Cash Flow in Solid Waste Management

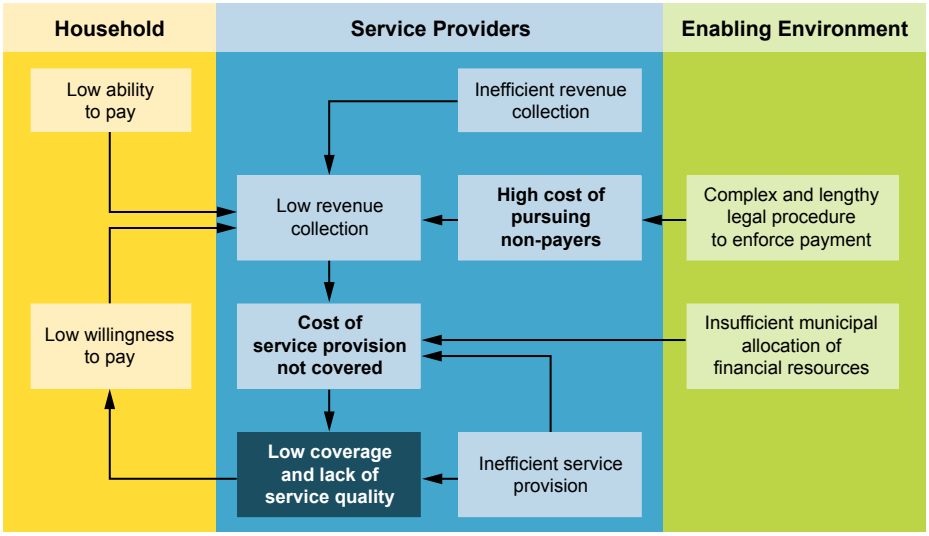
Operational costs to assure daily solid waste service provision and maintenance of equipment are substantial and may range from 20–50 % of the total municipal expenditure. Service levels can be sustained by improving the services and cash flow efficiency. Willingness to pay rises with the provision of better services, thereby contributing to enhance cost recovery. Experience recommends decentralised financial authorities at local government level. Chris Zurbrügg, Birgit Becker, Yvonne Vögeli

Inadequate solid waste management leads to negative environmental impact as well as health and safety problems. Pollution of air, soil and water by indiscriminate waste burning and dumping, as well as the spread of diseases by insects and rodents attracted by garbage heaps, threaten the health and wellbeing of all citizens. Municipal authorities, responsible for the provision of municipal solid waste management services, find it increasingly difficult to fulfil their mandate, which several municipal officers attribute to inadequate funds. A lack of budget may be partly an obstacle for some municipalities, however, the manner in which these funds are spent often have a more significant influence on service quality. Many cities in developing countries spend 20–50 % of their municipal budgets on street sweeping and waste collection, and allot scarcely any funds to waste treatment or disposal. Despite these high expenditures, collection coverage remains low. Often less than 60 % of the generated waste is collected, and the poor areas of difficult access and low political priority are generally underserved. Cost efficiency is often not an objective pursued by the municipal authorities. This is especially true when politicians allocate budgets to the solid waste department. By proving that little can be achieved with the funds available may actually solicit more money from the central government. Introducing user charges is seen as an option to improve cash flow and to enhance accountability for service performance. However, unsatisfactory service provision or even a lack of trust in service quality directly affects residents' willingness to pay and again threatens cash flow. Furthermore, inefficient or ineffective revenue collection systems may also hinder appropriate cash flow and cost recovery (Fig 1).

Solid waste management - A merit good

Solid waste management is a commodity, i. e. a service benefiting the individual household with a positive impact on public health and the environment. Service contributing to private and public benefits has inherent characteristics of a private and public good. Waste collection at household level (door-to-door or curbside collection) provides a certain degree of convenience to the resident and lies in the interest of the household. Non-payers can be excluded from such a service if alternatives are available (such as provision of a collection point). Thus, primary collection has inherent characteristics of a private commodity. However, it is of public interest that residents make use of some form of waste collection service, since littering and indiscriminate dumping endanger the health and environment of all concerned. No one should be excluded from such services, as everyone benefits from the various individual activities of appropriate waste management. In contrast to individual waste collection, public cleanliness and sanitary waste management, to protect the environmental resources (water, soil and air), are thus a public commodity. Solid waste services can thus also be considered and defined as a merit, valuable and under-consumed commodity (or service) if ruled by market mechanisms. In economic terms, the positive externalities of the asset are not internalised by consumers. Aside from solid waste management, typical examples of merit goods are health services, education or public libraries. Households are often only willing to pay for solid waste services from which they can draw individual benefits, such as primary collection. However, they seldom consider the benefits to public wellbeing, like secondary transport, treatment or sanitary landfilling. The attitude "out of sight, out of mind" by residents and authorities severely hinder the meeting of solid waste management objectives to provide a hygienic environment for all to lead a healthy and productive life and protect and improve the natural environment.

Figure 1: Various factors involving different stakeholders may affect cash flow of solid waste management systems [1].



Cost recovery and willingness to pay

Only few cities attempt to achieve full cost recovery of all waste management processes. The principle of cost recovery aims at raising the necessary financial funds to cover all investments and recurring costs of solid waste provision. Capital costs for investments are generally ob-

tained through national or international loans or grants. However, the choice of technologies influences the recurring costs, for which no municipal loans or grants are usually available. Revenues in solid waste management are most often obtained through taxes (e.g. property tax). Access to tax money – if not specifically earmarked for solid waste management – is subject to continuous negotiation with the municipality and, thus, not an assured source of income. Besides, substantial tax recovery is not an easy task given the inadequate property cadastre systems in rapidly urbanising cities with their large and continuously expanding informal settlements, which are unaccounted for and not recognised by local officials. Service provision to such areas is only possible if cash flow can be guaranteed by other means than taxes, for instance by user charges. Introducing user charges is, however, not easy either, though surveys have shown that residents are willing to pay for services if they see improvements and if the tariff is affordable. Difficulties arise when residents historically perceive waste management as a free basic service which "must" be provided by the municipality. Revenue collection rates are often also low where municipalities have implemented service charges. Municipal staff remunerated by a centrally managed budget often shows little incentive to deploy the necessary tenacity in collecting the service charges. In a franchising or open competitive system using private sector or community-based participation, service providers collect their revenues directly from the residents. They are accountable to them and rely on these service charges to cover their costs. This model can enhance motivation to provide quality service and establish efficient revenue collection. Nevertheless, an efficient enforcement system to penalise non-payers is also necessary as service is non-excluding (to guarantee public interest in hygiene and avoid environmental degradation).

		Low-income country	Middle-income country	High-income country
Average waste generation	(t/capita, year)	0.2	0.3	0.6
Average income from GNP	($/capita, year)	370	2400	22000
Collection cost	($/t)	10 - 30	30 - 70	70 - 120
Transfer cost	($/t)	3 - 8	5 - 15	15 - 20
Sanitary landfill cost	($/t)	3 - 10	8 - 15	15 - 50
Total cost	($/t)	16 - 48	43 - 100	105 - 190
Total cost per capita	($/capita, year)	3 - 10	12 - 30	60 - 114
Cost as % of income	**(%)**	**0.7 - 2.6**	**0.5 - 1.3**	**0.2 - 0.5**

Table 1: Cost of municipal solid waste processes (S. Cointreau, cited in [2]).

Photo 1: The choice of technology affects recurring costs. A new collection fleet in Kathmandu.

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Breakdown of costs by process cost accounting

What are the feasible cost recovery models and tariffs required? These and other strategic decisions call for a transparent and well-structured cost analysis of the existing situation. They are essential when benchmarking service components and planning recycling, collection, transport or treatment. However, specific cost data (based on process steps in the waste management stream) is still scarce.

Sandec's solid waste management group has conducted studies on economic valuation of strategic alternatives in organic waste management and has developed a new approach combining the methods of material flow analysis and cost accounting. The approach provides information on waste flows, process costs and overall cost type structures of current and future SWM systems. Due to the growing trend towards user charges, tariff setting has become a key issue for municipalities to tackle. Commonly, provision of solid waste services for the poor costs more than for the rich, as costs are dependent on waste quantities in containers (little waste in many containers are more costly to collect) and on access possibilities by cost-effective vehicles. To avoid such effects, special attention must be given to financial issues to sustain equitable service provision and avoid financial burden for the poor. Municipalities may develop a cross-subsidising tariff model, where the more affluent pay more than the poor. Such tariff models might use the size of property and type of habitat as a proxy-indicator or link the waste service tariff to the water or electricity consumption (as the wealthier tend to consume more of this utility).

Outlook

With increasing private sector participation in service delivery, the importance of establishing equitable tariff models is greater than ever. Experience with community-based organisation of primary collection in Pakistan has shown that decentralised approaches foster participatory processes, and social cohesion may allow tariff setting by taking into account the financial hardship of residents (e.g. widows) and exempting them from waste service charges.

Public authorities can choose to outsource the service to private providers, but positive externalities from service provision justify public interventions to guarantee all households access to adequate service with equitable tariffs and policy goals to be defined. Knowledge of municipal solid waste costs allows authorities to make informed decisions about programmes as well as service improvements and future planning. Sandec is pursuing research opportunities on appropriate and equitable financing mechanisms for recurring cost recovery and methods of full cost accounting, tariff setting and benchmarking efficiency.

[1] Becker, B. (2007): Covering costs of solid waste and faecal sludge management in developing countries – the case of user-fees as a financing mechanism. Unpublished Sandec report, Draft version, January 2007.

[2] Inter-American Development Bank (2003): Economic Instruments for Solid Waste Management: Global Review and Applications for Latin America and the Caribbean. Environment Network. Regional Policy Dialogue, Inter-American Development Bank, Washington, D.C.