

Improvement of Operational Efficiency in Water Fee Collection by Using Value-Added Networks (VANs)

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Abstract

Securing stable revenue from water usage fees is essential for sound water business operations. Non-revenue water (NRW) is one of the greatest challenges for water utilities around the world. In developing countries, together with physical losses from water conduit leakage, commercial losses from underdeveloped water fee collection systems account for 40% of NRW (World Bank, 2006). By contrast, due to efforts by Japanese water utilities to facilitate bill payments, enhance water fee collection efficiencies, and address delinquency to maintain fair and equitable fee collection systems, commercial losses from NRW in Japan are practically zero. Efficient water fee collection from delinquent users has even been an issue for the water supply business in Tokyo, which serves one of the largest markets in the world. Therefore, Bureau of Waterworks Tokyo Metropolitan Government (Bureau of Waterworks, TMG) effectively employed a value-added network (VAN) to instantly and efficiently identify payments from delinquent users.

For over 40 years, Public Utilities Services Center Co., Ltd. (PUC) has used information technology (IT) to support the water supply business in Tokyo. The query function developed and provided by PUC for constant (24 hours a day, 365 days a year) and instant delinquent user payment status confirmation has further contributed to operational improvements in the water business.

Keywords

Sound water business operations, water fee collection system, value-added network (VAN), water bill payment reminder, instant payment status inquiry

Introduction

Securing stable revenue from water usage fees is essential for sound water business operations. Non-revenue water (NRW) is one of the greatest challenges for water utilities around the world. In developing countries, together with physical losses from water conduit leakage, they are struggling to

reduce commercial losses from underdeveloped water fee collection systems that account for 40% of NRW (World Bank, 2006). By contrast, due to efforts by Japanese water utilities to facilitate bill payments, enhance water fee collection efficiencies, and address delinquency to maintain fair and equitable fee systems, commercial losses from NRW in Japan are practically zero.

Bureau of Waterworks, TMG serves nearly 7 million users. To reliably collect water fees from users, Bureau of Waterworks, TMG must consolidate customer data to facilitate payments. In this context, a water fee collection system (hereinafter “fee collection system”) which makes extensive use of IT is even more important.

PUC was initially established in 1966 as the Public Utilities Computing Center to advance the computerization of the water supply business in Tokyo (hereinafter “Tokyo Waterworks”) sales administration. Since then, Bureau of Waterworks, TMG has commissioned the PUC with the development and maintenance of its fee collection system. As a collection systems expert, PUC has leveraged its competency in IT systems to improve both the efficiency of Tokyo Waterworks sales administration and the services provided to Tokyo residents. Since PUC became an affiliated organization of Tokyo Metropolitan Government in 2006, it has also been tasked with managing sales administration, including service station and call center operations. PUC is expected to use its IT expertise to further enhance efficiency, and serve as a model water utility operator for the private sector.

In this paper, we discuss the query function developed and provided by PUC for constant (24 hours a day, 365 days a year) and instant delinquent user payment status confirmation, implemented by Bureau of Waterworks, TMG in the special wards of Tokyo in 2006 to improve the efficiency of fee collection and management, together with our contribution to operational improvement.

1. Tokyo Waterworks Fee Collection

1-1 Status of Fee Collection

Tokyo Waterworks accepts water bill payments via bank transfer, cash payment, and credit card payment. Most payments are made by bank transfer; cash payments make up 26.4% of total payments. Cash payments can be made at convenience stores as well as financial institutions and service stations. Convenience stores are open late or 24 hours a day in most towns in Japan. These stores accept utility fee and other payments, in addition to selling groceries and other products. In response to water user needs for diverse payment options, the water fee collection system was upgraded to allow water bill payments at neighborhood convenience stores.

Table 1 *1

	Total	Bank Transfers	Cash Payments	Credit Card Payments
No. of Fees Collected	7,012,913	4,411,773	1,853,681	747,459
Composition Ratio	100.0%	62.9%	26.4%	10.7%

Thanks to additional measures to effectively remind delinquent users to pay, the final collection rate of Tokyo Waterworks*2 is as high as 99.9%.

*1 Business Overview 2014 (Bureau of Waterworks, TMG, 2014)

*2 International Cooperation Program (Bureau of Waterworks, TMG, 2015)

1-2 Challenges of Unpaid Bill Management

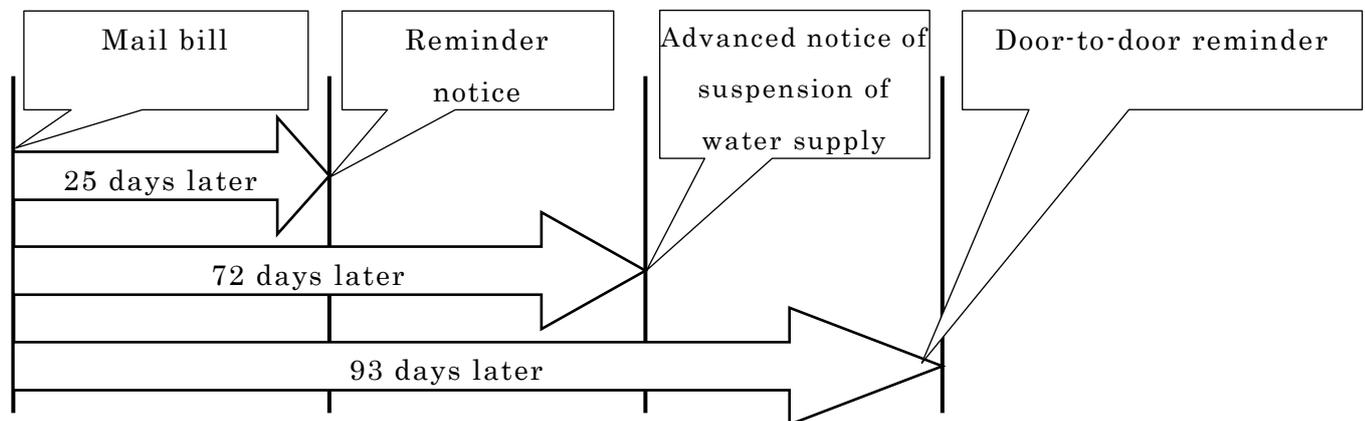
In addition to payment option diversification mentioned earlier, Tokyo Waterworks meticulously manages unpaid bills to maintain a high fee collection rate.

The principal management measure is a step-by-step delinquent user reminder system. (Figure 1)

The meticulous management of unpaid bills by Tokyo Waterworks was achieved using the fee collection system that consolidates user data by implementing an additional function to automatically extract unpaid bills and delinquent users at each payment deadline.

Figure 1

Cash Payment Reminder Cycle



The operational challenge for implementing the reminder cycle above was the final stage personal reminder. Unpaid bills requiring personal reminders in Figure 1 are extracted each month. Prior to the improvements implemented by Bureau of Waterworks, TMG, unpaid bills requiring personal reminders were handled manually by Tokyo Waterworks staff. More specifically, staff engaged in direct negotiations with delinquent users by visiting homes to encourage payment. If users failed to pay even after door-to-door reminders, staff shut off the water meter to suspend water supply.

Fee collection desks were set up in service stations for users paying bills after the water meter had been shut off. Staff used to accept payments on nights and weekends. Once delinquent users paid, staff would visit homes to reopen water meters.

Given this practice, Bureau of Waterworks, TMG faced the challenge of achieving a more efficient user service system on nights and weekends and managing fee collection from delinquent users more efficiently.

2. Specific Improvements

2-1 Improvements for Greater Operational Efficiency

Bureau of Waterworks, TMG carried out the following improvements to achieve a more efficient user service system on nights and weekends, and for better management fee collection from delinquent users:

- (1) Diverted direct negotiations with delinquent users requiring no expertise away from Tokyo Waterworks staff
- (2) Effectively used call centers to accept applications and respond to user inquiries 24 hours a day, 365 days a year
- (3) Effectively employed private contractors familiar with the locations of water user homes, for metering
- (4) Effectively used convenience stores that accept cash payments 24 hours a day, 365 days a year

2-2 Overview of Improvements

Actual improvements are presented below:

- (1) Reviewed (abolished) the user service system on nights and weekends

Modified required personal reminder stage tasks as follows, abolishing user services on nights and weekends. (Figure 2)

- 1) Tokyo Waterworks staff

Visit delinquent users who failed to pay, even after private contractor reminders, to shut off water meters.

- 2) Private contractors

- (i) Post reminder letters and bills to homes of delinquent users at personal reminder stage

- (ii) Visit delinquent users specified by call centers to reopen water meters

- 3) Call centers

- (i) Take fee inquiries from water users, and confirm payment status.

- (ii) Instruct private contractors to reopen water meters for users for whom late payments are confirmed.

- (2) Support measures for delivering a user service

To implement the user service defined in (1) above, the following measures were carried out with due attention to the need for facilitating bill payment and payment status confirming.

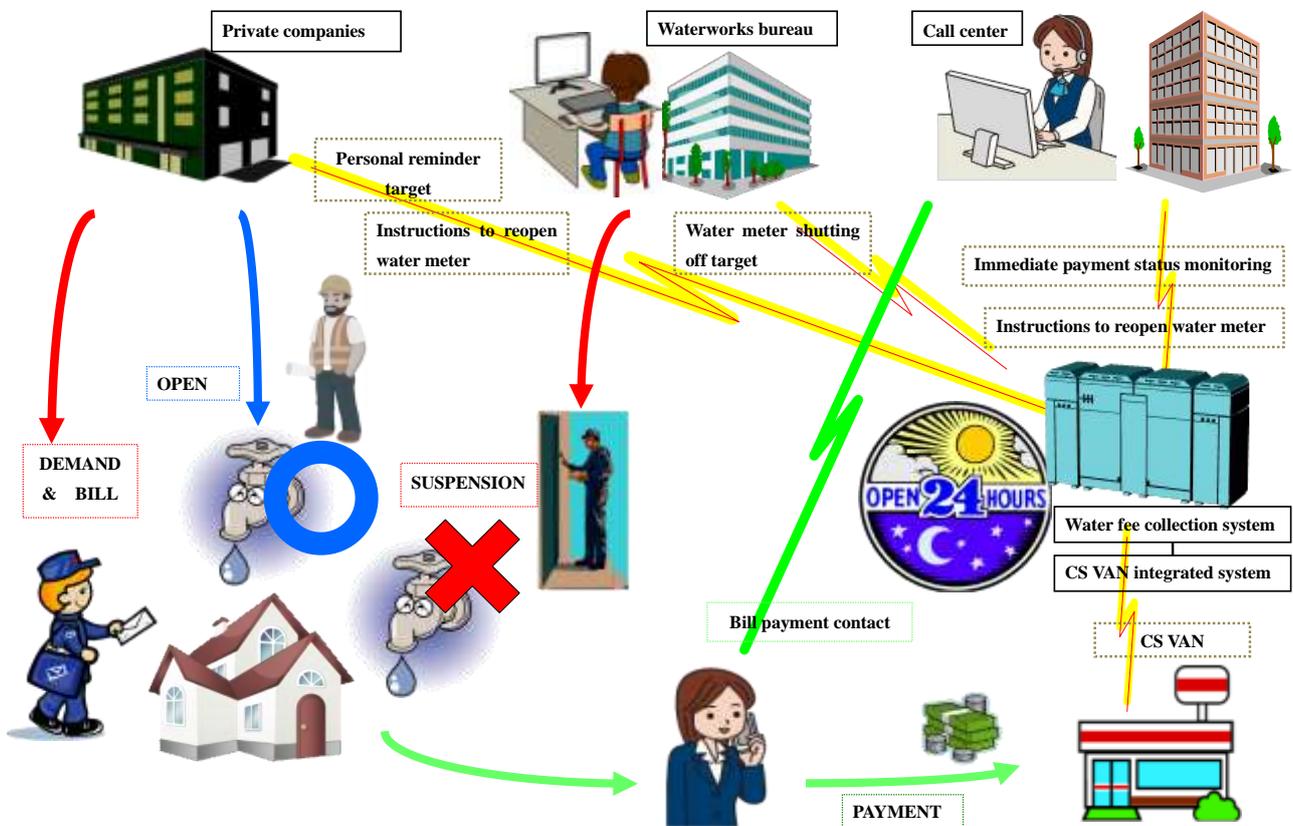
1) Modified payment methods for overdue bills

Unified payment methods for improved operational efficiencies: specifically, bills posted by private contractors now contain payment forms exclusively for convenience stores.

2) Immediate payment confirmation for convenience store payments

Under the new system, call center operators can now immediately confirm delinquent user payments when fielding calls from water users.

Figure 2



2-3 Modified Fee Collection System

PUC modified the fee collection system as follows in line with the measures above. PUC took on all tasks to support improvements to enhance Tokyo Waterworks operational efficiencies.

- (1) Preparing payment forms exclusively for convenience store use sent to delinquent users at the personal reminder stage
- (2) Developed functions allowing call centers to instruct private contractors to reopen user water meters, and contractors to record that meters were reopened as instructed
- (3) Developed a query function to immediately confirm payment status from convenience stores

Among these, a development of a query function to immediately confirm payment status played a core role in improving the operational efficiency.

Bureau of Waterworks, TMG decided to use a service based on a VAN to monitor convenience store payments every 5 minutes (hereinafter “CS VAN”).

An ordinary fee collection system processes the data of collected payment in the previous day. Therefore, it is impossible for the system to immediately identify any payment by a delinquent user at a convenient store.

This is why the fee collection system of Tokyo Waterworks faced a need to introduce a query function interlinked constantly with CS VAN to keep track of the payment status at convenience stores with a more efficient user service system.

The following section outlines the measures taken by PUC to satisfy system requirements in order to develop such a query function to immediately confirm payment status from convenience stores.

3. Overview of PUC Measures

3-1 Integrated Fee Collection System with Other Networks

Tokyo Waterworks consolidated water user data throughout Tokyo. For this reason, according to the security policy of the system, direct data exchange with other networks was not allowed.

Accordingly, PUC developed an integrated CS VAN system to load data from CS VAN as an external network to the fee collection system.

The integrated system loads data from CS VAN to the fee collection system every 5 minutes (about 290 times a day), for real-time system updates.

An additional function was developed to constantly monitor the operational status of the integrated system and incoming data from CS VAN, combined with a mechanism to issue alerts when integration is interrupted or communication errors occur.

This made real-time bill payment data inquiries from CS VAN possible from all fee collection terminals managed in all sales administration centers.

Also, a system requirement for delivering enhanced operational efficiency was a function for confirming both the reliability and accuracy of fee payment data from CS VAN at any time.

PUC addressed these requirements as follows:

3-2 Constant Operation (24 hours a day, 365 days a year)

PUC achieved a highly reliable system by developing the following functions and equipment to ensure constant operation of the query function to immediately confirm payment status from convenience stores

24 hours a day, 365 days a year.

(1) Equipment redundancy and uninterrupted operation (ensuring reliability)

PUC made all communication lines and devices involved in data retrieval from CS VAN and the integrated system redundant to provide backup should trouble arise. Device maintenance, server reboots, and other tasks are performed without interrupting data retrieval and integration.

(2) VAN data query function

PUC developed network and query functions to directly confirm CS VAN data before data is loaded into the fee collection system through the integrated system.

These functions make it possible to confirm the latest CS VAN data when the fee collection system or integrated system is not accessible during maintenance or for other reasons.

3-3 Developed a Function to Monitor Receivables (ensuring accuracy)

To avoid sending reminders to delinquent users who already paid or mistakenly shutting off water meters, PUC developed an original function to monitor and confirm payment data retrieved from CS VAN.

Once a delinquent user is registered as a monitoring target for bill payment, the system monitors user payment data, displaying detected payments on the monitoring screen.

This function is used effectively to avoid shutting off water meters of delinquent users who have just made payments by registering delinquent users whose water meters are supposed to be shut off and checking the monitoring screen each day tasks need to be performed.

The fee collection system reflects data confirmed from respective financial institutions and convenience stores a few days after payments to extract unpaid bills and delinquent users who reached the personal reminder stage. The data extracted in this process and the data retrieved from CS VAN are compared to immediately and reliably confirm delinquent user payments.

4. Improvements in Operational Efficiency

4-1 Improvement Outcomes

As mentioned above, Bureau of Waterworks, TMG achieved optimal, streamlined, and more efficient operations through improvements to establish a new user service system and effectively employ a fee collection system that ensures great reliability and accuracy. Specific outcomes from these improvements are as follows:

(1) Efficient payment reminders and reopening of water meters

Call centers and private contractors worked faster and more accurately (including nights and weekends) with the modified fee collection system reinforced by functions to instruct reopening of water meters and record functions for reopening operations.

(2) Reduced working time for user service

Working time for user service was reduced due to the reduced scope of work of Bureau of Waterworks, TMG, reduced errors from inconsistencies between actual payment status and processes, as well as a reduction in false claims from delinquent users.

(3) Reduced complaints

The number of complaints was reduced due to the reduced errors for inconsistencies between actual payment status and processes.

4-2 PUC Contributions

In light of the discussion above, a great deal of the credit for the improvements to operational efficiency go to the query function to immediately confirm payment status via CS VAN.

The fee collection system modified by PUC delivered reliable and accurate operations instrumental to improving operational efficiency.

In this sense, PUC fulfilled its role supporting Tokyo Waterworks as a partner of Bureau of Waterworks, TMG and fee collection system expert.

5. Conclusion

This paper has described how PUC helped Tokyo Waterworks improve business operations by effectively employing a VAN to instantly and efficiently confirm delinquent user payment status, making tangible contributions to the business.

Tokyo Waterworks needs to continue to maintain sound business operations, adjusting to diversifying lifestyles of Tokyo residents.

In doing so, it is essential to make further use of IT (e.g., integrating fee collection system with cashless payment services). We should continue to pursue greater operational efficiencies by reducing NRW and other losses, while offering greater convenience to water users.

PUC will continue to cultivate its capacity to respond to Tokyo residents' needs and support the sales administration of Tokyo Waterworks by making the most of its competency in IT and efficient business operation. The company strives to help Tokyo Waterworks to achieve greater operational efficiency and provide greater convenience to Tokyo residents as a fair service provider.

References (*1-*2: Data Source)

(i) Business Overview 2014 (Bureau of Waterworks, TMG, 2014)

<http://www.waterworks.metro.tokyo.jp/suido/jigyo/gaiyou/26gaiyou.html>

(Reviewed on May 15, 2015)*1

(ii) International Cooperation Program (Bureau of Waterworks, TMG, 2015)

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(Reviewed on June 2, 2015)*2