3.6 Management Conditions of Waterworks in Vientiane

3.6.1 Management of Vientiane Water Supply Company

The Vientiane Water Supply Company (Nam Papa Vientiane Capital City: NPVC) was reorganised from the Lao Water Supply Company (Nam Papa Lao: NPL) under the Prime Ministerial Decision (37/PM) in September 30, 1999. The NPL used to cover the entire country in water supply services. After the reorganisation, the NPVC became one of the Nam Papa State-owned Enterprises (NPSEs), covering Vientiane Capital City only. In terms of training for water engineers, the NPVC succeeded its function for the all NPSEs as the implementing agency in the country.

The top management of the NPVC is comprised of three deputy general mangers who report to the general manager. Its organisation consists of four branch offices, four water treatment plants, five administrative and engineering divisions, a training centre, and manufacturing bottled potable water. As of 2002, the number of workers in the NPVC was tallied at 322 for all of these sections.

The main water supply system of the NPVC covers the central area of Vientiane Capital City with two water treatment plants. The NPVC also operates two small water supply systems in the Tangon area in northern part of the capital city and the Thadua area in south-eastern part of the capital city. In addition to the water supply services, the NPVC carries also manufactures bottled potable water. Although all these water supply services are managed by the NPVC, the latter three businesses are managed with independent accounting systems. The total amount of these three businesses accounted for less than 3% of the main water supply business. In this chapter, then, the management of the NPVC is discussed as the main water supply system operator.

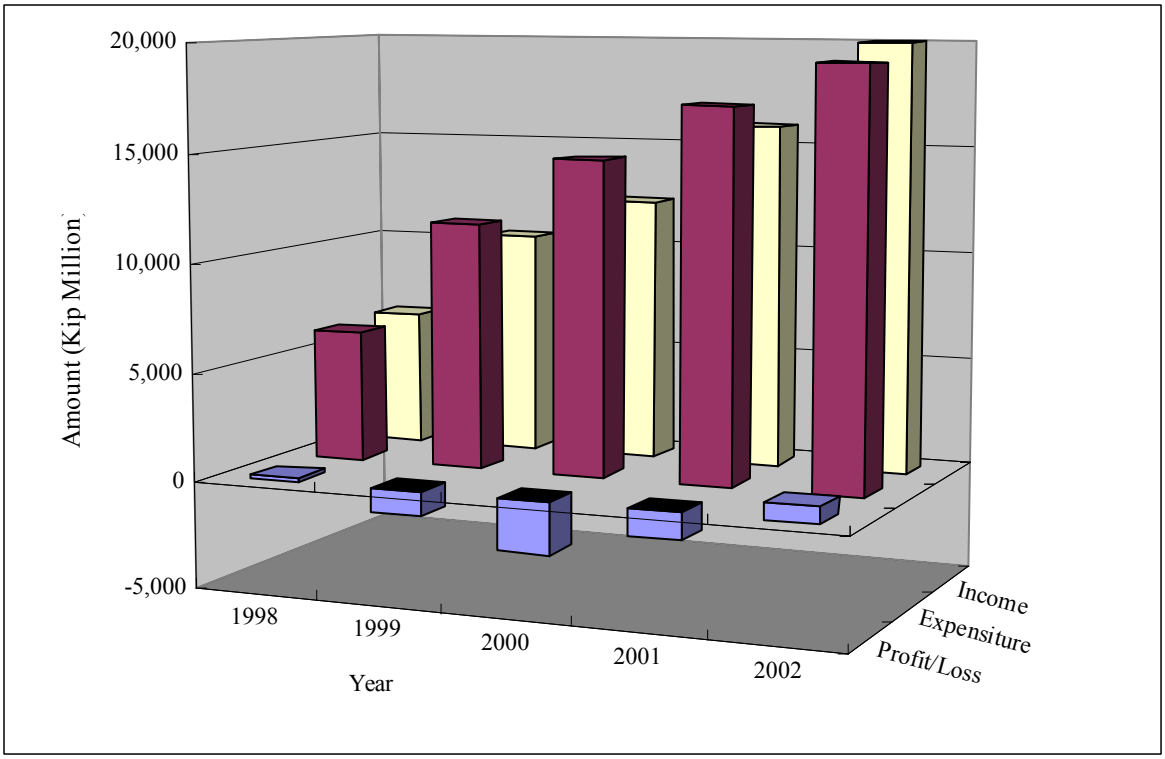
3.6.2 Financial Situation

(1) Financial Conditions

The management performance of the NPVC is reported in profit and loss (PL) tables in the financial statements of the NPVC. Sales revenue comprises water sales, new connection fees, income from projects undertaken, rental fees of heavy equipment and rental fees of water meters. In 2002, the sales revenues of the NPVC accounted for 19.8 billion kip. Of these sales revenues, 78% accrued from water sales. Other major revenue sources were connection fees, project income and rental fees of meters, accounting for 10%, 5% and 6%, respectively. Beside this sales revenue, the NPVC earns revenue of 163 million kip from non-operating activities.

In 2002, the total expenditure was 21.6 billion kip. Expenditure is divided into two main categories. The first category is the purchasing of materials and equipment for potable water production. This category accounted for 11.2 billion kip or 52% of the total expenditure. The other category is for service and administration expenses supporting water supply services. This accounted for 10.4 billion kip or 48% of the total expenditure. At the end of the fiscal year, the total expenditure was reduced through a closing adjustment, which was calculated at 2.4 billion kip. Accordingly, the net expenditure for the year 2002 was calculated to be 19.2 billion kip.

In 2002, the net profit after tax was calculated at 778 million kip. The NPVC experienced a financial net profit after an interval of three years. The financial trend for the past five years is illustrated in the figure below. According to the financial report, the NPVC received financial aid of 3.8 billion kip from the government in 2002. As a result, the deficit accumulated for the consecutive previous three years was settled by means of this assistance.



The financial conditions at the end of fiscal years are reported in the balance sheet (BS) of the NPVC. In 2002, the total assets were estimated at 39.0 billion kip. Fixed assets accounted for 22.6 billion kip, or 58% of the total assets. Current assets including (a) available assets of cash and bank deposits and (b) other current assets such as inventory stock, accounts receivable, products in progress, etc. accounted for 16.3 billion kip or 42% of the total assets. Of the total current assets,

available assets accounted for 4.2 billion kip, or 11% of the total assets. Other current assets were 12.1 billion kip or 31%. Accounts receivable was 3.6 billion kip or 9% of the total assets. This amount is equivalent to nearly three months of water sales.

The capital stock of the NPVC was 39.0 billion kip in 2002, comprised of 10.3 billion kip of shareholder's equity or 26% of the total, 23.3 billion kip of long-term liabilities or 60%, and 5.4 billion kip of short-term liabilities or 14%. Of the total equity, the government holds 8.3 billion kip or 80%. Other enterprises (NPVC) hold only 20% of the total equity. The long-term liabilities rely on bank loans. 75% of the long-term liabilities come from banks.

(2) Analysis of Financial Statement

Table 36-1 shows changes of the financial position in the balance sheet between 2000 and 2002. Current assets increased steadily for the three years as shown in the table. In particular, works in progress, bank deposits and cash positions recorded a remarkable increase for the three years. In addition to these, stocks of raw materials and accounts receivable also increased at a high pace. Fixed assets increased at a moderate pace, but they were cancelled by depreciation. Thus, the real increase of fixed assets were not realised for these years. As a result, the total assets increased at an average rate of 8% per annum. Since the inflation rate was more than 12% for these years, the real assets value is said to have decreased for these years.

In terms of capital stock, current liabilities in 2002 increased remarkably by 166%, more than that in 2000. In particular, overseas short-term debt increased 212% more than in 2000. Shareholder's equity increased from 6.6 billion kip in 2000 to 10.3 billion kip in 2002. This was not because of an incremental increase of capital stock, but was due to the cancellation of negative retained earnings, and because of current net loss owing to the government's subsidy. As a result, the equity increased by 155% for these years. Fixed assets kept almost the same financial position during the same period.

Table 36-1 Analysis of Balance Sheet: 2000-2002

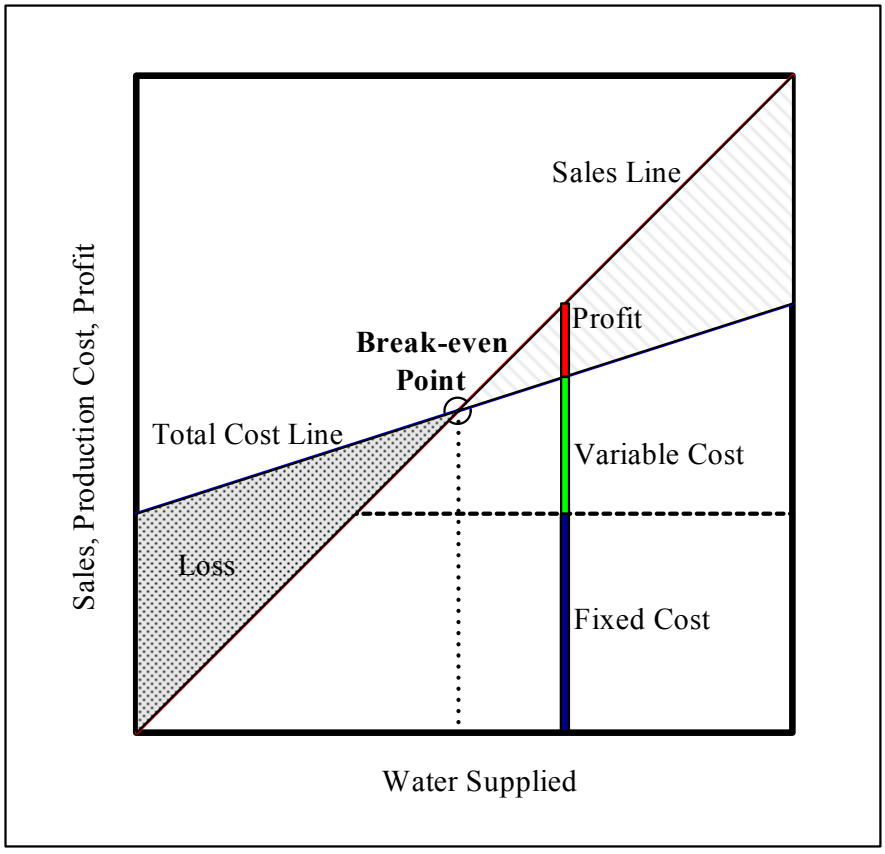
[Balance Sheet] (Unit: Kip Million)

Item			No.	2000 Amount Kip Mil.	2000 Share %	Index	2001 Amount Kip Mil.	2001 Share %	Index	Rise or Fall	2002 Amount Kip Mil.	2002 Share %	Index	Rise or Fall
Assets	Current Assets	Cash	1	144			207				304			
		Bank Deposits	2	1,447	5	100	1,626	6	114	↗	3,835	11	245	↗
		Other Deposits	3	124			126				67			
		Account Receivable	4	2,930	14	100	2,854	14	108	↗	3,595	14	120	↗
		Other Receivable	5	1,593			2,024				1,827			
		Raw Materials and Supplies	6	2,840			3,584				4,177			
		WIP (Work in Progress)	7	512	11	100	1,029	14	132	↗	2,448	17	188	↗
		Prepaid Expenses	8	187			49				15			
		Supplies	9	0			0				0			
		Other Current Assets	10	0	0		0	0			0	0		
		Total (1+2+ ... +9+10)	11	9,776	29	100	11,499	34	118	↗	16,268	42	166	↗
	Property, Plant, Equipment and Intangible Assets	Land, Buildings	12	29,909			30,333				32,778			
		Equipment	13	0	70	100	0	66	95	↘	0	58	96	↘
		CWIP (Construction Work in Progress)	14	0			0				0			
		Less: Accumulated Depreciation	15	-6,468			-8,046				-10,209			
		Not-current Assets	16	102	0		74	0			136	0		
		Goodwill	17	0	0		0	0			0	0		
		Total (12+13+ ... +16+17)	18	23,544	71	100	22,362	66	95	↘	22,705	58	96	↘
	Deferred Assets		19	0	0		0	0			0	0		
	Total (11+18+19)		20	33,320	100	100	33,861	100	102	↗	38,973	100	117	↗
Liabilities and Stockholders' Equity	Current Liabilities	Account Payable	21	0	0		0	0			0	0		
		Overseas Short-term Debt	22	1,351	9	100	2,447	14	151	↗	1,434	13	166	↗
		Short-term Debt	23	1,759			2,253				3,730			
		Income Taxes Payable	24	61	0		127	0	209	↗	-27	0	-	
		Dividends Payable	25	0	0		0	0			0	0		
		Advance Recipt	26	325	1		228	1	70	↘	226	1	70	↘
		Other Current Liabilities	27	0	0		0	0			0	0		
		Total (21+22+ ... +27)	28	3,496	10	100	5,055	15	145		5,363	14	153	
	Fixed Liabilities	Long-term Liabilities	29	17,488	55	100	17,114	53	99	→	17,443	47	100	→
		Borrowings	30	783			971				806			
		Interest Payable	31	4,371	13	100	5,240	15	120	↗	4,561	12	104	
		Major Repairs Reserve	32	552	2		188	1	34	↘	495	1	90	↘
		Other Fixed Liabilities	33	0	0		0	0			0	0		
		Total (29+30+...+33	34	23,193	70	100	23,512	69	101	→	23,305	60	100	→
	Stockholders' Equity	Common Stock, Preferred Stock	35	9,116	27	100	9,118	27	100	→	9,799	25	107	↗
		Additional Paid-in Capital	36	0	0		0	0			0	0		
		Capital Reserve	37	0	0		0	0			0	0		
		Retained Earnings	38	-105	0		-2,605	-8			0	0		
		Current Net Profit	39	-2,380	-7		-1,220	-4			506	1		
		Total (35+36+ ... +39)	40	6,631	20	100	5,294	16	80	↘	10,305	26	155	↗
	Total (28+34+40)		41	33,320	100	100	33,861	100	102	↗	38,973	100	117	↗
	Among items of 10, 12, 13, 14, 16, and 17, Assets Unrelated to Business Activities Total of Non-operating Assets		42	0			0				0			
Operating Assets (capital) (20-42)			43	33,320			33,861				38,973			

According to an analysis of income and expenditure, water sales in 2002 increased remarkably by 242%, more than that in 2000. Although other revenues decreased for these years, the net revenue increased by 165% more than that in 2000. This was because of an incremental increase of the average unit price of water from 269 kip/m^3 in 2000 to 547 kip/m^3 in 2002, in spite of the fact that the water supplied in 2000 increased at a modest rate of 118%, more than that in 2000. For the same period, production costs increased 143%, which was much smaller than the incremental increase of the net revenue (165%). Thus, the gross profit increased by 218% for these three years.

Yet, the operating profit was in deficit in 2000 and 2001, and in 2002, it recorded a small profit. During the period, the incremental increase of these expenses in 2002 was 122%, which was smaller than the incremental increase of the gross profit (218%). It is said that the expenses of services and administration were greater than the gross profit for these years. However, because of the way the accounting system is structured in the NPVC, the expenses can not be segregated into services expenses and administration expenses, furthermore into sub-items of expenses. It is then impossible to identify what expense items are influential for high costs in the expenditure of services and administration.

CVP analysis is one of the management tools, which is used for short-term profit planning. CVP stands for cost, volume (of sales) and profit. Break-even analysis is one of the CVP analyses. Table 36-2 shows the break-even points based on the financial statements of the NPVC. The break-even points were calculated at around 19,000 million kip, referring to the figures of 19,500 million kip in 2000, 18,900 million kip in 2001 and



18,800 million kip in 2002. Once the break-even point was estimated, the sales amount to achieve the target profit could be estimated through the following formula.

$$S = \frac{(F + P)}{M}$$

Where, S : Sales amount to attain target profit
F : Fixed Expenditure
P : Target Profit
M : Marginal Revenue Ratio

Table 36-2 Break-Even Point and Management Safety

Term Eye		2000 (Kip Million)	2001 (Kip Million)	2001 Ratio to Preceding Term	2002 (Kip Million)	2002 Ratio to Preceding Term
Fixed Expenses	Compensation	1,217	1,769	1.45	2,618	1.48
	Depreciation	1,399	1,578	1.13	1,972	1.25
	Welfare Expenses	114	203	1.77	408	2.01
	Other Expenses	4,212	5,213	1.24	5,782	1.11
	Sub-total	6,942	8,762	1.26	10,780	1.23
Variable Expenses	Direct Material Cost	5,023	5,479	1.09	5,050	0.92
	Indirect Material Cost	34	41	1.20	69	1.69
	Subcontract Cost	1,145	1,076	0.94	1,312	1.22
	Taxes and Charges	502	737	1.47	459	0.62
	Other Expenses	1,006	1,126	1.12	1,530	1.36
	Sub-total	7,710	8,459	1.10	8,420	1.00
Sales Amount		11,985	15,787	1.32	19,814	1.26
Marginal Revenue Ratio *1		0.357	0.464	-	0.575	-
Break Even Point *2		19,462	18,878	0.97	18,746	0.99
Ratio of Break Even Point *3		1.62	1.20	-	0.95	-
Management Safety Ratio *4		0.62	0.84	-	1.06	-

Note: *1 (Sales Amount - Variable Expenses)/Sales Amount
*2 Fixed Expenses/Marginal Revenue Ratio
*3 Break Even Point/Sales Amount
*4 Reciprocal of Break Even Point Ratio (= 1/Ratio of Break Even Point)

For example, if *F* and *M* were applied for the figures from 2002, i.e., F=10,780 million kip, M=0.575, and P was assumed at around 1,000 million kip, around 5% of sales amount in 2002, the sales amount should be 20,500 million kip. This is one of the management plans necessary to develop a sound financial condition.

3.6.3 Management Characteristics

(1) Analysis of Profitability

In 2002, the ratio of net profit to total capital was 1.93, as shown in Table 36-3. In 2000 and 2001, the net profit was negative, so no ratio could be calculated as an index in the table. The ratio of 1.93 is not small compared with the Japanese average ratio of 0.67 % in the water supply business. In the same manner, other ratios in the management fields look better than the ratios in the Japanese cases. This is because the total capital is small compared with those in the Japanese cases. This tendency is also realized from because the turnover of shareholders' equity is higher than that in the Japanese cases.

Yet, as can be understood from the ratio of net expense to net sales amount in Line No. 6, the ratio is considerably larger than that in the Japanese cases. In 2000 and 2001, on the other hand, some ratios were not indicated due to the recorded deficit in those years. Thus, the ratios in these years suggest an unstable condition for profitability. This condition could be caused by insufficient water sales. In addition, the fluctuation of the cost components such as production costs, service expenses and administration costs may cause this unstable condition.

(2) Analysis of Safety

The current ratio provides a measure of solvency for the financial situation. The ratio of the NPVC was nearly 300, which was sufficiently high enough for solvency. That was almost equal to the Japanese average ratio. Thus, the NPVC is in good condition for solvency, from the viewpoint of short-term safety. If a financial market is active well, surplus funds could be utilized efficiently in the financial market.

The ratios of fixed assets were checked through (a) the fixed asset ratio and (b) the ratio of fixed assets to long-term capital. The former ratio is desirable to be less than 100%. The real ratio of the NPVC was more than 200% in the past three years, and also more than the Japanese cases of 183%. However, even if the former ratio were in worse condition but if the latter ratio were less than 100%, the safety might be fair within the permissible range of safety. The ratio of the NPVC

was less than 80% in the respective years. Thus, the composition of capital and liability is biased to long-term liabilities more than capital. Overall, the NPVC seems to be in fair condition for fixed assets, as well.

The ratio of depreciation to fixed assets is usually 3% in every case in Japanese water supply systems. However, the ratio of the NPVC was almost 2 to 3 times larger than the Japanese standard. This may be that Lao PDR applies a different depreciation system for durable assets.

In terms of turnover of accounts receivable, it indicates the speed of bill collection. Thus, a larger index means better efficiency for capital utilisation. The NPVC recorded an index of between 2.7 and 3.7. These figures were considerably lower compared with Japanese cases of 7.9. This means that the NPVC spend more than twice as long to collect bills than Japanese water supply enterprises.

A period of bill collection is calculated applying the following formula:

Period of Bill Collection = 365 days / Turnover of Account Receivable

Applying this formula, an index of 3.65 of the turnover of accounts receivable in 2002, means that it takes 100 days to collect bills on average. Thus, this ratio should be improved as soon as possible for financial safety purposes.

The efficiency of fixed assets' utilization is examined through the indices of "turnover of fixed assets" and "ratio of depreciation fixed assets". The turnover of fixed assets shows the efficiency of fixed assets utilisation. The smaller index indicates that the fixed assets are utilised more effectively. The ratio of depreciation to fixed assts shows the size of depreciation against the book value of fixed assets. An inverse number for the ratio shows an average economic life of fixed assets. For instance, a ratio of 9.59% in 2002 indicates around 10 years of residual life. This index means that the present fixed assets value was small compared with depreciation. This was because of new investments and replacement works which were delayed or stagnated from the original scheduled plan.

The ratio of interest to net expenses indicates the static safety of financial procurement. A smaller index shows better soundness of management. It is said that the ratio is desired to be less than 5% for sound management. Thus, the NPVC should rather look for better financial sources to decrease the interest burden.

Table 36-3 Management Analysis: 2000-2002

	No.	Item	Unit	2000	2001	2002	Management Index*1			
				Value	Value	Value	Water	Elect-ricity	Gas	Manu factur ing
Management	1.	Ratio of Net Profit to Total Capital	%	-	-	1.93	0.67	4.30	5.80	2.86
	2.	Ratio of Operating Profit to Total Capital	%	-	-	4.0	-	9.38	8.99	4.51
	3.	Turnover of Total Capital		0.36	0.47	0.51	0.13	-	-	-
	4.	Turnover of Stockholders' Equity		1.81	2.98	1.92	0.26	0.51	0.69	1.04
	5.	Ratio of Operating Profit to Sales Amount	%	-	-	7.8		8.66	8.42	2.74
	6.	Ratio of Net Expense to Net Sales Amount	%	122.3	109.1	96.9	95.2	91.3	91.6	97.3
Finance	7.	Fixed Assets Ratio	%	353.50	421.03	219.01	182.6	-	-	-
	8.	Ratio of Fixed Assets to Long-Term Capital	%	78.6	77.4	67.1	94.5	-	-	-
	9.	Current Ratio	%	279.7	227.5	303.3	302.3	39.6	65.6	114.7
	10.	Turnover of Account Receivable		2.65	3.24	3.65	7.9	-	-	-
	11.	Turnover of Fixed Assets		1.96	1.41	1.14	0.14	-	-	-
	12.	Ratio of Depreciation to Fixed Assets	%	6.12	7.08	9.59	3.4	-	-	-
	13.	Ratio of Interest to Net Expenses	%	7.3	5.8	5.0	4.8	-	-	-
Production	14.	Annual Production per Employee	Kip Mil / Person	32.8	46.0	58.6	52.1*2	-	-	-
	15.	Value Added Ratio	%	56.3	55.3	59.4	76.2*3	-	-	-
	16.	Turnover of Raw Materials		4.22	4.41	4.74	-	-	-	-
	17.	Ratio of Production Cost to Net Sales Amount	%	92.6	89.1	88.1	-	-	-	-
	18.	Load Factor	%	-	-	-	85.1	-	-	-
	19.	Utilisation Ratio of Fixed Assets	m3 / Kip Mil	1,062	1,249	1,300	9.37*4	-	-	-
Marketing	20.	Ratio of Gross Profit to Sales Amount	%	7.4	10.9	11.9	-	-	-	-
	21	Ratio of Operating Profit to Sales Amount	%	-	-	-	-	-	-	-
	22	Ratio of Recurring Profit to Sales Amount	%	-	-	-	-	-	-	-
	23	Ratio of Service Expenses and Administration	%	20.3	12.8	4.1	-	-	-	-
	24	Ratio of Service Expenses	%	-	-	-	-	-	-	-
	25	Ratio of Advertisement and Public Relation	%	0.6	0.7	1.0	-	-	-	-
Labour	26.	Monthly Compensation per Employee	Kip 1000 / Person	276	428	608	-	-	-	-
	27	Ratio of Compensation to Net Sales Amount	%	10.1	11.2	12.4	19.3	-	-	-
	28	Number of Employees per Water Supplied	Person / $10^4 m^3$/day	53	45	42	12	-	-	-

Note: *2 Unit: Yen Million
*3 The ratio was quoted from that of Phylippines' water supply in 1994
*4 Unit: m3 per 10,000 Yen

(3) Analysis of Productivity

The value added ratio of the NPVC ranged between 55% and 59% in these years. On the other hand, the value added ratio in the Philippines case was reported as 76% in 1994. Thus, the NPVC's ratios are smaller compared to other water supply businesses. In order to improve this ratio, the management has to improve its productivity by means of restraining the production costs of water. In addition, the management has to cut down expenses for services and administration.

For instance, the purchasing and inventory systems are conducted through an annual purchasing plan proposed at the beginning of the fiscal year. The raw materials which must be imported from foreign countries are purchased directly through the import channel of the NPVC. In the process of importing these materials, the NPVC has to get permission from several government agencies in advance. It takes time to promote these procedures. The NPVC can not procure from local markets because of the immature local market in the Lao PDR. After the importation of these materials, the NPVC should improve the inventory control systems to achieve a reduction in the turnover of raw materials.

As shown in the number of employees per water volume supplied, in Line No.28 of the table, the number of staff for water supply services seems to be quite large as compared with the Japanese average. It ranged between 43 persons and 51 persons per 10,000 m^3 per day, which was more than 4 to 5 times of the Japanese average. Thus, these systems should be improved taking the future management conditions into consideration.

(4) Analysis of Financial Soundness

The soundness of the financial system is assessed through the indices of profitability, safety and productivity. The sound financial conditions are not only for these indices to attain good results but also for there to be a good balance among these indices. Since the indices were analysed taking into account Japanese indices, the evaluation results may not always be pertinent to Lao's conditions. As these management principles are common in the business world, these indices should be utilized properly to soundly manage the water supply business.

3.6.4 Water Production Costs

Unit production costs during recent four years from 1998 to 2001 were larger than the average unit prices. The average unit prices after tax were much smaller than the corresponding unit production costs. This was the reason why the NPVC recorded a final net deficit for the three years from 1999

to 2001. In April 2001, a new tariff system was permitted by the government and applied to water consumers. The new tariff turned the NPVC profitable in 2002, but the net profit was comparatively small. The new unit production cost in 2002 was 529 kip/m^3. In the same year, the average unit price was calculated 547 kip/m^3. The unit price after tax was 521 kip/m^3, so the increase still resulted in the unit price being smaller than the unit production cost.

The installation business seems to keep the financial balance sound, compared with water prices and production costs. The ratio of unit cost to unit price after tax was within the range of 0.8 and 0.9.

3.6.5 Tariff System

(1) Current Tariff System

In principle, the NPVC collects water charges on the basis of a metered-rate system. The present water tariff rate is set as shown in Table 36-4. The tariff is classified into four categories: (a) domestic users and officials, (b) enterprise and private business, (c) business users who consume water as a raw material, hotels, guest houses, restaurants, and swimming pools, and (d) embassies, international organisations, and foreigners. The unit rates are set by the categories above and by the water volume consumed.

The tariff was set into the four categories mentioned above through modification of the average prices of 550 kip/m^3, equivalent to around US$0.051/$m^3$. The tariff rates are so low that the water charges can not cover the full costs of water production, as discussed in the previous section, although the tariff for foreigners in Category 4 is high enough to cover the production cost.

The present tariff made the NPVC a small net profit in 2002. However, the profit was too small to solve the accumulated deficit for the previous three years. The NPVC is planning to again revise the water tariff. In order to revise the tariff, the NPVC has to obtain permission from the WASA, DCTPC, Governor of Vientiane Capital City and in the final stages, the Lao Government. The procedure for revision of the tariff requires a long time.

Table 36-4 Water Tariff: 2002

Article 01: Modify the Water Tariff in Vientiane Capital City at the average price of 550 kip/m3 in four Categories of consumers

Category	Range of Water Consumption		Water Rate	
Category 1	Water Tariff for the officials, soldiers, people without business and non-governmental organization:			
	Less than	5 m^3/month	219	Kip/m^3
	from	5 - 20 m^3/month	263	Kip/m^3
	from	20-50 m^3/month	329	Kip/m^3
	More than	50 m^3/month	383	Kip/m^3
Category 2	Water Tariff for enterprise, private business and merchandiser:			
	Less than	5 m^3/month	549	Kip/m^3
	from	5 - 20 m^3/month	602	Kip/m^3
	from	20-50 m^3/month	636	Kip/m^3
	More than	50 m^3/month	670	Kip/m^3
Category 3	Water Tariff for businesses used water as the raw materials for production, hotels, guest house, restaurant and swimming pool:			
	Less than	50 m^3/month	855	Kip/m^3
	from	50-100 m^3/month	1,216	Kip/m^3
	More than	100 m^3/month	1,360	Kip/m^3
Category 4	Water Tariff for embassy, international organisation, foreigners and expatriates:			
	Less than	10 m^3/month	0.75	US$/$m^3$
	More than	10 m^3/month	0.93	US$/$m^3$

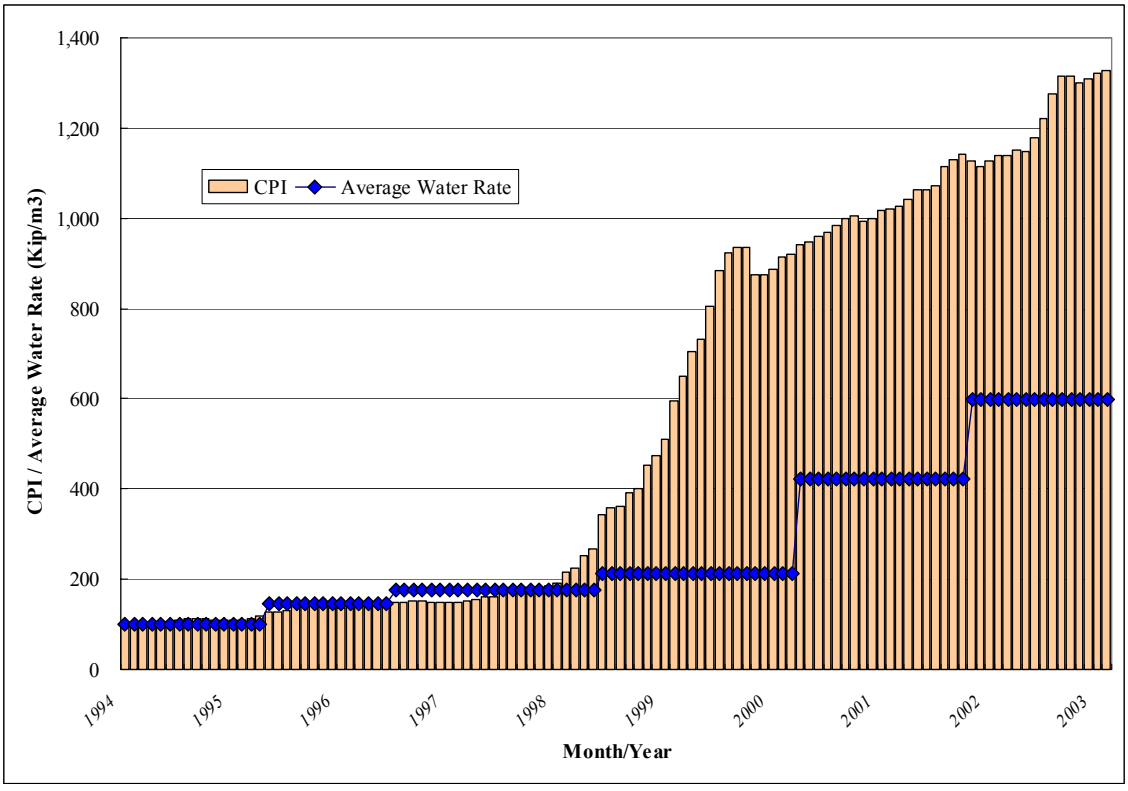
Water meter reading is conducted by meter readers once a month for the respective consumers. The bills for the water volume metered are prepared with a computer system and distributed by meter readers to the respective consumers. The consumers can pay the water charge directly to the water reader or pay at a cashier's window of the NPVC branch offices. Some consumers, however, seem reluctant to pay their water charge. This causes the NPVC's accounts receivable to become considerably large, as discussed in the previous sections. A considerable percentage of the accounts receivable is said to be attributed to the arrears of public agencies of the government.

In addition, there are fees raised when a water consumer installs a water meter to connect to the water distribution piping network of the NPVC. After signing a contract with the NPVC, the consumer installs connection pipes including the water meter at his own expense. In 2002, the average cost of new connection instalments was around US$105 per unit. The actual cost depends on the site conditions of a new consumer, which consists of the material costs including, installation

costs, and optional costs like valves, fire hydrants and drain installations. As a result, a larger diameter connection results in a higher installation cost. Furthermore, the consumer has to pay a water meter rental charge every month, in accordance with the diameter of the water meter.

(2) Trend of Water Tariff Revision

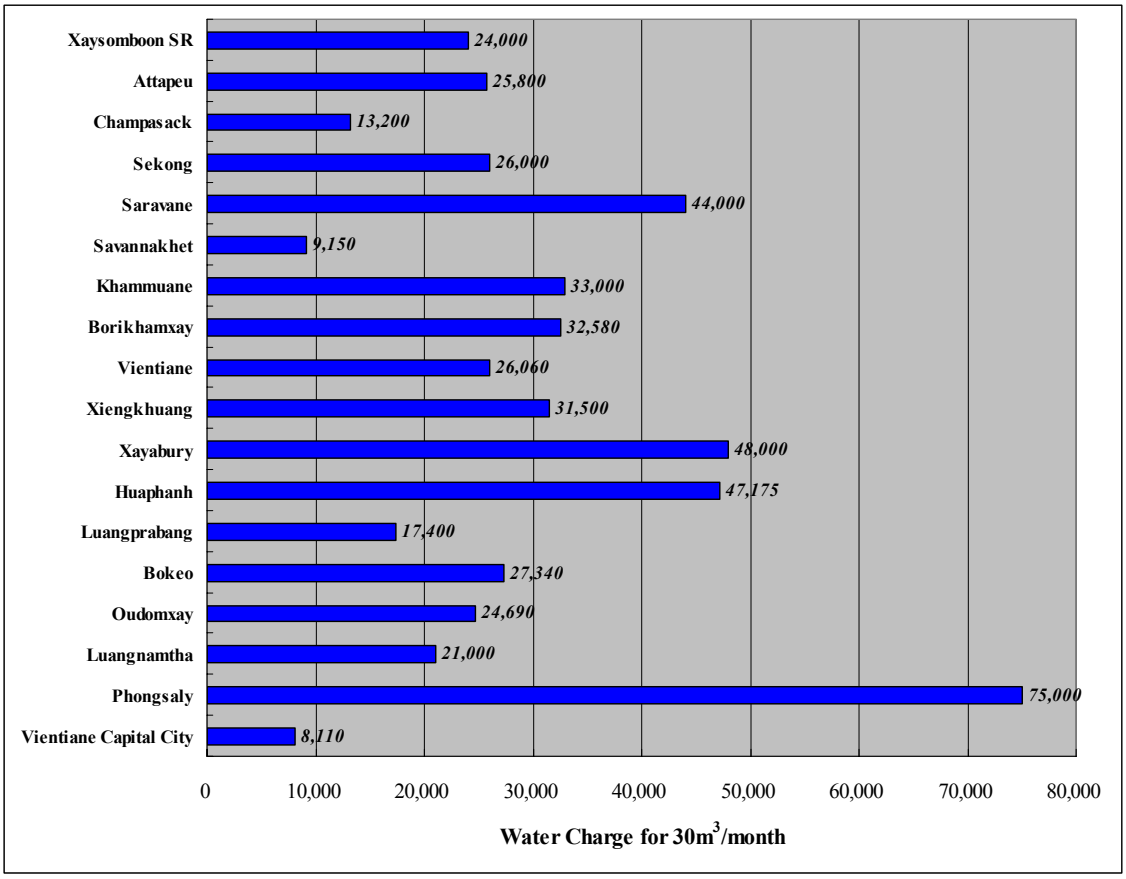
The water tariff of the NPVC has been revised six times since 1994. In January 1994, the average water rate was revised to 74 kip/m^3. As of 2003, the average water rate was 550 kip/m^3 or around 7.4 times more than that in 1994. On the other hand, the consumer price index (CPI) in January 1994 was 72 (base: 1995=100) and rose to 980 in February 2003. Therefore, the inflation rate during the period increased around 13.3 times. The inflation rate of 13.3 times was higher than the increased rate of the average water rate. The water rate is undesirably behind the inflation speed, as shown in the figure below. The water consumers have felt happy about the price of water comparatively declining in price. They have enjoyed their lives with the low-priced water.



(3) Comparison of NPVC Tariff with Other Waterworks

The water rate for domestic water consumers in Vientiane Capital City is known to be cheaper than those of other provinces. The figure below shows water charges for an average household

consuming 30 m^3/month in the respective provinces. The monthly charge in Vientiane Capital City was calculated at only 8,110 kip/month, which is the lowest among the 18 provinces. The average water charge in the 18 provinces was calculated at 29,700 kip/month. The water charges levied in Vientiane Capital City accounted for only 27% of the national average.



3.6.6 Billing System

Existing condition of billing and collection system is described in this section. Because among various managerial works, the well functioned billing and its related works are essential for the sustainable and sound financial foundation of water supply management.
The task described below are the major contents of works, currently being carried out by meter reading and bill collection staff (hereafter, referred to as the staff).

(1) Meter Reading, Billing, Collection Procedure

1) Meter Reading

i) At the Branch office, the staff receives a bag, inside of which there is small note-book for meter reading. When the staff is engaged in bill collection, there are also invoices with copies and receipts for the customers, and a small amount of money to give the correct change when customers pay their bill to the staff member.

ii) The staff visit houses in the service area, and reads the meters in turn. The staff uses a motor-bike for transportation within the service area.

iii) When the staff finds an unusual change of consumption, he asks the customer the reason why there has been significant change in the rate of usage. In cases where the customer is not at fault for the increased consumption, the meter reader reports the situation to the branch manager and then acts on the instructions of the manager.

iv) When the staff finishes their allotted task for the day, the notebook is submitted to the manager the following day.

v) The manager checks the contents of the note-book, especially the accuracy of calculations and for any significant changes of consumption.

vi) The task of meter reading is basically planned to be carried out from 26th of the month to 10th of the following month. ie, over a two week period.

vii) A detailed plan for each staff members tasks and duties is shown to them by the branch manager in advance, so that staff are aware of what is to successfully do their job.

viii) All of the meter readings are principally done based on the plan during a half month.

2) Billing

i) After the staff finishes meter reading of the assigned customers for the day, he sends the note-book to the branch which is then entered into the computer system at the NPVC's Head Office.

ii) The computer system prints the water bills and distributes them to the staff.

iii) The staff then distributes the bills to the consumers and then collects money owed,

as outlined below.

3) Bill Collection

i) At the Branch office, the staff receives a bag for bill collection.

ii) Inside the bag, there are the above mentioned items.

iii) The task of bill collection is planned to be carried out from 11th to the 25th of the month.

iv) Before going out for bill collection, the staff visits the cashier in the branch office to pay the money collected the previous working day.

v) The staff visits his customers houses in the service area in turn, and asks the customers to pay the bill.

vi) The staff asks the customer to pay the bill by showing the invoice.

vii) When the customer pays the bill, the meter reader gives the consumer a copy of the bill and a receipt.

viii) If the customer does not pay the bill, the staff gives the bill to the customer and asks the customer to pay the bill by the due date.

ix) When the staff returns to the branch office, he calculates the amount of money collected and checks this amount against copies of the bill.

x) It takes time to return to the office, so the staff leaves the collected amount of money in his bag overnight.

xi) The total monthly bill is made by adding the previous month arrears to the current month's bill.

xii) When a customer fails to pay the Bill for four months, water supply will be disconnected by the meter reader assign to the arrears.

Bill for Water Tariff

(A)	(B)	(C)
Bill No.	Bill No Please pay before due date	Payment Receipt
Due Date	Customer's Name	Bill No
Category	Address	Due date
Account No	A/C	Customer's Name
Date of the Bill issued	Customer's No	Address
	Category Date of previous reading	A/C
	Previous figure Date of this time reading	Customer's No
	This time figure Meter No	Official Receipt
	Consumption(Vol)	Date
	Water rate + Meter fee ……..	Arrears……... Date of the Bill issued
Total Amount to Pay……	Arrears ……. Total Amount to pay ……..	Total Amount……..

Payment Receipt

Nam Papa Lao Company — Ref. No……/NPVC

Department of Commerce — Vientiane, Date……

Tel: 412885 — Cashier

Customer's Name — Address

Charge in month — Customer's No:

Customer's Account No	Bill No	Payment	Payment Date	Bank	Amount

Remark: This bill is only use for Nam Papa Lao Company, when money received from customer and it must have only company stamp and staff's signature.

This bill is only use for customer who paid water rate to Nam Papa Lao Company for Payment reference.

Meter reading

Bill collection

4) Customer Business

i) The meter reading and bill collection are mainly handled by branches through the instructions of the commercial section of the NPVC. However, for large consumers who are scattered throughout whole service area, a special zone has been established, and these businesses are handled by 3 staff from the headquarters of the NPVC. Thangone and Thadeua are located in separate service areas.

3.7 Human Resource Development

3.7.1 Present Situation of Training in NPVC

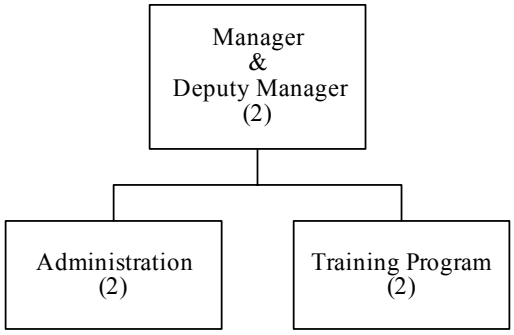
In the NPVC,, an independent training facility is established within the compound of the Chinaimo water treatment plant. Most staff training is conducted at this centre.

(1) Roles of the NPVC

According to the Prime Minister's proclamation (37/PM), the NPVC is required to offer technology development, courses and workshops for the training of all water supply enterprises in Lao. In addition, the NPVC is given the responsibility to spread information about training, manuals and staff development methods.

(2) Organization

6 staff, including a manager are assigned to the centre. The organization chart of the Training Centre is as follows.



Organisation Chart of the Training Centre

(3) Results of recent training

A summary of the training results from 1996 to 2002 are shown below.

The training consists of

(1) Capital city based training
(2) Provincial based training
(3) Overseas training in Thailand and Vietnam.

The centre has trained a total of 805 people.

Sammary of the Trainings, 1996-2002

No	Year	Times	Female	Male	Total	Remarks
A1	Training for Municipalities					
1	1996	2	12	22	34	
2	1997	4	9	41	50	
3	1998	5	8	73	81	
4	1999	2	1	29	30	
5	2000	3	0	36	36	
6	2001	11	70	103	173	
7	2002	14	2	60	62	
Total		41	102	364	466	
B1	Training for Provinces					
1	1997	0	0	0	0	
2	1998	9	11	94	105	
3	1999	3	0	35	35	
4	2000	12	0	81	81	
5	2001	15	20	49	69	
6	2002	3	1	5	5	
Total		42	32	264	296	
C1	Training at Foreign Countries					
1	1997	1	0	2	2	
2	1998	2	0	3	3	
3	1999	4	0	5	5	
4	2000	2	0	21	21	
5	2001	1	0	12	12	Khonkene
6	2002	0	0	0	0	
Total		10	0	43	43	

The time-tables of training for Lao water supply staff 2002-2003 are shown in Table 37-1. The training subjects, number of trainees, terms and budget for 2002-2003 are shown in the table.
The 2001 plan for training of executive staff of NP Lao is shown Table 37-2.

Table 37-1 The time-tables of training for Lao water supply staff 2002-2003

Time-Table of Training for Lao Water Supply Staff 2003

No	Training Subjects	Instructor	Times	No. of Trainees	Term	2003												Budget	Remarks
						1	2	3	4	5	6	7	8	9	10	#	#		
1	Pipeline System Management		1	12	5				○									1,700,000	
2	Installation Repaire		2	12	10					○							○	3,400,000	
3	Enterprise Finance controlled by Computer		1	12	5							○						1,700,000	
4	Planning & Business Administration		1	10	5						○							1,650,000	
5	Regulation of water record & Management of water meters		1	10	5								○					1,650,000	
6	Introduction of Computers		2	12	10	○		○										3,400,000	
7	Water waste Prevention		1	10	5											○		1,650,000	
8	Management of Factory & Pumps		1	10	5										○			1,650,000	
9	Water Quality Research		1	8	5									○				1,600,000	
10	Management of Warehouse & Stock Account		1	12	5		○											17,000.00	
11	English-Intermediate, Advanced		3	83															*
12	French		3	6															**
Total			18	197	60													20,100,000	

Notice:

Training -Cooking Fee=100,000Kips/day
Subsidy for Trainees=10,000Kips/day
Expenses of Documentary provision & services
Coordinators & Document Reviewers=20,000Kips/day
Administrative Assistant-Photocopying=10,000Kips/day
Expenses of Snack & others=5,000Kips/person/day
Deductive Materials=150,000Kips/time

* Funded by Committee of STO
** Funded by Committee of AFT

Time-Table of Training for Lao Water Supply Staff 2002

No	Training Subjects	Instructor	Times	No. of Trainee	Term	2002												Budget	Remarks
						1	2	3	4	5	6	7	8	9	10	11	12		
1	Pipeline System Management		1	12	5				○									1,700,000	
2	Installation Repaire		2	12	10					○							○	3,400,000	
3	Enterprise Finance controlled by Computer		1	12	5							○						1,700,000	
4	Planning & Business Administration		1	10	5						○							1,650,000	
5	Regulation of water record & Management of water meters		1	10	5								○					1,650,000	
6	Introduction of Computers		2	12	10						○			○				3,400,000	
7	Water waste Prevention		1	10	5								○					1,650,000	
8	Management of Factory & Pumps		1	10	5										○			1,650,000	
9	Water Quality Research		1	8	5										○			1,600,000	
10	Management of Warehouse & Stock Account		1	12	5											○		17,000.00	
11	English-Intermediate, Advanced		3	83															*
12	French		3	6															**
Total			18	197	60													20,100,000	

Notice:

Training Fee & Document=100,000Kips/day

Subsidy for Trainees=10,000Kips/day

Expenses of Documentary provision & Administration

Coordinators & Document Reviewers=20,000Kips/day

Administrative Assistant-Photocopying=10,000Kips/day

Expenses of Snack & others=5,000Kips/person/day

Deductive Materials=150,000Kips/time

Remarks: Average Cost of Each Training (More or less 28,000Kips/day/person)

Table 37-2 The 2001 plan for training of executive staff of NP Lao

2001 Plan for Training of Executives of NP Lao

No	Title of Training	Instructor	No. of Training	No. of Trainee	Term	Budget	Remarks
1	The Management of System of Drinking Water	Saysamone THAMMAVONGS/ SisaNgouane SILITHASAK	2	24	10	3,000,000	
2	Economic & Financial Analysis	BounNhou HOMSOMBATH	1	12	5	1,500,000	
3	Long term Planning	Daophet	1	12	5	1,500,000	
4	Meter Reading, Collection, Custimers Relations	Bouathong CHITAVONG Pane KHOUNSY	2	24	10	3,000,000	
5	Training IT AS/400	Phiengkham SYSOURATH	2	24	30	9,000,000	
6	Survey of Keakage Detection	Viengthous VAVVARATH Khidavine SENGSAVANG	2	24	10	3,000,000	
7	Management of Pumps & Plant	Lat. PAPHANE Bouakeo CHITAVONG	2	24	10	3,000,000	
8	Management of Enterprise	Phom KEOKANEGNA	2	24	10	3,000,000	
9	Water Quality Analysis						
10	Account of Material & Stocks	Boakeo PHIMPHONSAVATH	1	12	5	1,500,000	
11	Management of the Stocks & Goods	Boakeo PHIMPHONSAVATH	1	12	5	1,500,000	
	Total		16	192	100	30,000,000	

Expenses

Expenses for Training & Preparation of the Documents: 85,000kips/day
Perdiem of Trainees: 8500Kips/day
Expenses for Preparation of Documents of Administration:
Coordination & Controller of Document: 17,000Kips/day
Personnel for Photocopier: 8,500Kips/day/person
Expenses for snack & drink: 5,000Kips/day/person
Expenses for Training (not exceeding 12 persons): 135,000Kips/Training

Remarks: The expenses for Training is about 300,000Kips/day, about 25,000Kips/person.

11 May 2001 Director of Training Center Khampheuy VONGSAKHAMPHOUI

The time-table for training in abroad is shown Table 37-3.

Table 37-3 The time-table for training in abroad

Time-Table of Training for Lao Water Supply Staff (Foreign) 2003

No	Training Programme	2003					Budget	Remark
		Times	Date	Term	Participants	Location		
1	Experience Exchange/Hanoi TC (Study & Curricula)	1	3-May	7 days	2	Vietnum	8,048,389	Internal Fund
2	Management of Factory in HatcoiFong	1	3-May	7 dats	2	Vietnum	8,048,389	Internal Fund
Total		2			4		16,096,778	

3.7.2 Human Resource Development by JICA

(1) Training Program by assistance of JICA

The training program for human resource development, with assistance from JICA, was started in June 2002 and will be completed in May 2004. This training program was prepared by JICA expert, Mr. Kawashima, who is assigned to the MCTPC. The training program consists of the following five components.

1) Seminar (In-Country Training Course) 2002 – 2004

This seminar will include 6 courses covering topics such as water supply planning, design, pipe installation, house connection installation, leakage prevention, operation and maintenance of treatment plant and water quality management. The duration of each course is for one week. Each trainee completes 6 courses and studies for a total of 2 months. Trainees are selected from the staff of WASA, NPVC, and from the Provincial Nam Papa (PNP). There are 15 trainees in each course, and in total, 90 trainees will attend the above courses annually.

2) Workshop in Savannakhet

Upon completion of the Project for Rehabilitation of Water Supply Facilities in the Savannakhet Area, implemented and funded from aid granted by the GOJ, a workshop was held in Savannakhet in February, 2003. The workshop focussed on pipe installation and about 15 trainees attended.

3) Master Plan for Whole Country

During the course of training, the existing conditions of water supply, facilities, service area and the served population will be investigated in each PNP. Based on the results of the investigation, future water supply planning including the projected served population and water demand forecasts will be prepared. Furthermore, the prepared plan will be summarized and evaluated.

4) Study in Vientiane

The water supply system especially in areas where supply conditions are very poor will be developed. This program will include data collection concerning the existing conditions, planning, design, cost estimates, and the evaluation of the plan.

5) Establishment of Water Supply Standards

Standards for the water supply system will be established to realize adequate supervision, management, and instruction systems at the NPVC.

These are the components of the on-going training program assisted by JICA. JICA also has a plan to conduct Project Type Technical Assistance from June 2003 and the scope of the technical assistance has been finalized as follows.

6) The Modified and Strengthened Project

The original project by JICA described above was partly modified and strengthened into the project named the 'Capacity Development of Urban Water Supply (UWS) Authorities in Lao PDR' and the project began in September 1st 2003 and will continue for 3 years until August 31st 2006.

The general image of technical cooperation project by JICA, the tentative schedule for implementation and the project design matrix (PDM) are attached on the following pages.

The contents of the project are as follows,

(i) Project purpose: Means of service performance of the staff of UWS authorities in Lao PDR are improved in the field of water pipe laying and maintenance, plant operation and for maintenance and water quality control.

(ii) Overall goal: The capacity of urban water supply (UWS) authorities will be enhanced in sustainable ways.

(iii) Super goal: People in the urban area of Vientiane can access a stable safe water supply.

(iv) Output:

1. Appropriate UWS training system is elaborated and trainers are trained.
2. Training textbooks and materials are developed.
3. The skills of UWS engineers are upgraded in each technological subject.
4. Manuals for routine works are developed.
5. The routine work skills of UWS technicians are upgraded.
6. The management skill of administrators and managers in the Provincial Nam Papa (PNP) is

upgraded.

(v) Activities:

1-1) To review the existing training needs.

1-2) To prepare the training programs in Thailand.

1-3) To conduct the training program on training management in Thailand.

1-4) To prepare a plan for the UWS training program.

1-5) To select twenty (20) trainers nation wide.

1-6) To conduct the training program at the plant and piping works for the trainers in Thailand.

1-7) To dispatch a trainee to Japan as a part of the counterpart training program.

1-8) To prepare a training curriculum for the in-country training program (ICTP).

1-9) To conduct the ICTP for trainers.

1-10) To evaluate, review and improve the ICTP for trainers.

2-1) To organize a working group to develop training textbooks.

2-2) To review and improve existing textbooks prepared by Nam Papa Vientiane Capital City (NPVC) trainers.

2-3) To complete and print the textbooks for each field of the water supply service.

3-1) To prepare the ICTO for engineers in each field.

3-2) To prepare the ICTP for 115 engineers from the Water Supply Authority (WASA), NPVC and PNP in Vientiane, Luangprabang and Pakse.

3-3) To evaluate, review and improve the ICTP for engineers.

3-4) To select twenty (20) assistant trainers from ICTP for engineers.

3-5) To prepare the training program on the plants and piping works for assistant trainers in Thailand.

3-6) To conduct the training program on the plants and piping work for assistant trainers in Thailand.

4-1) To organize a working group of manuals for routine works.

4-2) To collect technical information and prepare the training materials.

4-3) To edit the manuals for routine works in English and Lao.

5-1) To prepare the ICTP for 360 technicians of the PNP and their branches.

5-2) To conduct the ICTP in central regions by using manuals.

5-3) To conduct the ICTP in southern regions by using manuals.

5-4) To conduct the ICTP in northern regions by using manuals.

5-5) To evaluate, review and improve the ICTP for technicians.

6-1) To prepare the ICTP for administrators and managers.

6-2) To conduct the ICTP for 40 administrators and 120 managers from the NPVC and PNP.

6-3) To conduct the training program on water supply management for the management staff in Thailand.

6-4) To keep the records on routine operation in each PNP and summarize records into statistics in WASA.

6-5) To formulate the water supply and financial plan until 2020.

GENERAL IMAGE OF TECHNICAL COOPERATION PROJECT BY JICA

Project name: Capacity Development of Urban Water Supply (UWS) Authorities in Lao PDR
Project period: 3 years, September 1st 2003 – August 31st 2006

Main Activities
- Training to **NWTTI** 8 p
- Training to **NWTTI** 20 p
- Training to Japan
- In-Country Training for Training of **trainers** (TOT)

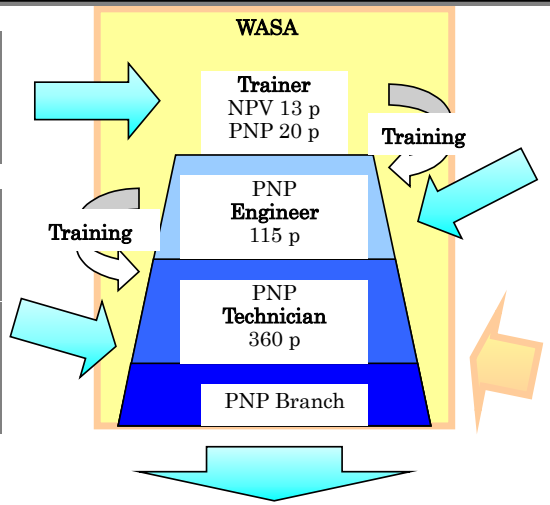
Main Activities
- To implement OJT
- To edit the **Manuals**

Main Activities
- Training in central region
- Training in southern region
- Training in Northern region

Output 1
Appropriate UWS **training system** is elaborated and **Trainers** are trained

Output 4
Manuals for routine works are developed

Output 5
The routine work skills of **UWS technicians** are upgraded.



Output 2
Training textbooks and materials are developed.

Output 3
USW **engineers** (115) are upgraded in each technology subjects.

Output 6
Management skill of **administrators** (40) and **managers** (120) in PNP is upgraded.

Main Activities
- A Lecturer **from NWTTI**
- To Make up **Textbooks**

Main Activities
- **Training in major town**
- Training to **NWTTI** 10 p
- Training to **NWTTI** 10 p

Main Activities
- Training for **administrators**
- Training for **managers**
- Training to **NWTTI** 10 p
- Training to **NWTTI** 10 p
- To formulate the Water Supply and Financial Plan until 2020

Inputs :

Japanese side
1. Long-term Expert
2. In-Country Training Course
3. Short-term Expert (In-Country Training)
4. Short-term expert or Senior Volunteers
   - Water Treatment Plant Management
   - Water Quality Management
   - Non-revenue water management
5. Equipment, Tools and Material
6. Training to Japan
7. Training to NWTTI in Thailand
8. Lecturers from NWTTI in Thailand

Lao side
1. Project office and necessary facilities
2. Electricity and Water
3. Counterparts

Project Purpose
Means of service performance of the staff of UWS authorities in Lao PDR are improved in the field of water pipe laying and maintenance, plant operation and maintenance, and water quality control.

Overall Goal
Capacity of Urban Water Supply (UWS) Authorities will be enhanced in sustainable ways.

Super Goal
People in urban areas can access safe water stably.

Source : JICA Expert for WASA, DHUP, MCTPC

Tentative schedule for implementation

		2003				2004												2005												2006								RESPONSIBLE PERSON	EXECTIVE PERSON	ITEM OF INPUT
		9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8			
OUTPUT 1: Appropriate UWS training system is established and Trainers are trained.																																								
1.1	To review the existing training needs assessment.																																					Dr. Somphone (P.D)	Mr. Noupheuak (P.M.)	-
1.2	To prepare the training programme at NWTTI																																					Dr. Somphone (P.D)	Ms. Kongsay	-
1.3	To conduct the training programme on training management at NWTTI [4p x 2]																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	Training at NWTTI
1.4	To make up UWS training program.																																					Dr. Somphone (P.D)	Ms. Kongsay	Lecturer from NWTTI
1.5	To select twenty (20) candidates for trainer from national wide.																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	-
1.6	To conduct a training programme on the plant and piping work for 20 candidates at NWTTI																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	Training at NWTTI
1.7	To conduct a trainee to Japan as a counterpart training programme																																					Dr. Somphone (P.D)	Mr. Noupheuak (P.M.)	Training in Japan
1.8	To prepare training curriculum for ICTP																																					Mr. Noupheuak (P.M.)	Mr. Khampheui	-
1.9	To conduct the ICTP																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	In-Country Training/S.E.
1.10	To evaluate, review and improve the ICTP for trainers																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	-
1.11	To establish the UWS Training System.																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	-
OUTPUT 2: Training textbooks and materials are developed.																																								
2.1	To organize a working group for Training Textbook.																																					Mr. Noupheuak (P.M.)	Mr. Khampheui	-
2.2	To review and modify existing textbooks formulated by NPV trainers																																					Mr. Noupheuak (P.M.)	Mr. Khampheui	S.E.
2.3	To compile the textbooks of each field.																																					Mr. Noupheuak (P.M.)	Mr. Khampheui	Lecturer from NWTTI
OUTPUT3: UWS engineers are upgraded in each technology subjects.																																								
3.1	To prepare the ICTP for engineers in each field.																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	-
3.2	To conduct the ICTP for 115 engineers in Vientiane, Luangprabang and Pakse																																					Mr. Noupheuak (P.M.)	Mr.Kampheui	In-Country Training/S.E.
3.3	To evaluate, review and improve the ICTP for engineers.																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	-
3.4	To select 20 candidates for assistant trainer from ICTP for engineers																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	-
3.5	To prepare the training for the plant and piping work for assistant trainers atNWTTI																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	-
3.6	To conduct a training programme on the plant and piping work for assistant trainers at NWTTI																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	Training at NWTTI
OUTPUT4: Manual books for routine work are developed.																																								
4.1	To organize a working group of Manual books for routine works.																																					Mr. Noupheuak (P.M.)	Mr. Khampheui	-
4.2	To collect technical information and prepare the materials																																					Mr. Noupheuak (P.M.)	Mr. Khampheui	S.E.
4.3	To formulate Manual books for routine work in English and Lao.																																					Mr. Noupheuak (P.M.)	Mr. Khampheui	-
OUTPUT5: The routine work skills of UWS technicians are upgraded.																																								
5.1	To prepare the ICTP for 360 technicans of PNP and their branches.																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	-
5.2	To conduct the ICTP in central region by using Manual books.																																					Mr. Noupheuak (P.M.)	Mr. Khampheui	In-Country Training / S.E.
5.3	To conduct the ICTP in southern region by using Manual books.																																					Mr. Noupheuak (P.M.)	Mr. Khampheui	In-Country Training / S.E.
5.4	To conduct the ICTP in northern region by using Manual books.																																					Mr. Noupheuak (P.M.)	Mr. Khampheui	In-Country Training / S.E.
5.5	To evaluate, review and improve the ICTP for technicians .																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	-
OUTPUT6: Management skill of administrator and manager in PNP is upgraded.																																								
6.1	To prepare the ICTP for administrators and managers.																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	-
6.2	To conduct the training programme for 40 administrators and 120 managers																																					Mr. Noupheuak (P.M.)	Mr. Khampheui	In-Country Training / S.E.
6.3	To conduct the training programme on water supply management for management staff at NWTTI																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	Training at NWTTI
6.4	To keep the records on routine operation in each PNP and summarize record in statistics in WASA																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	-
6.5	To formulate the Water supply and financial plan until 2020.																																					Mr. Noupheuak (P.M.)	Ms. Kongsay	-
																																				P.D.: Project Director P.M.: Project Manager S.E.: Short-term Expert		

Source : JICA Expert for WASA, DHUP, MCTPC

PROJECT DESIGN MATRIX (PDM)
CAPACITY DEVELOPMENT OF URBAN WATER SUPPLY AUTHORITIES IN LAO PDR

The first edition (2003.06.24) Duration of Project： 3 years (2003/9-2006/8)
Revision： Target：WASA(Water Supply Authority, MCTPC), NPVC(Nam Papa Vientiane Capital City), PNP (Provincial Nam Papa)

NARRATIVE SUMMARY	VERIFLABLE INDICATORS	MEANS OF VERIFICATION	
Super Goal People in urban areas can access safe water stably.	80% of the populations in urban areas are supplied safe, piped water by the year 2020. (48.9% in 2002 by WASA Statistics)	NSC Basic Statistics	Urban Water Supply and Sanitation Project is conducted by ADB and others.
Overall Goal Capacity of Urban Water Supply (UWA) authorities will be enhanced in sustainable ways.	To upgrade the quality of supplied water To be stable of the water pressure	Report of Water Quality Analysis Report of Water Pressure Survey	Trained engineers engage the same jobs.
Project Purpose Means of service performance of UWS authorities in Lao PDR are improved in the field of water pipe laying and maintenance, plant operation and maintenance, and water quality control.	Accuracy and efficiency routine work by water supply engineers To submit accurate reports to WASA	Monitoring reports after trainings Summarised reports by WASA	WASA, NPVC and PNP staff are available for training.
Outputs 1. Appropriate UWS training system is established and Trainers are trained.	1-1 Training Curriculum is made up. 1-2 13 trainers of NPV is upgraded. 1-3 20 trainers of PNP are developed.	1-1 List of Training Curriculum 1-2 List of trainers	
2. Training textbooks and materials are developed.	2-1 Textbooks of five subjects. 2-2 Materials	2-1 Textbooks for Planning and design / Pipe laying and Connection / Water treatment plant / Water quality / Non-revenue water	
3. UWS engineers are upgraded in each technology subjects.	3-1 115 engineers are trained. 3-2 Engineers trained open workshops using textbooks at each PNP.	3-1 List of engineers 3-2 Report from PNP 3-3 Comprehension test	
4. Manuals for routine works are developed.	4-1 Manual books of six subjects.	4-1 Pipe laying / Connection / Treatment plant / Pumping / Water quality / Water leak detection	
5. The routine work skills of UWS technicians are upgraded.	5-1 360 technicians are trained. 5-2 Operation and Maintenance is properly performed.	5-1 Training reports by PNP 5-2 O&M records by PNP	
6. Management skill of administrator and manager in Provincial Nam Papa (PNP) is upgraded.	6-1 40 administrators of PNP are trained. 6-2 120 managers of PNP are trained. 6-3 Water supply and financial plan are made.	6-1 Water Supply Plan 6-2 Financial Plan 6-3 Questionnaire	

Activities	**inputs**	
1.1 To review the existing training needs assessment 1.2 To prepare the training programmes in Thailand. 1.3 To conduct the training programme on training management in Thailand. [8 persons for one week] 1.4 To make a plan of UWS training programme. 1.5 To select twenty (20) trainers from nation wide. 1.6 To conduct the training programme on the plant and piping work for the trainers in Thailand. [20persons for 4 weeks] 1.7 To dispatch a trainee to Japan as a counterpart training programme. [one month] 1.8 To prepare the training curriculum for In-country Training Programme (ICTP). 1.9 To conduct the ICTP of Trainers. 1.10 To evaluate, review and improve the ICTP for Trainers. 2.1 To organize a working group for Training Textbook. [WASA, NPV] 2.2 To review and improve existing textbooks prepared by Nam Papa Vientiane (NPV). 2.3 To compile and print the textbooks of each field. 3.1 To prepare the ICTP for engineer in each field. 3.2 To prepare the ICTP for 115 engineers from Water Supply Authority (WASA), NPV and PNP in Vientiane and Luangprabang and Pakse 3.3 To evaluate, review and improve the ICTP for engineers. 3.4 To select twenty (20) assistance trainers from ICTP for engineers. 3.5 To prepare the training programme on the plant and piping work for assistant trainers in Thailand. 3.6 To conduct the training programme on the plant and piping work for assistant trainers in Thailand. 4.1 To organize a working group of manuals for routine works. 4.2 To collect technical information and prepare the materials. 4.3 To edit Manual books for routine work in English and Lao. 5.1 To prepare the ICTP for 360 technicians of PNP and their branches.. 5.2 To conduct the ICTP in central region by using manuals. 5.3 To conduct the ICTP in southern region by using manuals. 5.4 To conduct the ICTP in northern region by using manuals. 5.5 To evaluate, review and improve the ICTP for technicians. 6.1 To prepare the ICTP for administrators and managers. 6.2 To conduct the ICTP for 40 administrators and 120 managers from NPV and PNP. 6.3 To conduct the training programme on water supply management for the management staff in Thailand. 6.4 To keep the records on routine operation in each PNP and summarize records into statistics in WASA. 6.5 To formulate Water Supply and Financial Plan 2020.	Japanese side: 1. Long-term Expert 2. In-country training 3. Short-term Expert from Japan 4. Equipment, tools and materials 5. Training in Japan 6. Training at NWTTI in Thailand 7. Trainers from NWTTI 8. Others [Senior Volunteers] - Water Treatment Plant Management - Water Quality Management - Non-Revenue Water Management Lao side: 1. Assignment of Counterparts (C/P) 2. Project office and necessary facilities 3. Electricity and water	

Source : JICA Expert for WASA, DHUP, NCTPC

(2) The ADB Capacity Building of Water Supply Engineers Project

(1) A background

The ADB carries out water and sanitation projects for construction of water supply enterprises in small and medium size urban areas with populations of 2,000-15,000 in provinces. With the assistance of these projects, potable water will be provided for 80% of city population by 2020. Provincial water supply enterprises are now established in 18 provinces throughout country and they are in charge of water supply and sanitation services.

The lack of engineers in the water and sanitation sector is highlighted when the progress of construction of water supply facilities is considered. The current number of technical staff and engineers employed by water utilities in Laos are only about 50% of the required level to maintain an efficient service, so raising the level of trained technical staff and engineers employed in this sector is crucial.

To compound the staff shortages, it is estimated that by 2020, the number of water supply enterprises will be four times the number of enterprises currently in operation.

To address these problems, WASA plans to:

1) Train some leading technical staff and engineers of WASA, NPVCC and some Nam Papas of major urban areas, and
2) Give capacity building opportunities to technicians who are engaged in operating and maintaining water supply facilities in provinces.

(2) Abstract of the Project

1) Goal: To improve the knowledge and skill levels of staff of Nam Papas throughout the country (by the end of the project).
   To improve the technological and operational ability of water supply staff continuously (after the end of cooperation)
   To provide the inhabitants of urban areas with safe water (by 2020)
2) Index: Some 670 chief engineers, technical staff and management will have taken part in the training courses (by the end of project)
   Improvement of water quality and pressure (after the end of cooperation)
   To provide 80% of the urban areas population with safe water (by 2020)
3) Result: The establishment of an effective training system, training of lecturers, The development and delivery of textbooks for chief engineers and provision of teaching

materials, and skill development for chief engineers employed in the water and sanitation sector.

The development and delivery of manuals outlining the routine operations involved in the water supply sector.

Improvement of daily routine works of technical staff

Improvement of the managerial ability for the management and planners of individual Nam Papas.

4) Period: Three years

5) Characteristics: This project aims at sustainabilityOfthe training program by:

i) Training of trainers (or instructors)

ii) The training of chief engineers in major cities,

iii) Enforcement of On the Job Training (OJT) in major cities,

The system and programs are made in the following order. At first candidates for the roles of instructors and chief engineers will receive training, and chief engineers will lead OJT in individual Nam Papas in work places. Through these procedures it is expected that an establishment of continuous and sustainable training will be achieved.

3.7.3 The AFD Training Project

(1) Training Centre Project with assistance of the AFD

The NPVC wishes to have a training centre for the human resource development of NPVC staff and also staff from other Nam Papa in Lao PDR. A feasibility study for the construction of the training centre was completed at the end of 2002 with assistance from the AFD. The contents of this report, the "Provisional Report of the Feasibility Study for a Training Project in the Water and Sanitation Sector" are as follows.

(2) The aims of the training project

After 1998 in the national water sector, the Laotian national authorities wish to increase the level of efficiency in water utilities (Nam Papa) and to improve the quality of the service provided to customers.

The increase of the operational capabilities of the water sector relies on modernizing the infrastructures as well as technical tools, and increasing the capabilities the skill levels of staff.

Decree No 37/PM has assigned responsibility to the NPVC for the training and technical assistance

required for the most suitable operations of the NP's nation wide. However, the NPVC does not have adequate resources to fulfil the training and advisory service.

A training project was initiated with a view to;

1) To strengthen the decentralization policy.
2) To improve water network handling and technical skill levels.
3) To prepare managers for the challenges of sanitation.
4) To allow water and sanitation companies to improve their services for the benefit of customers.

The realization of the training project relies on the following ideas,

1) To increase the professional abilities of the sector personnel bringing them up to international standards.
2) To create the professional skills that would be required to fulfil the strategies planned by the Laos authorities for modernizing the water and sanitation sector.

(3) The solution to perform the aims of the project

To fulfil the above mentioned aims, a specific Training Centre (CFME Lao) is to be created for the training of professional personnel employed in the water and sanitation sector.

(4) The Project components

1) The location of the Training Centre
   Will be within the premises of the Chinaimo water treatment plant, covering 1.7ha of land.
2) The accommodation for trainees will be provided on campus in dormitories.
3) The training topics and their relative priorities are as follows,

Training Topics

No	Training Topics	Priority
1	Water analysis & control	1
2	Drinking water production	1
3	Drinking water supply	1
4	Sanitation systems(initiation & awareness raising in stage 1)	2
5	Urban wastewater treatment	2
6	Electricity and electromechanical	1
7	Pumping of drinking and wastewater	1
8	Mechanical maintenance	1

9	Sensors, measurements, automation	2
10	Industrial wastewater treatment	3
11	Computerization of the department	1
12	Appropriate technologies: Rural & peri-urban areas	-
13	National information & Training programme addressing the executives	1

4) Support and assistance actions

In order to start the operation as scheduled, some supporting and assisting actions are necessary as follows,

i) A preliminary assessment before the start of the project and the operating process,
ii) Administrative assistance
iii) Technical assistance
iv) Educational assistance
v) Steering and co-ordination of the project's implementation.

(5) Buildings

i) Training Centre (3 Buildings, 2 Technical buildings)
ii) Accommodation Facilities (2 Accommodation buildings, restaurant)
iii) Educational Infrastructures

(6) Costs

a) Buildings and Facilities: 2,090,000 Euro (1-3 stages)
b) Implementation : 759,500 Euro (1-3 stages)
Total 2,849,500 Euro (1-3 stages)

(7) Financing Plan

a) Donors: AFD, other institutional donors, etc.,
b) Laotian national funds: NPVC, MCTPC, other authorities of Laos, etc.

3.7.4 Training Project of WASA

WASA plans to carry out a 'Technical Training Programme for the Provincial Nam Papa', supported by the ADB. The TTP will be take place from May to December 2003, by using the training centre at the NPVC. The course consists of 11 subjects(phase 1 and 2, during the term), and the course duration is set for 5-20 days (105 days in total). The course is expected to be attended by 175

trainees. The training programme will be conducted for the water enterprise staff from each province. The contents of program are as follows.

Time Schedule for the Courses

Course	Phase	Training days	Participants
Technical Management of Water Supplies	1	10	12
Operation & Maintenance of Water Treatment Works	1	20	19
Technical Management of Water Supplies	2	10	14
Operation & Maintenance of Water Treatment Works	2	20	20
Pipe laying and House Connections	1	10	19
Pipe laying and House Connections	2	10	18
Pump Operation and Maintenance	1	5	14
Pump Operation and Maintenance	2	5	17
Electrical Installation maintenance	1,2	5	17
Leakage Detection	1	5	10
Leakage Detection	2	5	15
Total		105	175

The numbers of participants from the PNP who will attend the various courses are, Bokeo 9, Khammounane 17, Luang Prabang 19, Phongsaly 15, Savannakhet 16 (Phase 1), Attapeu 13, Champasack 16, Huaphanh 10, Saravane 13, Vientiane 21, Xaiyaboury 13, and Xiengkhuang 13･･･ (Phase 2).

WASA sponsors this program, and expenses will be paid by the ADB. The training programme is not only for the NPVC's staff, but the staff of each provincial Nam Papa, including Vientiane Province.

3.8 Social Condition (Household Survey)

3.8.1 Backgrounds and Purpose of the Household Survey

The household survey was undertaken to understand the socio-economic status concerning the water supply and sanitation in the study area. The results and findings are to be utilized in the preparation of the master plan. The survey has been undertaken with the specific purposes as follows:

- To comprehend the actual manner of water use/consumption, and the hygiene and sanitation condition of households, and also to identify problems concerning these issues.
- To calculate the actual amount of water consumption (through the public water supply service and/or other water sources) by households.
- To find the income level of households, their willingness to connect, the willingness to pay their bills, and affordability of paying for the water supply service
- To comprehend the degree of consumer satisfaction with and expectation for the water supply services

3.8.2 Survey Methodology

The interview procedure used by the survey team involved questionnaire interview to collect the required information for the household survey. The questionnaire was prepared in English to ensure that the questioning manner among surveyors was consistent with the aims of the survey (see Annex 12). The questionnaires were then translated into Laos. Two different kinds of questionnaire were distributed, one for households served by the public water supply service, and another for households not connected to a public water supply system. The questionnaire consists mainly of four sections; 1) water supply and use, 2) sanitary conditions, 3) community, and 4) family status.

The questionnaire was pre-tested, using 10 sampled households in the study area. The pre-testing was undertaken before the field survey to check the questioning manner and answer options, and through those findings, the final questionnaire was modified. A one-day orientation and training course was provided for surveyors before conducting the field survey.

A total of 150 households were sampled. 75 of the sampled households served by a public water supply and another 75 households not served by a public water supply, and the required data was collected. The collected data was further sub-categorized by location and characteristics of the current water supply service as follows:

Households served with public water supply service (75 households)

- Regions in the vicinity of Chinaimo and Kaolieo treatment plant where the supply pressure is comparatively high (10 households from each and 20 families in total)
- Regions in the central part of the city where supply pressure is moderate (35 families)

□ Regions where the supply pressure is considerably low, Dondock area, in the northern part of the city (20 households)

Households not served with public water supply service (75 households)

□ Within the existing service area (35 households)
- ➢ Regions in the vicinity of Chinaimo and Kaolieo treatment plant where water pressure is comparatively high (5 households from each and 10 households in total)
- ➢ Regions in the central part of the city where supply pressure is moderate (15 households)
- ➢ Regions where water pressure is considerably low, Dondock area, in the northern part of the city (10 households)

□ Outside of existing service areas (40 households)
- ➢ The future service area which is described in the NPVC Master Plan (40 families)

Each survey area is clustered in a reasonable size, and from each cluster, randomly selected samples were collected. The field survey was conducted from the 3rd April to 8th April, 2002. The questionnaire survey was supplemented with field observations and group focus discussions with community members for a comprehension of the socio-economic status of the area.

3.8.3 Key Results and Findings of the Household Survey

Details of results and findings of the household survey are described in Volume IV of Annex for Master Plan. In this section, the key findings are described.

(1) Actual manner of water use/consumption of households, and problems concerning these issues.

Only 34.7% of households served with public water supply service use the water from the public service for the purpose of drinking, while the majority uses the water for multi-purpose such as for cooking, washing dishes, clothes, and flushing the toilets. The bottled water is major source of water for drinking both in the households served with public service (66.7%) and those not served (68.0).

For the households which are not connected to the public service, the majority of households (54.7%) use protected dug wells or spring as major source of water for domestic uses. The survey also revealed that in the area where the public water supply service is available, households not connected to, but using public water service through neighbors increases to 40% - 60%.

The average consumption per person per day, in the households served with public water supply service, amounts to 167.5 liters. However, it shall be noted that the amount consumed varies considerably among the households. It might be due to a variation in life style, availability of public water, the availability of alternative water sources, and also amount of water shared with neighbors. Pipe and tap defects (in-house leakage) could also be one of the contributing factors in the variation, with a result that 22.7% of connected households replied that they have pipe and tap defects in the house. For the expenditure for monthly water bill, almost half of households (49.3%) paid for monthly water bill in a range of 10,000-30,000 Kip, followed by a range of 30,000-50,000 Kip (17.3%) and one of 5,000-10,000 Kip.

It is observed that amount of water consumption by the households not served is considerably limited in comparison to the household connected to the public water supply service. The most dominant group is the one consuming a range of 9-18m^3 per month, followed by 3-9m^3 (22.7%) and 18-27m^3 (16.0%).

38.7% of households connected to the public water supply service perceived that the quantity and pressure of water provided is not enough, while considerably more respondents, 69.3%, of the connected households perceived problems in water quality. Most of the households (61.3%) complained of a smell in the water from public in particular, a smell of chlorine.

(2) The actual amount of water consumption by households.

The average consumption per person per day, in the households served with public water supply service, amounts to 167.5 liters. However, it shall be noted that the amount consumed varies considerably among the households. It might be due to a variation in life style, availability of public water, the availability of alternative water sources, and also amount of water shared with neighbors. Pipe and tap defects (in-house leakage) could also be one of the contributing factors in the variation, with a result that 22.7% of connected households replied that they have pipe and tap defects in the house.

It is observed that amount of water consumption by the households not served is considerably limited in comparison to the household connected to the public water supply service.

(3) Income level of households, their willingness to connect, the willingness to pay their bills, and affordability of paying for the water supply service

In the survey area as a whole, the comparatively dominant range of average income per month is

between 500,000 to 1,000,000 Kip (28.0%), followed by ranges of 300,000-500,000 Kip (26.7%) and 1,000,000-5,000,000 Kip (23.3%).

For the expenditure for monthly water bill, almost half of households connected to the public water supply service (49.3%) paid for monthly water bill in a range of 10,000-30,000 Kip, followed by a range of 30,000-50,000 Kip (17.3%) and one of 5,000-10,000 Kip. It is calculated that the majority of households connected (86.7%) spend for monthly water bill at less than 4% of their monthly income. It can be said that the current tariff structure is set at a very reasonable and affordable ranges for the consumers. It is supported by the fact that the significant numbers of households connected to the public water supply service (69.3%), responded that the current amount paid for the water bill is fair. Another 9.3% of households considered their water bills "cheap" and "very cheap". It is also noted that the majority of households connected (70.7%) answered that they requires improvement water supply services

Almost all (94.7%) of non-connected households are willing to connect to the service if a pipeline is installed near their house. 40.0% of non-connected households are willing to pay in the range of 5,000-10,000 Kip for their water bill per month. This was, followed by 28.0% of respondents who are prepared to pay in the range of 10,000-30,000 Kip per month

3.8.4 Conclusion

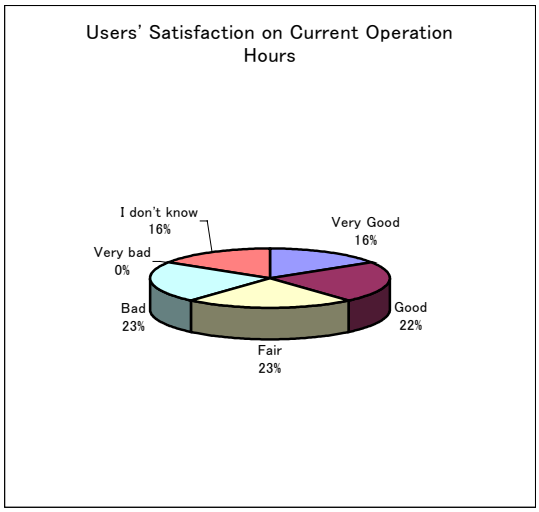
The public water supply service will become viable and sustainable when mutual confidence and cooperation is increased between the service provider and consumers. This can be achieved by the service provider committing itself to an improvement in service quality, and consumers placing a higher value on the services provided and utilizing the services in a responsible manner.

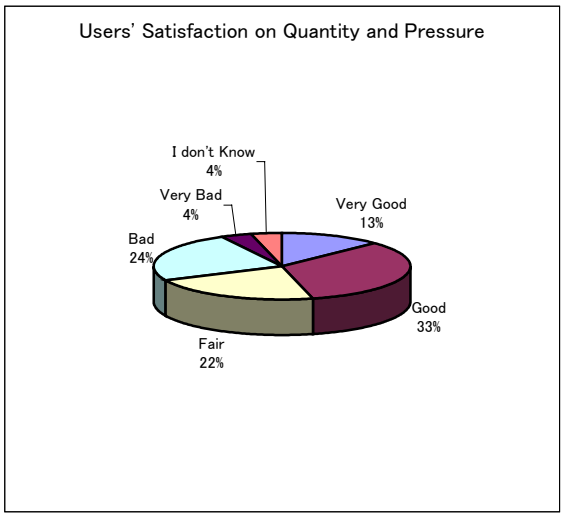
The household survey revealed users' satisfaction, as well as dissatisfaction, in each area of service and management provided by the NPVC. By analyzing the findings from the household survey, areas of service and management to be improved by the NPVC are identified for mutual confidence building. Improvement of those management/operation systems might contribute to convincing consumers of their responsibilities and assist in the cooperation of such areas as payment of water bills and connection fees, and repairing in-house/yard leakages. It should also be remembered when setting tariffs that the survey found that a considerable number of respondents (70.7%) are prepared to pay a higher fee if the service provided by the NPVC improves. Also, the majority of households not connected (94.7%) want to be connected to the service, and have said that they are

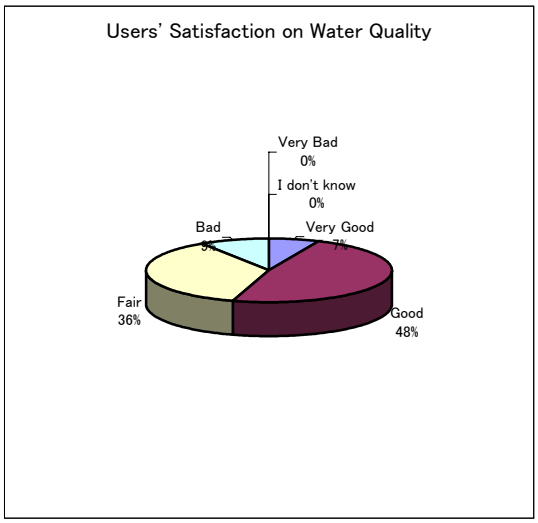
willing to pay.

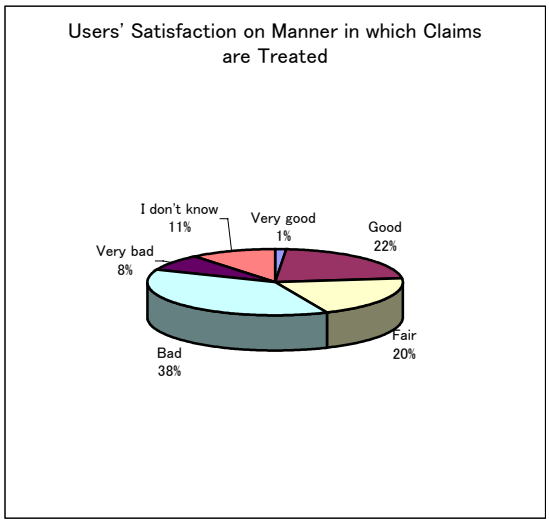
The figure below shows the degree of satisfaction in each area of operation and management of the public water supply service such as in; 1) current operation hours, 2) water quality and pressure, 3) water quality, 4) manner in which claims are treated, 5) manner in which defects are repaired, 6) manner of billing, 7) manner of notice, 8) manner of public relations, 9) services at the payment office, and 10) the amount paid for the water bill.

Figure 38-1 Users' Satisfaction on Current Management/Operation Field

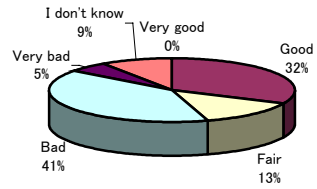




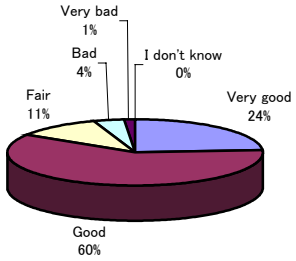




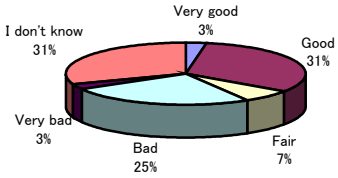
Users' Satisfaction on Manner in which Defects are Repaired



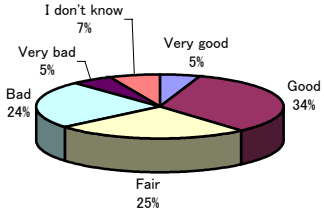
Users' Satisfaction on Manner of Billing



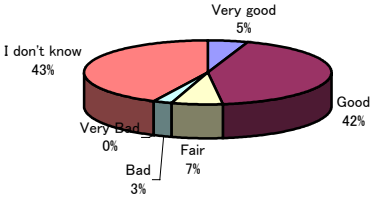
Users' Satisfaction on Manner of Notice



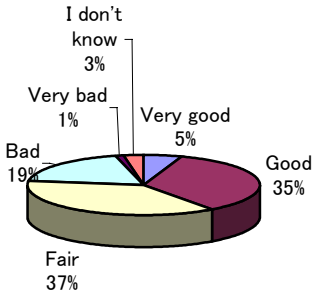
Users' Satisfaction on Manner of Public Relations



Users' Satisfaction on Service at Pay Office



User's Satisfaction on Amount Paid



It is observed, from the figure above, that users are relatively satisfied with the current operation and management in "the manner of billing", "service at the payment office", and "the amount paid". On the other hand, consumers are critical of the management and operation most in "the manner in which claims are treated and defects are repaired", and relatively in "operation hours", "quantity/pressure", "water quality", "manner of notice", and "manner of public relations".

It should be noted that the degree of users' satisfaction found in the survey fluctuates depending on the aspects surveyed. Dissatisfaction is concentrated on "manner in which defects are repaired (45.3%)", followed by "manner of public relations (41.3%)", "water quality (36.0%)", "manner of notice (32.0%)", and "quantity and pressure (32.0%)"., in the management and operation field.

Several approaches are can be taken to lessen consumer's dissatisfaction or, to build mutual confidence between the service provider and consumers. Taking into consideration the management/operation areas of dissatisfaction in which needs for improvement is identified, approaches for improvement could be possibly categorized into a number of areas. These are: "the infrastructure/ technology-improvement approach" to mediate consumer's dissatisfaction in water quality and quantity/pressure, and "the customer relation-improvement approach" for consumer's devaluation in the manner in which defects are repaired, the manner of public relations, manner of notice, and/or combination of those approaches. Priority in management/operation fields for improvement should be also selected in consideration of factors such as human resources, budget, cost, study term, and feasibility.

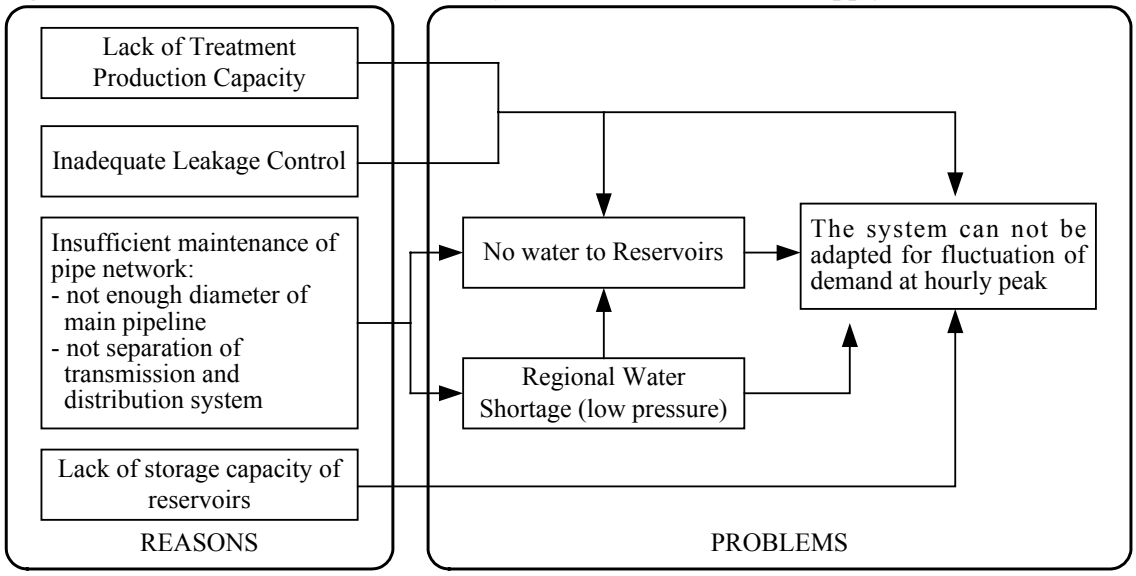
The management and operation areas that require the infrastructure/technology-improvement approach (i.e. for improvement of water quality, and quantity/pressure) is one of major concerns in the study, and the approaches and plans are utilised in the preparation of the master plan. It should be noted that the problems noted in this chapter concerning in water quality and quantity/pressure are caused through several complex factors such as the capacity of water production, leakage/loss in transmission and distribution, manner of users, contamination through damaged pipelines, an unexpected population increase, and so forth. The study findings and analysis of those issues are integrated in the preparation of the master plan.

3.9 Key Issues

3.9.1 Technical Aspect

As mentioned in the previous chapter, the Vientiane Water Supply System has problems which can be summarised as insufficient water in reservoirs and a regional water shortage (low pressure). Therefore the system can not be adapted for fluctuations of demand in peak periods mainly because of the following reasons. Figure 39-1 illustrates the problems of the existing network system.

Figure 39-1 Problem of Network System in Vientiane Water Supply



Key issues from the technical point of view are as follows:

(1) Shortage of Treatment Production Capacity

Although the total production capacity of the two existing treatment plants, Chinaimo and Kaolieo, is 100,000 m3/day, the total discharge in March 2003 was 114,794 m3/day as shown in Table 39-1, according to the records of the average discharge from the two existing treatment plants. Therefore the existing treatment plants are operating under overloaded conditions, beyond their rated production capacity.

In order to secure a stable and steady water supply service to meet the demand for water, it is obvious that the Vientiane Water Supply System is faced with a situation where the treatment production capacity needs urgent improvement.

Table 39-1 Discharge from Chinaimo and Kaolieo WTPs

WTP	Average Discharge in March 2003	Production Capacity
Chinaimo	88,849 m3/day	80,000 m3/day
Kaolieo	25,945 m3/day	20,000 m3/day
Total	114,794 m3/day	100,000 m3/day

(2) Deterioration of the Kaolieo Treatment Plant

The Kaolieo Treatment Plant which has a capacity to treat 20,000 m3/day was originally constructed in 1963 and rehabilitation work was implemented in 1983. 20 years has now passed since the last rehabilitation, and not only structural deterioration but also electro-mechanical equipment malfunction or deteriorations were found by our inspection. The conditions of the existing Kaolieo Treatment plant are detailed in the previous chapter.

In addition to the above issues it is judged that the rehabilitation work for the Kaolieo Treatment Plant is indispensable in order to secure water supply to the existing service area from the Kaolieo Treatment Plant. Furthermore, pipeline expansion from the Kaolieo Treatment Plant is on-going by AFD finance, hence, production of the Kaolieo Treatment Plant should be secured for future decades.

(3) Mixture of Transmission and Distribution System of Chinaimo Treatment Plant

Under present conditions, almost all of the reservoirs can not be filled up to the maximum capacity even during night time, because there is not enough water for Vientiane Water Supply System and also, the transmission and distribution pipelines are not separated clearly.

The Chinaimo Treatment Plant was originally designed so that water would be transmitted to elevated tanks and reservoirs in town. Although the plant was designed only for the transmission of water to elevated tanks and reservoirs, distribution lines are branched from transmission pipelines to distribute water directly to the town. The amount of the distribution is about 50 % of treated water, 40,000 m3/day and the remaining 50% is transmitted. Because of the mixture of the distribution systems and the transmission systems at the Chinaimo Treatment Plant, the distribution system can not meet hourly fluctuations in peak periods, and the transmission system becomes unstable, depending on the quantity of distributed water, as pointed out in the previous chapter.

To address this situation, separation of the distribution and transmission systems is indispensable to achieve a stable distribution and transmission system of water supply.

(4) Insufficient Storage Capacity of Reservoirs

The Vientiane Water Supply System has 9 reservoirs with a total capacity of 17,460 m3, including 3 ground reservoirs and 6 elevated tanks. The total capacity of reservoirs is calculated as 4.2 hours of the total production capacity of Chinaimo and Kaolieo Treatment Plants. Kaolieo Treatment Plant has 4,000 m3 a reservoir, corresponding to 4.8 hours of its production capacity. As mentioned above, the amount of distribution of water directly from Chinaimo Treatment Plant is about 50 % of treated water, 40,000 m3/day. This means that the transmission system of Chinaimo Treatment Plant has elevated tanks and reservoir of 10,160 m3 total capacity, equivalent to 6.1 hours of the production capacity. On the other hand the distribution system at the Chinaimo Treatment Plant only has a 3,300 m3 reservoir, equivalent to 2.0 hours of the production capacity of 40,000 m3/day. However the reservoir in Chinaimo Treatment Plant is the buffer for the transmission system since the plant was originally designed so that water would be transmitted to elevated tanks and reservoirs in the town. This means the plant is not able to distribute water confirming to hourly fluctuations. Additional reservoir space with a capacity of 10,000 m3 equivalent to 6 hours or 50% of plant capacity, 40,000 m3/day, is indispensable to achieve stable distribution from the Chinaimo Treatment Plant.

(5) Leakage Control

The AFD project, completed in May 2002, summarized the following three issues for a reduction of unaccounted for water.

1) Pressure of the service area

- The pressures of service are generally very low, notably in the day.
- Insufficient pressures in higher ground elevations areas which are also a long way from water treatment plants.

2) Physical loss

Investigation into leakages in the 5 zones supplied by the 125 km of pipelines which represents 25 % of the whole length of pipelines in Vientiane, detected 624 places of visible leakage or 4.1 places a one km. In addition, the results of leakage detection inside premises of large consumers concluded that:

- In investigating night time consumptions of water among 36 large consumers, except a few large industrial consumers who usually operate at night, (Beerlao for example), the consumption at night was often equal to the consumption during the day.
- Numerous visible leakages were detected in consumer’s premises.

- The level of losses among the large consumers of the public sector was extremely high.

3) Water measuring

The investigations of water meters for domestic use also detected 1,059 anomalies, or 9% of the meters investigated. The result was summarized as follows:

- In 20% of house connections, anomalies were detected,
- Leakage before the meters was detected in 7% of the connections,
- 6% of meters have been replaced before.

3.9.2 Institutional Aspect

(1) Expansion of autonomous status of General Manager

The NPVC is responsible for the management and operation of water supplies, and these management and operation systems are based on commercial principles. The operation and maintenance of these systems are conduted in accordance with performance indicators (PI). An enterprise is required to achieve the targeted performances, and the achievements of these performances are the responsibility of the General Manager as the senior manager of the enterprise. To achieve the set performances requires a certain amount of autonomous status for the General Manager. It is desirable to fix the range of autonomous status as broad as possible. The Prime Ministerial Decision (37/PM 1999) also describes that the NRW level should be maintained at less than 30%, the efficiency of collecting water bills should he targeted at 90%, and the O & M by NPSE should be in accordance with PIs, such as water use efficiency, water quality, reliability of supply, staff utilization and the level of consumer complaints. The NPSE's various PIs described above will not be achieved if the GM's, the representative of NASE, autonomous status is not fully secured. Autonomy goes hand in hand with the ability of the General Manager to exhibit strong leadership and management skills.

According to Article 11 (Regulation of Enterprise, 1999), the Administrative Council (AC) shall supervise the GM, but not directly join to manage the daily operations of the GM, except if the GM is a member of the AC.

The GM is usually appointed as a member of the AC, therefore the GM is usually in the position for the AC to supervise the daily work of the GM. The supervision of the GM by the AC includes orders in general, and this is not deemed to be a suitable method of business operations.

(2) Promotion of Public Private Partnership

As described in other sections, in the NPVC, the meter reading and water rate collection are both tasks which are carried out by staff as a single duty. These combined work duties seem to bring about a lower efficiency. For example, the staff / 1,000 connections ratio is high (16.1 staff to 1,000 connections, where in the average for 50 other SE Asian cities is 11.8). The UFW and the NRW are also high in comparison to other cities (33 : 39 / 35 : 40).

Considered from a view point of an efficiency oriented corporate management, reforms will be necessary, to be taken in various managerial phases. It is considered that one of the measures, PPP is worth studying as a reform which could be adopted.

(3) Reconsider the roles of a Drinking Water Factory

The NPVC factory produces 3 kinds of bottled water (in sizes of 20, 0.95 and 0.5 litre) from the NPVC. The water is treated using an advanced processing system (using a ceramic membrane) and the NPVC sells the product to customers. Comparing the charge of 0.5 litre bottled water produced in the factory (583 Kip) to the domestic water rate of 1m3 (219 Kip), we find a difference of approximately 5,000 times between the prices of the two commodities.

The mission of a water supply utility is to supply safe and potable water to the inhabitants of the community, and not low quality water which one cannot drink without boiling. The supply of water which one cannot drink without boiling is unsatisfactory, compared with the stated mission of the water utility. A continuous effort and a large amount of investment will be necessary to improve such a situation. The production and sale of bottled water seems to weaken such an effort. It is considered that water quality is sufficient when it meets the guidelines of the WHO. It seems unnecessary to produce special quality water named Crystal, when the price is taken into account.

It is considered that an effective alternative to bottled water is the improvement of the quality of tap water. If a domestic customer can drink tap water directly without boiling the water, they will be reluctant to buy expensive bottled water which can cost as much as 5,000 times that of utility water. In a situation where there are significant numbers of domestic customers using bottled water for drinking, and tap water for other purposes, the water utility is considered to be fulfilling their tasks inadequately. It is pointed out that a high infant mortality in Lao is connected with the insufficient supply of safe water, and it with this information in mind that it is necessary to examine the role of the water service again. This should be considered as a long-term subject.

3.9.3 Managerial Aspect

(1) To confirm the maintenance of good customer relations

The building and maintenance of good customer relations is vital for the water utility. A water utility should provide enough positive information customers in order to acquire the customer's cooperation, and to build up a trustworthy relationship with them.

(2) Strengthen the system of customer payment systems

An effective system of bill payment is the foundation of a stable and sound management for a water utility. At present, the system uses a variety of fragmented, troublesome and time-taking operations. A water utility should concentrate much of its resources and energy into this area.

3.9.4 Financial Aspect

Through analysis of the financial statements of the NPVC, the present management has the following characteristics. To improve financial conditions, the NPVC should incorporate in its management policy.

(1) To cover the fixed assets, stockholder's equity is comparatively small as a process industry. For safety management, the NPVC should expand its equity instead of long-term liabilities to improve the fixed asset ratio as early as possible.

(2) To improve a value added ratio, water sales revenue must be increased for the NPVC to achieve a principle of full cost recovery, as proclaimed in "Prime Ministerial Decision on Management and Development of Water Supply Sector (37/PM)". At the same time, to increase the value added, production costs of water should be reduced as much as possible.

(3) To cut back water production costs, raw materials such as chemicals, pipes and tools for repairs should be purchased at reasonable prices. At present, the NPVC imports those materials through dealers, which are cheaper than materials a in domestic markets. This is because the domestic markets are still in their infancy. Once the markets came to maturity in the near future, the NPVC could procure the materials at cheaper prices and improve the value added ratio, i.e., productivity of water.

(4) To shorten the collection period of account receivable, customer services staff have to endeavour to earn peoples full understanding of waterworks management through public relations. Furthermore, the NPVC should request that government agencies pay their water charges as soon as possible.

(5) To develop versatile workers as well as specialists, the NPVC must make programs to

cultivate people's abilities. The NPVC employs too many workers compared with the amount of water supplied, although its wage bill is comparatively low. Thus, this situation would be improved by means of higher labour productivity which is yielded through employing water specialists as a medium-term measure, and versatile workers, as a long-term measure.

People in Vientiane understand that a shortage of water supply leads to social confusion, as occurred due to water shortage during the dry season this year. They are substantially aware of the importance of a water supply for their living circumstances. According to the JICA household survey conducted in March 2003, people in Vientiane are concerned with water conservation but still a lot of water is wasted.

In Prime Ministerial Decision (37/PM), domestic water charges for low-income people should be established to be not more than 3% of household income, in section 4.6 in article 4. Furthermore, in the case where a water supply company sets a higher water rate in its service areas, the charge of domestic water should be not more than 5% of household income, taking into consideration the internal subsidisation among water type categories in the areas In the World Bank Report, "Investing in Development, 1985", it is suggested that the price of a minimum unit of water is commonly set at 3 to 5 percent of household income, which is affordable. However, it would be impossible for the NPVC to introduce these rates within a short time. The NPVC strives to attain these objectives based on the mutual understanding between water consumers and the water supplier.

3.9.5 Human Resource Aspect

(1) Training Programme focused on an individual's career (keeping individual training records for staff members)

It has been pointed out that the shortage of staff numners and the insufficiency of the abilities of technical staff of water utilities in this country for the prospect of water supply development. Recently, an average of 197 staff from the provinces throughout country joined the various training courses every year. In concert with the increase of training opportunties for staff, the making, maintaining and utilizing of individual trainee's record of training is necessary for personnel reference in water utilities.

Training is not conducted on the basis of short term necessity, but should be aimed to build an individual staff members' capability to develop a long term career. For this purpose, it is necessary

to maintain staff training records.

(2) Issuing common and standard training textbooks

It is necessary to maintain a consistent level of standards for all the training courses. Trainees are allowed to keep textbooks at the end of the training course so that it is always available for reference in their workplace.