CHAPTER SEVEN

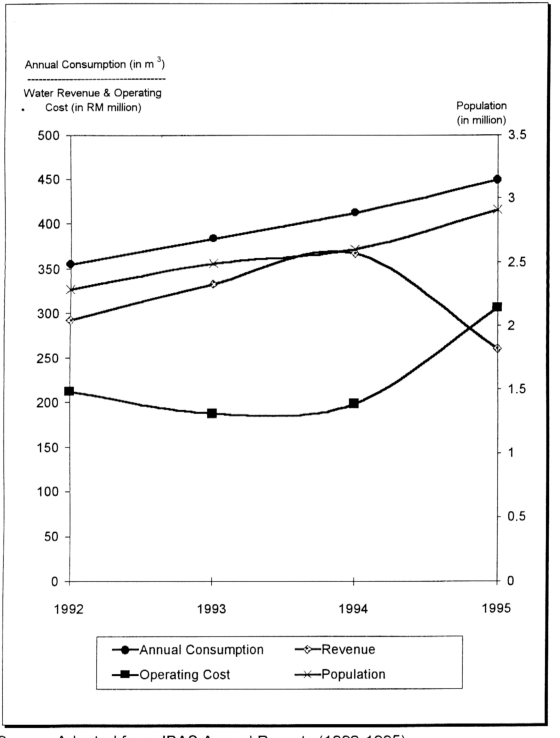
MANAGEMENT ISSUES

This chapter discusses the management issues facing the management of water resources.

7.1 Sustainability

Utilities such as water supply faces a greater challenge as it aims to provide safe water supply to large populations in towns and cities and addressing the needs of customer is of paramount importance. However, this can only be carried out if the water authority has enough funds to carry out the desired water services if all its cost could be recovered. Unfortunately, this is not the case experienced by JBAS as shown by Figure 7.1.

Figure 7.1 Graph showing the consumption, water revenue and operating cost in relation to population.



Source: Adapted from JBAS Annual Reports (1992-1995).

In the smoothed line graph above, it shows that in the years 1992 to 1995, the annual water consumption has increased from 355 million m^3 to 450 million m^3 as the population increased from 2.29 million to 2.91 million in the same period. However, the revenue from water sales has declined substantially from the high of RM367 million in 1994 to only RM260 million in 1995.

The decline in revenue may result in unfavourable liquidity maintenance, which means all costs and responsibilities associated with the system's planning and construction, operating and maintenance and eventual replacement, having been clearly identified and allocated are adequately met. This is a prerequisite to short term sustainability. Liquidity maintenance is an essential condition for the attainment of permanent sustainability (WHO, 1994, p.3).

The operating cost from the year 1992 to 1994 was relatively stable, ranging from RM188 million to RM212 million. However, in the year 1995, the operating cost shot up to RM306 million. Most of the expenses came from a 3-fold increase in water processing cost. The JBAS's water revenue collected was not even enough to cover the operating cost of these water schemes. The JBAS must therefore look into this problem seriously in order to ensure that the agency is able to meet the rising cost and demand in the future. It is essential for high quality water supplies.

The commitment to purchase water through the Bulk Supply Rate for the output of all WTPs operated by PNSB is subject to annual review which take into consideration changes in the cost of water production inputs. It is based on cost escalation formula. This shows that PNSB is solely protected against increases in operating costs. The initial Bulk Supply Rate at constant 1995 prices is 31 sen/m^3, to be raised to 43.5sen/m^3 upon commencement of operations for stage 1 of the new facilities scheduled in 1999, and 59 sen/m^3 upon commencement of operation for Stage II scheduled in the year 2002. Besides this the JBAS is also committed to pay a fixed monthly payment of RM1.75 million after completion of Stage I and RM3.5 million, after the completion of Stage II.

This will be a long-term liability for JBAS until the concession expires and if the tariff rates are not reviewed as constantly as the purchase price from the private operators to reflect the actual costs of water, then JBAS would not be able to operate well with great financial constraint. Other services will be affected too.

The research also found that the rate imposed by Malaysia is one of the lowest compared to the selected countries. This has been highlighted in an earlier chapter. Therefore, there is room for improvement and the public would not resent to any reasonable review of tariff if the water quality and the service provided is also improved.

The performance of JBAS as compared to Penang is shown in Table 7.1. The Penang Water Board seems to show higher efficiency in all the variables used in this comparison.

Table 7.1 Performance Indicators of Selangor Darul Ehsan and Penang (1994-1996)

State	Selangor Darul Ehsan			Penang		
Subject/Year	1994	1995	1996	1994	1995	1996
No. of connections per meter reader	2,844	1,970	2,101	4,212	4,462	3,940
Consumption Per Non-domestic Account/Month (m^3)	115	115	115	229	227	228
Consumption Per domestic Account/Month (m^3)	30	33	35	36	36	36
Non-Revenue Water (%)	39	36	36	21.7	22.0	21.8
Water Loss in Distribution (m^3/day per km)	92.0	69.0	72.0	40.0	42.0	45.0
Number of Billings Per Meter Reader Per Year	10,621	10,707	11,732	25,562	27,102	24,002
No of Pipe Breakage Per Km Per Year	1.3	2.2	1.7	0.8	0.7	0.7
Total no. of Connections	932,860			279,731		

Source: Adapted from Malaysia Water Industry Report 96/97, JKR, Kuala Lumpur 1998

Sound financial practises are urgently required to look into the substantial amount uncollected. Up to December 1997, a total of RM166,143,611.33 (JBAS, Aging Report 1997) is still accrued. The periods of uncollected bills range from 6 months to 36 months. Out of this, RM146,951,786.35 is from active account holders. The balance is from inactive account holders. That means if JBAS embarks on a serious collection-recovery move it may probably be able to improve its financial outlook.

JBAS has more challenges ahead. In trying to fulfill the demand, JBAS has embarked on a number of projects. The costs of the projects are shown in Table 7.2. This has added on to the financial burden of the JBAS, as it is a long term liability to the department due to the substantial amount involved.

Table 7.2 Schedule of Water Supply Projects in Selangor Darul Ehsan

No.	Water Supply Project	Principal Amount (RM) (a)	Interest Rate (%)	Term (years)	Total Interest (b)	Grand Total (a + b)
1	Damansara	11,700,000	5.75	30	12,880,087	24,580,08
2	Kelang Gates PKT II	10,500,000	5.75	30	11,559,054	22,059,05
3	KLIA Sepang	35,000,000	-			35,000,00
4	KLIA Sepang	25,000,000	-			25,000,00
5	Kuala Lumpur I (T)	47,979,834	8.00	30	78,761,417	126,741,25
6	Kuala Lumpur II	4,135,082	7.50	20	3,859,783	7,994,86
7	Kuala Lumpur III	1,312,000	8.00	25	1,725,869	3,037,86
8	Kuala Lumpur PKT II	14,262,082	7.50	20	13,312,565	27,574,64
9	Kuala Lumpur PKT III (Sg. Langat)	14,288,000	8.00	25	18,795,130	33,083,13
10	Kuala Lumpur PKT III (T)	15,000,000	8.00	20	15,111,842	30,111,84
11	Kuala Lumpur PKT III (T)	583,000	-			583,00
12	Petaling Jaya	5,462,577	5.00	35	5,990,197	11,452,77
13	Sabak Bernam II	600,000	5.75	30	660,518	1,260,51
14	Sabak Bernam III	1,900,000	5.75	30	2,091,637	3,991,63
15	Semenyih	1,000,000	5.75	30	1,100,863	2,100,86
16	Sg. Batu	7,781,199	7.50	20	7,263,156	15,044,35
17	Sg. Batu Devt	39,208,053	7.00	15	24,226,299	63,434,35
18	Sg. Selangor FASA I PKT II	102,497,000	-			102,497,00
19	Sg. Selangor FASA I PKT II	227,000,000	-			227,000,00
20	Sg. Semenyih I	306,436,438	7.50	20	286,035,023	592,471,46
21	Sg. Semenyih I (T)	3,811,435	4.00	22	1,925,834	5,737,26
22	Sg. Semenyih I (T)	98,295,670	8.00	30	161,357,501	259,653,17
23	Sg. Semenyih PKT I	123,886,419	7.50	20	115,638,515	239,524,93
24	Sg. Semenyih PKT I	4,184,000	-			4,184,00
25	Ulu Selangor Selatan	5,300,000	5.75	30	5,834,570	11,134,57
26	Ulu Selangor Utara	2,300,000	5.75	30	2,531,985	4,831,98
	TOTAL	**1,109,422,790**			**770,661,847**	**1,880,084,63**

Adapted from JBAS Statement of Finance 1997.

Calculation of Long-run Marginal Cost

From Table 7.2 above, the total capital cost (TCC) to develop the various water supply projects in Selangor Darul Ehsan is RM 1,880,084,636. The Long-run marginal capital cost of the water scheme is given as (Sivalingam ,1997(a)):

$$\frac{TCC}{(1 - NRW) \times Q/i \times [(1 + i)^{-5} - (1 + i)^{-55}]}$$

Where TCC = total capital cost of the schemes;
NRW = non revenue water rate;
Q = annual quantity of water treated; and
i = discount rate.

For this analysis, the year 1995 is chosen.

By substituting the values of:

TCC = RM1, 880,084,636
NRW = 36%,
Q = 701,464,300 m^3 and
i = 8% (assumed)

the long-run marginal capital cost is calculated to be at **RM 0.503** per cubic metre.

For year 1995, the total annual production of water for Selangor Darul Ehsan is at 701,464,300 m^3 (JKR, KL, 1998(Unpublished)) and the operating cost in the same year is RM 306,079,203 (JBAS Statement of Profit and Loss 1995). This gives the cost per cubic metre of water produced as RM 0.4363.

Hence the summation of the long-run marginal capital cost and the operating cost per unit of production, which will give the long-run marginal cost, is:

		RM
Long-run marginal capital cost	=	0.5030
Operating cost per unit	=	0.4363
Long-run marginal cost	=	**0.9393** per m^3

Average water price calculations

To calculate the water price, the water market is divided into two sectors, domestic and industrial.

Table 7.3 Calculation of the average water price in 1995

	Domestic	Industrial
Total annual consumption (m^3) *	305,448,081	143,740,273
Consumption Share (%)	68	32
Water price (RM/m^3) **	0.53	1.2
Weighted water price (RM/m^3)	0.3604	0.3840
Weighted average water price (RM/m^3)	**0.7444**	

* Source: JKR, KL, 1998 (Unpublished)

** Source: Water Rates in Malaysia, JKR, 1998

In summary, the long-run marginal cost for water supply in Selangor Darul Ehsan is RM 0.9393. The average water price of water in the year 1995 is RM 0.7444 per m^3.

It can be concluded that based on the data calculated, the current water tariff in the state of Selangor Darul Ehsan is not sufficient to cover the long-run marginal cost of water. This means that the revenue generated by the extra unit of water sold is inadequate to cover the cost of producing that extra cubic metre of water. The JBAS must therefore seriously look into the possibility of raising the water rates in order for it to be sustainable.

However, there are other considerations that should be examined before implementing such an increase in tariff:

a) whether there is any political issue involved that could undermine such an increase;
b) whether the poorer citizens will be able to afford a higher water price;
c) whether the increment is inevitable in view of the rising cost of maintenance;
d) the projected population increase in the next millennium means more water is required and such an increment may be required to motivate the people to save water;
e) the inherent economic downturn that the country is facing may inhibit such an increment as it will severely burden the people especially the poor.

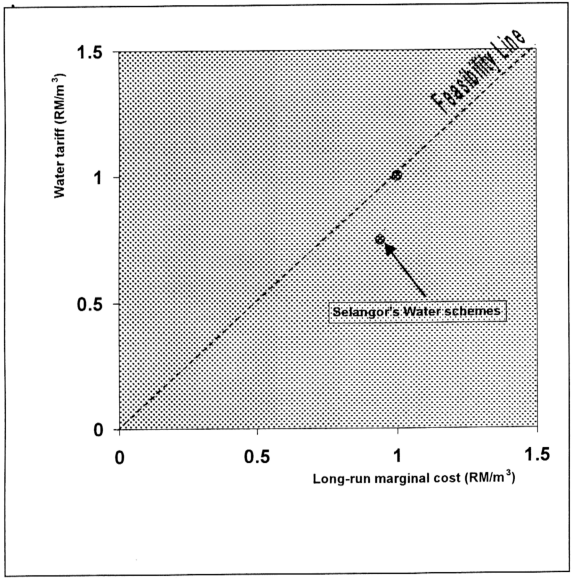
The estimated Long-run Marginal Cost is also the water supply curve (Sivalingam, 1997(a)). In order to be self-financing, the average water tariff must be set to at least cover the long-run marginal cost. This is clearly not the case for JBAS. There are arguments that if the water scheme is not self-financing, it may also not generate enough of revenue to maintain a proper water system in its complex network.

When plotted onto the feasibility graph shown in Figure 7.2 the water schemes were on the left side of the feasibility line. It shows that the water schemes in Selangor Darul Ehsan are not self-financing. This also shows that the schemes were not viable and were economically to other non-consumptive uses of water. On the basis of water supply alone, they were not justified.

There may be objections to using the LRMC pricing rule because the LRMC of producing the last unit of water may be much higher than the LRMC of producing smaller quantities of water. The LRMC generates supra normal profits as the unit cost of supplying less, is less than the unit cost of supplying more. The LRMC criteria may not be socially and politically acceptable due to

the inability of the poor to pay. The LRMC pricing rule may be efficient but it is not equitable (G. Sivalingam, 1995, p.7). The problem of inequality can be solved by charging below LRMC prices to the poor and above LRMC prices to the rich.

Figure 7.2 Feasibility of water scheme in Selangor Darul Ehsan



Source: Author's own

Assumptions

The above calculations are prepared based on the following assumptions:

a) the individual scheme and water supply projects in Selangor Darul Ehsan are aggregated and taken as one. This is parallel to the assumption that the water production and consumption are uniform and aggregated throughout the state.

b) the Total Capital Cost includes only the total cost of each scheme and the relevant interest payments. No other cost is considered.

c) the Total Interest is calculated based on reducing balance over the term of the loan. For simplicity sake, the interest payable is not discounted to present value because of the different year of commencement of each scheme.

d) the calculation assumes that there is no incremental capital investments and distribution network.

e) the annual operating cost stays constant throughout the life of the water schemes.

f) any incremental environmental depletion and damages are excluded.

g) the non revenue water is assumed to be uniform at 36% throughout all the schemes.

h) the discount rate in the calculation of long-run marginal cost is assumed to be 8%.

i) the rural water supplies sponsored by Kementerian Pembangunan Luar Bandar (Ministry of Rural development) are excluded from the analysis although they form part of the water supply system in Selangor Darul Ehsan.

7.2 Willingness to Pay

Although no formal survey has been carried out to ascertain the extent of willingness to pay, one can see that it was revealed during the water crisis period. Consumers were reported to have paid as high as RM20 a day for water. Many were willing to invest in new storage tanks in their homes and

paid high charges for these installations.

7.3 Human Resource

The human resource is under utilised by JBAS. Table 7.4 shows the water works staff employed in the country by state in 1997.

The state of Selangor Darul Ehsan has the second highest number of professionals after the state of Johor. As for the technical staff and general and junior staff it is the fourth largest in the nation.

With the manpower in store, the JBAS is expected to perform satisfactorily but it has recorded a great loss of RM15, 367,231 in its Statement of Profit and Loss for the year ended 1997. This is in contrast to Penang which recorded an impressive profit of RM49, 629,964 (JKR, KL, 1998 (Unpublished)) for the same year.

Table 7.4 Water Works Staff Employed - 1997

States	Professional	Technical Staff	General & Junior
Johor	39	211	1,239
Kedah	14	106	580
Kelantan	15	73	412
Melaka	10	51	530
N.Sembilan	13	64	578
Perak	25	164	980
Pahang	20	185	1,833
Perlis	2	18	134
P.Pinang	22	108	991
Selangor	33	139	1,100
Sarawak	24	99	429
Sabah	25	50	1,253
Terengganu	17	94	629
Labuan	2	7	93
Kuching	11	40	524
Sibu	5	27	163
Laku	15	132	168
Total	292	1,568	11,636

Source: JKR,1998 (Unpublished)

7.4 Short Term and Long Term Water Supply Solution

Water treatment plants and storage capacities are utilised to its maximum in certain areas to meet the demand. However during the water crisis period, JBAS resorted to water rationing in order to ensure that the people receive water. This was the short term measure taken by the JBAS.

As the demand is expected to increase in the future, JBAS has resorted to inter basin water transfer from neighbouring state, Pahang, if it can not resolve the problem of water shortage from within. Two dams in Kelau and Telemong may be constructed to supply water to Selangor Darul Ehsan. This is considered a long term measure to fulfill the increasing demand of the Klang Valley population (The Star, 19 May 1998, p.4).

7.5 Privatisation

The operation and management of water treatment plants and dams are under private hands. The next area of privatisation of water supplies is the distribution system. Serious thought has to be given to this as the distribution system with its high NRW level urgently needs the participation of the private sector which is acknowledged to be more efficient. The terms and conditions should reflect some risk sharing between the concessionaire and the state government. This is to ensure that the issue of equity is comprehended.

7.6 Water Catchment Area

Catchment areas are important in gathering, collecting, storing and transmitting the water provided by rainfalls. By depending heavily on surface water, it actually places high demand on sites of water catchments areas, and in the state of Selangor Darul Ehsan, major catchment sites are no longer available. The last is the Sg. Selangor catchment area (Hamirdin, 1997, p.144).

It has become fashionable to site development projects in forested and hilly areas. Consideration for the effect of such projects on water resources seems to be non- existent.

7.7. Bureaucratic Challenges

Management of the water catchment area is ineffective since the responsibility is being shared by eight government agencies that do not share similar goals and priorities. The agencies involved are the Land and Mines Department, District Land Office, Department of Environment, Drainage and Irrigation Department, Forestry Department, Agriculture Department, Local Council (Health, Building, and Engineering) and the JBAS.

This has resulted in duplication of activities, confusion and delays in carrying out enforcement. In some cases the department policies contradict each other. As a result of differing departmental goals and priorities, they often impede interdepartmental co-ordination.