

Factor Analysis of Water Rate Revisions (External Factors and Internal Factors)

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1. Period of Expansion & Stable Water Supply to the Next Stage

Tokyo Metropolitan Government (hereinafter referred to as, "Tokyo Waterworks") has increased water rates until 1994 because of "increasing project costs". The causes of increasing water charges are both external and internal factors including cost increase by inflation, increasing costs of construction improvement projects (capital investment), maintenance management costs (repairing fee), and others as well. The paper discusses about external and internal factors when water rates have been revised to date, and controlling water charges on eras of renewing and re-building large-scale facilities.

During the period of post-war economic growth, the concentration of both population and industries in Tokyo was significant, and this situation greatly contributed to the development of the area. However, the rapid population influx to Tokyo urged the area to expand the water supply system in order to deal with the demand for water. Afterwards, the situations changed: Advanced purification plants have been constructed on the grounds of deterioration of the quality of water from rivers; preparations for disasters have been required and others. In this era, stable water supply is the main focus. Having gone through such times, Tokyo Waterworks is about to face "Next Stage," the era when redevelopments of major facilities will begin all together from FY2018. The paper discusses about the future water rate revisions by looking into the past implementations.

2. A comparison of the Water Rate Revisions in 1975, 1994, and 2005

Table 1 describes the water rate revisions since 1965.

Table 1. Changes of water rate in Tokyo

Revision Date	Water Rate Revision	Revision Details and Social Conditions at That Time
February, 1964	3.00 times	Revision of the rate structure (from single to a pipe diameter)
December, 1965	6.00 times	
September, 1975	6.00 times	Prices shot up in the wake of the first oil crisis. The draft revision caused confusion.
December 1st, 1978	6.30 times	Established a new water resources development fund. The largest water distribution volume per day for a record of 6.45 million cubic meters (perpet recorded volume).
November 1st, 1981	5.74 times	
May 1st, 1984	4.69 times	
June, 1989	4.69 times	The 3% consumption tax was introduced on April 1st, 1989
June 1st, 1994	4.51 times	
June, 1997	4.51 times	On April 1st, 1997, tax rate was revised (consumption tax and local consumption tax were increased to 5% in total).
January, 2005	4.18 times	Reduced the rate by 1.3%, discount for payment on bank transfer by 0.9%. Lowered the base water volume 1.0m ³ → 0.9m ³ . Introduced the discount system for payment on bank transfer.
June, 2014	4.18 times	On April 1st, 2014, consumption tax rate was revised (consumption tax and local consumption tax were increased to 8% in total).

(After the adoption of the rate structure according to a pipe diameter)

The external and the internal factors with regard to the following 3 rate revisions were examined.

- The rate revision in 1975, when the increase rate was significant
- The rate revision in 1994, when the expenses for water resources developments increased, and constructions projects of advanced purification facilities were encouraged.
- The revision in 2005, when the rate was reduced by the revision of the base water volume and others.

In Tokyo, Tokyo Waterworks had not adopted the rate revisions for 7 years since 1968 until 1975, based on the political judgment, which took the social economic situations and others into consideration. That was the time when the financial situation in waterworks was difficult and Tokyo Waterworks had a large cumulative deficit. The priority was put on the reconstruction of finances as the cumulative deficit exceeded 45.2 billion yen in March, 1975.

In 1975, Tokyo Waterworks had to tackle the reconstruction of finances amid the recession following the oil crisis and the price spurt triggered by the crisis. At the same time, Tokyo Waterworks had to deal with the increasing water demand. This period is referred to as "Expansion Period" in this paper.

Throughout 1994, with price still moderately increasing in the aftermath of the bubble economy, Tokyo Waterworks intensively tackled issues, such as increasing costs of developments of water resources, promoting constructions of advanced water purification facilities, and enhancement of monitoring system for water quality. This period is referred to as "Transition Period" in this paper as this period is in the stage of transition from Expansion Period towards the period of stable water supply (focusing on stable supply of safe water by ensuring earthquake resistance and others).

Throughout 2005, Tokyo Waterworks addressed the issues of stable water supply, by reinforcement and maintenance of facilities, such as enhancement of facility reliability (earthquake resistance) and supply of safe, better-tasting water (by advanced water purification system). This period is referred to as "Stable Water Supply & Maintenance Period" in this paper.

With regard to the customer price index and the revenue from water supply service, as well as the annual volume of water distribution can be referred to Table 2. In addition, Table 3 shows the classification of the external and the internal factors for the rate revisions.

Moreover, the revenues and expenditures upon the rate revisions over the last three years were examined (Table 4), along with the factors listed in Table 3.

Table 2. Consumer Price Index, revenue from water supply service, and annual volume of water distribution

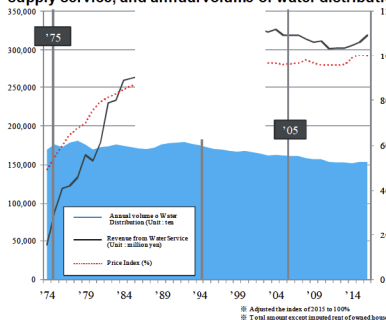


Table 3. External and internal factors for Rate Revisions

	Rate Revision in 1975	Rate Revision in 1994	Rate Revision in 2005
External Factors	Expansion Period Rapid population increase Rapid price increase Taking measures to tackle increasing water demand Increase in laborers' wage	Transition Period (Gradually Transitioned from Expansion to Stable Water Supply) Structural change in water demand Deterioration of water quality Lack of enough water resources (developments of new water resources) Price increase	Stable Water Supply & Maintenance Period Moderate increase in population Price increase remained almost at the same level. Structural change in water demand Change in awareness of citizens of Tokyo (water-saving efforts were widely spread)
Internal Factors	Delay in rate revision (political judgement) Construction improvement projects (facility investment) Expansion of facilities	Construction of advanced water purification facilities Ensuring earthquake resistance of facilities	Promoted constructions of advanced water purification facilities Ensuring earthquake resistance of facilities
Others (External Effects)	Sold off a park, roads, etc. at the former site of Yamanashi Water Purification Plant. Put emphasis on operational efforts	Abolished the shared water use system Meter reading once in every 2 months, changed from once in 4 months	Made every effort to improve the operational efficiency by revising construction improvement costs, etc.

3. The Implementation of Rate Revisions in terms of the Fiscal Revenues and Expenditures, and Its Factors.

Firstly, in Expansion Period (1975), the revenue from water rate was half of the operating cost, and was unable to follow the inflation which was external factor. This could partly be attributed to the political situation, as listed as an internal factor at that time, which did not allow rate revision. Meanwhile, issue of bond was almost in an amount equal to the cost of construction improvement. However, as for revenue and expenditure, expenditure exceeded the revenue. This was attributed to the following situations at that time: The priority was put on the resources developments and the expansion of water system and others in order to meet the increased demand for water on the grounds of the rapid increase of population. In Expansion Period, external factors work more than internal factors, and therefore, a rate revision is required at a right time.

In Transition Period (1994), the revenue from water rate was almost equivalent to the operating cost. This was attributed to the constant efforts made by Tokyo Waterworks. However, with an advent of following challenges, it was indispensable for Tokyo Waterworks to outlay capital expenditures. One is development of new water resources with a view to securing sufficient water supplies. Another is construction of advanced water purification facilities, launched in 1989 for the purpose of enhancing its water quality. On account of these factors, Tokyo Waterworks estimated in its medium-term plan that it would post a cumulative payments deficit; accordingly, it revised its water rate structure with an eye to compensating this shortfall.

In Stable Water Supply & Maintenance Period (2005), Tokyo Waterworks shifted its focus from expanding facilities and water resources developments to crisis management in case of disasters, earthquake resistance for stable water supply, as well as developments of the facilities to deal with water quality. The construction improvement cost was three-times as much as the amount of issue of bond (double in 1994), however, the revenue and the expenditure were almost same, and it seemed that the levelling of necessary costs was going well. With such situations, Tokyo Waterworks decided to reduce the rate by revising the base water volume and others as the social conditions and the awareness of citizens of Tokyo were changing greatly.

Table 4. Samples of fiscal revenues and expenditures

Outlook for the revenues and expenditures, as of 1975, when the rate revision was introduced									
(Unit: hundred million yen)									
	Rate	Issue of bond	Revenue from Water Supply Service (Total)	Operating Cost	Interest Expense (Principal Repayment)	Construction Improvement Cost	Total	Balance (Revenue or Expenditure)	Conclusion (Revenue or Expenditure)
September 1975	200	600	7	770	30	200	1,000	-293	-1,293
1976	140	810	11	1,420	700	400	2,520	-1,370	-1,370
1977	141	730	11	1,284	600	300	2,184	-1,032	-1,032
Total	1,382	2,140	32	3,654	2,000	1,300	5,954	-3,524	-3,524
Outlook for the revenues and expenditures, as of 1994, when the rate revision was introduced									
	Rate	Issue of bond	Revenue from Water Supply Service (Total)	Operating Cost	Interest Expense (Principal Repayment)	Construction Improvement Cost	Total	Balance (Revenue or Expenditure)	Conclusion (Revenue or Expenditure)
1994	2,882	538	784	4,234	2,597	940	7,771	-4,889	-4,889
1995	2,923	550	887	4,338	2,478	871	7,686	-4,763	-4,763
1996	2,932	588	884	4,384	2,743	877	7,981	-4,987	-4,987
1997	2,933	582	889	4,432	2,883	880	8,198	-5,215	-5,215
Total	11,669	2,260	3,444	17,388	10,620	3,458	31,466	-15,111	-15,111
Outlook for the revenues and expenditures, as of 2005, when the rate revision was introduced									
	Rate	Issue of bond	Revenue from Water Supply Service (Total)	Operating Cost	Interest Expense (Principal Repayment)	Construction Improvement Cost	Total	Balance (Revenue or Expenditure)	Conclusion (Revenue or Expenditure)
2004	3,327	316	471	4,134	2,234	872	7,240	-3,913	-3,913
2005	3,323	316	472	4,089	2,278	880	7,247	-3,915	-3,915
2006	3,319	381	471	4,071	2,276	887	7,514	-4,143	-4,143
Total	9,969	1,013	1,314	12,294	6,889	2,737	21,920	-11,315	-11,315

4. Renewal & Reconstruction Period

Based on these situations, the renewal and reconstruction of major facilities are discussed. As assumptions, large-scale facilities such as purification plants, and others are to be renewed and rebuilt while population drops slightly, and demand for water decreases owing to improvement of water-saving efforts and equipment. The external factors such as inflation and increase of unit labour costs, is difficult to control as utilities. However, the internal factors such as maintenance, management, and reconstruction of facilities can be controlled.

- 1) Inflation → Efforts of cost reduction (Although this measures has a limitation as this is based on the external factor, this measure along with the internal factor, such as internal efforts is implemented.)
- 2) Increase of Construction Improvement Projects (Including Redevelopments) → Asset management, downsizing, levelling of operation and burden
- 3) Increase of maintenance and management cost → Well-planned repairs, levelling with regard to projects, such as sizes of repair works and others.

If inflation continues in the future, Tokyo Waterworks needs to consider making efforts systematically (levelling of projects and finance) which is controllable part such as projects' scales by utilities as internal factor.

Meanwhile, in case those efforts do not bear fruit, without showing much improvement in financial conditions, implementation of a rate revision must be undertaken in order not to increase the future burden, and deteriorate finances (rate revision is an important option).