

## Helpdesk Research Report: Impact of municipal billing systems on revenue collection

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**Query:** Identify literature regarding the impact of municipal billing systems on revenue collection.

**Enquirer:** Government of South Africa / DFID

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### 1. Overview

Billing processes play a critical role in revenue for a number of public sector organisations, including municipalities. In the delivery of public services, for example, billing drives cash flow and is the key source of information for customers using these services. In many countries, reforming billing processes, coupled with strengthening collection processes, has improved revenue collection. Most of the evidence about the role of billing in revenue collection comes from the water sector.

Some experts argue billing systems based on consumption are more likely to be paid by individual users (USAID n.d.). In the water sector, this could take the form of universal adoption of water metering or spot-billing (Agarwal 2008). Other measures to improve revenue collection include computerising customer databases and billing systems. Some experts argue that human handling should be eliminated from all billing processes to prevent fraud and billing errors (Misra and King 2012). In addition, some advocate pre-payment as a means of increasing collections: this means that rather than billing after service consumption/usage, it may be better to employ pre-payment. This can ensure payments for services, as well as help households monitor and plan their expenditures. This may be more important when providing services for poorer customers, who may also benefit from the option

of phased payments facilities and/or debt counselling (Blore et al 2004). A strictly enforced disconnection policy for utilities, to address those who default in making payments, will also help ensure payment compliance (Agarwal 2008).

A number of case studies illustrate the improvement of revenues through better billing and collection processes. Most of these case studies are from the water sector. The key reforms considered to have enabled revenue improvements include the following.

- **Bangladesh:** Moving from a fixed to an individual billing system, increased bill collection efficiency from 80 per cent to 95 per cent and reduced the bill collection period from 15 months to 3 months. The utility conducted water meter testing in front of customers to counter claims of faulty meters and excessive billing.
- **Brazil:** The water utility of São Paulo focused on improving the metering and billing of its prime two per cent of customers who make up 34 per cent of revenues. Through installation of new meters, revenue increased by US\$ 72 million.
- **Burkina Faso:** Computerisation of billing and administrative systems, as well as replacing older (water) meters has improved collection efficiency to 95 per cent and cost recovery to 96 per cent of costs.
- **India:** The Hyderabad water utility outsourced its billing function with the long-term goal of bringing the function back into the organisation through training and restructuring. The implementation of spot-billing, as well as incentives to settle arrears (i.e. instalment facilities and discounts for upfront payments) ensured record revenue collections and a reduced billing cycle.
- **Kenya:** In Nyeri and Mavoko the use of integrated financial management systems (IFMS) to identify tax defaulters and manage bad debts, was a key factor in improving local tax revenues.
- **Philippines:** The Manila water utility undertook a series of reforms between 2000 and 2003. The utility now employs 100 per cent metering on all service connections, which are read monthly. There has been an increase in new service connections, identification of illegal users, billing of unbilled services, and replacement of faulty meters. As a result, revenue has increased by 83 per cent while the average collection period has fallen from 86 days to 50 days.
- **Rwanda:** Implementation of an electricity prepayment billing system (EPBS) across Rwanda resulted in: a reduction of utility company operational costs; increased and timely revenue collection; enhanced earnings by the private sector and improved electricity services delivery. Revenue rose in tandem with the increased number of EPBS enrolment, from US\$ 0.2 million in 1996 to US\$ 22.9 million in 2008, though part of this increase was attributable to tariff rises.
- **Senegal:** The water utility outsourced billing and collection processes incorporating targets and incentives in the outsourcing of contracts. Following this, the government began to pay its bills fully and a strict disconnection policy was enforced for defaulters. Successful bill collection rates improved from 91 per cent to 97 per cent.

- **Thailand:** Bangkok's water utility appointed meter readers to check meters monthly using handheld readers that confirm consumption levels with the utility's servers before printing instant bills. As a result, the overall financial performance of the water utility improved between 1998 and 2008 with revenues starting to significantly exceed costs.
- **Uganda:** To improve property tax collection, a city council in Kampala undertook a series of reforms including: a bill delivery drive, media campaigns, better reminders, more payment points, individual pressure on major defaulters, prioritisation of bad debts, and the use of private bailiffs. Programme revenues have since increased by over 60 per cent although part of this increase is accounted for by government payment of tax arrears.

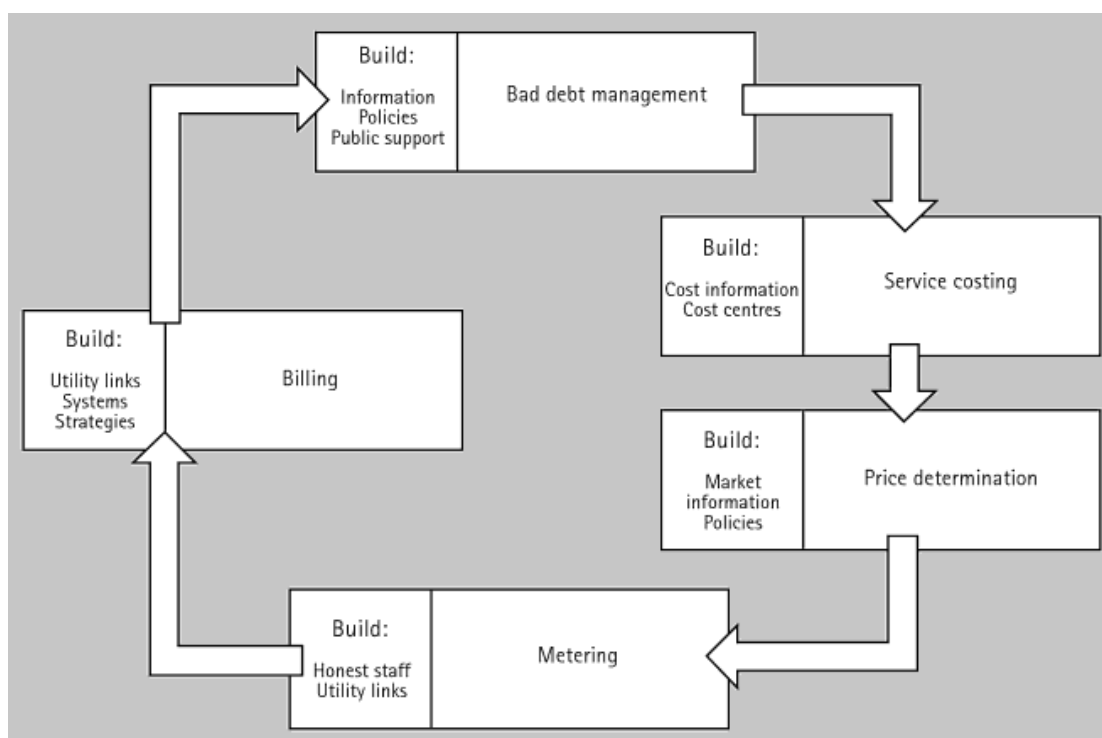
## 2. Background literature

USAID (n.d.) argues that in relation to delivery of services, billing is the principal mechanism that drives all cash flow and is the main source of customer information. Billing is thus critically fundamental for a municipality to succeed. When much of municipality revenue comes from the delivery of services the municipality needs to bill customers regularly and accurately. Payment invoices that reflect the true nature and quantity of services delivered are more likely to be paid.

Agrawal (2008) argues that improving billing, as well as collection services, will have a swift impact on the revenue streams of a service provider. In relation to provision of water and sanitation, the author argues that any successful billing practice must ensure that bills are raised on a monthly basis and based on volumes. This way customers pay for what they consume. This is best carried out through adoption of 100 per cent metering of customer connections. Effective billing and collection systems that are based on these principles can bring about immediate improvements in revenue streams. It can also set incentives for a service provider to effectively charge and collect bills while providing a commercial orientation to services. Other critical components include customer databases, tariff and billing structures, delivery of bills, and facilities for customer payments. In particular, it is essential that providers have updated, robust and computerised customer databases. Using improved technology, such as spot billing, could further ease the billing function, thus improving collection efficiencies and eventually revenue streams. At the same time it is important to note that the institutional arrangements under which service providers operate and provide services determine whether such practices will remain sustainable in the long term. In the shorter term, where there is weak capacity, it may be worth outsourcing billing and collection to private parties with relevant experience, if available.

Blore et al (2004) include billing as a critical part of the tax revenue cycle (see Figure 1). The authors argue that the difference between payment in advance and ex-post billing is a crucial distinction and the first method is the only truly excludable method. To improve collection levels from poorer customers it may be better to include drip-feed payments (e.g. prepayment meters), phased payments to counter short-term fluctuations in income, positive bad debt recovery programmes and debt counselling services.

Figure 1: Tax revenue cycle and capacity building



Source: Blore et al. 2004

Better billing can ensure that what is put into any service delivery system is paid for at the end, providing stronger revenue streams. For example, Kingdom et al (2006) highlights the issue of the considerable difference between the amount of water put into the distribution system and the amount of water billed to consumers. This can be termed as 'non-revenue water' (NRW) and is a common problem with the water systems of developing countries. The high levels of NRW are due to huge volumes of water being lost through leaks, water not being invoiced to customers, or both. Kingdom et al (2006) estimate that worldwide, close to 30 million cubic meters are delivered every day to customers, but are not invoiced because of theft, employees' corruption and poor metering. This affects the financial viability of water utilities through lost revenues and increased operational costs. The authors stress the importance of improving meter reading and billing, noting that a significant portion of commercial losses arise from mistakes in the meter reading and billing chains, because of poor technology, antiquated property registers and data-handling errors among other things.

Misra and Kingdom (2012) argue that meter reading and billing errors, whether involuntary or resulting from fraudulent practices, should be eliminated by limiting the human handling of data. The authors argue that well tested commercial software available on the market should be preferred to what they define as 'home-grown' (i.e. locally built) ones. Water service providers should comply with disconnection and reconnection procedures to prevent the accumulation of large unpaid arrears. Also, particular attention should be paid to those customers that often constitute a large part of arrears. The authors suggest that to reduce billing fraud, tariffs should be uniform. At the same time they note that for political expedience a 'lifeline', or reduced tariff can be proposed but this should still try to cover operating costs,

create an incentive to be financially responsible and have an upper consumption limit that is sufficient for basic needs.

### **3. Case studies**

A number of case studies have demonstrated the potential to increase revenue from better billing and collection processes:

#### **Bangladesh**

Revenue collection increased by 15 per cent following the installation of individual water meters in Satkhira, Bangladesh (World Bank 2012). The move from a fixed, to an individual billing system, increased bill collection efficiency from 80 per cent to 95 per cent and reduced the bill collection period from 15 months to 3 months.

The cost of supplying water was high in Satkhira due to the absence of available surface water and the need to treat underground water for iron and arsenic. Consumers were charged a flat rate depending on the diameter of the connection pipe. This fixed billing system meant that several families living in multi-story buildings were billed for a single house connection. This resulted in huge revenue and water losses for the utility.

New meters were introduced for all households in 2007-08 and consumers charged for the volume of water used. Many consumers, seeing a spike in their bills, lodged complaints accusing the utility of excessive billing and faulty meter-readings. In response, the utility installed a water meter testing area to verify the new billing system and visited households, bringing the meter to the test area and testing it in front of homeowners. The results of 100 tested meters, along with official explanations, served as evidence to disprove any meter-tampering. The utility now provides a bill against readings based on consumption, which customers pay through the bank.

#### **Brazil**

Companhia de Saneamento Básico do Estado de São Paulo (SABESP) is the utility that serves the São Paulo Metropolitan Region of Brazil. Kingdom et al (2006) conclude that SABESP have greatly increased their revenue through better metering and billing of certain key customers.

In São Paulo 28 per cent of total billed metered consumption and 34 per cent of all revenues come from just 2 per cent of SABESP customers. As a strategic decision, SABESP decided to pay particular attention to the meters of these prime customers. Attention had been paid before to this customers but, nevertheless, it was suspected that many meters were significantly underestimating levels of water consumption. SABESP issued contracts for meter replacement of 27,000 large revenue accounts. Following the replacement of meters the total volume of metered consumption increased by 45 million cubic metres, while revenues increased by Brazilian reais (R\$) 172 million (US\$ 72 million). Of this, R\$ 42 million (US\$ 18 million) was paid to the contractors who replaced the meters, with a net benefit to SABESP of R\$ 130 million (US\$ 54 million).

## **Burkina Faso**

The restructuring of the water utility in Burkina Faso between 1990 and 1998 has resulted in a utility with high collection rates and cost recovery (Agarwal 2008). Specific initiatives have subsequently been undertaken that include computerisation of billing systems to create and maintain up-to-date customer databases. Staff conduct monthly billing of customers at the same time as they read meters. This has the added benefit that it helps customers and the utility manage cash flow. To accurately reflect consumption a number of old meters have been replaced with more reliable and sturdier ones. There has been a reduction in the average time between meter reading and invoicing; an increase in metered consumption; and implementation of a computerised administrative system for billing, collection, receivables, complaints tracking and accounting.

These measures have produced a number of improvements including water supply coverage of 85-86 per cent, reduced unaccounted-for water at 17 per cent and improved metering at 100 per cent. Of greatest importance to revenue has been an improved collection efficiency of 95 per cent and cost recovery at 96 per cent of all costs.

## **India**

The Hyderabad Metro Water Supply and Sewerage Board introduced a spot billing scheme for billing its water connections. This helped reduce the billing cycle from three weeks to one day, which in turn resulted in increased cash flow (Agarwal 2008). The Board initially outsourced the billing function to a private party that had relevant experience. Through handheld data logger machines, staff employed by the private party can generate bills on the spot and deliver them to customers. The scheme has been in operation for about 70 per cent of the Board's service area. In the long run, the Board aimed to hand over the bill generation activity through spot billing to its own meter readers. Meter readers were trained by the private agencies on how to generate on-the-spot bills. The Board undertook some restructuring of its current staff, and redeployment and rationalisation of their work schedules, so that each meter reader can be made responsible for about 2,000 connections on average in a month.

At one point there were 280,000 customers who had water arrears. To encourage customers to settle their arrears the Board launched a scheme in June 2004, giving a discount of 10 per cent to those who would pay their water arrears upfront. Alternatively, an instalment facility of 10 instalments was made for those who could not make upfront payments of arrears. There was a record collection of US\$ 4.71 million in June 2004. The scheme, which was due to expire in August 2004, was later extended till September 2004. The collection in September 2004 was also comparatively high, totalling US\$ 4.16 million.

## **Kenya**

In Kenya there were a number of innovations in the 1980's to improve local tax revenues. Blore et al (2004) highlight the cases of Nyeri and Mavoko, which concentrated on billing and collection reforms, in particular focusing on making use of integrated financial management systems (IFMS) to identify tax defaulters and manage bad debts. The authors conclude that the IFMS was a key factor in improving local tax revenues in these cities by synthesising important data and identifying the action required.

## **Philippines**

Since privatisation in 1997, a number of initiatives have been undertaken in relation to water and sewerage services in Manila. This has resulted in a number of improvements including greater revenue (Agarwal 2008). Since 1997 there has been an increase in billed volumes of approximately three to five per cent per year, largely because of an increase in new service connections, identification of illegal users, billing of unbilled services and replacement of faulty meters. The utility has 100 per cent metering on all service connections, which are read monthly. The reading is electronically transferred at the end of the day to the company's computer servers for billing. Bill delivery is outsourced to third parties for most customers, but carried out directly by the utility for large commercial customers. As a result, customer receivables - the money owed by customers to the firm – has seen an 83 per cent increase between 2000 and 2003, while the average collection period has fallen from 86 days in 2000 to 50 days in 2003.

## **Rwanda**

Implementation of an electricity prepayment billing system (EPBS) began after it became difficult to bill and collect revenue from consumers following the 1994 genocide. In 1999, EPBS was rolled-out to all consumers in Kigali city which accounted for 73 per cent of total electricity revenue, 65 per cent of electricity consumption and 58 per cent of customers. In 2000, the government adopted prepayment meters in all of its offices; a decision that boosted perception and demand for prepayment meters. By 2008, 80 per cent of customers used the EPBS compared to 30 per cent in 1998.

Mwaura (2012) concludes that the main advantages of EPBS were: a reduction of utility company operational costs, since only a few employees were required and billing costs were avoided; increased and timely revenue collection; enhanced earnings by the private sector and improved services delivery to electricity users as they could purchase electricity tokens from many places and at any time. Revenue rose in tandem with the increased number of EPBS enrolment, from US\$ 261,000 in 1996 to US\$ 22.9 million in 2008, though part of this increase was attributable to tariff rises.

## **Senegal**

Senegal managed to improve their bill collection level for their water utility through outsourcing billing and collection (Agarwal 2008). The outsourcing process involved contracts with defined incentives and targets. In Senegal's case, the contract included specific and time-bound targets covering areas of operational efficiency, billing and revenues, service extension, service quality, customer services, and capacity building. Following this process, successful bill collection rates improved from 91 per cent to 97 per cent. This was in part due to the government starting to pay its bills, as well as a strict disconnection policy for disconnecting those who defaulted in making regular payments (ibid).

## **Thailand**

The Metropolitan Waterworks Authority (MWA), the municipal water utility of Bangkok has implemented new billing and collection practices which have improved revenues to a sustainable level (Agarwal 2008; Babel and Rivas 2012). Meter readers have been appointed

to read meters on a monthly basis through the use of handheld meter reading devices with portable printers (Agarwal 2008). The facility of an instant bill enables customers to check the amount of water charges right away after the meter has been read. Once the meter is read, the meter reader enters the data, checks the data, and prints an invoice for the customer. The invoice and data is transmitted through the handheld meter reading device to MWA's server and the readings are checked to see if the consumed water amount is unusual (i.e. if it is more than 30 per cent of a three-month average). If it is not, the invoice is handed over to the consumer, otherwise it is returned to the office for further investigation. The back office then undertakes a thorough investigation of the bill including a verification of the meter and, if need be, calls for a replacement of the meter. Once the correct data are confirmed, the invoice is sent to the customer by mail (ibid)

As a result of such practices the overall financial performance of MWA was on a positive trend in between 1998 and 2008. MWA had an operating ratio<sup>1</sup> of around 0.70 and consistently high revenue collection efficiency (Babel and Rivas 2012). Babel and Rivas (2012) conclude that such figures indicate the sustainability of utility operations as costs are comfortably covered by revenues.

### Uganda

In Kampala, the city council have made several attempts to improve property tax collection to boost municipal revenue. In 1999 there has been a programme aimed at billing and collection which includes: a bill delivery drive, media campaigns, better reminders, more payment points, individual pressure on major defaulters, prioritisation of bad debts, and the use of private bailiffs (Blore et al 2004). Since the implementation of this programme revenues have increased by over 60 per cent in two years although part of this increase is accounted for by a substantial payment by government of tax arrears.

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<sup>1</sup> Operating ratio is defined as a company's operating expenses as a per centage of revenue. A ratio below 1 indicates that operating expenses are fully covered by revenue.



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## 6. Additional information

### **Suggested citation:**

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