

7.2 Tariff Level, Structure, and Affordability

The tariff level assumed for the financial projections was selected considering that the following conditions must be satisfied between 1991 and 1995 when PDAM will have to bear the vast financial burden due to the proposed investments:

- 1) Sufficient cash flow be generated so that no drawing-down of cash at hand is required after meeting the debt-service obligations and paying out tax and other necessary expenses even when some unfavourable conditions are applied.
- 2) Rates of return be kept within a reasonable range which ensures sound financial operations and does not generate exorbitant profits.
- 3) A rate of tariff increase be moderate and gradual one so that tariff revision will not give too large an impact on water users.
- 4) A tariff level be lower than long-term marginal cost.
- 5) A tariff level be affordable by water users.

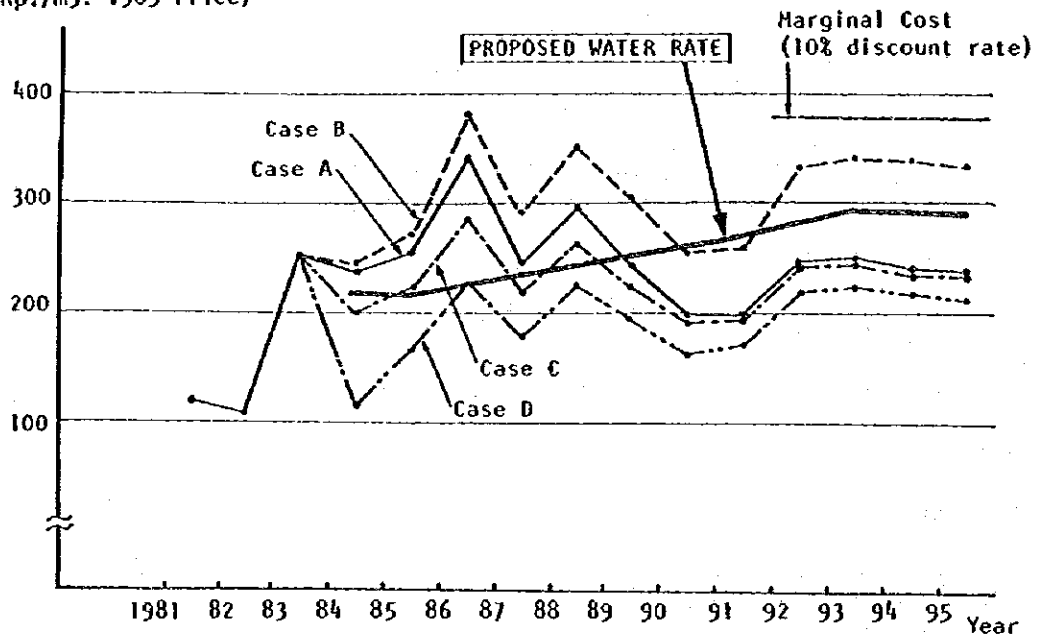
Figure 7-1, in addition to Table 7-1, shows that the proposed tariff level can satisfy the condition 1). Each line in the Figure was drawn connecting the tariff levels which make cash inflows equal to cash outflows, i.e., no cash shortage and no cash surplus. For instance, the tariff in real term which makes the net cashflow zero in 1991 under the set of assumptions of the Base Case (the financial projection of Section 7.1) is Rp.201/m³, and the rate will be Rp.262/m³ if the present rate of accounted-for water were not improved at all.

As for the condition 2), the rates of return of 5-10 percent on a historic cost basis and 3-6 percent on a revalued cost basis shown in Table 7-1 can be regarded as reasonable as a public utility enterprise.

The tariff of Rp.292/m³ is below the long-term marginal cost of Rp.334/m³ at 8 percent discount rate and Rp.427/m³ at 12 percent discount rate computed using the average incremental cost method (AIC).

Rates of increase in the average tariff in real term proposed are only 1.5 percent yearly and 15.9 percent for 10 years. However, this does not necessarily mean that the average tariff will reach Rp.292/m³ in 1993 if the water rates listed in PDAM's present tariff table (water rate table) are raised by 15.9 percent for 10 years. The water consumption share of residential users is expected to increase from 43 percent in 1983 to 59 percent in 1993. This change of consumption pattern, i.e., increase of heavily cross-subsidized users, requires a slightly more elaborated analysis on rates of revising the water rate table since they are closely related to a degree of cross-subsidy from non-residential users to residential users.

Average Tariff
(Rp./m³: 1983 Price)



Case A PDAM is subject to Tax Payment and DKI Contributions.
PDAM does not receive Local Government Equity(groundwater charges).

Case B Assumptions are as same as Case A except that Accounted-for Water Ratio is not improved at all from the 1983 level.

Case C PDAM is exempted from Tax Payments and DKI Contributions.
PDAM does not receive Local Government Equity.

Case D PDAM is exempted from Tax Payments and DKI Contributions.
PDAM receives Local Government Equity(groundwater charges) of Rp.6 billion every year.

Note : -Each line, except for the line of Proposed Water Rate, indicates the average tariff in 1983 constant price which makes each year's net cash flow zero(no cash surplus and no cash deficit).

-For computing the amount of DKI Contributions, it is assumed that the value actually paid out in 1982 will be maintained in real term.

FIG 7.1 TARIFF LEVEL AND MARGINAL COST

JAKARTA WATER SUPPLY DEVELOPMENT PROJECT JICA

Table 7-3 summarizes the result of the analysis. Reading the column of 2.5% from the bottom to top, the table says that, if the present water rate table for non-residential users is revised upward by 35 percent, the average tariff of all users will be Rp.292/m³, and the average of non-residential, high income families, and low income families are Rp.459/m³, Rp.224 m³, Rp.99/m³, respectively. For realizing these averages, the present water rate table for the residential, i.e., Rp.40 for the first 15 m³, Rp.80 for the next 15 m³, and Rp.300 for the use in excess of 30 m³, will have to be changed by 33 percent (53/40) in real term. Finally, this column says that the middle income families will have to pay, on the average, 2.5 percent of their income for piped water under the assumed tariff level.

Table 7-3 Affordability and Tariff Increase

(Unit: Rp., Rp./m³)

	Percentage of monthly income spent for water charges (Middle income group with monthly income of Rp.150,750) ^{1/}			
	2%	2.5%	3%	4%
1. Monthly Payments ^{2/}	3,000	3,780	4,560	6,072
2. Water Rate				
0 - 15 m ³	40 ^{3/}	53	66	91
15 - 30 m ³	80	106	132	182
more than 30 m ³	300	398	495	683
3. Average Water Rate				
- Middle income	75	99	123	171
- High income	169	224	277	385
- Non residential	522	459	400	480
4. Necessary Revision of Present Tariff Schedule for Non- Residential Users ^{4/} (1983-1993) ^{5/}	54%	35%	18%	-18%

- Notes: ^{1/} The middle income family is defined as the Group III and IV of the classification quoted in Chapter 2 of Master Plan. Rp. 150,750 is the mean income-per-connection of these Group III and IV in 1993 in terms of 1983 constant price computed using the same set of assumptions of the demand projection.
- ^{2/} Rp.600 for meter maintenance and administration included.
- ^{3/} Same as the present rate.
- ^{4/} Public hydrant included.
- ^{5/} The projected average tariff of non-residential uses for 1993 is Rp.340/m³ in case the present water rate table is not changed in real term.
- ^{6/} The average tariff of all users is Rp.292.

Conversely, reading from the top to bottom, if the middle income families agree to pay 3 percent of income, the present water rate table for the residential can be raised by 65 percent (66/40). Given this revision for the residential, the water rate table for the non-residential will have to be raised by only 18 percent in order to reach an overall average tariff of Rp.292/m³.

Now, it is clear that the conditions 3) and 5), i.e., impacts of tariff increases and affordability, are jointly satisfied. Upward revision of the present tariff table by 33-35 percent for ten years in real term does not seem to give a strong impact to water users in Jakarta in view of expected growth of real per capita income for the same period. Note that most of the low income families are expected to still rely on the public hydrants. Hence, their affordability is not a key issue in examining the feasibility of the proposed tariff level.

In addition to the affordability of water charges, the affordability of connection charges was roughly tested and a generally positive conclusion was drawn.

Although accurate information was not made available to the study team, it is estimated that the residential users are at present paying about Rp.300,000-350,000 for a new connection, which is 1.3-3.1 month worth of monthly income of middle income families. According to PDAM's information, about 40 percent of the charges are used for installation of house connections and the rest is contributing as PDAM's additional cash inflows. Suppression of demand by charging consumers at a high rate may be justified when supply capacity can hardly catch up with growing demand; however, such a policy is not rational when the supply capacity is largely expanded. Therefore, the level of connection charges in nominal term is held constant in the financial projections in order to reduce the level in real term. Consequently, the connection charges will become equal to connection cost in 1995 in both real and nominal term as the result of price increases.

Although it is difficult to draw a definite conclusion regarding the affordability of the connection charges unless a detailed household income survey is conducted, it is possible to obtain a rough idea using a rule of thumb which goes that the residential users can pay up to 4 percent of their income for water charges and up to 7 percent inclusive of installment payments for direct connections. In the case of Jakarta, if installment plan for connection charges is introduced under the condition of monthly equal payment (amortization plus interest) for 60 months at 11 percent interest rate, the payment will be about 1.3 to 3.1 percent of income of middle income families in 1993. Adding this percentage to that of water charges, e.g., 2.5 percent, it can be concluded that the percentage of income a middle income family has to pay for both water charges and installment of connection charges is 3.8 to 5.6 percent, i.e., below 7 percent.

For reference purpose, the magnitude of additional funds to be required for introducing the installment plan is shown below. The cash flow turns from deficit to surplus in 8 years. The magnitude of yearly outflows depends upon the policy concerning how many percent of applicants are allowed to pay in installment.

Table 7-4 Additional Funds Required for Introduction of Installment Plan

(Unit: Rp. million)

Year	Net Cash Flow				
	Percentage of Customers Using Installment Plan				
	100%	80%	60%	40%	20%
1985	-5,161	-4,129	-3,097	-2,064	-1,032
86	-6,145	-4,916	-3,687	-2,458	-1,229
87	-7,354	-5,883	-4,412	-2,942	-1,471
88	-4,801	-3,841	-2,881	-1,920	-960
89	-1,299	-1,039	-779	-520	-260
90	-823	-658	-494	-329	-165
91	2,394	1,915	1,436	958	479
92	3,392	2,714	2,035	1,357	678
93	4,116	3,293	2,470	1,646	823
94	5,099	4,079	3,059	2,040	1,020
95	5,409	4,327	3,245	2,164	1,082
96	4,562	3,650	2,737	1,825	912
97	3,913	3,130	2,348	1,565	783

Source: Table 7-14 of Appendix FVII-1.

7.3 Financial and Economic Impacts

The financial internal rate of return (FIRR) of the project, defined as a discount rate which equalizes the present value of incremental cost and revenue streams, is at a moderate level, as a water supply project, of 5.8 percent.

The major assumptions for computation of FIRR are:

- 1) Price level: constant price of end 1983/84.
- 2) Tariff level: the schedule assumed for the financial projections.
- 3) Project life: 30 years after completion of the treatment plants in 1990.
- 4) Costs and benefits: incremental costs and benefits attributable to the proposed project including a part of the investment cost for the leakage reduction program.
(For incremental streams of costs and benefits, see Table 7-11 of Appendix FVII-1).

The FIRR of this project should not be used as a conclusive indicator for making decision on whether the project be implemented or not. The rate should be used more for evaluating the tariff level which is set at a level below the marginal cost.

Various types of socio-economic benefits, in addition to the financial benefits, are expected to be derived from undertaking of the proposed water supply project. The population served is projected to be increased by 3.0 million from 2.4 million in 1983 to 5.4 million when the

facilities to be constructed by the proposed project are put into service and fully utilized. To be noted here is the fact that almost 100% of the population will have access to piped water in northern part of the city, i.e., Zones I and II, where water is in chronic shortage and many people are relying on ground water and water vendors. Furthermore, net average daily water use per capita of residential users will be increased by some 110 liters which will bring about significant positive impacts on low-income families, those living in water-scarce regions, and present overall suppressed water supply conditions. If a increase in population who can receive "adequate water supply" is calculated, although it is very difficult in practice, it will be more clearly recognized that the impact of this project is not confined to the increase in the population served of 3 million people.

As the result of the increased water supply, health, sanitation, and environmental conditions will much be improved. At the same time, opportunities for housing and industrial development will be facilitated. The increased water supply will contribute also to ease the degree of dependence on ground water and, eventually, the continuous decline of ground water levels and sea water intrusion will be moderated. In addition, the benefits from increased employment opportunities by construction work and PDAM's operation and administration and reduced fire damages by earlier extinction with piped water should not be overlooked.

7.4 Sensitivity Analysis

An analysis on a sensitivity of the financial projections described in Section 7.1 (Base Case) was conducted under the following seven alternative assumptions:

- Case 1 Revenues are increased by 10 percent. Alternatively, this assumption may be read as the tariff is increased by 10 cent or no allowances for bad debts.
- Case 2 Tax payments and contributions to DKI budget are exempted.
- Case 3 The level of connection charge in 1983 is halved from 1984 and kept constant in real term thereafter.
- Case 4 Investment costs of the 6 m³/sec. expansion project are increased by 10 percent.
- Case 5 Operating expenses are increased by 10 percent.
- Case 6 Accounted-for water is improved only 10 percent, i.e., half of the targeted improvement rate of 20 percent, between 1983 and 1995.
- Case 7 Revenues are decreased by 10 percent.

The results summarized in Table 7.6 shows that there will be no serious financial problems between 1991 and 1995 even under slightly pessimistic assumptions. During this period, cashflows are positive for all cases and, therefore, no cash shortages are forecasted. Rates of return on a both historic and revalued cost are also positive except for a few small negative futures of the Case 5 and 6.

As for the period between 1984 and 1990, the picture will be changed. The finance to be required for making up for the cash shortages, which was calculated as the deficits after having drawn down the stock of the cash at hand, will amount to Rp.34.2 billion in the worst case among the tested seven cases. If drawing-down of cash at hand is not allowed, the necessary finance will reach almost Rp.38 billion which is about 3 times as large as the Base Case.

Contrary, the analysis also suggests that impacts of exempting tax and DKI contributions and of increasing revenues by either reducing bad debts or raising the tariff slightly higher will be significant. In both cases, rates of return stand at a high or satisfactory level in most years and, if drawing-down of cash at hand is allowed for a few years, almost no additional finance between 1984 and 1990 will be necessary.

A sensitivity of FIRR was also tested on different levels of revenues, investment cost, and operating cost. It was found that 10 percent change in the investment cost and the operating cost do not change FIRR more than 1 percent. FIRR is slightly more sensitive to changes in revenues. Yet, FIRR stands at positive value of 2.4 percent even if revenues were decreased by 20 percent.

Table 7-5 Sensitivities of FIRR

(Unit: %)

Change	Financial Internal Rate of Return: Base Case 5.8%		
	Revenues	Investment	Operating Cost
20% increase/decrease	8.6	7.5	7.2
10% increase/decrease	7.2	6.6	6.5
10% decrease/increase	4.2	5.1	5.0
20% decrease/increase	2.4	4.5	4.3

7.5 Risks in Realizing the Projected Revenues

The preceding financial analyses and related sensitivity analysis have proved that the proposed project is financially viable even if slightly unfavorable conditions are applied. Nevertheless, it does not say that PDAM does not have to well prepared beforehand for foreseeable risks in realizing the projected revenues, especially those related to price elasticity and ground water use.

Table 7-6 Sensitivities under Different Assumptions

(Unit: percent)

Case	Rate of Return Historic Cost		Rate of Return Revalued Cost		Change in Cash		Additional ^{4/} Finance Required
	84-90	91-95	84-90	91-95	84-90	91-95	
Base case	4/12 ^{1/}	5/10	-3/5	3/6	-1 ^{2/}	+3 [/]	9.3 billion
1. Revenues increased by 10 %	7/16	8/14	-1/7	5/9	-/+	+	-
2. Tax and DKI contribution exempted	1/16	5/14	-3/7	3/8	-/+	+	3.3 billion
3. Connection Charge halved ^{2/}	-1/11	5/10	-5/4	3/6	-/+	+	21.8 billion
4. Investment increased by 10%	1/12	4/9	-3/5	2/6	-/+	+	9.3 billion
5. Operating Expenses increased by 10%	-1/9	3/8	-5/3	2/5	-/+	+	22.1 billion
6. Accounted-for water improvement only 50% of targeted rate	-2/8	-1/6	-4/2	-1/3	-/+	+	20.7 billion
7. Revenues decreased by 10%	-6/7	+0/6	-5/2	-0/3	-/+	+	34.2 billion

Note: 1/ Lowest rate/Highest rate
 2/ Negative cashflow in some years and positive in others
 3/ Positive cashflow throughout the period
 4/ Largest negative figure of cash at end
 5/ The level of connection charge in 1983 is halved from 1984 and kept constant in real term thereafter

Source: Table 7-13 of Appendix FVII-1.

The price elasticity of water use is presumed to be very low where the water demand is suppressed by limited supply capacity. Indeed, the elasticity in Jakarta might have been far below -0.1 since water consumption was reduced, according to PDAM's record, only about 3 percent while the average tariff was more than doubled in May 1983. However, we cannot deny the possibility that the price elasticity would become more influential on PDAM's revenues when the supply capacity is largely expanded after completion of the proposed project. It may be valuable to know that various studies have found that the price elasticity could be within the range of zero to -0.5 and most probably around -0.1 to -0.3 , although it depends upon such surrounding conditions as length of measurement period, treatment of income effects, etc.

Under these uncertainties, Table 7-7 shows implication of the price elasticity on PDAM's revenues when the present water rate table is revised upward at a uniform rate of 33 percent in real term. It says that, if the price elasticity is -0.2 , water consumption will be smaller than the base case, where the elasticity is zero, by 6.6 percent and the total revenue will decline by 9.0 percent. Very fortunately, PDAM will be able to repay the loans for the proposed project even if the price elasticity fully worked on the water use at the rate of -0.2 since the foregoing sensitivity analysis on the case of 10 percent decline in revenues assured the loan repayment. However, it might be serious if the value of elasticity were different.

The important lessons we should obtain from the table is that the revenues from the residential users, especially from the middle income group, are very sensitive to the value of the elasticity. If the price elasticity changes from 0.0 to -0.1 and from -0.1 to -0.2 , the revenues from the middle income will be reduced by 11.9 percent and 12.3 percent, respectively. This implies that a very small change in water use at the level of slightly above $30 \text{ m}^3/\text{month}$ will cause a large deviation from the projected revenues of the residential users due to the present tariff structure which is designed to peralize the water use in excess of $30 \text{ m}^3/\text{month}$.

The above findings tells us that PDAM should be careful in determining the tariff level and structure in order to avoid the situation that revenues do not come in as planned. To this end, it is necessary to collect and compile accurate data on consumption pattern and its changes before and after tariff revision. Obviously, promotion of metering is prerequisite for this kind of data collection.

Then, based on the data collected, alternative tariff level and structure to achieve the targeted revenues should be analysed. For example, Figure 7.2 shows by the shaded area infinite number of alternative average tariff levels which assure loan repayment of the proposed project. If we move along the line of the Base Case (the case used for the financial projection), we can find out a set of revision rates of the present water rate table for the residential and the non-residential users which ensures the overall average tariff of $\text{Rp.}292/\text{m}^3$ in 1993 without considering the effects of the price elasticity. In addition, if we move along the line of $y=x$, we can find out a set of average tariff and alternative financing arrangements. For instance, the intersection of the lines of $y=x$ and the Minimum Case

Table 7-7 Implications of Price Elasticity

		<u>Elasticity</u>			
		0.0	-.1	-.2	-.3
<u>Consumption per Connection</u>					
. Middle income:	Volume (m3/month)	32	31	30	29
	(% decrease)	(-)	(3.3)	(6.6)	(9.9)
. High income:	Volume (m3/month)	55	53	51	50
	(% decrease)	(-)	(3.3)	(6.6)	(9.9)
. Non residential:	Volume (m3/month)	174	168	163	157
	(% decrease)	(-)	(3.3)	(6.6)	(9.9)
. All users:	Volume (m3/month)	62	60	58	56
	(% decrease)	(-)	(3.3)	(6.6)	(9.9)
<u>Average Tariff</u>					
. Middle income:	Value (Rp./m3) ^{1/}	99	90	80	79
	(% decrease)	(-)	(9.1)	(19.2)	(20.2)
. High income:	Value (Rp./m3)	224	218	211	207
	(% decrease)	(-)	(2.7)	(5.8)	(7.6)
. Non residential:	Value (Rp./m3)	452	452	452	452 ^{2/}
	(% decrease)	(-)	(-)	(-)	(-)
. All users:	Value (Rp./m3)	291	287	283	281
	(% decrease)	(-)	(1.4)	2.7)	(3.4)
<u>Revenues per Connection</u>					
. Middle income:	Value (Rp./month)	3,168	2,790	2,400	2,291
	(% decrease)	(-)	(11.9)	(24.2)	(27.7)
. High income:	Value (Rp./month)	12,320	11,554	10,761	10,350
	(% decrease)	(-)	(6.2)	(12.7)	(16.0)
. Non residential:	Value (Rp./month)	78,648	75,936	73,676	70,964
	(% decrease)	(-)	(3.3)	(6.6)	(9.9)
. All users:	Value (Rp./month)	18,042	17,220	16,414	15,736
	(% decrease)	(-)	(4.6)	(9.0)	(12.8)
<u>Total Revenue</u>					
. Middle income:	Value (Rp.million/year)	7,720	6,799	5,848	5,583
	(% decrease)	(-)	(11.9)	(24.2)	(27.7)
. High income:	Value (Rp.million/year)	27,272	25,576	23,821	22,911
	(% decrease)	(-)	(6.2)	(12.7)	(16.0)
. Non residential:	Value (Rp.million/year)	61,780	59,649	57,843	55,744
	(% decrease)	(-)	(3.4)	(6.4)	(9.8)
. All users:	Value (Rp.million/year)	98,076	93,607	89,227	85,541
	(% decrease)	(-)	(4.6)	(9.0)	(12.8)

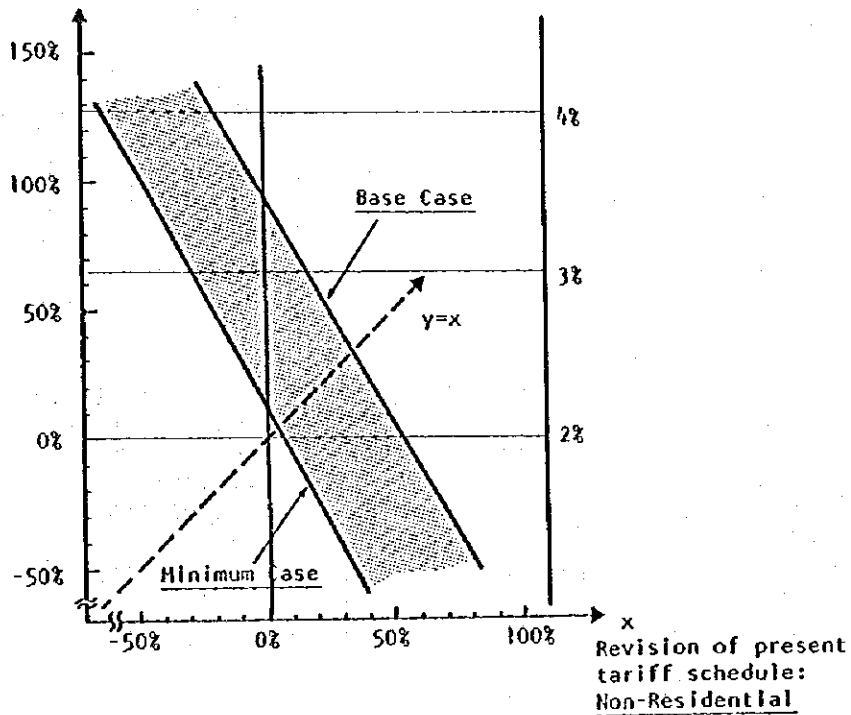
Notes: ^{1/} This table is calculated considering the revision of present water rate table by 33 percent.

^{2/} Some users among the non-residential are subject to progressive tariff. However, its effect on the average tariff is very small. Therefore, for simplicity of calculation, it is assumed that the average tariff of the non-residential does not change due to decrease in water consumption.

Revision of present
tariff schedule:
Residential

y

Affordability
(Percentage of income spent for
water by middle income family)



- Base Case
- The case used for the financial projection.
 - Average tariff in real term in 1993 is Rp.292/m³.
- Minimum Case
- Tax and DKI contribution are exempted; groundwater charges are given to PDAM as local government equity.
 - Average tariff in real term in 1993 is Rp.227/m³.
 - Rp.227/m³ makes PDAM's net cashflow of 1993 zero (no cash shortage; no cash surplus).

FIG 7.2 ALLOWABLE DECREASE IN AVERAGE TARIFF

JAKARTA WATER SUPPLY DEVELOPMENT PROJECT | JICA

indicates that an average tariff of Rp.227/m³ suffices where tax payments and DKI contributions are exempted and, furthermore, ground water charges are given to PDAM. It should be stressed that it is PDAM's important task to pin-point in the shaded area, continuously reviewing relevant data on tariff along with analyses on an appropriate set of financing arrangements.

Another issue we cannot forget for realizing the projected revenues relates to the use of ground water. At present, the deep wells, which are used mostly by non-residential users, in the areas where piped water is available are being charged at Rp.250/m³ and those where piped water is not available are at Rp.200/m³. These charging rates are considerably lower than the rates of piped water for non-residential users. Therefore, in order to encourage the non-residential to switch from groundwater to piped water, these rates should be more than or at least equal to the rate of pipes water when supply capacity is expanded and stable supply is assured. Furthermore, some more actions should be taken to detect wells which are not paying charges to PDAM/DKI, if any. Otherwise, the expanded capacity will not be utilized fully and end up with shortfall in revenues.

On the other hand, control of shallow wells, which are used mostly by the residential, involves more serious political and economic implications especially in light of effects on low income families than the case of deep wells. Nevertheless, PDAM should continue to make efforts to encourage them to use piped water, taking such measures as to penalize the ground water use by high income families, to introduce a subsidy system for low income families utilizing collected groundwater charges as financing source of the subsidy, etc., although it is not an easy task.

7.6 Conclusions

The analyses of this chapter have proved the financial and economic viability of the proposed 6 m³/sec. expansion project with the following findings and results:

- 1) PDAM will be able to meet the financial obligations of the proposed project after paying taxes and making contributions to DKI budget if the average water tariff is raised to Rp. 292/m³ toward 1993 in terms of the end 1983/84 constant price from the 1983/84 level of Rp.252/m³.
- 2) The finding 1) will not seriously be changed even if slightly unfavorable assumptions are introduced, e.g., an improvement in accounted-for water ratios ended up with only half of the targeted rate of 20 percent between 1983 and 1995.
- 3) Some cash shortages are expected between 1984-1990; however, this will not seriously change the finding 1), either, even if the shortages are financed by outside borrowing.

- 4) The cash shortages will be disappeared if tax payments and contributions to DKI are exempted or if revenues are increased by 10 percent by eliminating bad debts or by raising the tariff level, although minor drawing-down of cash at hand has to be allowed.
- 5) Rates of return on average net fixed assets in operation after 1991 when the debt-service of the proposed project starts, will be within a reasonable range of 5-10 percent on a historic cost basis and 3-6 percent on a revalued cost basis.
- 6) The assumed average tariff of Rp.292/m³ in 1993 and thereafter is below the long-term marginal cost of water supply, i.e., Rp.379/m³ which was computed using the average incremental cost method at 10 percent discount rate.
- 7) The average tariff will be affordable by residential users. The percentage of income which an average middle income family has to expend for piped water will be 2.5 percent which is lower than usually used rule of thumb for estimating the maximum affordability, i.e., 4 percent.
- 8) The finding 7) is based on the schedule of revising the present tariff table for residential users by 33 percent and that for non-residential users by 35 percent in real term for ten years. Tariff revision at this rate does not appear to give a significant adverse economic, financial, and political impact to water users.
- 9) The financial internal rate of return computed is at a moderate level, as a water supply project, of 5.8 percent.

The above endorses the conclusion of this chapter that it is desirable to implement the proposed project.

In addition to the financial/economic viability of the project, the analyses of this chapter have elucidated the measures to be taken by PDAM for ensuring the viability as follows:

- 10) Relevant and accurate data should be collected and analysed for determining the degree of revising the water rate table and designing its structure. Otherwise, unpremeditated tariff revision may lead to unexpected shortfall in planned revenues due to effects of price elasticity and tariff structure.
- 11) Appropriate management system of ground water use should be pursued in order to encourage present ground water users to switch to the piped water from the expanded water supply facilities.

8. ORGANIZATION AND PERSONNEL DEVELOPMENT

8. ORGANIZATION AND PERSONNEL DEVELOPMENT

8.1 PDAM Future Organization

1) General

In anticipation of extension of the Jakarta water supply system, improvement and modification in the existing PDAM's organization will have to be effected for the purpose of attaining maximum efficiency and economy of management and operation for future programs of system expansion. Such improvement and modifications include reformation and reinforcement of the present organization, administrative changes and staffing development.

It is intended that, by modifications and improvement, the present organization is to be strengthened for proper operation of whole system in terms of technical, financial and administration and to improve level of water services to customers. The modification also aims at establishment of administrative procedures in order to ensure the effective function of the organization, and at the same time, to create conditions, which will optimize the use of all PDAM resources.

2) Review and Findings of Present Organization and Business Operation

The business operation of PDAM is largely divided into the operation of the Central Office, and that of Branch Offices and Special Units. The Central Office is the center of management and administration, establishing task planning and programming, and supervising all operation and activities, while, Branch Offices and Special Units are, under control and supervision of the Central Office, in charge of field administration and operation on PDAM's regional activities in customer meter reading, bill rendering and collection, and maintenance of distribution system. The operation of water service in Branch Offices and Special Units has been intensified in recent years due to rapid growth of served population and expansion of water systems.

PDAM has been taking policy of decentralization of its functions to Branch Office in the expanding service areas. As a result, under the Central Office, it has provided 13 Cabang/Units/Rayons in the city in charge of maintenance of distribution system together with connections and meter, and customer service. To control operation of water service as intended by means of decentralization, however, the policy and management plan of water supply should be clearly directed to respective Branch Office through the Central Office. Assignment of number of staff should also be distributed to the areas required properly. Review disclosed that necessary control and supervision by the Central Office has not been achieved to the operations done by the Branch Offices. It is desired that definite and concrete targets of water supply service of PDAM water supply be established and the existing organization should be modified to realize such objective.

Considering the above findings, the following improvement should be made:

- (1) PDAM's definite target of water supply service should be set up and management strategies should be formulated, and be fully recognized by employees.
- (2) Present organization structure should be improved so as to achieve such objectives.
- (3) Function of divisions and sections should be defined according to the improved structure, and divisional coordination should be attained.
- (4) Recruitment of a number of engineers and technicians should be made to rectify the present imbalanced personnel distribution in areas of technical and administration and also to strengthen manpower capacity in the areas of engineering.
- (5) Overall personnel policy and administration should be set up to select, train and utilize capable staff.
- (6) An appropriate compensation should be assured to attract new applicants as well as encourage employees for better achievement of tasks.
- (7) All employees should be well informed of their duties, responsibilities, areas of authority, benefits, and condition of employment at the time of employment.
- (8) It is required to set up standards of staff performance based on a job evaluation.
- (9) To let management and administration staff familiarize with activities and operation in both Central Office and field offices, periodical shifts of personnel based on a personnel policy should be arranged.

3) Future Organization Requirements

It is essential for PDAM to improve its organization and to upgrade management system for sound business operation as well as operation and maintenance of facilities to be expanded in the Second Stage. The establishment of sound management system includes financial arrangement and fund to future physical extension program.

Future modification of PDAM organization is considered based on the review and findings of the present organization and management, assessing changes required to enable PDAM to manage the development and operation of water supply systems.

For improvement of PDAM's organization to meet the future requirement, following objectives are considered:

(1) Production and Supply of Safe Drinking Water

It is as ever important for PDAM to produce and supply hygienically safe drinking water to customers continuously supported by a reliable organization, management and legislations.

(2) Provision of Maximum Level of Service

Water supply operation should be significant as public service through maximum level of service. Effort, therefore, should be made in PDAM to maintain and/or upgrade such level of service.

(3) Maximum Utilization of Facilities

Maximum utilization of the existing water supply facilities in PDAM should be attained through efficient and effective control of every possible resources.

(4) Minimum Costs

It is also important for PDAM to provide its customers with required services at the lower possible costs.

(5) Financial Independence

System of financial self-supporting should be fully assured so that the revenue generated by business operation can be used entirely for water supply program.

4) Proposed Organization

On the basis of review of the present structure of PDAM organization, alternative structures were studied and evaluated in the Master Plan. Such evaluation was made in the light of the following principles:

- Improvement of organization structure with an appropriate number of staff,
- Improvement and strengthening of the divisional make up for sound operation,
- Upgrading of water service for customers.

(1) Alternative Structure

The operation of water service in PDAM has been expanded due to the growth of population served and expansion of the facilities. To meet the changing requirement, water service operation has been decentralized from Central Office to Branch Offices in field. Reflecting this requirement structure of organization and administration has been modified accordingly to meet increasing needs in the field offices. As a result of this decentralization of administration, there are 13 fields offices located in the city. These field offices are: 6 branch offices, 6 unit offices for specially assigned areas, and 1 rayon. Besides, PDAM is also undertaking operation and maintenance of 4 treatment plants and 6 mini-plants (Ref.: Fig. 8.1)

Central Office in Pejompongan is the center of administration, conducting planning and designing for distribution and connections, technical, and customer service, billing and collection, procurement, water meter administration, accounting and personnel affairs in administration. While, meter reading, collection of water bills, installation of house connection and minor repair works are conducted in field offices. The operation of treatment plants and mini-plants are handled independently by Instalasis or Installations.

The decentralized operations, however, require strict management including direction and supervision by the Central Office, and if proper management is not maintained in the Central Office, operation of the Branch Offices would be hazardous. In the present organization, line organization of these field offices are under none of any direct control of the Directorate, and due to this, required coordination with other divisions in the Central Office is insufficiently maintained, and there are several problems existed between the Central Office and Branch Offices as to level of performance, communication, and information systems. Alternative for organization modification, therefore, should be considered and evaluated keeping the above in mind.

(a) Alternative 1 (Ref.: Fig. 8.2)

The alternative intends to keep close administrative and operational coordination between the Central Office and Branch Offices and Installations. Therefore, operation of Branch Offices is shifted from direct control of the President Director to the related divisions to attain full coordination through required operational direction and supervision. Production Division in Technical & Production should be improved and conduct strict supervision for operations in Installations and Mini-Plants which will be under the Production Divisions. Logistic Division under Business will be shifted to

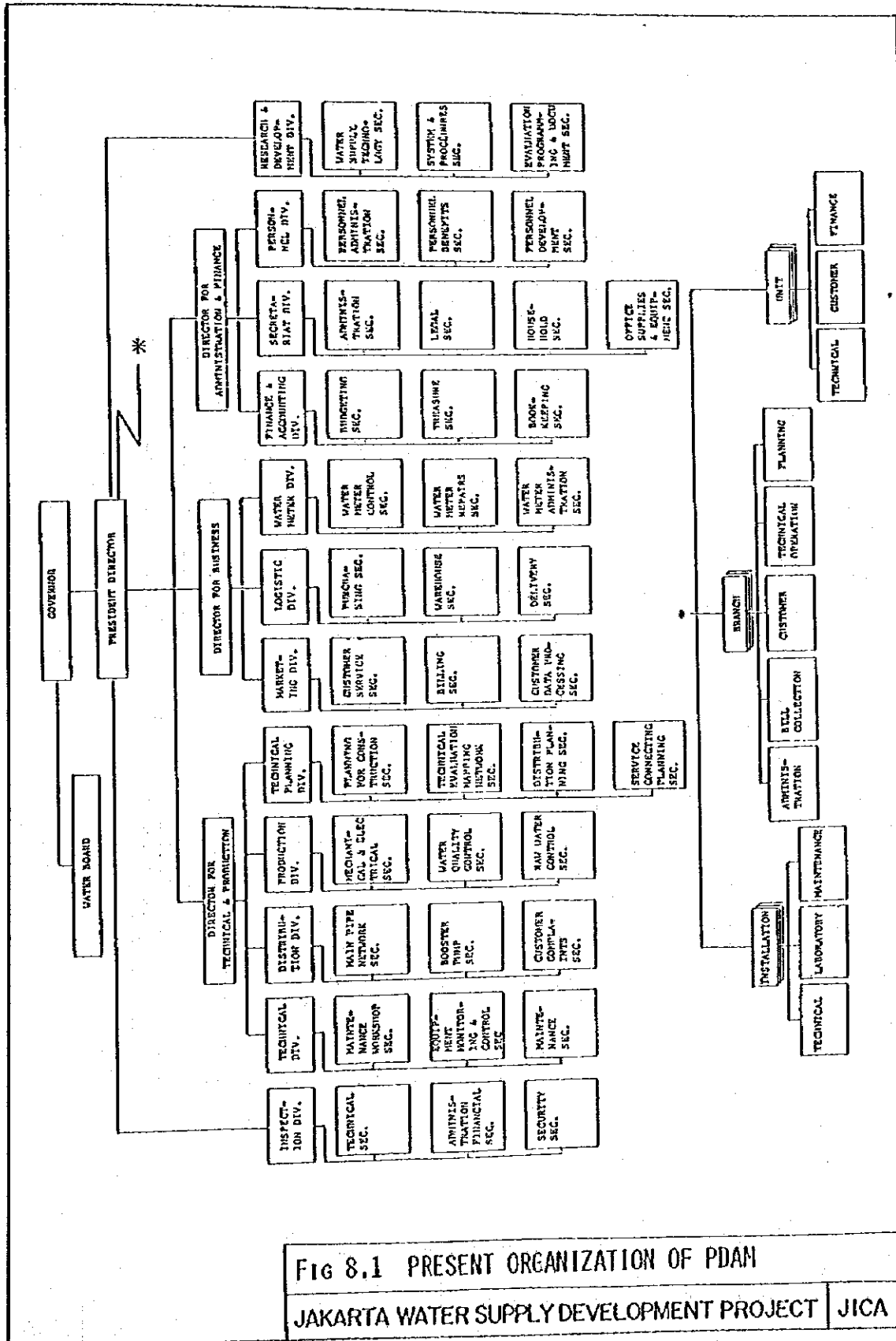


Fig 8.1 PRESENT ORGANIZATION OF PDAM
 JAKARTA WATER SUPPLY DEVELOPMENT PROJECT JICA

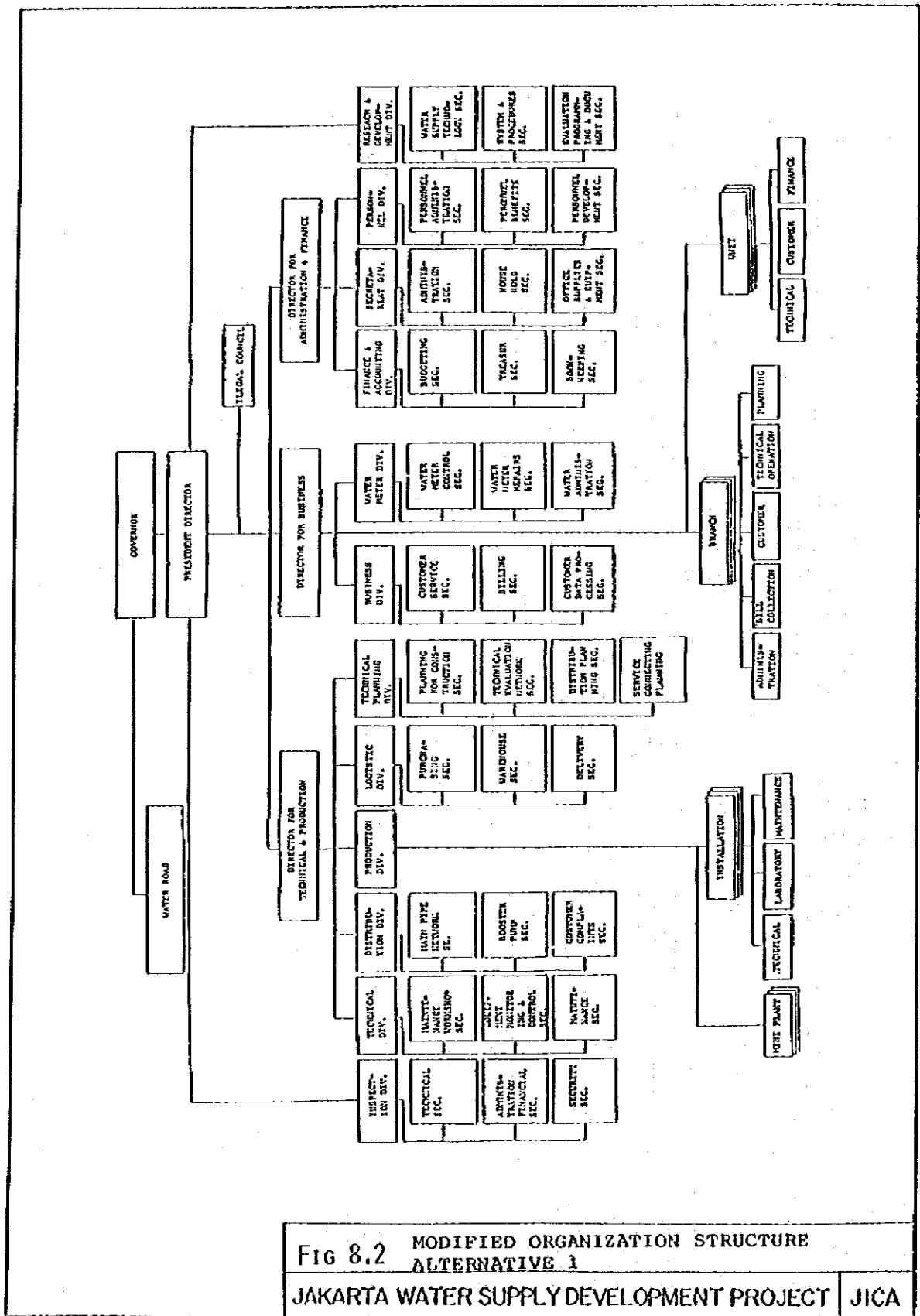


FIG 8.2 MODIFIED ORGANIZATION STRUCTURE ALTERNATIVE 1
JAKARTA WATER SUPPLY DEVELOPMENT PROJECT JICA

Technical and Production and conduct activities of coordination with other technical divisions. The Branch Offices and Units will be placed under Business which will supervise branches operation to the fullest extent. Under this arrangement, it is intended to provide prompt service to customers and at the same time to improve and upgrade procedures of meter reading and operation of billing and collection. Inspection Division and Research and Development Division will also be strengthened to conduct not only technical but financial, and to carry out research work respectively. Other divisions and sections will be remained same.

(b) Alternative 2 (Ref.: Fig. 8.3)

As arranged in Alternative 1, Installations and Mini-Plants should be placed under Production Division, and Branch Offices and Units will be placed under Business Directorate. In addition, project coordination and monitoring will be provided in Technical & Production to participate future extension project from planning stage to implementation stage. In case of Alternative 2, Logistic Division will be shifted to Administration and Finance Directorate to maintain coordination with Finance and Accounting Division. Under this shift, control of equipment and materials will be expected. Other divisions and sections will be remained same.

(c) Alternative 3 (Ref.: Fig. 8.4)

This alternative is more strengthened structure than the Alternatives 1 and 2. In order to strengthen the Technical & Production, this will be divided into two Directorates: Engineering and Planning, and Production and Operation. Under the new Engineering and Planning function, Design Division and Construction Division will be newly provided, in addition to the existing Technical Division. Installations and Mini-Plants will be under Headworks Operation and Maintenance Division. Under the Production and Operation Directorate, also Mechanical and Electrical Services Division will be provided. Distribution Division will be improved as Distribution Operation and Maintenance under the Production and Operation Directorate. At the same time, Business Directorate will be improved and changed into Service Directorate. Customer Service will be upgraded into division level and perform operations of customer service. Customer Complaints Section now under Distribution Division will be shifted under this Customer Service Division. Also, operations of Branch Offices will be under direct control of Service Directorate, which is newly reorganized. By this arrangement, effective and quick services to the customers will be expected. Logistic now under Business will be shifted to Administration and Finance. Other function will be remained same.

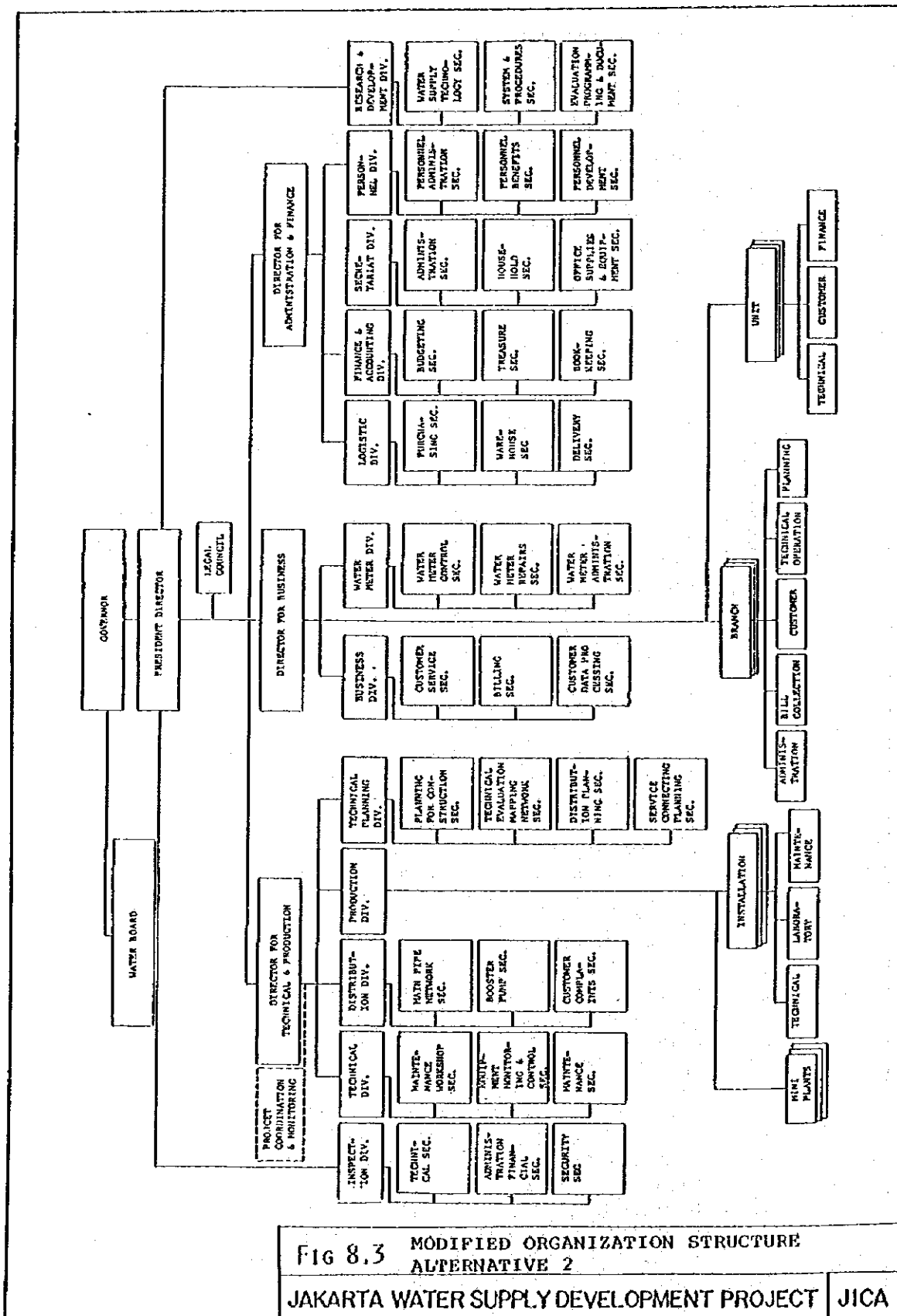


FIG 8.3 MODIFIED ORGANIZATION STRUCTURE ALTERNATIVE 2

JAKARTA WATER SUPPLY DEVELOPMENT PROJECT JICA

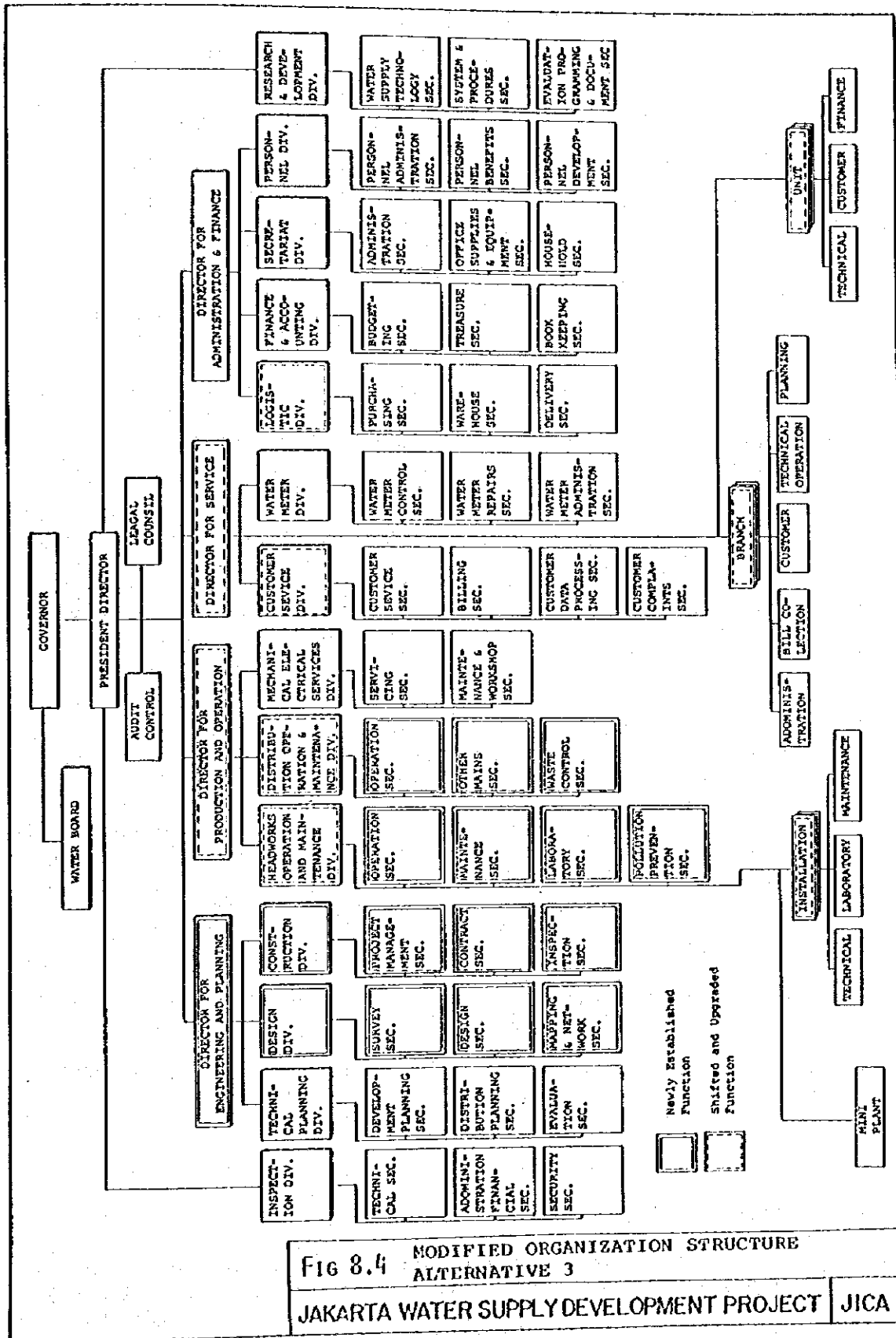


FIG 8.4 MODIFIED ORGANIZATION STRUCTURE ALTERNATIVE 3
JAKARTA WATER SUPPLY DEVELOPMENT PROJECT JICA

Summary of comparison of alternative structure modifications is shown in Table 8.1.

All the above alternatives are considered along the improvement of the existing organization. As mentioned earlier, alternatives are intended to attain good management system in the organization to cope with the future extension programs by strengthening of operation and maintenance and improvement of water supply services. Alternatives 1 and 2 are intended to change the structure minimum, while Alternative 3 requires more changes and upgrading. However, these alternatives will not require drastic change of the present structure. Such changes are arranged to the minimum extent, not causing overall disturbance in the existing organization, still encouraging maximum implementation possibility. It is, therefore, recommended for PDAM to employ Alternative 3, for future modification.

It is noted that the evaluation of the existing divisions of Inspection, and Research and Development was also made in the overall function of PDAM organization. There might be a possibility to absorb the Inspection into the function of Audit Control and the Research and Development into the function of Technical Planning Division. However, it is considered too early to make such an amalgamation at this stage when evaluated the current functions and responsibilities of the both divisions. It is recommended, therefore, that possibility and timing of such amalgamation should be practiced in conjunction with the detailed study of PDAM management consultant in a later stage.

5) Modifications Required

The organization and management structure proposed for PDAM is designed to strengthen its operational undertakings capable of carrying out all technical, operational, planning and administrative functions. The proposed structure can be implemented in stages and modified to meet future requirements in order to justify the major programs of expansions and rehabilitation envisaged in the Master Plan.

Features of organization modification shall be focused at the following:

- (1) Attainment of technical competence through provision of safe and reliable potable water.
- (2) Integration of overall activities of the Central Office, Branch Offices, Units, and Installation with economy and efficiency.
- (3) Upgrading of water service for customers.

Central Office

Central Office is principally concerned with policy making, planning and design, and overall financial, administrative and technical control of PDAM operations. Through modification proposed earlier, the Central Office of PDAM is enable to strengthened its engineering as well as managerial and administrative capability.

Table 8.1 Comparison of Alternative Structure Modification

Factors	Alternative 1	Alternative 2	Alternative 3
1. Coordination between Central Office and Branch Offices	<ul style="list-style-type: none"> - Improved better and close, since line of organization is shifted from President Director to the level of related existing division. 	<ul style="list-style-type: none"> - Same as Al. 1 	<ul style="list-style-type: none"> - Strengthened and improved, since line of organization is shifted from President Director to related newly provided division and existing division.
2. Organization Required Modification	<ul style="list-style-type: none"> - Logistic Division is shifted from the line under Business to the line under Technical & Production. - Branches and Units are under Business. - Installation/Mini-Plants are under Production Division, Technical & Production. - Legal Section under Secretariat is reformed newly in Legal Council independently under the line of President Director. 	<ul style="list-style-type: none"> - Logistic Division is shifted from the line under Business to the line under Administration & Finance. - Branches and Units are under Business. - Installation/Mini-Plants are under Production Division, Technical & Production. - Legal Section under Secretariat is reformed newly in Legal Council independently under the line of President Director. - Project Coordination & Monitoring are provided when required under Technical & Production. 	<ul style="list-style-type: none"> - Technical & Production will be divided into Engineering and Planning and Production and Operation. Under Engineering and Planning, new divisions of Design and Construction are provided. - Under Production and Operation, new divisions of Headworks Operation and Maintenance and Mechanical and Electrical Services are provided. - Business is modified to Service. - Logistic Division is shifted from the line under Business to Administration and Finance. - Audit Control and Legal Council are formed independently under the line of President Director.
3. Degree of Organization Change	<ul style="list-style-type: none"> - Minimum 	<ul style="list-style-type: none"> - Minimum 	<ul style="list-style-type: none"> - Significant, but not drastic.
4. Maximum Implementation Possibility	<ul style="list-style-type: none"> - Better 	<ul style="list-style-type: none"> - Better 	<ul style="list-style-type: none"> - Best

Area of Engineering and Planning

Engineering and Planning Directorate is the center of planning and designing of PDAM physical construction program. Engineering and Planning Directorate is responsible for future program of construction and rehabilitation. Provision of this function is to cope with future development program, despite the current practice that major capital construction is carried out by the Central Government. Especially, Construction Division will take part in construction program in the early stage of project administration and monitoring during the construction stages. In this respect, close coordination with the Central Government for project preparation is required. Construction Division will be staffed with one senior engineer and two associate engineers and number of technicians at the initial stage of operation.

Area of Production and Operation

Production and Operation Directorate is responsible for proper operation and maintenance of treatment facilities. By separation of designing/ planning function from Production and Operation Directorate to Engineering and Planning Directorate, Production and Operation Directorate can concentrate its activities on production of potable water, which is hygienically safe and reliable, and its distribution to consumers. Major modifications required are for Headworks Operation and Maintenance Division and Mechanical and Electrical Services Division. Headworks Operation and Maintenance Division will be responsible for raw water control and production process and treated water control. This Division will control overall operations of Installations and Mini-Plants. Especially, this Division will pay attention to monitoring water sources which are in problems of pollution, in coordination with the related agencies of Cipta Karya, Pengairan and Jatiluhur Authority. Activities and function of laboratory will be upgraded with facilities and staff capable of ensuring the production of safe drinking water. Control of leakage is also another area to be solved. Present system leakage is not accurately figured out, but it is considered much, and may be contributed to high portion of the present unaccounted for water of 54%. To curbe the system leakage and reduce amount of water loss in the distribution system are important tasks. Distribution Operation and Maintenance Division, being responsible for such work, will be in charge of maintaining supplies and repairing mains and connections.

Area of Customer Services

Upgrading PDAM service level is another area to be looked into carefully. Business Directorate should be improved into Service Directorate with an aim to provide better customer service operation. Customer Service Division shall be strengthened with the increased number of staff and facilities, improving the present level of procedures of billing and collection services. Additionally provided section will cope with customer problems and complaints. Branch Office's operation is all under control of Service Directorate, maintaining coordination between Central Office and Branch Offices.

Area of Administration and Finance

Improvement of administrative procedures and financial control should be made together with strengthening the area of technical and engineering.

The present procedures should be improved to meet requirements upon completion of the systems expansion. Especially Finance and Accounting Division should be provided with up-to-date procedures assisted by adequate numbers of manpower and resources. System of budget preparation and control, accounting and bookkeeping procedures should also be improved. PDAM will start repayment of loan to the Central Government from the fiscal year of 1984/85, and loan repayment administration is to be set up in the procedures of the Finance and Accounting Division.

Branch Office and Unit

The importance of operation activities in Branch Office and Unit is increasing because of the current management system of decentralization. Responsibility of customer service in respective Branch Offices and Units has been widened and deepened reflecting the recent expansion of service areas and increase of number of customers. The operational procedures of meter reading, billing and collection, connection and minor repair should be reviewed and re-arranged in a more efficient and systematic manner and be set up new refined procedures in order to upgrade the level of service.

6) Management of Organization

The primary task of PDAM Jaya is to ensure that its objectives are achieved with the fullest economy, efficiency, and effectiveness. It is the duty of the key officers to create an atmosphere in the organization which will bring about the optimum utilization of resources available to PDAM.

To ensure sufficient and effective operations, overall supervision and control of the top management group is, needless to say, the key factor. In addition, major divisional operations should be under the supervision and control of the Deputy-Directors each responsible for Engineering and Planning, Production and Operation, Service, and Administration and Finance.

President Director

- (a) Recommends the Supervisory Board policies and plans of PDAM.
- (b) Conducts the decision of the Supervisory Board.
- (c) Formulates and enforces general operating policies, plans, and program required to attain the objectives of the system.
- (d) Executes management of PDAM and controls its planning, operating and reporting function.
- (e) Submits to the Supervisory Board annual budgets, and proposals on financial requirements.
- (f) Submits to the Supervisory Board financial and operational performance reports.
- (g) Ensures a high level of management proficiency in PDAM through regular appraisals of routine work in progress and of the performance of Branch Offices and Units through a management development program.
- (h) Performs such other executive duties as may be assigned by the Supervisory Board and Municipal Government, DKI, or as prescribed by existing laws and regulations.

Director for Engineering and Planning

- (a) Prepares plans and designs of long term as well as short term PDAM systems and facilities expansion program, assessing the requirements of supply capacity.
- (b) Supervise and controls implementation of physical construction programs under the finance by the central government and those of PDAM own finance, and their inspection.
- (c) Maintains administration of engineering activities and monitoring progress of project implementation.
- (d) Plans and conducts surveys for the purpose of evaluation of pipeline network, mapping and distribution, and for house connection.

Director for Production and Operation

- (a) Prepares long term and routine maintenance plan for operation and maintenance of water sources, raw water, production process of treatment plants and mini-plants and transmission facilities.
- (b) Maintains operation and maintenance of mechanical and electrical facilities, and water distribution facilities and service connections.
- (c) Controls, maintains and repairs trunk mains and other pipe network and booster pump, and conducts leakage abatement programs.
- (d) Formulates and submits to the President Director proposals and recommendations on water production, its raw water and treatment process.

Director for Service

- (a) Supervises and controls overall activities of customer service, billing and collection, water meter reading, meter repairs administration.
- (b) Maintains good provision of customer service with an aim to attain better appreciation of water supply business.
- (c) Ensures the efficient collection of revenues.
- (d) Formulates and submits to the President Director proposals and recommendations on water meter program, billing and collection, and customer relations policies.

Director for Administration and Finance

- (a) Plans, directs, and coordinates the activities of office services, finance, accounting and preparing financial reports, and personnel administration of Finance and Administration Division.
- (b) Formulates and submits to the President Director proposals and recommendations on important financial and administrative matters including the operating budget, long term financial plans, capital budgets, personnel administration, and office management.
- (c) Recommends a realistic annual expenditures program necessary to maintain a high performance level in all activities of the system.
- (d) Submits to the President Director financial and operational performance reports.
- (e) Undertakes procurement of construction works and procurement materials, warehouse and delivery of materials.

7) Restructuring of Line of Functions and Division

In the recommended organization structure, an additional function of "Engineering and Planning" was newly provided after separated from Technical and Production. Therefore technical function has been restructured into "Engineering and Planning" and "Production and Operation" in order to carry out independently engineering activities of technical planning and design and project implementation, and production activities of water treatment plant and distribution. The President Director has four subordinates: Engineering and Planning Director shall attend to matters pertaining to technical plans and design, and project management. The Production and Operation Director has the responsibility of control of water sources, water production and distribution. The Services Director has responsibility of customer relations, meter administration and billing and collection. The Administration and Finance Director is responsible for office administration, financial management, budget compilation and execution, loan repayment administration and purchasing and warehousing.

New function has been created in the organization, and divisions and sections have been regrouped and shifted for more effective coordination and control. These changes are as follows:

Engineering and Planning. Under the recommended organization Engineering and Planning will be center of technical planning, implementation and evaluation, also project administration and monitoring.

Engineering and Planning consists of three divisions, (1) Technical Planning, (2) Design, and (3) Construction Division. Technical Planning Division is responsible for planning for civil work and construction, distribution and service connection.

Design Division conducts design work in relation with planning of extension of civil works of treatment plant and pipelaying work, and related survey work.

Construction Division has responsibility for supervision and inspection of civil works, and project administration and monitoring.

Production and Operation. This modified organization is responsible for control of operation and maintenance of water sources, raw water production and treated water distribution.

Headworks Operation and Maintenance Division is responsible for control and raw water quality monitoring and treatment processes in plants conducting chemical dosage on the basis of laboratory analysis. Distribution Operation and Maintenance Division has responsibility for preparation and updating network plans of the entire distribution system.

Mechanical and Electrical Services Division keeps close reviews of mechanical and electrical equipment and conducts maintenance for workshop.

Services. In the upgraded organization, Service Directorate is responsible for customer service billing and collection, and water meter reading.

Customer Service Division. The former Section is upgraded into Division, maintaining records of water consumption, and conducts processing of billing and collection, and customer data processing.

Water Meter Division. The Division keeps administration of water meter, receiving, storing and maintaining repairing, and verification the accuracy.

Administration and Finance. The existing structure of Administration and Finance is kept same, except Logistic Division that will be shifted from the Business.

8) Implementation of Organization Modification

Modification and improvement of PDAM organization and management should be initiated with the start of the detailed design and be implemented during the design and completed at the

end of 1987 at the earliest time, so that PDAM can arrange necessary set up well ahead of the actual operation and maintenance of the newly expanded system. This will also ensure PDAM to participate in planning and design stage and to assign engineering staff during construction stage of the proposed project implemented by the Central Government.

Fig. 8.5 shows required schedule of the implementation of organization modification and management improvement.

8.2 Personnel Development and Training

1) Personnel Development

The current service operation of PDAM is characterized as follows:

- PDAM operation is decentralized, as staff of more than 50% are engaged in operation of Branch Offices and Special Units.
- Staff of about 20% are engaged in the field of production.
- Staff of about 30% are stationed in the Central Office which is the center of management and administration for making policy and decision of business enterprise.

Along the service operation, the current staff level can be summarized as follows:

- PDAM is facing shortage of adequately trained technical staff to manage overall system. In particular, number of qualified engineers is limited, only 1% of the total staff, and there are few skilled technicians, 1.4% of the total staff.
- These engineers and technicians are mostly assigned in the Central Office, and a few limited engineers are assigned in the Branch Offices and Treatment Plants.
- There is an inadequacy of personnel program to cope with the changing requirements in terms of size and complexity of water supply system and procedures.

In order to overcome the existing problems of personnel arrangement and meet future condition in the system expansion, an appropriate personnel program should be developed considering:

- Requirements of administrative and operational function with adequately balanced number of staff to produce effective management.
- Recruitment of engineering and technical staff to overcome the present imbalanced number of engineering staff.

SUBJECT	AREAS TO BE UPGRADED	A C T I O N	IMPLEMENTATION SCHEDULE															
			1984				1985				1986				1987			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Structure of Organization	Technical & Production	<ul style="list-style-type: none"> - Separation of function into Engineering and Planning and Production and Operation - Establishment of Engineering and Planning - Provision of design and related Sections - Provision of Construction Division and related Sections of Production and Operation - Upgrading function of Production and Operation - Provision of Headworks Operation and Maintenance Division and related Sections - Upgrading function of Distribution Operation and Maintenance Division with provision of new Section - Provision of Mechanical and Electrical Services Division with related Sections 	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	Business	<ul style="list-style-type: none"> - Reorganization of Business into Service - Provision of Customer Service Division with related Sections 	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	Administration & Finance	<ul style="list-style-type: none"> - Upgrading function of Administration and Finance - Shift function of Logistic Division from Business 	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	Branch Office/Installation/Unit	<ul style="list-style-type: none"> - Modification of line of organization and upgrading procedures of operation 	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Management Planning	Management Responsibility	<ul style="list-style-type: none"> - Establishment of management responsibility according to new modified organization 	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Division Planning	Divisional Responsibility	<ul style="list-style-type: none"> - Preparation and issuance of modified responsibility 	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Staffing	Staffing Recruitment	<ul style="list-style-type: none"> - Preparation of staffing plan - Recruitment policy 	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

NOTE : _____ shows schedule of implementation ----- shows schedule of continuous implementation

FIG 8.5 IMPLEMENTATION OF ORGANIZATION MODIFICATION
JAKARTA WATER SUPPLY DEVELOPMENT PROJECT JICA

- Continuous programs of training for personnel to attain efficient water service with provision of possible training.

To recruit planned number of personnel for PDAM, PDAM is required to develop following:

- Establish salary program that is adequate to attract competent employees.
- Make available personnel policies and practices to all PDAM employees.
- Set up overall transfer program of personnel to give knowledge and practice of different functions of organization.

Personnel program is to be prepared taking into account PDAM management plan of short term and long term with an objective to attain effective and efficient operation of the system and consequently to provide maximum level of water supply service to consumers.

It is important for PDAM to plan staffing schedule and an arrangement of recruitment in accordance with the requirement derived from the expansion of the system. The main target of staff development should be focussed on the following:

- (1) To strengthen engineering forces by recruitment of engineers and technicians so that imbalance of the present manpower structure will be improved.
- (2) To increase manpower in production and also operation of the systems to remedy imbalance of the overall distribution of staff.
- (3) To increase manpower in Branch Offices, Units and Rayons in order to improve operation capacity of field activities to meet PDAM's policy of decentralization.

Considering the future organization structure to be set up in PDAM, the following job groups are required:

(a) Professional job groups:

- engineers
- chemists
- economists
- accountants
- personnel and training managers
- legal officers
- administrative professionals

(b) Sub-Professional, skilled and other job groups:

- water superintendants and inspectors
- water operators
- technicians
- draftsmen
- clerk

2) Personnel Requirement

The manpower requirements for PDAM up to the year 1995, completion of the proposed Second Stage Project are set out in Table 8.2. PDAM is required to fulfil the senior management position of each division by recruitment of respective qualification. Particularly, manpower strengthening of Branch Offices including their customer services and procedures of meter reading and billing and collection activities is strongly required. Careful plan of management is also to be practiced in overall personnel program in order to avoid vacancy in the position of organization. It is important that staff planning activities should be carried out on a continuous basis and the plan should be revised periodically as changing conditions required.

To carry out the proposed staffing plan as intended, PDAM is required to develop recruitment policy with allocation of necessary budget. The concensus of necessary recruitment should be obtained from divisions in PDAM and approval from Water Board in DKI. It is also important to make necessary arrangement for improved salaries to attract the competent engineering professionals as required for future assurance of maximum level of water supply operations.

3) Training Requirements

To achieve goal of policies and objectives of PDAM, organization must be upgraded and improved according to the requirements, and along with the upgrading of the organization, personnel programs accordingly be reinforced. Such continuous upgrading of PDAM's personnel's skills and knowledge owes much on a training program. To cope with the expanded functions of the proposed Second Stage Project, there is a need for training of the existing PDAM personnel. The training program should be geared towards upgrading of the skills and knowledge of both technical as well as administrative and operational functions. The training program should cover the following areas:

Engineering and Planning

Engineering and Planning covers the jobs related with technical planning, survey and design, and construction/project, and is in charge of preparation of engineering plan and design of treatment and distribution facilities. Newly added jobs are survey and monitoring and supervising construction projects. Engineering and Planning should maintain close coordination among divisions concerned on the matters of technical knowledge and information concerning treatment process, design and operation.

Table 8.2 (1) Proposed Staffing Plan (1)

YEAR	MANAGE	ENGINEER	PRODUCT	SERVICE	RESEARCH	FINANCE	INSPECT	GRA.UNIT	MINI-P	INSTALL	AUDIT	LEGAL	TOTAL	YEAR
1984	4	86	190	101	116	175	42	908	121	257	0	9	2025	1984
1985	4	93	199	112	116	175	44	972	130	264	0	9	2134	1985
1986	5	104	221	126	118	177	46	1074	130	272	0	9	2298	1986
1987	5	122	247	148	138	198	47	1250	130	277	0	9	2507	1987
1988	5	144	269	172	160	207	50	1351	130	277	0	9	2796	1988
1989	5	167	291	198	183	216	62	1457	130	347	0	9	3081	1989
1990	5	187	359	227	212	226	71	1568	138	346	0	9	3356	1990
1991	5	211	359	269	246	243	80	1659	109	484	0	9	3682	1991
1992	5	244	359	290	270	254	82	1787	109	484	0	9	3901	1992
1993	5	269	359	324	302	266	84	1901	109	484	0	9	4120	1993
1994	5	295	403	358	334	278	85	2018	109	560	0	9	4462	1994
1995	5	328	403	393	367	207	92	2159	109	560	0	9	4720	1995

Table 8.2 (2) Proposed Staffing Plan (2)

DESCRIPTION	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915
1) MANAGEMENT STAFF	4	4	5	5	5	5	5	5	5	5	5	5
- PRESIDENT DIRECTOR	1	1	1	1	1	1	1	1	1	1	1	1
- DEPUTY DIRECTOR												
- Engineering			1	1	1	1	1	1	1	1	1	1
- Production	1	1	1	1	1	1	1	1	1	1	1	1
- Services	1	1	1	1	1	1	1	1	1	1	1	1
- Adm. & Finance	1	1	1	1	1	1	1	1	1	1	1	1
2) ENG. & PLANNING	86	93	104	122	144	167	187	211	244	269	295	328
- TECH. PLANNING DIV.	42	46	52	59	70	81	92	104	122	132	145	160
- Senior Engineer	1	1	1	1	1	1	1	1	1	1	1	1
- Associ. Engineer	1	4	4	4	4	4	4	4	4	4	4	4
- Technicians	5	5	5	5	5	5	5	5	5	5	5	5
- Office Staff	35	36	42	49	60	71	77	89	107	117	130	145
- DESIGN DIV.	21	23	25	29	34	40	46	52	59	65	72	80
- Senior Engineer	1	1	1	1	1	1	1	1	1	1	1	1
- Associ. Engineer	2	2	2	2	2	2	2	2	2	2	2	2
- Technicians	3	3	3	3	3	3	3	3	3	3	3	3
- Office Staff	15	17	19	23	28	34	38	44	51	57	64	72
- CONSTRUCTION DIV.	23	24	27	34	40	46	49	55	63	72	78	88
- Senior Engineer	1	1	1	1	1	1	1	1	1	1	1	1
- Associ. Engineer	2	2	2	2	2	2	2	2	2	2	2	2
- Inspectors	2	2	2	3	3	3	3	3	3	3	3	3
- Technicians	3	3	3	5	5	5	5	5	5	5	5	5
- Office Staff	15	16	19	23	29	35	36	40	48	55	61	71
3) PRODUCT & OPERATION	198	199	221	247	269	291	359	359	359	359	403	403
- HEADWORKS O & M DIV.	48	49	49	51	51	51	53	53	53	53	53	53
- Senior Engineer	1	1	1	1	1	1	1	1	1	1	1	1
- Associ. Engineer	4	4	4	4	4	4	4	4	4	4	4	4
- Assist. Engineer	6	6	6	8	8	8	10	10	10	10	10	10
- Technicians	10	10	10	10	10	10	10	10	10	10	10	10
- Hydrochemist	4	5	5	5	5	5	5	5	5	5	5	5
- Office Staff	23	23	23	23	23	23	23	23	23	23	23	23
- DISTRI. O & M DIV.	119	119	141	163	105	207	270	270	270	270	314	314
- Senior Engineer	1	1	1	1	1	1	1	1	1	1	1	1
- Associ. Engineer	2	2	2	2	2	2	2	2	2	2	2	2
- Assist. Engineer	5	5	7	9	11	13	14	14	14	14	20	20
- Technicians	19	19	29	39	49	59	104	104	104	104	128	128
- Office Staff/Work.	92	92	102	112	122	132	147	147	147	147	161	161
M & E SERVICES DIV.	31	31	31	33	33	33	36	36	36	36	36	36
- Senior Engineer	1	1	1	1	1	1	1	1	1	1	1	1
- Associ. Engineer	2	2	2	2	2	2	2	2	2	2	2	2
- Technicians	5	5	5	7	7	7	10	10	10	10	10	10
- Office Staff	23	23	23	23	23	23	23	23	23	23	23	23

Table 8.2 (3) Proposed Staffing Plan (3)

DESCRIPTION	1904	1905	1906	1907	1908	1909	1990	1991	1992	1993	1994	1995
4) SERVICE	101	112	126	148	172	190	227	269	290	324	350	393
- CUSTOMER SERVICE DIV	46	57	71	93	117	143	172	190	225	259	293	320
- Chief of Staff	1	1	1	1	1	1	1	1	1	1	1	1
- Admnl. Assistant	5	5	5	5	5	5	5	5	5	5	5	5
- Public Relat. Spec	5	5	5	7	7	7	7	10	10	10	10	10
- Computer Specil.	5	5	5	7	7	7	10	10	10	10	13	13
- Office Staff	30	41	55	73	97	123	152	172	199	233	264	299
WATER METER DIV.	55	55	55	55	55	55	55	71	65	65	65	65
- Chief of Staff	1	1	1	1	1	1	1	1	1	1	1	1
- Admnl. Assistant	3	3	3	3	3	3	3	5	5	5	5	5
- Office Staff	51	51	51	49	49	49	49	60	54	54	54	54
5) RESEARCH & DEVELOPMENT	116	116	110	130	160	103	212	246	270	302	334	367
- Senior Engineer	1	1	1	1	1	1	1	1	1	1	1	1
- Assocl. Engineer	1	1	1	3	3	3	3	5	5	5	5	5
- Asslt Engineer	6	6	6	10	10	10	10	10	10	10	10	10
- Programmer Specil.	2	2	2	5	5	5	5	5	5	5	5	5
- Statistic. Specil.	2	2	2	3	3	3	3	3	3	3	3	3
- Office Staff	104	104	106	116	138	161	190	222	246	278	310	343
6) ADMINY. & FINANCE	175	175	177	190	207	216	226	243	254	266	270	207
LOGISTIC DIV.	30	30	38	47	47	47	47	53	53	53	53	53
- Chief Purch. Officer	1	1	1	1	1	1	1	1	1	1	1	1
- Purchasing Officer	2	2	2	5	5	5	5	7	7	7	7	7
- Inventory Officer	3	3	3	6	6	6	6	8	8	8	8	8
- Contract Admnl.	2	2	2	5	5	5	5	7	7	7	7	7
- Office Staff	30	30	30	30	30	30	30	30	30	30	30	30
FINANCE & ACCOUNT DV	55	55	55	60	60	60	60	60	60	60	60	60
- Chief of Staff	1	1	1	1	1	1	1	1	1	1	1	1
- Budget Officer	1	1	1	2	2	2	2	2	2	2	2	2
- Account Officer	1	1	1	2	2	2	2	2	2	2	2	2
- Accountants	2	2	2	5	5	5	5	5	5	5	5	5
- Office Staff	50	50	50	50	50	50	50	50	50	50	50	50
SECRETARIAT DIV.	40	40	40	40	40	40	40	40	40	40	40	40
- Chief Secretary	1	1	1	1	1	1	1	1	1	1	1	1
- Admnl. Assistant	3	3	3	3	3	3	3	3	3	3	3	3
- Secretary	3	3	3	3	3	3	3	3	3	3	3	3
- Office Staff	33	33	33	33	33	33	33	33	33	33	33	33
PERSONNEL DIV.	42	42	44	51	60	69	79	90	101	113	125	134
- Chief of Pers. Offi	1	1	1	1	1	1	1	1	1	1	1	1
- Asslt Pers. Offic	3	3	3	5	5	5	5	5	5	5	5	5
- Office Staff	30	30	30	40	45	54	63	73	84	95	107	119
7) INSPECTION DIV.	42	44	46	47	56	62	71	80	82	84	85	92
- Senior Engineer	1	1	1	1	1	1	1	1	1	1	1	1
- Chief of Inspector	3	3	3	3	3	3	3	3	3	3	3	3
- Inspectors	1	1	1	1	1	1	1	1	1	1	1	1
- Asslt. Admnl.	1	1	1	2	2	2	2	2	2	2	2	2
- Office Staff	36	36	36	40	47	53	62	71	73	75	76	83

Table 8.2 (4) Proposed Staffing Plan (4)

DESCRIPTION	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
8) BRANCH & SPECIAL UNIT												
BRANCH OFFICES	00	01	04	96	104	113	120	123	133	140	165	178
- Chief of Staff	6	6	6	6	6	6	6	6	6	6	6	6
- Assoc. Engineer	6	6	6	6	6	6	6	6	6	6	6	6
- Administrator	6	6	6	6	6	6	6	6	6	6	6	6
- Assist Engineer	12	13	16	21	24	28	30	32	36	40	42	46
- Field Tech.	50	50	50	57	62	67	72	73	79	82	105	114
SPECIAL UNIT												
- Associate Engineer	20	20	20	28	28	28	28	28	28	28	28	28
- Administrator	7	7	7	7	7	7	7	7	7	7	7	7
- Assistant Engineer	7	7	7	7	7	7	7	7	7	7	7	7
- Field Technicians	7	7	7	7	7	7	7	7	7	7	7	7
OFFICE STAFF												
- Installer	800	863	962	1126	1219	1316	1420	1508	1626	1733	1825	1953
- Meter Reader	100	135	190	205	310	335	360	365	395	410	410	440
- Bill Collector	144	157	177	207	241	278	318	361	406	453	501	551
- Clerk	102	112	126	148	172	198	227	258	290	324	358	393
- Admini. Staff	400	400	400	400	400	400	400	400	400	400	400	400
	54	59	69	86	96	105	115	124	135	146	156	169
9) MINI PLANT												
- Associ. Engineer	121	130	138	138	138	138	138	109	109	109	109	109
- Assistant Engineer	1	1	1	1	1	1	1	1	1	1	1	1
- Administrator	6	9	9	9	9	9	9	7	7	7	7	7
- Technicians	1	1	1	1	1	1	1	1	1	1	1	1
- Office Staff	82	94	94	94	94	94	94	69	69	69	69	69
- Workers	7	8	8	8	8	8	8	6	6	6	6	6
	22	25	25	25	25	25	25	25	25	25	25	25
10) INSTALLATION												
- Associ. Engineer	257	264	272	277	277	347	346	484	484	484	560	560
- Assistant Engineer	3	3	3	3	3	4	4	4	4	4	5	5
- Administrators	12	12	12	12	12	15	14	20	20	20	23	23
- Technicians	172	177	182	187	187	235	235	332	332	332	306	306
- Office Staff	12	12	12	12	12	16	16	22	22	22	26	26
- Workers	55	57	60	60	60	73	73	100	100	100	113	113
11) AUDIT CONTROL												
- Auditor Chief	8	8	8	8	8	8	8	8	8	8	8	8
- Auditor	1	1	1	1	1	1	1	1	1	1	1	1
- Office Staff	2	2	2	2	2	2	2	2	2	2	2	2
	5	5	5	5	5	5	5	5	5	5	5	5
12) LEGAL COUNCIL												
- Legal Officer	9	9	9	9	9	9	9	9	9	9	9	9
- Assistant	1	1	1	1	1	1	1	1	1	1	1	1
- Office Staff	3	3	3	3	3	3	3	3	3	3	3	3
	5	5	5	5	5	5	5	5	5	5	5	5

Table 8.2 (5) Proposed Staffing Plan (5)

JOB GROUP	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
T X- Top Management	4	4	5	5	5	5	5	5	5	5	5	5
T 1- Senior Engineer	14	14	14	14	14	14	14	14	14	14	14	14
T 2- Associ. Engineer	31	34	34	36	36	37	39	41	41	41	42	42
T 3- Assistant Engineer	56	58	63	76	81	90	94	100	104	108	119	123
T 4- Technicians	299	316	331	350	360	418	473	547	547	547	625	625
T 5- Field Technicians	57	57	57	64	69	74	79	80	86	89	112	121
T 6- Hydrochemist	4	5	5	5	5	5	5	5	5	5	5	5
T 7- Administrator	31	31	31	37	37	38	38	47	47	47	48	48
T 8- Economist	2	2	2	2	2	2	2	2	2	2	2	2
T 9- Accountants	4	4	4	8	8	8	8	8	8	8	8	8
T 10- Computer Speci.	5	5	5	7	7	7	7	10	10	10	13	13
T 11- Programmer Speci.	2	2	2	5	5	5	5	5	5	5	5	5
T 12- Purchasing Officer	3	3	3	6	6	6	6	6	6	6	6	6
T 13- Statistic. Speci.	2	2	2	3	3	3	3	3	3	3	3	3
T 14- Public Relat. Spec	5	5	5	7	7	7	7	10	10	10	10	10
T 15- Inventory Officer	3	3	3	6	6	6	6	6	6	6	6	6
T 16- Budget Officer	1	1	1	2	2	2	2	2	2	2	2	2
T 17- Auditor	4	4	4	4	4	4	4	4	4	4	4	4
T 18- Legal Officer	4	4	4	4	4	4	4	4	4	4	4	4
T 19- Secretary	3	3	3	3	3	3	3	3	3	3	3	3
T 20- Clerk	400	400	400	400	400	400	400	400	400	400	400	400
T 21- Admini. Staff (B)	54	59	69	86	96	105	115	124	135	146	156	169
T 22- Bill Collector	102	112	126	148	172	198	227	258	290	324	358	393
T 23- Installer	100	135	190	285	310	335	360	365	395	410	410	440
T 24- Meter Reader	144	157	177	207	241	278	318	361	406	453	501	551
T 25- Office Staff	604	622	663	719	813	914	1017	1126	1217	1320	1440	1557
T 26- Workers	77	82	85	85	85	98	98	125	125	125	130	130
T 27- Chief of Pers. Offi	5	5	5	7	7	7	7	7	7	7	7	7
T 28- Inspectors	6	6	6	7	9	9	11	11	11	13	13	13
TOTAL STAFF	2025	2134	2298	2587	2796	3081	3356	3682	3901	4120	4462	4720

Production and Operation

Importance and valuableness of drinking water should be well recognized among personnel in PDAM, especially who are engaged in production. The present condition of treatment in production might be attributable to the low appreciation of water supply. The operation of the production areas should by all means be improved and technicians and operator training should be provided.

Service

Other areas to be improved are those of customer service and meter administration. The present procedures of meter reading and billing and collection needs to be improved and strengthened. Review of the existing operation disclosed that unaccounted for water deriving from administration is high and there remains much room to improve procedures of meter reading including upgrading of capability of a meter reader for more reading efficiency and also procedures of billing and collection. As procedures of meter reading and billing and collection are basis for PDAM's revenue planning, and which affects directly PDAM's revenue condition, strengthening of the existing function and manpower resources by rearrangement and provision of necessary training for personnel in the division has higher priority.

Administration and Finance

Engineering and technical strengthening will not be effectuated if strengthening of administration and finance areas is neglected.

The procedures of budgeting, accounting, procurement, ware housing and general administration are to be improved, and control of budget and efficient management of financial operation including income and expenditure is to be well conducted. Personnels engaged in finance and administration needs general management skills, budgeting and accounting.

It is noted that the Subdirectorate of Development in Directorate of Water Supply, Cipta Karya, has been developing plan and organized program of training for water enterprise staff in the country under Human Resources Development Project (HRDP). This training has been carried out in the National Training Center (NTC) Jakarta and other parts of the country according to the needs, under the program of water supply targets 1983-1990.

This covers two categories of training.

- Training for existing enterprise staff,
- Training for staff who will be recruited in the period up to 1990.

The area of such training covers engineering and management aspects, (1) target of water supply, (2) basic management, (3) manpower development, (4) budgeting and reporting system.

PDAM training program in future is recommended to coincide with this HRDP program.

Personnels and their area of training are suggested in the Appendix FVIII-1.

9. CONCLUSION AND RECOMMENDATION

9. CONCLUSION AND RECOMMENDATION

1) First Phase of Second Stage Project

The feasibility study justified that proposed project is viable in technical and financial aspects. The First Phase of Second Stage Project was, therefore, recommended as next extension project succeeding to the ongoing project. Outline of the First and Second Phases of Second Stage Project is briefed below:

<u>Description</u>	<u>First Phase</u>	
Target Year	1990	
Service Area (km ²)	338	
Total Population (A)	8,872,000	
Total Population in Served Area (B)	6,538,000	
Population Served (C)	5,357,000	
Service Ratio (%) (C/B)	81.9	
(C/A)	60.4	

Per Capita Demand Gross (lpcd)	257	
Domestic use (lpcd)	106	
Max. Day Demand (l/sec)	18,300	
Expanded Capacity (l/sec)	6,000	

Water Source	WTC	3.2 m ³ /sec
	Cisadane River	3.2 m ³ /sec
Location of Treatment plant	Buaran	3.0 m ³ /sec
	Lebakbulus	3.0 m ³ /sec
Major Facilities		
- Raw water intake and transmission	Intake bay, grit chamber, raw water pumps	
	Raw water main	
	ø1500 x 16.5 km	
- Treatment	Buaran	3.0 m ³ /sec
	Lebakbulus	3.0 m ³ /sec

<u>Description</u>	<u>First Phase</u>
- Treated water transmission	Buaran to Distribution Center. ø1500 to ø1650x16.3km, Lebakbulus to Distribution Center ø1200x9.1km
- Distribution	Service area: 6 zones Distribution Center: 2 (for Zones 3 and 4) Distribution pipeline: Trunk mains ø300 to ø1800x200km Secondary mains ø200 to ø250x70km Unit: Tertiary mains ø50 to ø150x1,500km

2) Project Cost

Items	Unit: <u>F/C US\$1,000</u> Rp. million					
	<u>Cisamade System</u>		<u>WTC System</u>		<u>Total</u>	
	<u>F/C</u>	<u>L/C</u>	<u>F/C</u>	<u>L/C</u>	<u>F/C</u>	<u>L/C</u>
- Land Cost	-	2,480	-	1,666	-	4,146
- Supply and Construction	51,606	37,522	53,844	41,773	105,450	79,295
- Power Receiving Cost	-	1,620	-	620	-	2,240
- Administration Cost	-	832	-	882	-	1,714
- Engineering Cost	3,613	1,126	3,769	1,253	7,382	2,379
- Physical Contingency	5,523	4,359	5,761	4,619	11,284	8,978
Sub-total (1984 prices)	<u>60,742</u>	<u>47,939</u>	<u>63,374</u>	<u>50,813</u>	<u>124,116</u>	<u>98,752</u>
- Price Contingency	29,809	37,207	33,143	42,511	62,952	79,718
Total	<u>90,551</u>	<u>85,146</u>	<u>96,517</u>	<u>93,324</u>	<u>187,068</u>	<u>178,470</u>

3) Service Area

The service area of the First Phase of Second Stage Project is extended from present 283 km² to 338 km² which is approximately 52 percent of DKI Jakarta administrative area. The area to be expanded by the Project are:

- (1) Part of Kec. Penjaringan and Cengkareng, (North District and West District), developing area by housing plan,
- (2) Kec. Kebon Jeruk and part of Kel. Lebayoran Lama (West District and South District), development area by land and housing developing plans,
- (3) Part of kel. Kepala Gadung, Kec. Koja (North District), to be developed as an industry area,

- (4) Part of Kec. Jatinegara (East District, east part of Jl.D.I. Panjaitan), housing complexes area,
- (5) Part of Kec. Mampang Prapatan (South District), to be developed as housing area.

4) Project Implementation

It is recommendable that for execution of the project as scheduled, the procedures of selecting the consultants and initiating the detailed design engineering should be taken as early as possible after signing of the Loan Agreement. Prior to the completion of the extension project of First Phase of Second Stage, it is required to accomplish the rehabilitation and improvement works proposed as the Immediate Program and the ongoing First Stage project, as scheduled.

The Supply Zones 4 and 5, western and south-western area, newly developing areas with housing, are given high priority to be served in the service area. In order to supply water for these zones in 1991, construction schedule of the Cisadane System is proposed to be completed in 1990 including distribution pipelines.

The implementation of future projects needs coordination among agencies concerned including Cipta Karya, DGWRD/POJ and PDAM Jaya for smooth execution. The following arrangements are therefore recommended:

- (1) Establishing a special group of experts to supervise and control all relevant projects to be implemented by different agencies,
- (2) Preparing and giving a guideline defining direction and scope of works, approach etc to the consultants of each project, and
- (3) Providing PDAM with a consultants for coordination and management for expansion of all its business operation and projects.

5) Land Acquisition

It is recommendable that the land required for treatment plant and distribution center to be constructed by the First Phase of Second Stage Project shall be purchased prior to the detail design stage to facilitate topographical survey and soil investigation for foundation of structures. In addition to the above land, the purchase of land with 10 m width for raw water transmission pipeline shall also be required from the Cisadane intake to treatment plant for construction of pipeline and its maintenance. In this connection, the selection of the planned route of the pipeline, however, should be made carefully taking into consideration variable topographical conditions.

6) Raw Water Quality Analysis

The Cisadane River is one of the water source for next water supply system expansion, while its water quality data are deficient at present. It is considered that there will be vast fluctuation of water quality of the river between dry and rainy seasons, so that continuous quality analysis is required through the year forward. It is recommended that the water quality analysis should be carried out at least twice a month at Serpong and the confluence upstream of the Cisadane River.

7) Financial and Economic Analysis

The analyses of this chapter have proved the financial and economic viability of the proposed 6 m³/sec. expansion project with the following findings and results:

- (1) PDAM will be able to meet the financial obligations of the proposed project after paying taxes and making contributions to DKI budget if the average water tariff is raised to Rp. 292/m³ toward 1993 in terms of the end 1983/84 constant price from the 1983/84 level of Rp. 252/m³.
- (2) The finding (1) will not seriously be changed even if slightly unfavorable assumptions are introduced, e.g., an improvement in accounted-for water ratios ended up with only half of the targeted rate of 20 percent between 1983 and 1995.
- (3) Some cash shortages are expected between 1984-1990; however, this will not seriously change the finding (1), either, even if the shortages are financed by outside borrowing.
- (4) The cash shortages will be disappeared if tax payments and contributions to DKI are exempted or if revenues are increased by 10 percent by eliminating bad debts or by raising the tariff level, although minor drawing-down of cash at hand has to be allowed.
- (5) Rates of return on average net fixed assets in operation after 1991 when the debt-service of the proposed project starts, will be within a reasonable range of 5-10 percent on a historic cost basis and 3-6 percent on a revalued cost basis.
- (6) The assumed average tariff of Rp. 292/m³ in 1993 and thereafter is below the long-term marginal cost of water supply, i.e., Rp. 379/m³ which was computed using the average incremental cost method at 10 percent discount rate.
- (7) The average tariff will be affordable by residential users. The percentage of income which an average middle income family has to expend for piped water will be 2.5 percent which is lower than usually used rule of thumb for estimating the maximum affordability, i.e., 4 percent.

- (8) The finding (7) is based on the schedule of revising the present tariff table for residential users by 33 percent and that for non-residential users by 35 percent in real term for ten years. Tariff revision at this rate does not appear to give a significant adverse economic, financial, and political impact to water users.
- (9) The financial internal rate of return computed is at a moderate level, as a water supply project, of 5.8 percent.

The above endorses the conclusion of this chapter that it is desirable to implement the proposed project.

In addition to the financial/economic viability of the project, the analyses of this chapter have elucidated the measures to be taken by PDAM for ensuring the viability as follows:

- (10) Relevant and accurate data should be collected and analysed for determining the degree of revising the water rate table and designing its structure. Otherwise, unpremeditated tariff revision may lead to unexpected shortfall in planned revenues due to effects of price elasticity and tariff structure.
- (11) Appropriate management system of ground water use should be pursued in order to encourage present ground water users to switch to the piped water from the expanded water supply facilities.

8) Organization Modification

- (1) Future modification of PDAM organization is considered based on the review and findings of the present organization and management in the Master Plan, assessing changes required to enable PDAM to manage the development and operation of water supply systems.
- (2) The proposed restructure plan of Alternative 3 was recommended for (i) attainment of technical competence through provision of safe and reliable potable water, (ii) integration of overall activities of the Central Office, Branch Offices, Units, and Installation with economy and efficiency, and (iii) upgrading of water service for customers.
- (3) The proposed structure should be implemented in stages and modified to meet future requirements in order to justify the major programs of expansion and rehabilitation. Such modification and improvement of organization should be initiated with the start of the detailed design and be executed during the design and completed at the end of 1987 in order to arrange necessary set up well ahead of the actual operation and maintenance of the newly expanded system.

- (4) To overcome the existing problems of personnel arrangement and meet future condition in the system expansion, personnel program was proposed up to 1995, the completion of the Second Stage Project. PDAM is required to fulfill the position of each division by recruitment of respective qualifications. Particularly, manpower strengthening of Branch Offices including customer services and procedures of meter reading and billing and collection activities is strongly required. It is important that staff planning activities should be carried out on a continuous basis and the plan should be revised periodically as changing conditions required.
- (5) To keep continuous upgrading of PDAM's personnel's skill and knowledge, overall training program was proposed covering the areas of Engineering and Planning, Production and Operation, Customer Service, and Administration and Finance. The training program was geared towards upgrading the skills and knowledge of both technical as well as administrative and operational functions. It is noted that the Subdirectorates of Development in Directorate of Water Supply has been developing plan and organized program of training for water enterprise staff in the country under Human Resources Development Project. PDAM training program in future is recommended to coincide with this HRDP program.

