[CF] : Foreign Commercial Fund for Foreign Currency Portion : 10% annual interest rate, 10-year repayment period with no grace

[CL] : Local Commercial Fund for Local Currency Portion : 20% annual interest rate, 10-year repayment period with no grace

[P] : Public Fund by Aid Agencies : 9% annual interest rate, 30-year repayment period including 10-year grace

[E] : Equity

[IF] : Internal Fund

Table-3111.3 ASSUMPTIONS FOR FINANCIAL FORECAST

General	
1)Inflation	Prices are expected to increase as follows. Indonesian general price level + 8.37% per annum Japanese general price level + 2% per annum US general price level + 2% per annum
2) Exchange Rate	1 Japanese yen = 21 Indonesian rupiah 1 US dollar = 2130 Indonesian rupiah
3)Unaccounted-for-Water (UFW)	Targeted UFW percent is used every year, which is presented in the forecasted income statement.
4)PAM JAYA Production	Forecast consumption divided by accounted-for-water less total treated water purchase.
5)Average Tariffs	Division of tariff revenues by forecast consumption. Tariff increase of each scenario is shown in Table-3.111.2.
Income Statement	
Income	
6)Tariff Revenues	Multiplication of average tariff by forecast consumption.
7)Income from New Connections	This includes administration fees on new connections and customer contributions.
8)Other Income	This comprises such fee as administrative cost, meter maintenance, documentary stamps and penalties. These fees are expected to increase (or decrease) in line with tariff changes.
Expenses	
9)Personnel	1995 as a base year, the expense would increase by 12 percent every year. It is assumed that the number of staff would remain unchanged for the projected years.
10)Fuel and Power	This is assumed to increase by 12.3 percent (average percentage increase of fuel and power over the last 8 years) every year plus a percentage of increase (or decrease) in production from the previous year.
11)Chemicals	This is assumed to increase by 9.21 percent (average percentage increase of fuel and power over the last 8 years) every year plus a percentage of increase (or decrease) in production from the previous year.
12)Maintenance Materials	This is assumed to increase by 4.75 percent (average percentage increase of PAM JAYA production over the last 4 years) plus assumed inflation of 8.37 percent.
13)Purchase of Raw Water from POJ	Forecasted raw water cost is presented in Section 3.6.
14)Purchase of Treated Water	This is assumed to increase by 20 percent every 5 years.
15)Bad Debts	Multiplication of total operating revenues by 2.3 percent (average ratio of bad debts to total operating revenues over the last 3 years).
16)Sales Expense	Multiplication of tariff revenues by 5.75 percent (average ratio of sales expenses to tariff revenues over the previous 8 years).
17)Office Expense	Multiplication of tariff revenues by 4.1 percent (average ratio of office expense to tariff revenues over the last 8 years).
18)Research & Development	Multiplication of tariff revenues by 4.53 percent (average ratio of research & development to tariff revenues over the last 8 years).
19)Travel	Multiplication of total operating revenues by 0.2 percent (average ratio of travel to total operating revenues over the last 8 years).
20)Transtation	Multiplication of total operating revenues by 0.98 percent (average ratio of transportation to total operating revenues over the last 8 years).
21)General Expenses	Multiplication of total operating revenues by 4.3 percent (average ratio of general expenses to total operating revenues over the last 4 years).
22)Depreciation	Two depreciation methods are used in PAM JAYA. One is based on useful life for financial projections; the other is based on fiscal (tax rule) for financial accounting and reporting, and tax reporting. Depreciation rates and services based on both methods are presented in the preceding chapter.
23)Provision for Income Tax	30% on net fiscal income
Statement of Cash Flows	
Operating Activities	
24)Profit Distribution to Employees	15 percent of net fiscal income after tax(including distribution to PAM JAYA cooperative).
Investing Activities	
25)Capital Expenditures	Investments based on this master plan would start in 1999.
Financing Activities	
26)Profit Distribution to DKI	No profit distribution is assumed.

3.11.2 Analyzing Future Financial Condition Under Fifteen Scenarios

The forecasted income statements and cash flow statements under fifteen scenarios for the 1996 to 2019 period are presented in **Annex-311** and key figures of these statements are set out in **Table-3112.1.**

Table-3112.1 KEY FIGURES OF FINANCIAL FORECAST

(in Billions of Rp.)

	Net Income					Cash Flow				
Scenario	1999	2004	2009	2014	2019	1999	2004	2009	2014	2019
A1	48	25	43	206	1,074	(16)	(437)	(3,341)	(5,108)	(6,007)
B1	63	113	238	346	908	(4)	19	(388)	(1,061)	(1,371)
C1	73	171	355	579	1,193	5	196	363	887	2,346
D1	66	144	227	590	1,317	(2)	186	86	(50)	1,329
E1	91	285	546	945	1,512	(6)	618	2,135	4,850	8,986
A2	60	108	331	756	2,414	12	(179)	(1,214)	(2,027)	1,464
B2	74	185	497	896	2,248	20	249	496	1,617	5,696
C2	84	243	614	1,217	2,533	30	414	1,235	3,552	9,401
D2	77	216	486	1,140	2,657	22	403	958	2,615	8,383
E2	102	357	805	1,495	2,852	18	835	3,107	7,515	16,040
A3	71	187	634	1,428	4,186	32	34	(257)	1,044	10,273
B3	85	263	800	1,568	4,021	46	478	1,470	4,756	14,522
C3	88	294	789	1,812	4,929	45	633	1,932	5,754	17,209
D3	94	321	917	1,802	4,306	54	643	2,209	6,691	18,229
E3	112	435	1,108	2,167	4,625	42	1,065	3,981	10,654	24,867

(1) Analyses of Future Financial Condition

Analyses of the future financial condition under each scenario are made in the following:

1) Scenario A1, A2 and A3

In the three scenarios, net income (depreciation is based on useful life) would be generated over the projected years. With respect to future cash flows, however, recurring repayment of principal of commercial loans would give rise to negative cash flows, indicating that the water supply enterprise would have to obtain additional external financing to maintain planned level of its capital expenditures. Note, however, if the water supply enterprise finances its capital expenditures with additional debt, its problems will, of course, be compounded. Even if tariff is raised by 25% every 3 years (scenario

A2), which is considered to be the ceiling given the current high tariff, negative cash flow peaks in 2014 -- 2,027 billion. In the case of A3 (30% tariff increase every 3 years), however, planned levels of investment may be maintained.

2) Scenario B1, B2 and B3

In scenario B1, net income would continue all the projected years. However, in terms of cash flows, negative cash flows would occur between 2008 and 2015-- yearly average of Rp. 150 billion negative cash flow. In order to maintain planned levels of investments, the water supply enterprise must obtains some equity and/or raises tariff.

In scenario B2 (25% tariff increase every 3 years), net income would be, of course, higher than in scenario B1 and positive cash flows will be generated over the projected years.

3) Scenario C1, C2 and C3

These scenarios are similar to scenario B1 and B2 except that only service main is financed through private fund and the rest of facilities are financed through public fund. Since approximately 75% of capital expenditures are financed through public fund, the cost of capital is lower than in scenario A, B and D, and consequently bringing about higher net income and cash flows than in scenario A, B and D.

4) Scenario D1, D2 and D3

Financing higher capital expenditures of distribution and service main through public fund would result in lower cost of capital and therefore higher net income and positive cash flows than those of scenario B.

5) Scenario E1, E2 and E3

In these scenarios, the highest income would be generated over the forecasted years. This is due primarily to much lower interest expenses compared to the other scenarios. Grace periods for repayment of the loans also contribute to accumulation of cash reserves which can be used for future investments. With these financing sources, the water supply enterprise could maintain planned levels of investments without deteriorating financial soundness. Moreover, a tariff increase could be lower than E1 (20%/3yrs).

(2) Results of Analyses

The analyses identified those cases which result in negative cash flows (A1, A2, B1) and those cases which increase tariff higher than needed, therefore making it unnecessary to consider. These cases are shaded in **Table-3112.1.**

An favorable case in each base scenario is described below. On aggregate, of course, Scenario E, which could provide consumers with the lowest cost, is the best alternative, followed by scenario D, C, and B (B2 whose tariff increase rate is similar to the inflation rate) in decreasing order. As for scenario A, a tariff increase would be higher than the inflation rate. In order to avert a tariff increase higher than the inflation rate, it is imperative that the water enterprise seek lower cost of capital for investments and pursue operational efficiency.

Table-3112.1 RESULT OF FINANCIAL FORECAST

Base Scenario	Favorable Case	Resulting Tariff Increase
A	A3	Higher than Inflation Rate
B	B2	Similar level as Inflation Rate
C	C1	Lower than Inflation Rate
D	D1	Same as above
E	E1	Lower than Scenario C and D

3.12 IMPLEMENTATION SCHEDULE

The implementation of the proposed water supply system development upto target year of 2019 for Master Plan should be planned and arranged taking into account the implementation plan of JICA 1985 Master Plan and the present conditions of the on-going projects. Stagewised development is applied in order to avoid a huge investment to execute at one time construction of facilities for the proposed system in the year 2019.

Implementation by two stages are recommended, namely the Second Stage for the target year 2008 and the Third Stage for 2019. First Phase of the Second Stage planed by 1985 Master Plan including constructions of Buaran II and Cisadane I Treatment Plants has been almost completed although the Cisadane Water Treatment Plant has not been commenced to date. Therefore, Second Phase of the Second Stage is the first program of this Study. The staging of the proposed system is considered mainly based on timing of the raw water development plan to the Jakarta and progress of the on-going projects which were recommended by JICA 1985 Master Plan. Proposed staging development plan is shown on **Figure-3120.1**. The reason why the year 2008 is selected as target year of the Second Phase of the Second Stage is as follows.

1) Before 2008, upgrading of West Tarum Canal will be completed to supply raw water in amount of $10m^3/sec$.
2) Two treatment plants, namely Buaran III and Cipayung Treatment Plants, can be constructed using new raw water sources from upgraded WTC.
3) Year 2008 is almost middle year of whole Study period.
4) In year 2008, Day-Maximum water demand is founded to be approximately half of the ultimate water demand in 2019.

The Second Phase of the Second Stage as the first program of the Study is proposed to be executed by two parts in its implementation, namely constructions of Buaran III Treatment Plant and Cipayung Treatment Plant. The Third Stage Program is proposed to be executed by two phases, namely constructions of Cisadane II Treatment Plant and Cisadane III Treatment Plant. **Table-3120.1** shows list of facilities required for each Stage.

The Second Phase of the Second Stage is proposed to be included in the Feasibility Study of this Study based on the followings.

1) Considering water demand increase of Jakarta, at least two treatment plants should be constructed immediately.
2) It is necessary for the Jakarta Water Supply System to immediately construct Buaran III Treatment Plant, because the West Tarum Canal is only available water sources up to 2008.
3) Constructions of two treatment plants and its associates transmission and distribution facilities are appropriate scale for the feasibility study.

The implementation schedule for the whole plans are shown in **Figure-3120.2**.

Figure-3120.1 DAY-MAXIMUM WATER DEMAND AND TREATMENT CAPACITY

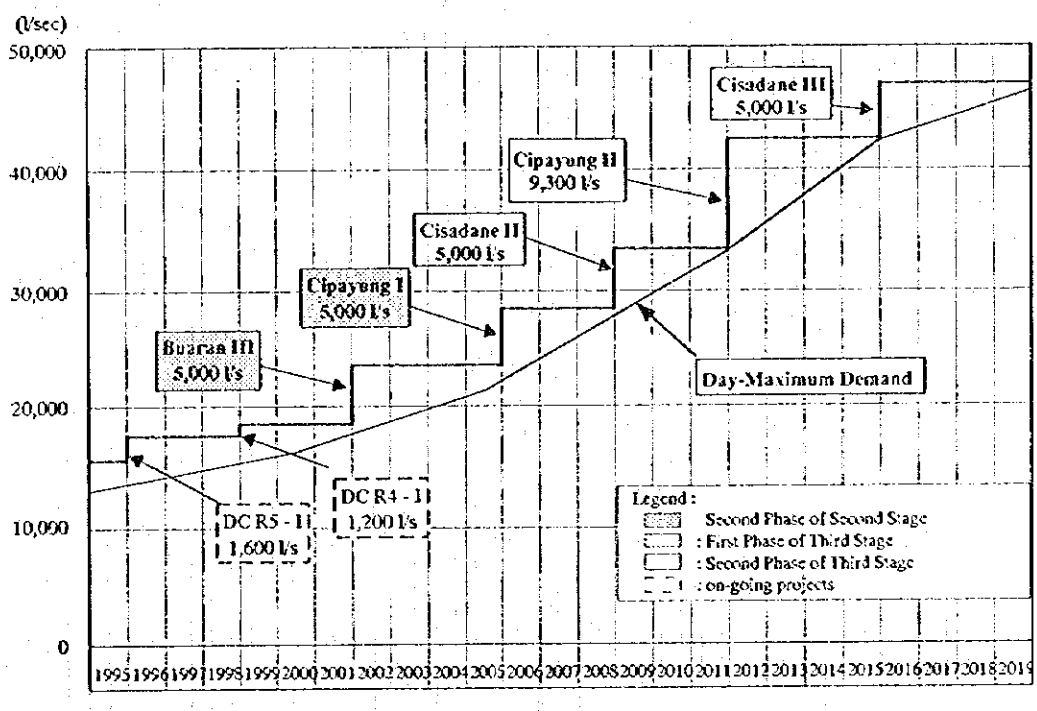
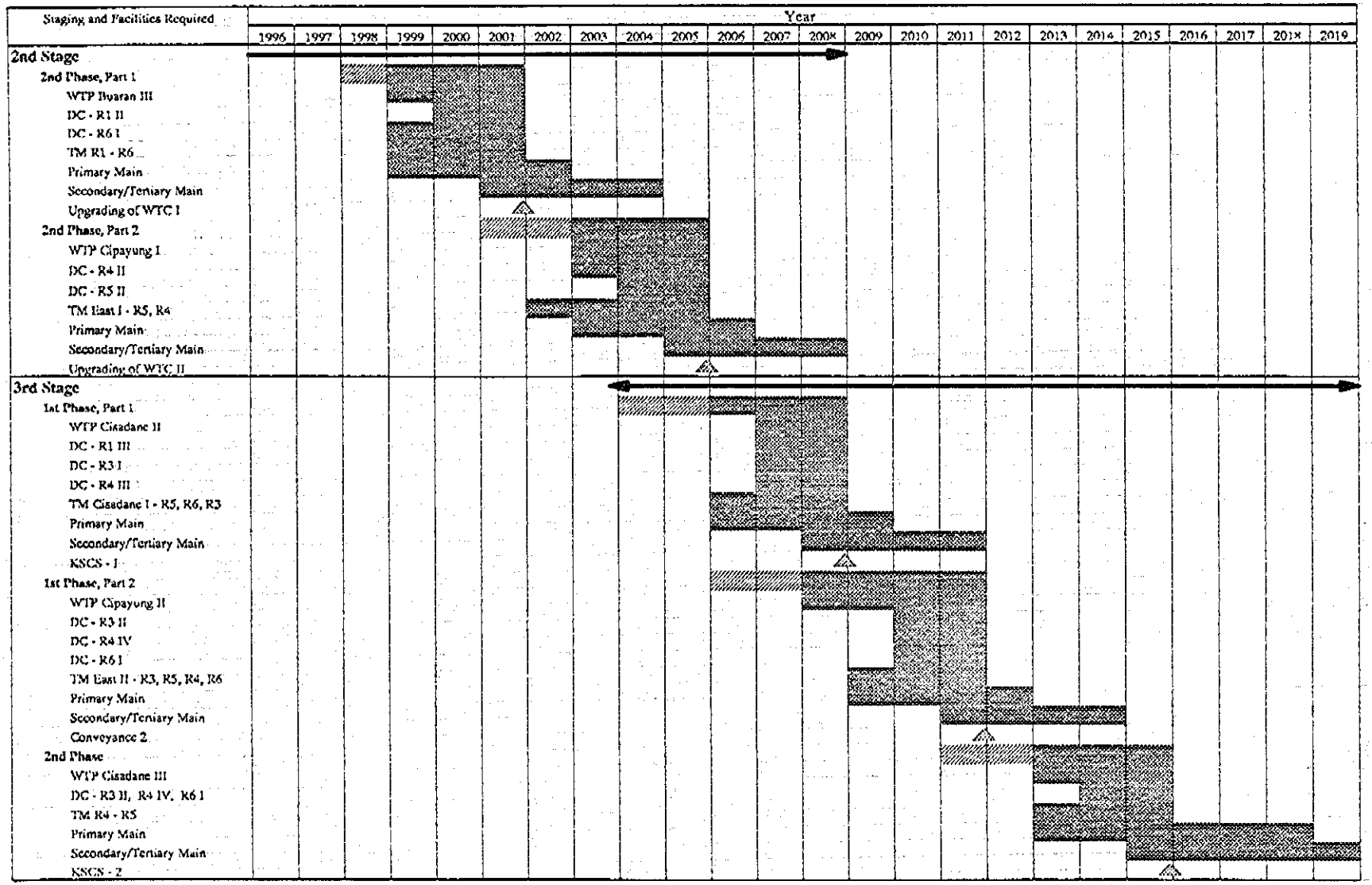


Table-3120.1 LIST OF FACILITIES REQUIRED

Stage	Phase	Part	Facilities Required	Capacity / Length
2nd Stage	2nd Phase	Part 1	Buaran III Treatment Plant	5,000 l/s
			R1 II Distribution Center	2,000 l/s 19,800 m3
			R6 I Distribution Center	2,100 l/s 50,400 m3
			Treated Water Transmission R1-R6	Dia.1500 x 33.5 km
		Part 2	New East Treatment Plant I	5,000 l/s 46,400m3
			R4 II Distribution Center	2,600 l/s 35,100m3
			R5 II Distribution Center	1,600 l/s
			Treated Water Transmission East TP - R4	Dia.2,200 x 15.5 km
				Dia.2,000 x 8.0 km
				Dia.1,800 x 11.0 km
				Dia.1,500 x 5.5 km
				Dia.1,000 x 1.5 km
			Raw Water Transmission Pump Station	5,025 l/s x 2 places
			Raw Water Transmission to East TP	Dia.1,800 x 20.0 km
3nd Stage	1st Phase	Part 1	Cisadane Treatment Plant II	5,000 l/s
			R1 III Distribution Center	- 19,800m3
			R3 I Distribution Center	800 l/s 22,500m3
			R4 III Distribution Center	1,000 l/s 23,200m3
			Treated Water Transmission	
			Cisadane TP - R4	Dia.1,800 x 14.0 km
				Dia.1,200 x 15.0 km
			East TP - R6	Dia.1,800 x 10.0 km
				Dia.1,500 x 2.0 km
		Part 2	New East Treatment Plant II	10,000 l/s
			R3 II Distribution Center	1,300 l/s 22,500m3
			R4 IV Distribution Center	1,200 l/s 23,100m3
			R6 I Distribution Center	800 l/s -
			Treated Water Transmission East TP - R4	Dia.2,200 x 15.5 km
				Dia.2,000 x 8.0 km
			Treated Water Transmission East TP - R4	Dia.1,800 x 11.0 km
	2nd Phase		Cisadane Treatment Plant III	5,000 l/s
			R3 II Distribution Center	400 l/s -
			R4 IV Distribution Center	400 l/s -
			R6 I Distribution Center	1,500 l/s -
			Treated Water Transmission R5 - R4	Dia. 700 x 2.0 km
			Cisadane TP - R5	

Figure-3120.2 IMPLEMENTATION SCHEDULE



3.13 STUDY ON COOPERATION WITH PRIVATE SECTOR

Involvement of a private sector is a recent boom in the field of infrastructure development in Asian developing countries. The positive aspect of this epoch-making trend is the active promotion of the private sector side including fast development of project financing, while the negative factor of anticipated shortage of public funds mainly from foreign economic assistance relative to rapidly growing fund requirement for infrastructure development is forcing developing countries to resort to funds from private sources.

This movement have necessarily involved donor countries and aid agencies into modify their assistance principles that currently prevent them from directly giving financial assistance to private-driven development efforts. The Japanese Government, which has been the biggest donor to Indonesia, has also started considering to orient its aid schemes toward assistance for such efforts.

3.13.1 Present Conditions of Jakarta Water Supply

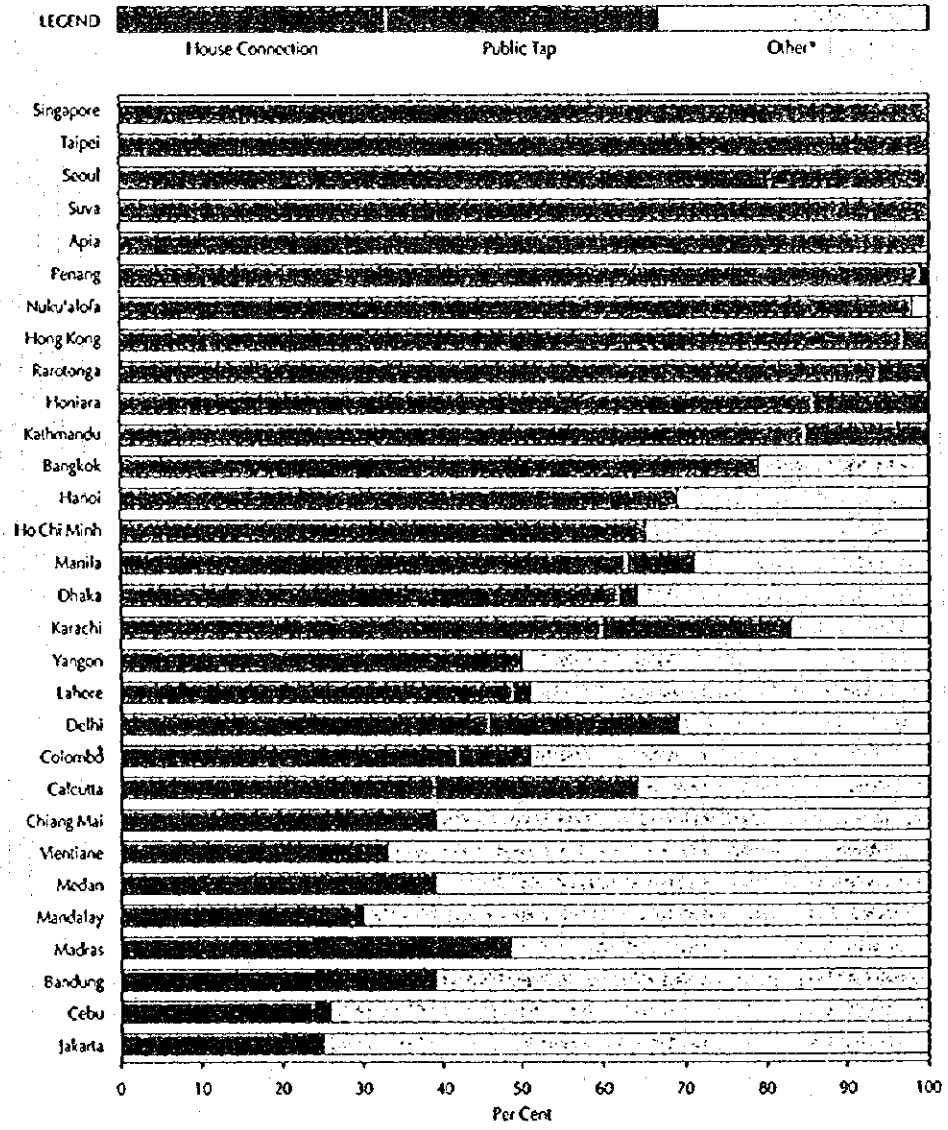
- Necessity for private sector participation

A series of figures which compare key aspects of water service and its management of cities in Asia and Pacific Region frankly shows the present conditions of the Jakarta Water Supply.

The figures say that among the cities compared, the Jakarta Water Supply serves (1) the smallest percentage of the city population with piped water **(Figure-3131.1)** at (2) considerably high price placing Jakarta among three most expensive cities including Singapore and Hong Kong **(Figure-3131.3)** which have already achieved 100% service coverage. The high level tariff is meant to compensate its (3) high cost operation partly due to the highest rate of unaccounted for water **(Figure-3131.2)** and financially, the lowest grant element for capital investment **(Figure-3131.5)**. Though the operation is costly enough because of its managerial and operational inefficiency, the unit production cost is not as high as ones of Singapore and Hong Kong **(Figure-3131.4)**. This situation brings (4) remarkably high rate of markup to PAM JAYA. This tariff level which is high enough compared to the unit production cost could be one of the major factors for the markedly low service coverage by discouraging potential customers to have a new connection.

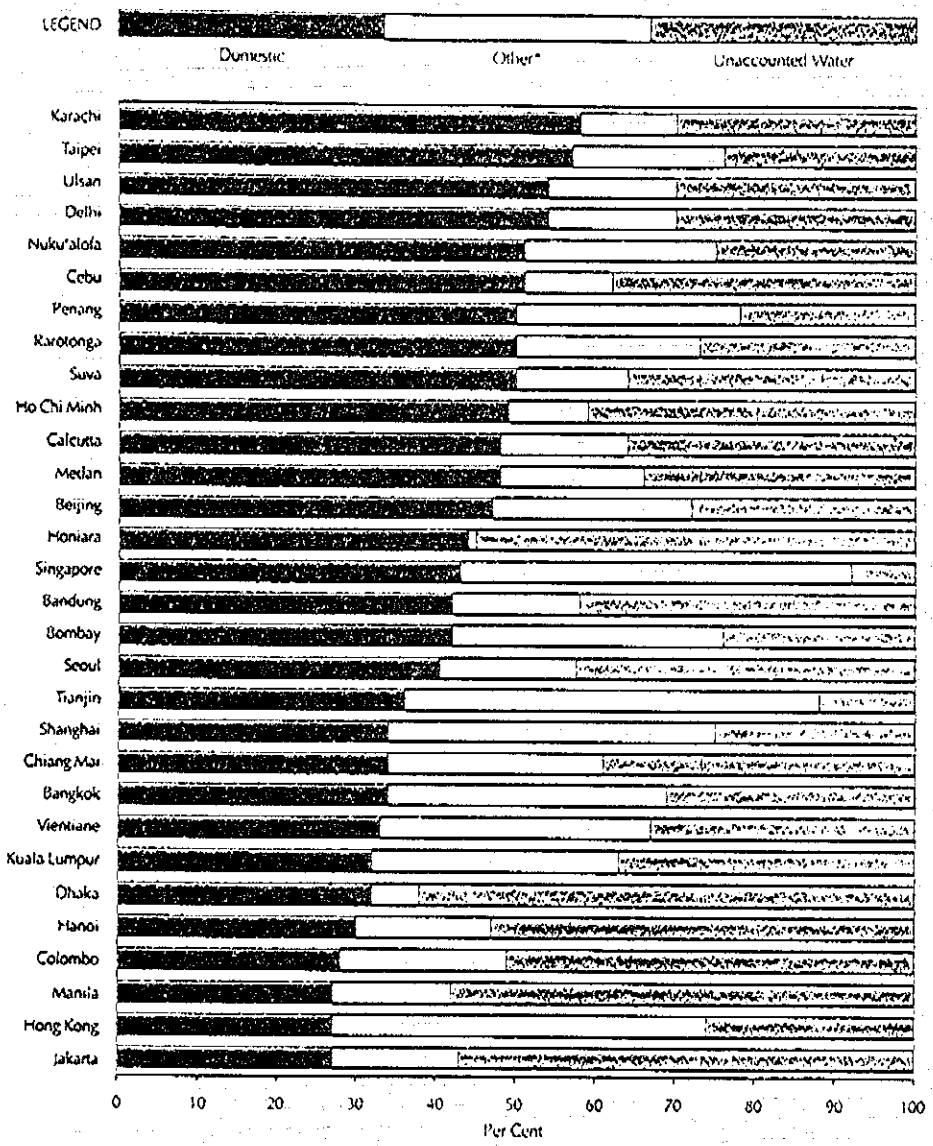
The current state of the Jakarta Water Supply characterized by those revealing facts hampers satisfactory achievement of its social mission as a public utility to supply drinking water to the widest possible population at their affordable price. Thus it is still far from the ideal, but conversely, that indicates a great room for improvement to realize remarkable contribution to the welfare of the public. The challenging trial to take an active step for total improvement by means of private sector participation is therefore highly expected in terms of introducing advanced technology, efficient management and operation and customer-oriented service improvement.

Figure-3131.1 DOMESTIC WATER SUPPLY SERVICES



Other sources include wells, springs, rivers, canals, rainwater, vendors and neighbours.
Source; Water Utilities Data Book, Asian and Pacific Region, Asian Development Bank, November 1993

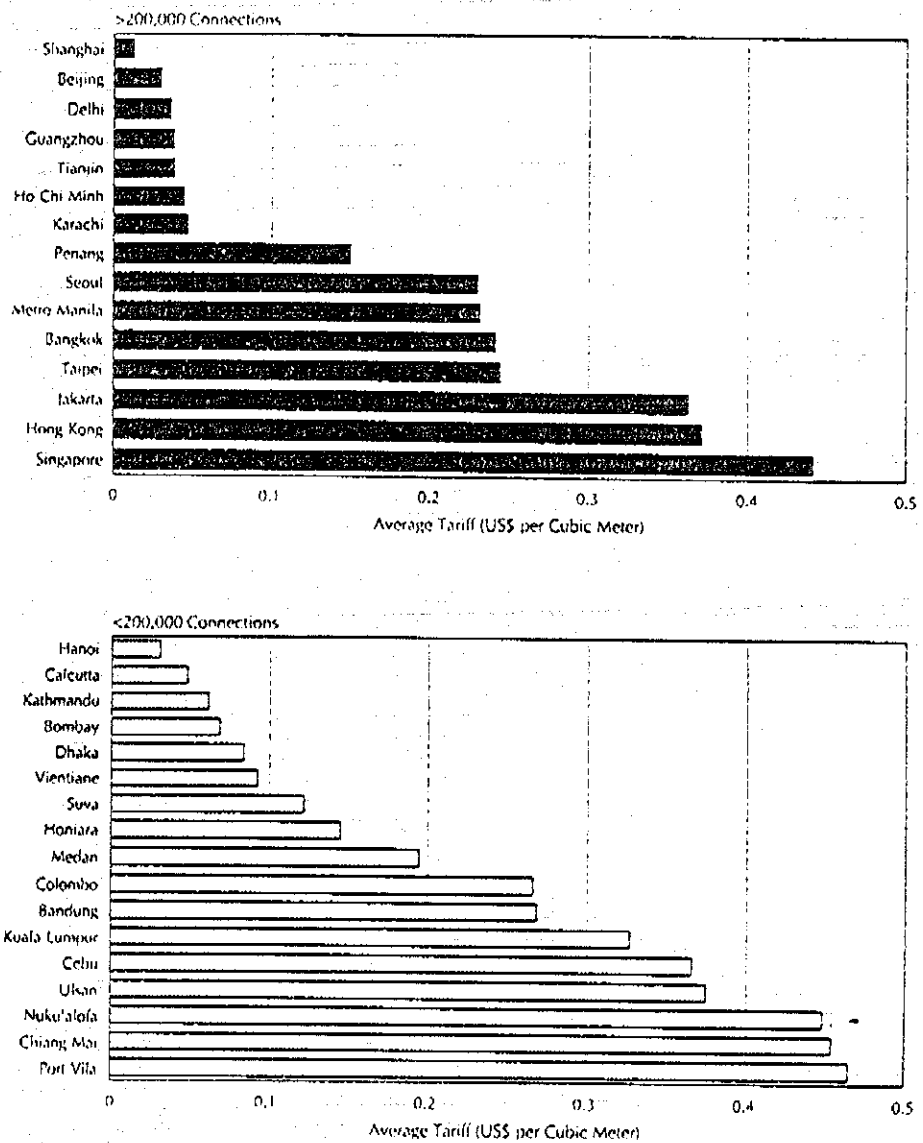
Figure-3131.2 WATER USE



Other use include industrial, commercial and institutional

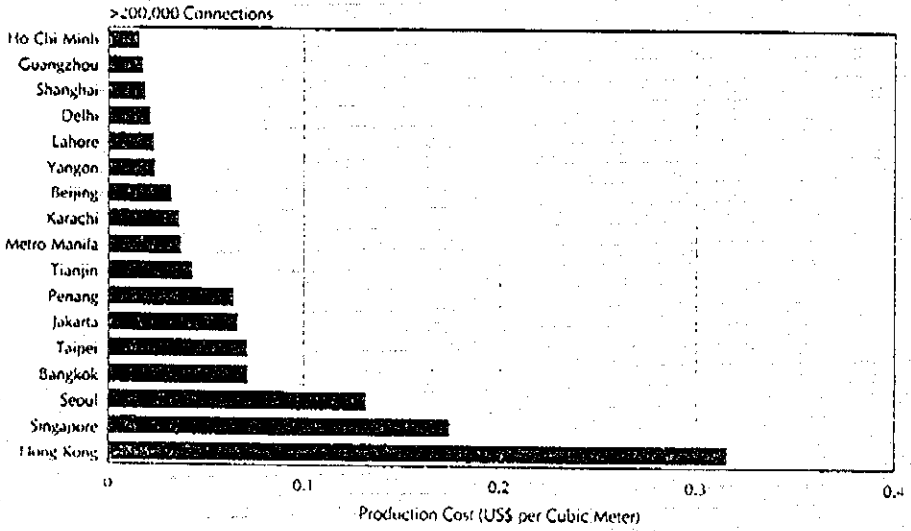
Source; Water Utilities Data Book, Asian and Pacific Region, Asian Development Bank, November 1993

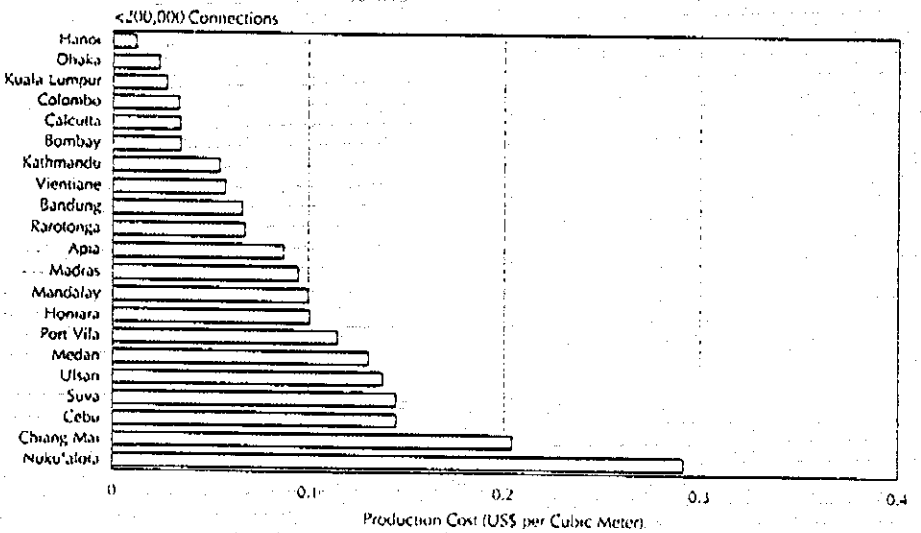
Figure-3131.3 AVERAGE TARIFF



Source; Water Utilities Data Book, Asian and Pacific Region, Asian Development Bank, November 1993

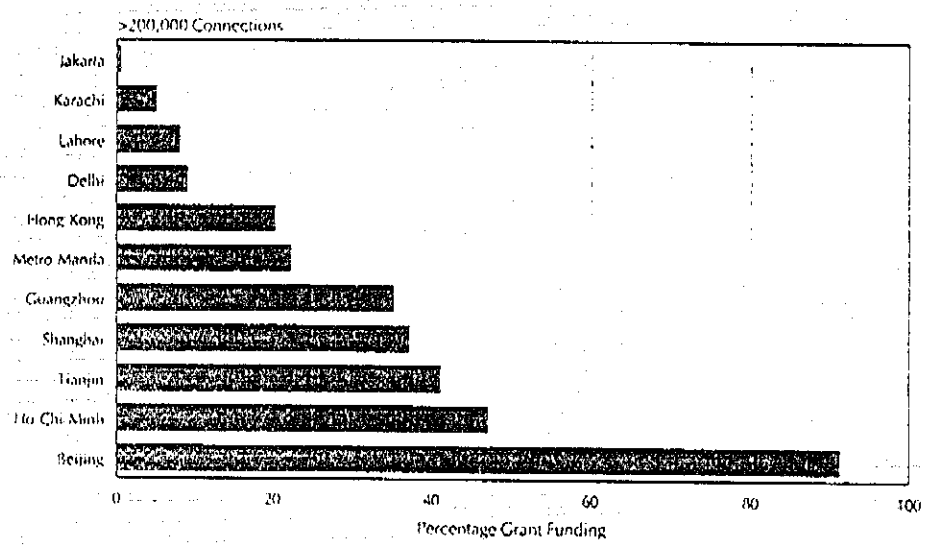
Figure-3131.4 UNIT PRODUCTION COST

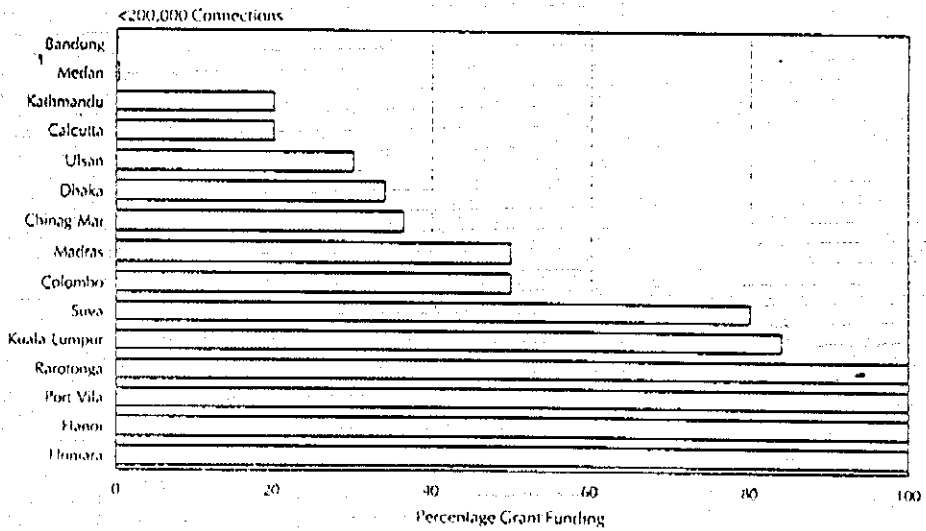




Source; Water Utilities Data Book, Asian and Pacific Region, Asian Development Bank, November 1993

Figure-3131.5 GRANT ELEMENT OF CAPITAL INVESTMENT





Source; Water Utilities Data Book, Asian and Pacific Region, Asian Development Bank, November 1993

3.13.2 Attempt at Private Sector Involvement

The Sixth five Year Development Plan emphasizes the development of economy and increasing income per capita of the people. In line with this Plan, the responsibility of water supply development projects are expected to be gradually transferred to the local governments, the communities, and the private sectors. In this context, it is obviously PDAMs that primary attention will be paid to in the efforts to improve the efficiency of water supply system and expand the water supply infrastructure to satisfy the basic human needs. Subsequently, the private sector in water supply is invited to participate in the development projects.

The President of Indonesia announced on June 5th, 1995 that the Jakarta Water Supply System would be organized on a sector basis using the River Ciliwung as a dividing line. Based on this announcement and the subsequent announcement by the Minister of Public Works, the Government decided to split The Jakarta Water Supply System into two concession areas, Jakarta East and Jakarta West, with the River Ciliwung being their boundary, and to appoint two private consortia to undertake comprehensive functions covering operation, maintenance and management of water supply services in the respective areas.

Names of the two consortia and the sector allotment of their undertakings are as follows:

For Jakarta East

Kekar Airindo (Indonesia) / Thames Water International (UK)

For Jakarta West

Garuda Dipta Semesta (Indonesia) / Lyonnaise des Eaux (France)

After a series of discussions since the appointment, PAM JAYA and the respective consortia reached an agreement and signed the MOU on October 6th, 1995 which requires the consortia to prepare Feasibility Studies with the following contents.

I. Introduction
II. Present Water Supply System of PAM JAYA
    a. Water Source and Treatment Plants
    b. Distribution Systems and Services

c. Percentage of Non Revenue Water (NRW)
d. Trend of Service Extension
e. Personnel and Organization
f. Average Tariff

III. Purpose of Cooperation, Technical Target and Service Standard
a. Purpose
b. Technical Target and Service Standard
(1) Standard quality of water
(2) Percentage of NRW
(3) Target of addition in subscribers
(4) Target ratio of population served

IV. Scope of Feasibility Study; Technical and Financial Proposal; Proposal for Cooperation Commitment

IVa. Study of Master Plan and Corporate Plan

IVb. Study of Present Conditions and Evaluation of Current Programs
(1) Physical, social and economical conditions at present
(2) Water demand in eastern (western) sector
(3) Water supply system of PAM JAYA in eastern (western) sector
(4) Evaluation of PAM JAYA's present and future programs
(5) Service areas and water demand forecast
(6) Study of technical target and service standard
(7) Major proposals for programs of operation, maintenance and investment during concession period

IVc. Detailed Proposal for Operation, Maintenance, Development and Investment
(1) Improvement in service water quality, constant supply and water pressure
(2) Treatment plants
(3) Water meter and program for metering consumption
(4) Source of water
(5) Percentage of NRW
(6) Preliminary design and construction/investment plan
(7) Management/control system of water supply
(8) Operation and maintenance of distribution system and treatment plants

IVd. Proposal from Financial Aspect
(1) Cost of operation and maintenance
(2) Investment cost
(3) Fund raising for operation and maintenance
(4) Tax and duties
(5) Tariff, management fee, cash flow and profit projection
(6) Risk analysis

IVe. Proposal for Commitment of Concession Cooperation

V. Period of Feasibility Study and Reporting

VI. Evaluation Method of Feasibility Study
a. Method of evaluation
b. Evaluation criteria

The Feasibility Studies (Proposals) had to be completed within 4 months from the date of signing MOU (October 6th, 1995), and periodic discussions between PAM JAYA and the consortia were held in the process of the preparation. In early 1996, the Feasibility Studies were

submitted by both consortia and are under negotiation with the Indonesian side.

3.13.3 Related Technical Assistance

(1) Jakarta Water Supply Sector Project (JWSSP) -World Bank-

JWSSP is a World Bank technical assistance project which aims to directly assist GOI in facilitating the process of concession contract with the two consortia for the Jakarta Water Supply. Besides technical studies including water demand forecasts and distribution system preliminary design, JWSSP also deals with the legal aspect and integrates the result into the proposal for PSP options.

The Legal Framework Report reviewed the current Indonesian laws and regulations relevant to water supply from the viewpoint of private sector participation into the Jakarta Water Supply, and examined the legal viability of various options for private participation. The Report identified a range of private sector options including corporatization and privatization of PAM JAYA, and the entry by PAM JAYA into basic Service Contracts, Management Contracts, Lease Contracts, Concession Contracts and Build Operate Transfer (BOT) arrangements. Based on the review, the Report concluded that, among the various options for private sector participation, the only option that is not immediately achievable under existing Indonesian law is the corporatization and/or privatization of PAM JAYA. All other options are permitted under current Indonesian Law and could be undertaken by PAM JAYA within its existing powers and authorities.

The conclusion of the Legal Framework Report is elaborated in the Report on Options for Private Sector Participation with its preference for long term concession arrangements along which actual actions have been going on. The Report also includes the following noticeable recommendations.

1) Phased Concession

The long term concession could include operation and maintenance, budgeting, revenue collection and administrative activities in the early stages of the contract with investments phased to allow contracting parties to:

a) become more accustomed to the operating environment;
b) become better informed about actual investment needs;
c) demonstrate to potential lenders the commercial viability of the businesses.

2) Greater Jakarta Bulk Water Supply Corporation (GJBWSC)

In support of the two concessions providing a satisfactory framework for bulk water supply, GJBWSC is proposed to be established as a joint government/private sector company.

3) Greater Jakarta Water Supply Regulatory Agency (GJWSRA)

For the purpose of a satisfactory regulatory arrangement to guide and control the future development of the water supply sector, GJWSRA is proposed to be organized involving various ministries, local governments and PDAMs concerned.

(2) Private Participation in Urban Services (PURSE) Project -USAID-

The PURSE Project supports the GOI to expand private sector participation in urban services; namely, water, wastewater and solid waste services.

The strategy of the Project is to support GOI and the Indonesian private sector to establish a national consensus concerning:

a) Legal and regulatory requirements and procedures;
b) Priority areas and acceptable forms of private sector participation;
c) Technical and financial implications of prototype agreements for public/private project.

The Project assists GOI in developing laws, decrees, regulations, technical standards and procedures for public/private urban environmental infrastructure development and management in the urban services sector. The legal and regulatory component focuses on the establishment of the enabling framework required to attract private investment and facilitate the successful closure of project negotiations.

The Project made a broad survey and analysis of the constraints, deficiencies and omissions in the legal and regulatory framework affecting the private sector involvement. The recommendations relevant to the Jakarta Water Supply include the following:

a) An interdepartmental approach toward establishing clear procedures of project approval and implementation is required. Coordination between Ministries of Home Affairs and Public Works is particularly needed in urban services projects.

b) As one of the means for effective water management systems, a formal water use rights system should be established.

c) To broaden the financial channel for activities with private sector involvement, the regulation of the Ministry of Finance which prohibits Indonesian state banks from providing loans to foreign-invested infrastructure projects should be amended.

d) Current decrees of the Ministry of Home Affairs that establish guidelines relating water tariffs should be amended to permit longer maximum tariff rate terms and/or to allow rates to be established that will reflect commercial and economic realities.

In addition to the legal review from the viewpoint of private participation, the Project had drafted a regulation of the "Minister of Public Works regarding planning, design and construction of water supply systems". The draft was elaborated and the contents were further improved with wider coverage under the new title "Water Supply Infrastructure and Facility Development and Management" in October 1995.

The Master Plan Report recommends establishment of a fundamental water act as a principal guideline for water supply development and operation, and accompanied institutional arrangement to efficiently and effectively execute the social mission of the water supply service. This draft regulation should be carefully reviewed as a threshold of this effort. The importance of this draft in the institutional development from the legal aspect is further discussed in **3.14.1, 2, (2)** in this Final Report.

3.13.4 Problems Critical for Private-Driven Infrastructure Investment and Operation

(1) Background and Recent Trend

The advent of private-driven development strategy is derived from three main factors; namely, (1) anticipated enormous financial requirement for infrastructure development in developing countries and consequent shortage of fund from public sources, (2) growing business interest of the private sector targeting this emerging market and (3) the development of project financing as a new device to connect the former factors. The desire of governments of developing countries to alleviate the burden of accumulating public debts also tempts them into this fascinating way to tackle their tough but important duties.

The World Bank estimates the total fund demand for infrastructure in East Asia during ten years to come at 1,509 billion US dollars in their Baseline Scenario, which would be far beyond the affordability of ODA moneys represented by the World Bank, ADB and Japanese bilateral assistance. For instance, even Japan, which is the biggest donor country in this region, continues to increase its ODA budget at the rate of 5 % every year, it can cover only 5 to 6 % of the total fund requirement.

Table-3134.1 shows the sector and country-wise distribution of the total investment requirement in Asian infrastructure.

The private sector involvement thus rapidly became a hot topic replacing a conventional thought which connects infrastructure investments directly with public fund especially associating it with foreign economic assistance. Arguments are prevailing and actions are being actively taken among the key players involving governments of developing countries, private investors / operators and private financial institutions. The late comers are aid agencies and governments of donor countries, but their actions are also quick to consider modification of the assistance schemes to facilitate private-driven development efforts.

Before considering to directly finance private corporations who undertake infrastructure investment and operation, aid agencies started assistance entitled "assistance for privatization" including institutional aspects to deal with its development in order to promote and facilitate the

"process of private involvement".

Table-3134.1 INDICATE INVESTMENT REQUIREMENTS IN INFRASTRUCTURE, 1995-2004

	Power		Telecom		Transport		Water and Sanitation		Total	
	US$ B	% GDP	US$ B	% GDP	US$ B	% GDP	US$ B	% GDP	US$ B	% GDP
Baseline Scenario (IEC baseline growth)										
China	200	2.0	141	1.4	302	3.0	101	1.0	744	7.4
Indonesia	62	2.9	23	0.8	62	2.2	25	0.9	192	6.8
Korea	101	2.1	32	0.7	132	2.7	4	0.1	269	5.6
Malaysia a/	17	1.7	6	0.6	22	2.1	4	0.4	50	4.8
Philippines	19	2.7	7	1.0	18	2.5	4	0.4	48	6.8
Thailand a/	49	2.4	29	1.4	57	2.8	10	0.5	145	7.2
Other b/	25	3.1	18	2.2	14	1.7	4	0.5	61	7.5
East Asia c/	493	2.2	256	1.2	607	2.7	153	0.6	1509	6.8
Low Case Scenario (GDP growth lower by 2 percentage points)										
China	150	1.7	113	1.3	265	3.0	88	1.0	616	7.0
Indonesia	73	2.9	20	0.8	56	2.2	23	0.9	172	6.8
Korea	80	1.9	26	0.6	106	2.5	3	0.1	215	5.1
Malaysia a/	16	1.8	6	0.7	22	2.4	4	0.4	48	5.3
Philippines	16	2.6	5.5	0.9	14	2.3	2	0.3	38	6.1
Thailand a/	38	2.2	26	1.5	52	2.9	9	0.5	125	7.1
Other b/	18	2.5	14	1.9	13	1.8	3	0.4	48	6.7
East Asia c/	391	2.0	211	1.1	528	2.7	132	0.7	1262	6.5

a/ Estimates were available only for the public sector
b/ Others Comprise cambodia, Fiji, Kiribati, Lao PDR, Maldives, Mongolia, Myanmar, Solomon Islands, Tonga, Vanuatu, Vietnam and Western Samoa.
c/ East Asia includes China, Indonesia, Korea, Malaysia, Philippines, Thailand and "Others"

Source : The World Bank Report

(2) Standpoint of Master Plan

In the prevailing circumstances where, no matter how it may be, cooperation with private sector in infrastructure development is in any event indispensable, any action and effort to technically facilitate its progress is necessary. The water supply sector is not an exception. However, the Master Plan Study should not be involved in these technical actions.

All these actions are to facilitate, promote and assist the "private involvement" itself, while the Master Plan Study contemplates how to facilitate and assist maximum achievement of social mission of the water supply services as a public utility by means of utilizing the power of private sector, to which much discussion has not been devoted.

To consider the issue from this viewpoint, the following are the key elements to be carefully examined especially for the water supply sector.

(3) Consistency with Public Benefit

This would be the most important element from the nature of the water supply service as a typical public utility. To consider this point, it is meaningful to review the nature of water supply service first.

1) Nature of water supply service

The peculiarity of public utilities that segregates them from other businesses is their nature of services, provision of which are continuously necessary for people's living, and that the service is provided by monopolies. This nature of service necessarily requires public utilities to be subject to public regulation and control for the sake of people's benefit.

a) Necessity of continuous provision

What is required to water supply service is not limited to mere provision of certain amount of clean and drinking water itself, but is complex services assuring supply of required volume of quality water on request to the required place with constant pressure. As the service is inherently not able to be reserved for future use, the provision must be constant without discontinuity.

Thus the water supply service must fulfill the strong social request for continuous water provision, moreover, its strength of necessity is greater than those of other utility like electricity and gas in the sense that water lacks substitute while the others do have.

b) Monopolistic service

Public utilities including water supply are specially allowed to render their services monopolistically even in a economy where market competition is dominant.

For instance, utilities like water supply distribute their products widely to general public assuming utilization of roads and other public facilities. Under the circumstances in which market competition prevails, it could happen that different companies would use a single road for their respective service provision. Civil

works for the installation and maintenance will be done separately, which apparently causes much trouble to the society.

There is also an economical aspect to justify monopoly. Public utilities as its nature involves gigantic scale of investment and consequently the fixed assets occupy large portion of the total assets. It brings a significantly slow turnover of capital, whereas its market can not be extended beyond the limited area where distribution facilities have been installed. If market competition is allowed, a number of companies will operate in the same area with sizable investment but with scattered income sources. This obviously leads to total inefficiency in each operation and resultant appreciation of service charges which goes against the people's benefit and accordingly against the corporate target of the public utility.

2) Necessity of public regulation

The two inherent factors above in public utilities are inconsistent with each other. Economics tells that a monopoly can fix its supply price at well above the economic level and is allowed to enjoy monopolistic profit at the sacrifice of its consumers under laisez faire. Higher the necessity of the service and accordingly lower the price elasticity of demand, more severely the benefit of the consumer will suffer. This situation applies most to water supply services.

This is the very reason why the operation of utilities, especially water supply service, must be publicly regulated in a careful manner. In other words, a monopoly of public utilities is allowed only under the public control.

The following two ways are normally practiced to execute the public regulation.

a) State or municipality's direct operation. Private sector's entry is not permitted.

b) Private operation is allowed under state's or municipality's control and supervision.

Section 3.14.1 Legal Aspect of Institutional Framework mainly deals with this issue emphasizing the necessity of establishing fundamental water act and its main principles.

3) Public or private operation

As mentioned above, options for public utility operation are only two: direct operation by public authority or private operation under control of public authority.

Compared with other utilities like electricity, gas, telecommunication and railroad which the latter option is widely taken in the world, water supply service is normally owned and operated by public authorities with a few exceptions including the case in the United Kingdom and France. In case of Japan for example, electricity, gas, telecommunication and railroad have already been privatized, while the water supply service is owned and operated by regional municipalities.

The following three reasons may explain why water supply sector is apt to be negative for private sector participation.

a) Significance of service

As discussed in the earlier section, constant water supply is not only essential for people's daily living but directly affects their health and even life. Therefore the service must be operated with special attention in terms of its quantity and quality.

b) Wide range of external economy

The beneficiary of the water supply service is not limited to the individual consumer concerned, but its benefit ranges over the region involved as a whole. Its contribution to the health improvement and the function for regional fire service are the typical examples.

c) Peculiarity in its material

Raw water as the material of clean and drinking water production is the most fundamental natural resource. Because of its relative scarcity, its use must be comprehensively controlled by proper authorities.

4) Conclusion

To conclude this first topic, the cooperation with private sector of the Jakarta Water Supply must be introduced within the regulatory framework set out by the government in order to

ensure fulfillment of its mission to provide the most basic services for the people's life. It is important to identify and specify the scope that the private sector can work most effectively.

(4) Financial Implications

The private sector participation has important implications for the issue of financing investment activities in terms of the following two aspects.

a. New access to private fund

b. Restriction of direct foreign assistance under the present system

The former aspect has one of the main objectives of the private involvement creating new channels of fund for infrastructure development with greater expectation to alleviate the official financial burden of the government debts. However, it also brings a side effect which imposes higher cost of fund on investment activities. The financial analysis of the master plan in **Section 3.11** shows financial difficulty in case that the implementation of the master plan will rely entirely on the private fund. Considering those situation, it is not a wise choice to abandon the channel of public financing by direct foreign economic assistance.

Advantage of involving the ODA fund would be the following: (in this report, the term ODA mainly means grant and soft loan assistance rendered by bilateral and multilateral aid agencies and excludes loan facilities provided with commercial or semi-commercial conditions by those agencies)

a) Attract more private fund showing evidence that the project or operating entity concerned is nationally supported.

b) Reduce cost of fund for investment.

c) Assure sufficient amount of investment fund

d) Less difficulty in fund request on the existing track

Although most of the existing ODA schemes can not be directly provided to private entities, it is the recent trend to modify those schemes to cope with the wave of privatization of infrastructure development in developing countries.

Considering this trend in the field of ODA, whether it is by public or private sector will not be the problem in the future, but its provision will be more dependent upon the fundamental criteria whether the project is formulated in the framework of the national development plan and definitely contribute toward achievement of the sectorial development purpose. The criteria include as a new factor whether institutional capability in terms of the government's leadership, regulation and organization is sufficient to guide and control the activities of the private sector involved in line with the attainment of the development target. It is certain that ODA will not finance any distorted project or operating entity which for instance has biased preference in terms of service or location, or disregards environmental consideration from a private sector's profit orientation.

(5) Private Sector Involvement and Implementation of National Development Plan

As it has been emphasized in the previous section, the private involving projects and operation and management of public utilities are formulated and carried out in the framework of the national development guided by the national development plan. In other words, the purpose is national development and the cooperation with a private sector is a tool for its achievement.

It should be very careful that preparation of private involvement must be carried out in such a way that it does not hamper the implementation of the national development plan. As have happened in some national projects in the transportation sector in Indonesia, a prolonged delay of project commencement due to a long time which has been taken for preparation of private involvement itself may cause serious effect on overall implementation of the national development plan.

3.13.5 Framework of Water Supply Development with Private Sector Participation

Based on the discussion in the former section from various aspects of water supply service and involvement of a private sector into it, this section presents the desirable framework of the development of the Jakarta Water Supply with the private sector involvement.

(1) Strong Leadership of Government

The Jakarta Water Supply Service has a strong mission as a public utility to serve social welfare and development in the region through provision of clean and drinking water. The government decided to utilize private power aiming to improve the present operation of the Jakarta Water Supply through introducing better technology and efficient management.

The primary requirement for the successful development is the strong leadership of the government. The argument for this requirement is derived from the discussion of private sector participation regarding its consistency with the public benefit in **Section 3.13.4, (3)**. The section concluded that the cooperation with the private sector in the Jakarta Water Supply must be introduced within the regulatory framework set out by the government in order to ensure fulfillment of its mission to provide the most basic services for the people's life. This corresponds to the text of Indonesian Constitution (UUD '45), Article 33 which states that water is controlled by state and used for the maximum welfare of the people.

There is other argument to support the necessity of the government's leadership from a financial point of view.

Section 3.13.4, (4) stressed that even after the private involvement, public fund especially from the source of ODA should play an important role. Currently ODA is only given to projects implemented by the government or other agencies in the public sector. This situation will change with the modification of the present ODA schemes in the future and direct assistance to private-driven projects is also expected. However, as also emphasized in the same section, the government leadership is still a prerequisite for these assistance.

Private sector participation gives a new access to commercial funds. Developing countries' infrastructure investment accompanies various kinds of risks that confront financial institutions. Apparently, commercial financiers are discouraged to provide a fund for the projects without the government support.

(2) Principles to Support Government Leadership

The leadership must be supported by a solid principle for its execution.

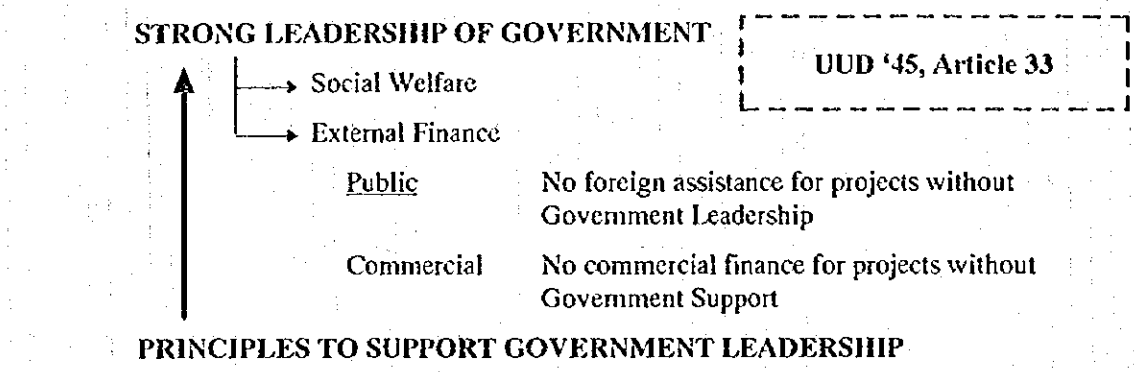
Laws and regulations regarding water supply to deal with individual problems have been developed in Indonesia and are being improved with foreign technical assistance, however, Indonesia still lacks a fundamental water act to comprehensively regulate all aspects of water supply based on a normative principle.

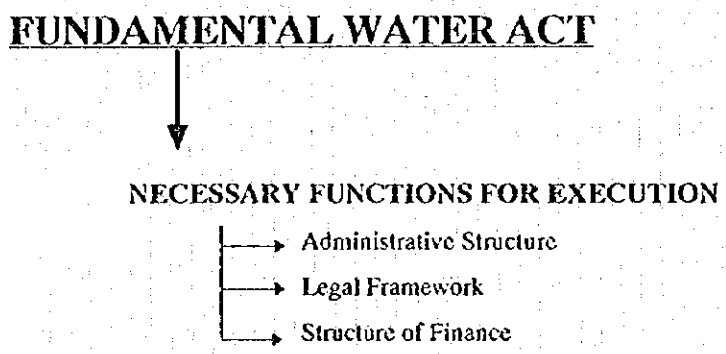
This fundamental act should also stipulate administrative structure to manage all the process relating to water supply covering from raw water until distribution, and a legal framework to regulate each aspect of water supply.

Emergence of a new factor, the private sector participation, in Jakarta Water Supply hastens the requirement for establishing of this fundamental act. The Master Plan recommends preparation of the water act within five years, concurrent review of the administrative structure, legal framework and structure of finance are to be carried out in the same period. The review and development of this institutional framework will be further discussed in **Section 3.14**.

The overall framework of the water supply development is summarized in the following **Figure-3135.1**.

Figure-3135.1 WATER SUPPLY DEVELOPMENT WITH PSP





TARGET WITHIN 5 YEARS

a) Establishment of Fundamental Water Act
b) Review of Administrative Structure
c) Review of Legal Framework
d) Management Improvement of Water Supply Entity

3.13.6 Structure of Private Sector Participation in Jakarta Water Supply

It has been decided that Jakarta Water Supply System is split into West and East operations and that two private consortia are to be given concession right for each area. In this scheme, the private consortia will be charged with operation and maintenance as well as capital investments.

The evaluation as to whether this PSP scheme is most appropriate, however, is yet to be completed. The three basic objectives of the Master Plan of this report will be used to evaluate the PSP scheme in Jakarta water supply, namely:

- Long-term planning
- Sustainable and fair operation of Jakarta water supply
- Maximization of social benefits

The new attempt to improve the Jakarta water supply management by experienced private sector will expect the following merits of its involvement to clear technical, managerial, operational and financial obstacles which now prevent the Jakarta Water Supply from taking powerful steps toward its goal.

- Better technology in every process of the water supply service.
- More efficient management and operation.
- Market-minded customer services with better quality.
- Alleviation of public financial burden through inviting funds from private sources.

Especially, the private sector participation is imperative to speed up the implementation of facilities development that tends to delay due to financial, technical and managerial reasons; to improve the efficiency of management and operation; and to supplement overall shortages of public fund for further development.

In order to make optimal use of the above advantages, however, the following conditions should be carefully taken into consideration:

- Under the present immature legal and administrative systems to regulate and conduct the water supply services, a certain extent of the public sector's involvement is also

indispensable.

- The financial forecast of the Master Plan indicates that the implementation of the Master Plan solely depending upon private-source funds is not financially viable.

(1) Fundamental Functions in Water Supply Services

In order to evaluate the PSP modality in Jakarta water supply, it is essential that the fundamental functions required for the efficient water supply are clarified, after which the most suitable way of public and/or private involvement in each function should be examined.

The two primary functions required for the efficient water supply services are regulatory activities and managerial activities.

Ideally, the regulatory activities can be best performed by a single public agency which can set up the legislation and regulatory framework for water supply. In Indonesia, these activities have been traditionally scattered on various public agencies both at central and regional levels. Under this system, the coordination efforts between the central and the local government have been made in case of any inconveniences. This fragmentary system obviously lacks efficiency and some type of bureaucratic expertise is needed for the system to function.

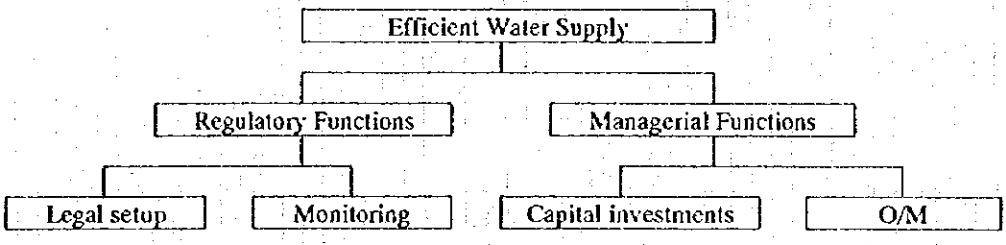
In the absence of an integrated and efficient legal setup, the function of regulatory coordination should be maintained and strengthened. Furthermore the cooperation agreement should be prepared well enough to minimize regulatory negotiations with existing agencies.

Managerial activities of Jakarta water supply have been performed by PAM JAYA, which is a local government company and has technical relations with central government agencies. Under this system, operational problems can be finally solved by negotiations between public agencies and it is not always necessary to monitor the operations. After PSP, however, the public side should monitor to certain extent the management of water supply by the private consortia in East and West Jakarta. This monitoring task can be regarded as a part of regulatory function.

Managerial functions can further divide into two subfunctions, (1) capital investments or construction of facilities and (2) operation and maintenance of facilities. These subfunctions can be analyzed separately because of the importance.

To sum up, the primary functions required for the efficient water supply services are as shown in **Figure-3136.1**.

Figure 3136.1 Fundamental Functions for Efficient Water Supply in Jakarta



(2) Evaluation of PSP for Each Fundamental Function

1) Legal setup

The legal framework for the water supply services should be set up by the Central Government. Regarding the setup of administrative framework, the jurisdiction should cover not only the City of Jakarta for the time being, but ultimately whole provinces of Indonesia. This is because PSP in Jakarta water supply is expected to be followed by many PSPs in other PDAMs. In this study however, the analysis is focused on the City of Jakarta which currently runs PAM JAYA.

2) Monitoring and Coordination

Monitoring of operation and coordination among concerned parties should be done by PAM JAYA. However, the scope of monitoring and coordination should be strictly limited to only necessary parts. Because the Cooperation Agreement between PAM JAYA and the private sector should have already provided self-contained regulations. Especially important is the integration of monitoring data of East and West Jakarta where water will be served by respective private consortia. Without subsequent integration and coordination by the public sector, there

will be disparity between two areas. Main items that PAM JAYA should carefully monitor would be for example, (1) water flow, pressure and continuity at the distribution system, (2) Water quality which will be tested at a centralized laboratory.

3) Capital Investments

It has been already decided by the national policy that capital investments or construction of facilities in Jakarta water supply will be made by the private consortia. However, the water tariff to finance the capital investments should not exceed the community's ability to pay. In order to justify the future water tariff, evaluation is necessary as to who should be responsible for capital investments and its financing.

Between the both extremes where the public or the private sector takes whole responsibility, a variety of private sector participation scenarios have been compared.

The candidate scenarios include cases in which the private sector deals with facility development and funding of secondary and tertiary pipelines of the water distribution system (Scenario C), and all distribution system including trunk mains (Scenario B). These are the scenarios assuming concurrent private dealing for both development and O/M of the water distribution system that is what most needs efficiency improvement in the whole systems of the Jakarta Water Supply.

A private participation in the development of treatment plants, transmission and distribution centers, which would be easier for the private to cope with than its involvement with a geographic spread covering all over Jakarta in case of handling the distribution system, is the other scenario of partial involvement of the private sector.

The scenarios evaluated are summarized in **Table-3136.1**.

Among items to be taken into consideration when evaluating the above scenarios are conformity to national policy, financing ability, construction speed, O/M, water tariff, etc. However conformity to national policy is of paramount importance.

Table-3136.1 LIST OF SCENARIOS EVALUATED

Scenarios / Facilities Developed	A	B	C	D	E
Treatment Plants	Private	Public	Public	Private	Public
Transmission Facilities	Private	Public	Public	Private	Public
Distribution Centers	Private	Public	Public	Private	Public
Primary Pipelines	Private	Private	Public	Public	Public
Secondary & Tertiary Pipelines	Private	Private	Private	Public	Public

In **Table-3136.2**, each scenario is evaluated from respective weight allocating 5 to 1 points according to their advantages in descending order. This scoring is based on the consultant judgment. Regarding the item "Conformity to national policy", its importance is taken into account and preferential threefold point is given in parallel with normal point.

a) Conformity to National Policy

According to the National Policy, all the facilities should be developed by the private sector. In this sense, only Scenario A scores 15 points while other scenarios scores 3. However, since Scenarios B, C, and D can also mitigate the government financial burden, they are given 6 points. If the importance of the conformity to national policy is considered same as other items, Scenarios A, B, C, D, and E score 5, 2, 2, 2, and 1 point(s) respectively.

b) Financing

Table-3136.3 shows comparative nature of public and private funds in the context of infrastructure development.

Considering respective attributes of each fund compared above, especially from the viewpoints 2 and 4, private fund would better suit distribution facilities, whose improvement could be more flexibly segmented and staged, rather than upper stream facilities like treatment plants and distribution centers which usually need lump sum investment in a large scale.

Table-3136.2 Comparison of PSP Scenarios in Capital Investment

Item to be Compared	Reason of Consideration	Scenario option				
		A	B	C	D	E
1. Conformity to National Policy	The 6th Five-year National Development Plan advocates the infrastructure provision by participation of local community and private sector. This policy is expected to better satisfy the infrastructure need of community. Incidentally the more private funding, the more foreign debts the Government can repay.					
	Point by preferential weight	15	6	6	6	3
	Normal point	5	2	2	2	1
2. Financing						
2-1. Characteristic of fund	Foreign public fund is suitable for massive and lump-sum financing, while private fund is flexible enough to accommodate smaller financing needs.	3	5	4	1	3
2-2. Availability in a massive lump	Vast amount of money will be needed for Jakarta water supply project, hence both foreign public and private funds should be available to the undertaker. Reliance on single financing source, whether public or private may result in shortage of fund required.	2	5	5	5	2
3. Capital investment	Capital investment should be accelerated in future to meet the demand. Timely financing and execution of planned investment are essential. Private sector is regarded more capable of planning and execution of project. Ideally two consortia should be invited for competition of capital investment project.	5	4	4	3	1
4. Reduction of UFW	Unaccounted for water reduction is top priority to cope with. Completion of PJSIP and its follow-up in UFW reduction are vital. It is desirable that capital investment and O/M be done by a same party.	5	5	5	2	2
5. Tariff	Average water charge in Jakarta accounts for as high as 5-6% of house income, which ranks high among Asian countries. Increase of water tariff should not exceed that of consumer prices.	1	4	4	4	5
	Total Point (Preferential weight for Item 1)	31	29	28	21	16
	Ranking	1	2	3	4	5
	Total Point (Equal weight for all items)	21	25	24	17	14
	Ranking	3	1	2	4	5

Based on the above rationale, Scenarios B and C score highest points from the viewpoint of characteristic of fund. Financing availability in a massive lump is also notably high in Scenarios B, C, and D because both private and public funds will be used.

Table-3136.3 COMPARISON OF PRIVATE AND PUBLIC FUND

	Private Fund	Public Fund
1. Availability of Long-term Fund	Relatively scarce, especially for local fund due to immature long-term capital market in Indonesia.	Prepared for development purpose.
2. Availability in a big lump	Depends on the estimated project profitability, however, relatively difficult to procure especially in early stages in which the business profitability has not been established.	Most portion of the project fund requirement is met subject to the appraisal.
3. Loan Conditions (in case of loan)	Provided on commercial basis.	Provided in concessional terms.
4. Flexibility and Mobility	More flexible and mobile in terms of appraisal and provision.	Takes time for preparation and less flexible in use adhering to development purpose.
5. Development Orientation	Appraised purely from a viewpoint of commercial viability and profitability not involving development perspective.	Appraised mainly from a viewpoint of development keeping consistency with the national development plan.

c) Capital Investments

As explicated in this Master Plan, the facilities should be developed at a higher speed than it has been in order to meet the future water demand, some of which will be shifted from the ground water. These capital investments require massive amount of funds and should be executed with careful planning. The private sector is regarded more capable of undertaking the capital investments assuming that the funds are available.

d) Reduction of UFW

Reduction in UFW is one of the most significant elements for improving the Jakarta Water Supply System. For this purpose it is important to efficiently and systematically implement the PJSIP, which includes rehabilitation of the distribution networks, and its follow-up. Therefore, it would be desirable if a single entity takes responsibility for both capital works and operation.

Among the five scenarios, highest points 5 are given to the scenarios where the private sector participates in the distribution system which has most to do with reduction of UFW.

e) Water Tariff

As shown in Chapter 3.13.1, the average water tariff of Jakarta is considerably high. Any further increase of tariff may affect the community whose ability to pay is not high enough. It is advisable that the tariff increase is inferior to that of consumer price.

Scenario A, therefore, scores lowest point due to the involvement of the private sector in tariff determination. Even in this scenario, the private sector should seek the lowest fund to minimize the possible tariff increase. Scenario E, with a lowest expected rate of tariff increase scores highest 5 points. Scenarios B ,C, and D, which will also limit the tariff increase to be less than the consumer price increase, are given 4 points. Incidentally, the conditions of water tariff is elaborated in **Chapter 3.11 FINANCIAL FORECAST.**

f) Best Combination of Capital Investments

Analyses in a) through e) above lead us to adopt Scenario A, if the conformity to the national policy is prioritized. As shown in **Table-3136.2**, however, Scenario A has only a slight lead over Scenarios B and C. Therefore if the conformity to the national policy is weighed same as other items, Scenario B turns out to be the best.

It can be also said that Scenario A, option of all capital investments by the private sector, should be carefully monitored when selected, especially for low point items such as fund availability in a massive lump and water tariff.

4) Operation and Maintenance

Among many problems in operation and maintenance of the Jakarta Water Supply System, improvement of supplied water quality and UFW reduction would be most important. The water quality improvement plan of The Master Plan Study envisages production of drinkable water at the treatment plant level in the short-run, and its ultimate supply to the end-users in the middle term period. Water quality management based on the qualified experience is essential in strengthening of chlorination at the water treatment plants and booster chlorination at the distribution networks.

As for the reduction in UFW, JWSSP firstly put the target of 35% UFW realized by PAM JAYA by 2010 in the Water Demand Update Report, but this target was upgraded later upgraded to 28% taking into account the intensive efforts through extended participation of the private sector.

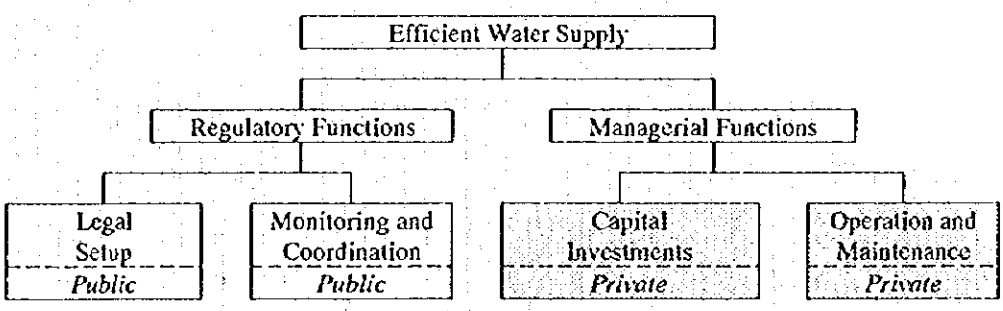
The Master Plan Study suggests that UFW should be reduced by the year 2019 up to 25% from the current figure at about 50% through active implementation of PJSIP and its follow-up works after the private sector involvement. However, it is the fact that the follow-up works including leakage survey by PAM JAYA have not been effectively executed.

It is therefore necessary that the private sector operate and maintain the whole system of the Jakarta Water Supply System pursuing ample supply of quality drinking water with stable pressure utilizing their advanced technical and management know-how and experience in order to furnish the community with high quality total water services.

3.13.7 Preferable Course of PSP

Based on the analyses of fundamental functions for water supply in the previous subchapter (2), desirable allocation of the functions between public and private sector is summarized in **Figure-3137.1**.

Figure-3137.1 Desirable Allocation of Principal Functions



The Jakarta Water Supply System should be developed and operated under a strong leadership

of the Government with a maximum use of private merit expected to introduce better technology, efficient management and operation, customer-oriented service improvement and fund from private sources which will alleviate the government's financial burden.

Considering above, and based on comprehensive analyses about the desirable extent of the private participation, a preferable course of the Jakarta Water Supply Development involving the private sector would be as follows:

- In order to utilize technical, managerial and operational merits of the private sector, management, operation and maintenance including budgeting, revenue collection and administrative activities of the water supply system from the water treatment plants to the customer are undertaken by the private consortia under the concession contracts.

- Parallel efforts for institutional capacity strengthening including development of regulatory framework is to be conducted in order to guide the private-involving water supply development to the achievement of the social mission of water service without weakening the advantages of the private participation. The issue of institutional strengthening is further discussed in **Section 3.14.3** from the viewpoint involving administrative and legal aspects as its integral elements.

In terms of finance, however, public funds particularly a fund from ODA (Official Development Assistance) would continue to play an essential role from the following reasons:

- The financial forecast of the Master Plan indicates difficulty in terms of cash flow in implementing whole the projects which constitute the Master Plan relying solely on commercial loans.

- Advantages in involving public finance including ODA should be emphasized. Particularly the following effects are significant:

  (a) Attract more private fund demonstrating that the project concerned is nationally supported.

(b) Reduce cost of fund for investment.

(c) Assure sufficient amount of long-term fund for the projects.

(d) Less difficult in fund request on the existing track.

(e) The projects are appraised from the development viewpoint.

The last point could be especially emphasized because of its double-check function to support the social and economic contribution of the projects concerned through the appraisal from the following aspects:

(a) Consistency with the overall development plan;
(b) Consistency with the social targets including environmental consideration;
(c) Institutional capacity to conduct the project implementation and operation including coordinated government leadership.

Maximum introduction of private funds for capital works should be pursued in a viable way particularly from its financial and social perspective. However, the involvement of ODA should be continuously taken into account as well to realize its full advantage emphasized in **3.13.4, (4)**.

3.14 Institutional Framework

3.14.1 Legal Aspect

(1) Relevant Law and Regulations

Existing Indonesian laws and regulations relating to water supply were reviewed from the viewpoint of evaluating the legal viability of various options for private participation in the World Bank's technical assistance entitled "Jakarta Water Supply Sector Project" (JWSSP). The result with comments on the nature of changes deemed necessary to the existing legal and regulatory framework in order to facilitate private sector participation was reported in its "Legal Framework Report" dated January 1995.

The following are the laws and regulations directly related to water supply in Indonesia extracted from the Report.

Laws (Undang-Undang)

1. Law No.11 of 1974 on Water Resources Development.

Government Regulations (Peraturan Pemerintah)

1. Government Regulation No.22 of 1982 on the Management of Water.
2. Government Regulation No.20 of 1990 on Water Pollution Control.
3. Government Regulation No.22 of 1990 on Water Management.

Ministerial Regulations (Peraturan Menteri)

1. Minister of Mining and Energy Regulation No.03/P/M/Pertamben/1983 dated 15 Dec.,1983, on the Management of Sub Surface (Underground) Water.
2. Minister of Home Affairs Regulation No.690 - 536 dated 30 June 1988, on Guidelines on Water Tariffs of PDAMs.
3. Minister of Public Works Regulation No.65/KPTS/1989 on the Establishment of a Joint Technical Team for Investment in Water Supply [Projects].

4. Minister of Public Works Regulation No.45.PRT/1990 dated 30 July 1990 on Quality Control of Water Resources.

1. Minister of Health Regulation No.416/MENKES/PER/IX/1990 dated 3 Sept.,1990 on Water Quality Standards for Drinking, Sanitation, Bathing and Swimming.

Ministerial Decree (Keputusan Menteri)

1. Decree of the Minister of Health No.2180/YANKES/INSTAL/XI/1981 dated 2 November 1981, on the Establishment of a Team for the Management and Supervision of the Quality of Water and Environmental Development.

2. Decree of the Minister of Home Affairs No.690.31-285, on PDAM DKI Jakarta (PAM JAYA)

3. Decree of the Minister of Public Works No.269/KPTS/1984 dated 8 August of 1984, on the Establishment of Badan Pengelola Air Minum (BPAM).

4. Decree of the Minister of Home Affairs No.690-1599 dated 13 November 1985, on the Guidance and Monitoring Tasks of PDAMs at the Provincial Level.

Joint Decrees

1. Joint Decree of Minister of Public Works, Home Affairs and Finance No.281/KPTS/1978, No.160 of 1978 and No.350/KMK.011/1978 dated 19 Sept.,1978 on Fresh Water Construction Projects with Central Government Assistance.

2. Joint Decree of Minister of Home Affairs and Public Works, No.4 of 1984 and No.27/KPTS/1984 dated 23 January 1984 on the Supervision of PDAMs.

3. Joint Decree of Minister of Home Affairs and Public Works, No.5 of 1984 and No.28/KPTS/1984 dated 23 January 1984, on Guidelines on Organization, Accounting System, Operations, Maintenance, Calculation of Potable Water Tariffs,

Supply of Water to Subscribers, Management of Clean Water Taps by PDAMS and BPAM.

A group of laws and regulations listed above are to individually cope with problematic areas of water supply. They are directly dominated by the Indonesian Constitution 1945, Article 33, which states that water is controlled by the States for the maximum benefit of the people. Thus, Indonesia lacks a single fundamental law of water supply which gives basic principles of the water supply in Indonesia.

(2) Fundamental Water Act

1) Basic Requirements

Standing on the viewpoint of sound and solid development of the Jakarta Water Supply involving private sector cooperation, the Master Plan recommends to establish a fundamental water act to clearly prescribe the principles of the Indonesian water supply and basic regulations to provide a master rule for water supply operation, management and development.

It was emphasized in Section **3.13.4,(3)** which reviewed the basic nature of water supply, that public regulation has key importance in water supply service. The fundamental water law should act as a pivot for any public regulation concerning water supply.

Method of preparation and contents should be subject to careful as well as comprehensive consideration from technical, legal, managerial, financial and other relevant aspects referring also to examples of other countries like Japan and UK.

The following are the essentials to be prescribed in the fundamental water act as basic and common requirements or duties of water supply services.

a) Duty of unrestricted supply

Among other utilities, the social necessity of water is extremely high (cf. Section 3.13.4,(3)). This principle corresponds to this utmost necessity. When requested, water supply service is not allowed to reject or restrict its supply without justifiable reason, and has to provide the service indiscriminately to those who are requesting within its supply area. The water supply service thus bears grave responsibility to make every possible effort to satisfy every water demand under its natural, social and technical conditions given to the supplier.

b) Duty of full capacity service

The water must be instantly and fully supplied on consumer's demand within its capacity. The supplier is not allowed to restrict its supply volume. That means it has a duty to operate with full capacity to satisfy anytime demand. It is requested because of the inherent situation of a water supply entity who monopolistically supplies its service of highest necessity for people's daily living. The full capacity service is not only for the present water demand but it is also requested in a long-run perspective. Therefore water supply service is requested to always adjust its capacity to expected growing demand in future by advance investment.

c) Duty of setting reasonable tariff

① Reasonableness

From the monopolistic nature of water supply service, the tariff can be set at the level much higher than its economically determined level under laisez faire. Therefore tariff determination is publicly controlled by proper authority. The water tariff must be fixed at the level which covers proper cost of services under efficient operation.

② Impartiality

This duty requests to apply a single tariff to consumers in the same category under the same conditions.

d) Duty to keep safety in providing services

For water supply services the safety is a matter of special attention, because "Water" is directly related to the health and life of the public. In order to maintain the safety, construction and installation of water supply facilities and their operation must be properly regulated.

Main points of control are as follows:

(Construction and installation)

i) Construction and installation standards

ii) Supervision during construction and installation

iii) Inspection before starting water supply

iv) Structure and materials of facilities

v) Inspection of facilities

vi) Request for inspection

(Operation)

i) Water quality standard

ii) Qualification of engineers

iii) Inspection of water quality

iv) Health check

v) Hygienic devices

vi) Emergency stop of water supply

2) Draft Regulation by PURSE

The Private Participation in Urban Services (PURSE) Project is primarily meant to assist the Government of Indonesia in promoting private participation in urban services from institutional aspect including legal issues. However, their draft report for the Regulation of the Minister of Public Works entitled "Water Supply Infrastructure and Facility Development and Management" submitted in October, 1995 exceeds the limit of mere promotion of private participation. It is prepared from a general perspective of total water supply services, whereas their another legal report "Analysis of Legal and Regulatory Constraints, Deficiencies and Omissions in Indonesia Regarding PPP & PSP Projects in Water Supply, Waste Water and Solid Waste Urban Infrastructure" in December, 1995 deals with comprehensive legal review for private participation itself. In this connection, JWSSP's "Legal Framework Report" mentioned in **3.13.3** and **3.14.1,(1)** stands on the same standpoint as the latter.

The Master Plan Report appreciates this draft regulation as a foundation for the further steps to establish the fundamental water act from the following points in light of the arguments above regarding the requirements of the act.

a) Comprehensive coverage

The draft limits its scope to "urban areas" in Article 3 (1), however, the contents are universally applicable to any water supply service.

The draft regulation also covers whole process of water services ranging from water resources until house connections, and basic issues including development, management and public control as well.

b) Manifestation of basic principles

The draft regulation articulates basic principles on which water supply services must base its operation including basic human rights. Important descriptions in this regard are included in the following articles.

Article 2

(1)The purpose of this Ministerial Regulation is to establish basis for implementation of water facilities and infrastructure development and management in order to improve public welfare and promote economic growth.

Article 4

(1)Any one has the right to have good and healthy environment.
(2)Any one has the right to obtain sufficient clean and drinking water to maintain his health.
(3)Any one has the obligation to participate in maintaining clean water and drinking water facility and infrastructure.

Article 7

(1)Surface water resources management is based on river area management, including management of water under the ground which is physically part of the river flow system concerned.

Article 15

(1)The volume of water supplied through all distribution system shall meet the requirements of all water users for 24 hours continuously.
(2).Distribution systems are planned and operated with adequate pressure at all times in order to secure that water will be continuously supplied to users without hindrance.

The PURSE Report is thus a well-thought-out draft to serve as a base for the fundamental water act. However, it is preferable to be taken into consideration during the further elaboration that;

a) clauses regarding tariff determination and control be included to secure its reasonableness and impartiality (cf. **3.14.1,(2),1**);

b) the regulation cover control over individual installation after house connection as it may also affect the water quality in the distribution systems;

c) one of the criteria for the approval for the partnership with the third party be adoption of "adequate" rather than "high" technology;

d) the regulation provide for technical qualification of water engineers for safety in water provision;

e) the regulation propose concept and possibility of extended water supply development and management beyond administrative boundaries where it is regarded preferable from natural and/or social reasons.

It is significant for the institutional development of Jakarta and other water supply systems in Indonesia to thoroughly discuss the contents of this draft regulation from viewpoints of applicability to the Indonesian situation and its implementability aiming at the establishment of the fundamental water act.

3.14.2 Administrative Aspect

(1) Present Water Supply Management

The present practice of the water resource management including water supply management is characterized as spread-over responsibility sharing among various ministries and agencies with lack of satisfactory coordination.

Main participants in Jakarta water supply services are illustrated in **Figure-3142.1.** It is noted that PAM JAYA with assistance of DKI Jakarta is confronted with each regulatory agency. Among those notable agencies and the functions are:

- Ground water management and abstraction approvals (Ministry of Mining and Energy) ,

- Surface water management and development, allocation and abstraction licensing (Directorate General for Water Resource Development)
- Environmental control of existing facilities and project development (BAPEDAL)
- Raw and treated water quality monitoring (Ministry of Health)

Due to the importance of collective as well as systematic management of total water resources for the sake of their optimal use, numbers of studies propose establishment of a coordination body for this purpose. Among others, the JABOTABEK Metropolitan Development Plan proposed to establish the JABOTABEK Water Board and carried out a study for its preparation in 1980.

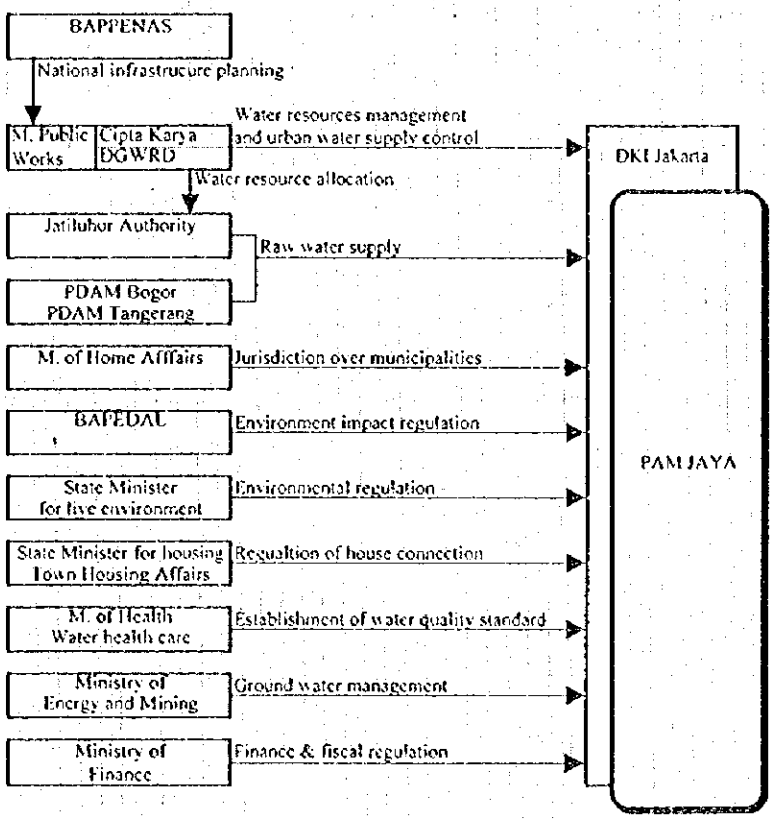
In spite of these recommendations based on a consensus that unified or at least coordinated management of water resources is badly needed, concrete actions toward its realization have not proceeded up until present. However, several ideas to realize efficient bulk water management and supply creating a certain authority or company have been prevailing. They include establishment of bulk water supply companies (PDAB) at provincial levels; financially self-sustaining authorities for comprehensive water management by the river basin; GJBWSC, a joint government/private sector corporation proposed by JWSSP (cf. **3.13.3, (1)**).

It is an urgent need to establish an effective and reliable bulk water management and supply system for Jakarta Water Supply in cooperation with a private sector, since its successful performance will much depend upon that requirement. Therefore the above alternatives have to be carefully examined in a comprehensive feasibility study including coordination among the respective bodies who support each idea aiming for the earliest possible realization.

(3) Public Regulation on Water Supply Services

PAM JAYA should have responsibility to deal with some of the regulatory functions more than ones for performance monitoring of concessionaires and coordination. Conceivable functions which seem to suit the undertakings by PAM JAYA would be the institutional and policy-related control and evaluation of total service quality including customer satisfaction research (cf. **3.14.3**).

Figure-3142.1 PRESENT ADMINISTRATIVE ERAMEWORK IN JAKARTA WATER SUPPLY



It has been already confirmed that efficient and rational water resource management system prefers the management and operation based on hydrologic and hydrogeologic drainage basin of rivers to the ones based on administrative boundaries. The JABOTABEK water resources management should also seek this way which JABOTABEK Metropolitan Development Plan has ever envisaged. It is desired that parties involved be open-minded enough not to adhere to bureaucratic thought but to consider things from the perspective of the prosperity of JABOTABEK.

3.14.3 Institutional Development

It is the point of argument in **3.13.5** that the government leadership supported by a steady principle to conduct the water supply service is a prerequisite to lead the Jakarta Water Supply Development in cooperation with the private sector toward a successful goal. To carry out the government leadership, establishment of a solid legal system with a fundamental water act as a base rule, and an effective administrative framework as an apparatus to execute the legal provisions are indispensable.

As reviewed in **3.14.1, (1)**, a number of laws and regulations regarding water supply have been issued abreast with the progress of water supply services in Indonesia, and concurrent administrative preparation has proceeded to implement necessary public regulations. However, it is also a prevailing fact that the total system has not been complete and systematic enough to deal with every aspect in conducting water supply services in a sophisticated manner.

The attempts at private involvement is a great turning point for the water supply services in Indonesia, and it gives occasion to review the total institutional framework from a macro point of view in order to formulate a total system to provide improved services.

(1) Necessary Functions for Water Supply Services

The institutional development involving legal and administrative aspects must start with considering functions required to perform desirable water supply services as a total system; because, the legal system is a package of rules while the administrative framework is an

apparatus to conduct the whole process of water supply carrying out all the functions necessary to achieve the social mission assigned.

The functions required to conduct the whole process of water supply from water resources until the consumers would be as follows:

1) Water resource development based on a comprehensive analysis of water demand

   a) Planning

   b) Financing

   c) Implementation

2) Water resource management and control

   a) Water allocation

   b) Maintenance of water quality (pollution control)

   c) Review of water quality standards

3) Development of drinking water facilities

   a) Planning

   b) Financing

   c) Implementation

4) Drinking water supply

a) Production

b) Transmission

c) Distribution

5) Public regulation on water supply service

i) Institutional and policy-related control

(a)Tariff (including tariff ceiling) setting

(b)Preparation and enactment of laws and regulations

(c)Execution of legal actions

ii) Supervision on waster supply services

(a)Quality monitoring of treated water

(b)Research on deteriorating factors and remedies

(c)Evaluation of total service quality

(d)Research on customer satisfaction

iii) Technical supervision

(a)Technical audit of water enterprises

(b)Evaluation of production process

(c)Examination of chemicals and other materials

(d)Review of water quality standards

iii) Financial supervision

(a)Financial audit of water enterprises

(b)Monitoring of capital works

(c)Arrangement of fund raising including bond issuance and granting subsidies

(2) **Steps for Institutional Development**

1) Establishment of Fundamental Water Act

Much has been discussed regarding the fundamental water act in the previous section **3.14.(1),2)**. Careful discussion and examination involving all the parties concerned needs to be continued toward its establishment.

2) System Elaboration for Implementation

a) Review of present administration system

It has been repeatedly emphasized that the establishment of a solid administrative framework is so important to conduct sound development and management of the Jakarta Water Supply. The section 3.14.2,(3) has shown possible alternatives for strengthening interdepartmental administrative structure. However, whatever course would be followed, it should be developed based on a careful study and analysis primarily on the current system to carry out the necessary functions of comprehensive water management identified above.

Proposed steps for the further study required would be as follows:

i) Review of prevailing system from the following points of view.

(a) Identify undertakers of respective functions required for total water management

(b) Review how they are being performed

(c) Review how each activity is coordinated and synthesized into total management

(c) Identify functions that are not performed at all or in a satisfactory manner

(d) Identify needed coordination that present system lacks

ii) Review of the past efforts for administrative structure development

iii) Identification of preferable administrative structure

iv) Preparation of action program for structure development

b) Review of present water regulations

The fundamental water act is a basic principle that should govern development and management of the total water supply system, but for its implementation more detailed supporting regulations for each control point are needed as well as effective administration or interdepartmental implementation systems as described above. Indonesia has already prepared numbers of water related laws and regulations to individually cope with problematic areas of water supply as summarized in **3.14.1,(1)**. Those existing laws and regulations should be reviewed in the framework of the implementation of the fundamental water act concurrently with the administrative review discussed in the previous section. The review must be conducted trying to identify inadequate, insufficient, duplicate, inconsistent and missing regulations to implement the principles expressed in the fundamental water act.

3.15 ORGANIZATION, MANAGEMENT, AND FINANCE OF PAM JAYA

3.15.1 Organization and Management

In order for the new structure to achieve the effective and efficient organizational performance, PAM JAYA should lay great emphasis on such factors as structure, staff, skills and system. For instance, good organization structure does not by itself produce good performance. The overall effectiveness of the organization will be affected both by sound structural design and by the individuals filling the various positions within the structure. At the same time, poor communication and coordination system make good performance impossible, no matter how good the structure may be.

Our recommendations for strengthening structure, system, skills and staff and also suggestions for improving finance, accounting, water tariff determination, billing and collection system and others are described in this section.

(1) Structure

1) Elimination of redundant tasks between or among organization components, and between individuals of the same organization components through workflow analysis.

2) Establishment of clearer responsibilities and authorities of each organization components and individuals assigned therein (more detailed job descriptions should be designed).

3) Reduction of organization layers to the extent possible.

4) Establishment of clear hierarchical links to ensure effective communication.

5) Proper delegation of authority to cabangs, rayons and treatment plants to accelerate decision makings, which contribute to quick responses to consumer requests or complaints.

6) Assignment of the right person to each job.

(2) System

1) Establishment of effective management information system which provides relevant information timely.

2) Establishment of clear reporting relationship and lines of communication.

(3) Skills

Training system should be improved to ensure that all employees are qualified to perform their tasks. Particularly, a new organization structure will come into effect sometime in 1996, rendering cabangs, rayons and treatment plants more authorities and responsibilities. Strengthening skills and abilities of personnel in these areas through effective training will be of great importance to successfully achieve a goal of efficient operations by means of decentralization. In this connection, PAM JAYA should:

1) Promote training section to a higher organization level in that stronger position in PAM JAYA organization enables them to acquire a routine budget (not limited only to IBRD and OECF budgets) and also to achieve better coordination with organization components concerned (for example, involvement of cabangs, rayons, and treatment plants in planning training programs).

2) Increase personnel of training section in both quantitative and qualitative terms so that they can develop an effective training plan and program, and evaluate programs.

3) Train employees with better facilities and equipment.

4) Utilize its resources in the most effective and efficient manner possible and realize better communication and coordination by making one division or bureau uniformly responsible for training.

(4) Staff

PAM JAYA should give primary attention to human resource management, which includes inventorying the people available, recruiting, selecting, placing, promoting, appraising, planning the careers of, compensating, and training employees so that they can accomplish their tasks effectively and efficiently. Increases in the moral, commitment and motivations of PAM JAYA employees could be achieved through effective human resource management.

In the meantime, PAM JAYA should not increase the number of employees in that it already employs redundant staff (administrative staff, particularly). Moreover, PAM JAYA should eliminate two types of employees status (PNS and Non-PNS).

1) Career Development Program

This system should be designed in order to provide employees with practical guidance, encouragement and support so that they may realize their potential, satisfy their career ambition and wish to remain with the organization. Successful career development program needs to be supported by effective recruitment and selection, personnel information, placement, promotion, appraisal and training system as illustrated in **Figure-3151.1.**

2) Recruitment and Selection System

PAM JAYA should improve the recruitment and selection system so as to recruit and select qualified individuals required in the context of the staffing plan as seen in **Figure-3151.2.**

Organization components being served (cabangs, rayons and treatment plants) should actively participate in the final selection order to ensure to a significant extent that the right person is hired in the right place.

3) Personnel Information

Expeditious completion of the personnel data files is urgently required to assist effective utilization of employees through proper assignment.

4) Placement

Regular job rotation should be fully implemented as a means of career development.

5) Performance Appraisal and Promotion

In addition to the present appraisal (DP 3) required for all government employees, performance appraisal system, which suits PAM JAYA as an enterprise, should be introduced.

The basis of determining promotion should be ability, besides seniority and education.

6) Compensation

In order to motivate employees to provide higher levels of service, compensation system should be redesigned as recommended in the following:

Consideration of job performance should be given to salary and bonus.

The introduction of incentives according to each employee's effort and performance, and also to group performance is recommended. Incentives are paid to staff in relation to the performance of the group as a whole. Especially the latter should be effective for improving communication and coordination within organization components.

Periodic reappraisal of whether the compensation system is achieving its proper objectives, and what possible modification should be made of it.

7) Disciplinary Action

PAM JAYA should implement a punishment or penalty against violation of rules and regulations, and against neglecting jobs assigned in order to maintain moral and integrity of employees. Several types of disciplinary action should be considered, such as warning; wage-cut; suspension; and dismissal.

3.15.2 Finance

PAM JAYA should improve financial and accounting aspects by:

reducing operating expenses through improvement of unaccounted-for-water and through employment of the appropriate number of staff.

Figure-3151.1 CAREER DEVELOPMENT PROGRAM

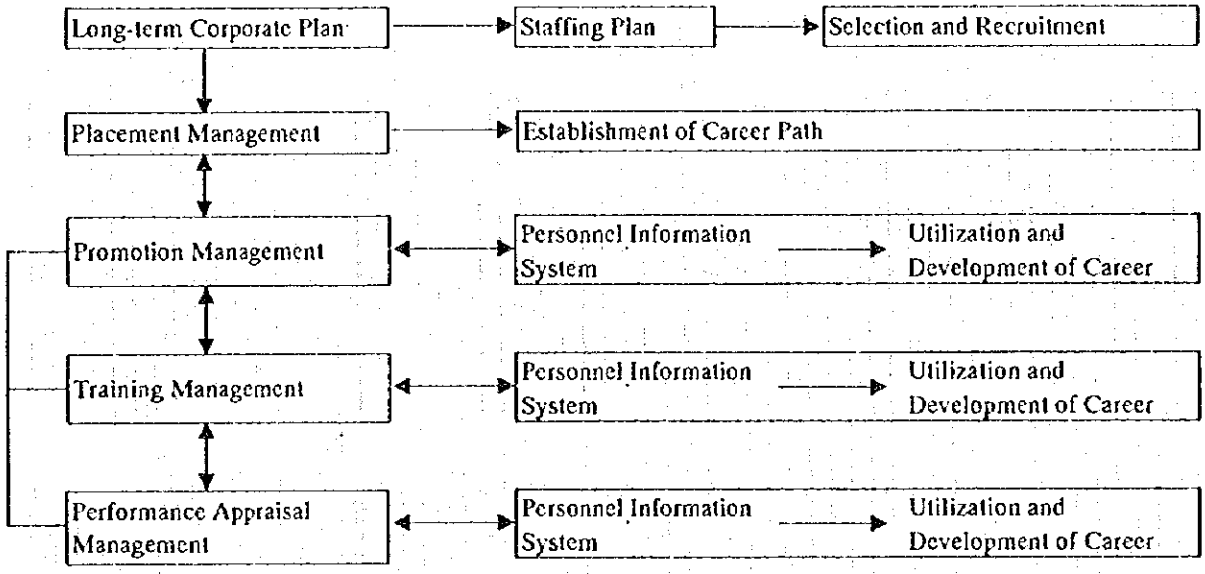
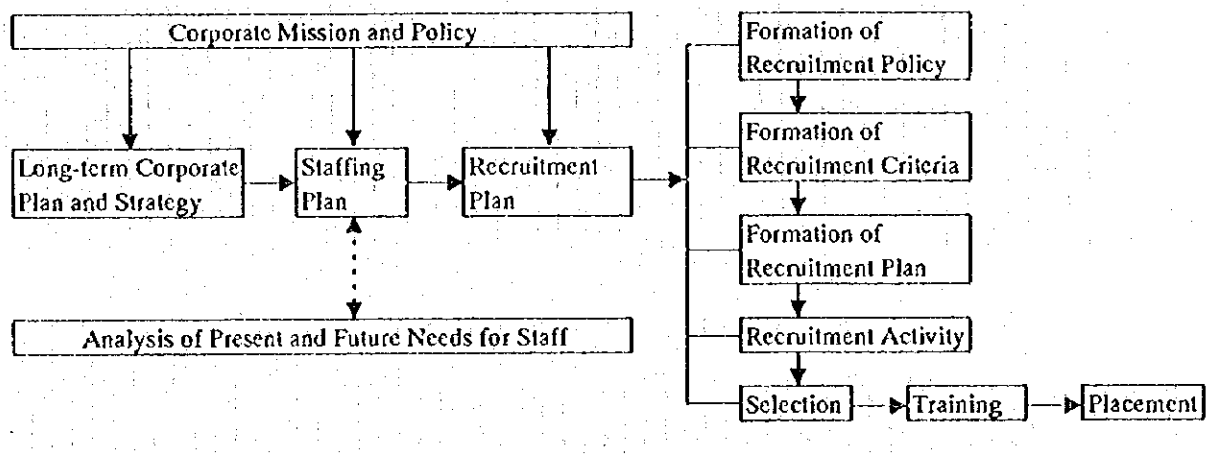


Figure-3151.2 STAFFING PLAN AND RECRUITMENT MANAGEMENT



reducing of removing distribution of part of its profits to DKI to save cash flows for investment.

using depreciation based on useful life for proper financial accounting and reporting as opposed to depreciation based on fiscal rule for tax reporting purposes.

3.15.3 Water Tariff Determination

(1) Costs to be Included

PAM JAYA should use open and transparent procedures and calculation methods. This can be done by including other proper costs and, if necessary, provisions to the extent that PAM JAYA could realize appropriate profits and cash inflows.

1) Depreciation based on useful life is followed to determine *net income* as opposed to net fiscal income. Also, depreciation (assumed) based on useful life *adjusted by inflation* is used instead of fiscal rule for water tariff determination purpose.

	1994 (Projected)	1995 (Projected)	1996 (Projected)
Depreciation based on useful life	19,391	24,401	46,955
Depreciation based on useful life adjusted by inflation	20,206	25,653	51,795
Depreciation based on fiscal rule[a]	62,736	74,296	86,683

[a] This method was used by PAM JAYA for its tariff setting. The amounts are provided for comparison purpose.

2) Amortization on long-term loan (principal payment) and provision for increase in working capital are included for our determination. These costs and provisions are not presently included for PAM JAYA's tariff setting.

	1994 (Projected)	1995 (Projected)	1996 (Projected)
Amortization on Long-term Loan	11,862	13,609	13,636
Provision for increase in working capital	41,694	25,704	14,946

3) Results obtained from our calculation indicate that tariff would be Rp. 775 and high incomes and positive cash flows would be generated for the projected years. These higher incomes are due primarily to the application of depreciation based on useful life for financial accounting purposes and due partly to the inclusion of appropriate provisions and costs.

Importantly, in determining water tariffs, tariffs should be set in a manner which would generates moderate incomes as well as cash inflows.

Projected Financial Performance

Tariff: Rp. 755 (Recommended)

	1994 (Projected)	1995 (Projected)	1996 (Projected)
Tariff Revenues	253,952	281,307	310,891
Net Income Before Tax	103,175	68,163	55,467
Net Income After Tax	81,884	62,539	52,839
Net Increase in Cash	12,461	23,881	20,852

(2) More Accurate Demand Projections

Tariff rise effects on water consumption should be carefully taken into account when projecting water demand. Also, alleviation or rebalancing of cross subsidization is of great importance to increase demand from commercial, industrial and special users.

(3) Simplified Tariff Classifications

More simplified tariff classifications and accurate allocation of customers to tariff categories should be done in order to eliminate ambiguity of categories and also to reduce administrative costs.

3.15.4 Billing and Collection System

Internal control of collection (cash receipt) should be strengthened by having PAM JAYA staff no access to cash in the collection process. Consumers' payment at banks or post offices is recommended.

3.15.5 Publicity and Customer Service

PAM JAYA should promote community awareness and understanding through health education leaflets, school curricula, and radio and TV programs. In this connection, PAM JAYA should strengthen public relations activities by adding qualified personnel to a subdivision or, preferably, a division responsible for public relations.

Customer database should be developed to ensure efficient customer service and longer hours of telephone hot line should be created. In addition renovation of cabangs and rayons should be done. More importantly, employees should acquire concept of customer service through training.

3.15.6 Office Environment

Working environment of field offices such as cabangs and rayons should be improved through establishment of an effective filing system and introduction of computers (possibly office automation) to increase the effectiveness and efficiency of personnel. It should be noted that automation of offices can be successful provided that essential non-technical aspects such as training, workflow redesign, of organization structure are improved.

3.16 EVALUATION AND RECOMMENDATIONS

3.16.1 Evaluation of Master Plan

Master Plan for Jakarta Water Supply Development of which target year is 2019 has been discussed in the previous section. In this section, the contents of the Master Plan are reviewed comparing with basic concepts which were defined in the very beginning of the Master Plan.

Comparison of the basic concepts and proposal recommend in the Master Plan is shown on **Table-3161.1**. As a results of evaluation of the Master Plan, it is concluded that the Plan is satisfactorily conforming to the basic concept.

The defined basic concepts and evaluation for each concept are described hereunder.

(1) Improvement of Water Supply Conditions

Service Coverage

In terms of area, service area is planned to be expanded year by year conforming to the city development. In year 2010, whole area of DKI Jakarta will be covered by PAM JAYA service area. Most of people live in Jakarta will be able to access piped water service in the year 2010. Upon 100 % coverage of DKI Jakarta, PAM JAYA service area will be expanded even though beyond the administrative municipal boundary. Considering the availability of alternative water source, in the fringe area where future groundwater condition is not suitable and not sufficient, PAM JAYA will supply water those who live in such area.

In terms of ratio, service ratio will increase constantly along with expansion of the water production and distribution facilities. Service ratio in DKI Jakarta will reach about 70 % (including indirect served population) in year 2000 and will reach 84 % in year 2019.

These improvement of the service coverage will contribute to upgrading people's living standard and will support sustainable development of DKI Jakarta. Furthermore, groundwater abstraction will be reduced to the permissible level by sufficient piped water supply. Reduction of groundwater usage will minimize environmental problem such as land subsidence

and sea water intrusion to the groundwater.

Stability of Service

In the course of discussions with Indonesian side, realistic water resource development scheme has been confirmed. The Master Plan recommended to use water resource not only from eastern side of Jakarta such as Jatilhur Dam but also from western side of Jakarta such as Karian Dam to reduce the risk of water resource.

Based on the realistic water resource development plan, long term plan of development of water supply system has been prepared by selecting the most suitable plan among various alternatives. Although the proposed system expansion plan will require rather large scale, investment it is indispensable to secure stable water supply service.

According to the Indonesian policy, Jakarta water supply system will be divided into two system by the Cilliung River. However, clear water transmission system was planned to be able to interconnect these two system to stand accidents or national disaster.

Safety and High Quality

To achieve potable water supply, stepwised quality improvement plan is proposed. As the first step, of the plan treated water at each treatment plant should be portable. As the second step, water in the distribution network should be portable, and finally water from private faucet should be potable. To achieve the stepwised quality improvement plan, required measures are described in the Plan.

In the Master Plan, it is recommended to avoid further deterioration of raw water quality to achieve the target, of the first step upgrading of WTC is also recommended.

To achieve potable water supply without contamination, to the customer monitoring system of water quality in treatment plants, distribution centers, and distribution system are recommended.

(2) Improvement of Administration

Efficiency of Service

Reduction of unaccounted-for water is the key of increasing efficiency of the water supply system. Studying and evaluating the results of on-going PJSIP, required approach, methodology and organization are proposed in the Master Plan. Implementing these proposed countermeasures, it is assumed to reduce UFW ratio down to 25 % in year 2019.

Operation/maintenance and management of water supply system will be handed over to the private sector. The Master Plan has been prepared takeing account of the PSP and the Plan will be the guideline to the these private sectors.

Soundness of Services

PAM JAYA will act as regulator of the private driven water supply system. Therefore, necessary function of national government, municipal government and PAM JAYA itself were discussed in the Master Plant to achieve sound operation of water supply system.

To keep water tariff within people's affordable level, tariff setting system and suitable tariff level are recommended in the Master Plan. Considering private sector participation, required laws and regulations are also discussed and recommended to achieve impartial service to Jakarta citizen including social weak.

Table-3161.1 EVALUATION OF MASTER PLAN

BASIC CONCEPTS/FUNDAMENTAL MEASURES			PROPOSED IN MASTER PLAN
Improvement of Water Supply Condition	Service Coverage	Expansion of Service Area	Whole area of Jakarta will be covered by year 2010
		Increase of Service Ratio	Service Ration will reach about 70 % in year 2000 and will reach 84 % in year 2019 in Jakarta
	Stability of Service	Acceleration of System Development and Improvement	Production capacity in year 2019 will be 47 m3/sec about 3.5 times of existing capacity
		Acquisition of Stable and Sustainable Water Resources	Raw water from both sides of Jakarta, from East and West
		Strengthening of Systems Against Accident and Disaster	Interconnecting treated water transmission pipeline
	Safety and High Quality	Realization of Drinkable Water Supply Acquisition of Good Quality Raw Water	Stepwized quality upgrading plan Upgrading WTC to avoid deterioration of raw water quality
		Establishment of Adequate Monitoring System of Services	Flow, pressure, and quality monitoring system is proposed
Improvement of Administration	Effeciency of Service	Reduction of Unaccounted-for Water	Methodology for reduction is proposed by evaluating the results of on-going PJSIP
		Improvement of Service Managerial Capacity including PSP	Role of PAM Jaya after PSP is studied and proposed Master plan will be a guideline to PAM JAYA
	Soundness of Services	Improvement of Human Resources Capability of PAM JAYA	Necessity of human resources development and recommendation on organization structure is proposed
		Acquisition of Appropriate Fund & Establishment of Tariff System Affordable to Consumer	Tariff setting system and suitable tariff level are recommended
		Establishment of Law, Regulation and Organization for Supervision of Sound Operation	Necessity of basic water law is discussed and function of governments concerned are recommended
		Impartiality of Supply to the Citizen	For the preparation of the Plan, social weak are also taken into account

3.16.2 Identification of Priority Projects for the Feasibility Study

To meet the required future water demand, the Second Phase of the Second Stage Program as the priority project of the proposed Jakarta Water Supply System, as described in **Section 3.7**, should be implemented immediately.

The Second Phase of the Second Stage as the priority project which includes two parts of implementation programs are as follows.

(1) Part 1, the target year 2004

- Expansion of existing Buaran Treatment Plant with the capacity of 5,000 l/sec taking raw water from the upgraded WTC
- Expansion of existing Distribution Center R1 with the capacity of 2,000 l/sec receiving treated water from Buaran Treatment Plant (Treated water transmission pipeline will use existing transmission pipeline).
- New Distribution Center R6 with the capacity of 2,100 l/sec receiving treated water from Buaran Treatment Plant through Distribution Center R1.
- Treated Water Transmission Pipeline from Distribution Center R1 to R6 with the total pipeline length of 33.5 km.

(2) Part 2, the target year 2008

- New construction of Cipayung Treatment Plant with the capacity of 5,000 l/sec taking raw water from the WTC through raw water transmission pipeline of which length will be 20.0km.
- Expansions of existing Distribution Centers R4 and R5 with the capacity of 2,600 l/sec and 1,600 l/sec, respectively, receiving treated water from Cipayung Treatment Plant.
- Treated Water Transmission Pipeline from Cipayung Treatment Plant to Distribution Centers R4 and R5 with the total pipeline length of 41.5 km.

In the each program, implementation of construction of distribution mains and service mains are also included for expansion of service area.

Facilities required for each part are shown on the **Figures-3162.1** and **3162.2**.

3.16.3 Recommendations

This Master Plan has been prepared by revising the previous master plan which was prepared in the 1985. During the last decade, Jakarta City has been developed even though the rate of population growth is rather lower than the rate which was estimated in 1985 master plan. Circumstances and environment are also changed from the condition in 1985. Therefore, after a decade, the 1985 master plan is reviewed and revised as this Master Plan.

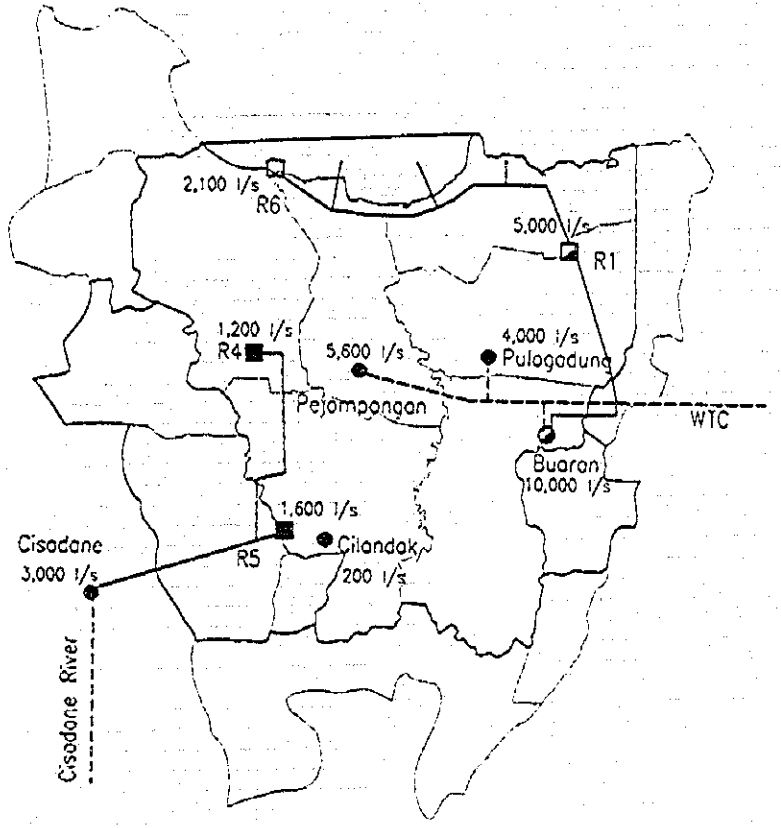
It is needless to say, condition of city will change year by year and some changes are not forecasted at this time. Therefore, this Master Plan is also necessary to be reviewed and revised periodically.

According to the implementation schedule, after implementation of the priority project, 3rd Stage project (detail design works for 3rd stage) should be commenced from year 2004. To avoid delay of the project, feasibility study works for priority projects of the 3rd Stage should be conducted during year 2003 prior to the commencement of the project.

It is recommended to review and revise the Master Plan in year 2002, before starting the feasibility study, and the Plan should be adjusted to fit the situation at that time.

Other recommendations such as actions required to be taken immediately will be explained in **Section5**.

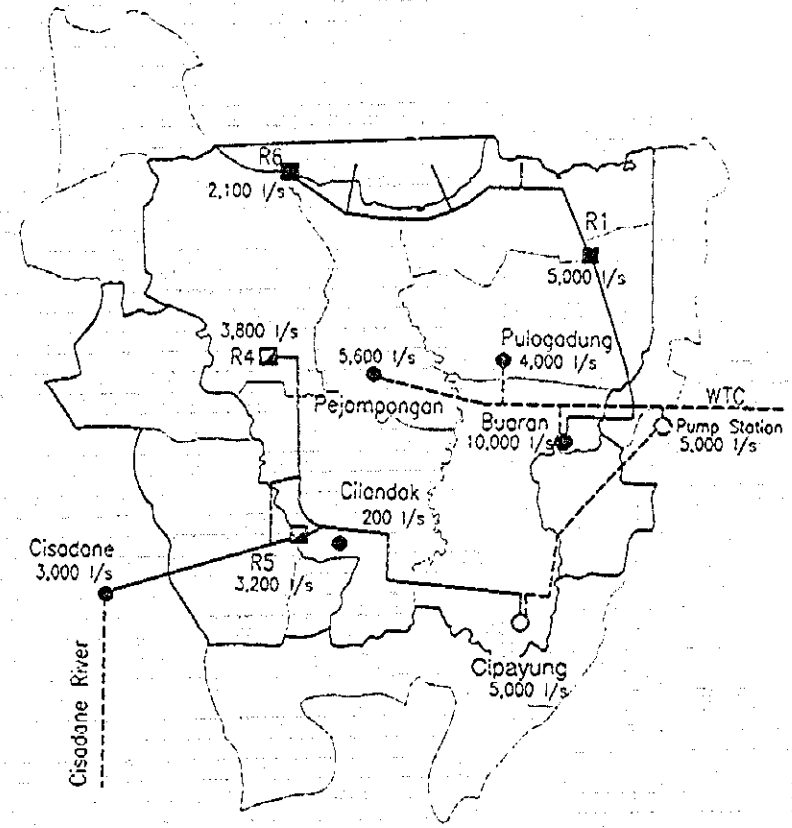
Figure-3162.1 PRIORITY PROJECT PART 1
PROPOSED WATER SUPPLY SYSTEM IN 2005



LEGEND :

- Expansion of Treatment Plant
- Proposed Treatment Plant
- Existing Treatment Plant
- Expansion of Distribution Center
- Proposed Distribution Center
- Raw Water
- Treated Water Transmission

Figure-3162.2 PRIORITY PROJECT PART 2
PROPOSED WATER SUPPLY SYSTEM IN 2008



LEGEND :

- Expansion of Treatment Plant
- Proposed Treatment Plant
- Existing Treatment Plant
- Expansion of Distribution Center
- Existing Distribution Center
- Raw Water
- Treated Water Transmission