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Practice of Waste Payment Collection from Public and the Improving of Its Challenges

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Abstract

Addis Ababa Solid Waste Management Agency has contract out the door to door household solid waste collection to share enterprise and transportation by the city cars at a price rate of Birr 90/m^3 and private association from business sector is paid Birr 90/m^3. Annually needed revenue was 400 million Birr and actual expense is the same. The service is required to provide full coverage; the contribution of the public will comprise 1/4 of the cost required. The gap between what their pays and the actual expenditure made the city administration to subsidize Birr 279 million was one of the critical problems because the existing service charging methodology lacks logic of collective action i.e. service takers which are not using taped water, mainly the business community high solid waste generator and give free service. Increasing the service charging money to solve poor sanitation service coverage by introducing a cost recovery mechanism of user charged service fees on a self financed base. This will benefit all the residences because marginal cost is very lower as compared to the high benefits they receive from the clean environment. The proposed collective action charges and revenue generated are residences 5-20% and business society 42.5% on tap water bill, public transport business Birr 75-100/annual, construction sector per bag 50 cents/cement and throwaway wastes 15-25 cents is crown corks, spring water bottled, mobile cards, chat, lottery can earn 93.1, 34.3, 2.3,5 and 62.1 million/annual Birr respectively. Due to this improving the collection of charging money to enhance the service and create jobs.

Keywords: Financing of waste; Charged; Paid; Service coverage; Enhancing collection

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Introduction

In the ancient times too the municipal solid waste services were funded through flat rate billing, by surcharging on the local property tax that enforce beneficiaries to pay the same cost regardless of the quantity of solid waste generated and cost of disposal. The purpose of the municipal solid waste tariff strategy is to provide a framework and guidance for municipalities in setting solid waste tariffs that align with the intentions of the National Waste Management Strategy [1]. The increased cost of landfilling, the dwindling landfill capacity the financial difficulties facing the municipalities, and the increasing environmental concern on the nation's solid waste practices have increased interest in making disposers responsible for the amount of waste they dispose. Following EPA's strategy for integrated waste management, a hierarchy or a list of preference for waste management includes waste reduction, waste reuse, recycling, composting, and at the lower end of the spectrum, incineration and disposal, a variable or volume-based rates has seen as an effective way to increase waste reduction, reuse and recycling, and decrease reliance on dwindling landfill capacity. The incremental cost approach argues that users should be exposed to this rising marginal cost of disposal, as this will ensure that the proper economic signals are sent to consumers to reduce waste [2]. This variable cost pricing cleansing management service fee system, were based on the volume of solid waste disposal. Therefore; household's solid waste disposal costs change with the number of bags of waste disposed since each bag has a fee. As a result, the less trash set out for disposal, the lower the cost to the resident. Experience from many jurisdictions shows that weight-based waste collection charges result in significant reductions in consumer waste; and develop the customer the sense of direct control over how much they are charged. But there are some indications that the implementation of pay by the bag system contributes to an increase in back yard burning and roadside dampings.

The pioneer market policy tool use in urban environmental service provision was exercised in the ancient times in China to control rate infestation. This market-led rat infestation controlling system of paying a lottery/tombola ticket to individuals per killed rate was effective incentive for controlling the rate infestation. And latter on UNFCCC in 1997 Kyoto the carbon cap and trade system has developed the market environmental service system. Ethiopian cities use the traditional method of flat rate system usually by incorporating into the local land property tax. The flat rate service fee system makes the cleansing management sector highly subsidize and low service coverage because: There is little association between the magnitude of the tax and the quantity of household waste generated. The sanitation charge is the same regardless of the quantity of solid waste an individual household disposes [3,4].

Mekelle and Adama cities are the first and pioneer cities implementing the creative problem-solving market-led municipal solid waste management by contract out the service to Micro and small enterprise (MSEs) in unit price bases. In Mekelle the unit price for Private Solid Waste Collectors (PSWC) was Birr 33.30/m^3. In Adama the unit price rate of PSWC is Birr 37.50/m^3 and Small Solid Waste collectors (SSWC) is Birr 27.5/m^3. Now in Mekelle the unit price Birr 25/m^3 waste disposed is determined via competitive tendering. This experience makes the service providers to deliver the sanitation service at lower price rates and reduce the cost burden on the service takers.

Policy and Legal Framework

Federal Democracy Republic of Ethiopia (FDRE) constitution Previous policies of the country regarding urban environmental and land use planning did not give attention to the relationship between the natural ecosystem and the man-made physical environment. Moreover the spontaneous growths of the cities which were characterized by unregulated population growth cause to loss the urban environmental qualities. It is the FDRE Constitution for the first time recognized the environmental right under the Article 44 stated: “Every citizen has the right to live in clean and unpolluted environment.”

To assure the constructional environmental rights, an environmental policy has developed in 1997 by EPA. Concerning the importance of the hospitable urban environment, “the Human Settlement, Urban Environment and Environmental Health” policy stated “To plan and manage the urban environment so as to satisfy the physical, social, cultural, health and other needs of their inhabitants on a sustainable basis, to integrate harmoniously, human-produced and natural elements in the development and management of urban areas in order to maintain the natural ecosystem”.

Urgency is required to give priority to waste collection services and to its safe disposal.

Adapt the “polluter pays” principles while endorsing the precautionary principle since pollution is likely to occur, and ensure that polluting enterprises and municipalities and whereas council their own appropriate pollution control facilities”. The polluter pays principle basically means that the producer of goods or other items should be responsible for the costs of preventing or dealing with any pollution which the process causes.

Market failures with regard to the pricing of natural, human-made and cultural resources, and failures in regulatory measures shall be corrected through the assessment and establishment of user fees, taxes, tax reductions or incentives.

It is an economical way of charging environmental taxes by pricing the environmental damage caused or the actual pollution cleanup cost incurred where prevention is unlikely to realize.

To promote the construction by individual family of their own houses and create conducive conditions for communities and individual families to make improvements to their immediate habitats as well as to human and demotic waste disposal facilities.

Based on the FDRE environmental policy directives, to address the major problems associated with the urban environment managements, environmental proclamations rectified to date are:-Environmental Impact Assessment (Proclamation No. 299/2002), Environmental Pollution Control (Proclamation No. 300/2002), Establishment of Environmental Protection Organ (Proclamation No. 295/2002), Solid Waste Management (Proclamation No. 513/2007). To solve this poor financial capacity caused low cleansing management service coverage, the city government of Addis Ababa based on the Charter 381/1995 Article 83 (1)f authority it has developed a solid waste management policy. Accordingly it has also enacted a solid waste management regulation No. 13/1996 and cleansing management regulation No. 24/2002 that authorizes the agency to introduce a collective action sanitation charges from the service taker for the sanitation service provided. Based on these policy and legal frameworks the city council will be expected to approve the study proposed cleansing management charges regulation.

Objectives

1. To produce a document that could be used.
2. To capacitate the cleansing management of the city by introducing a market-led service charges as per the service taker amount of waste generated and cost of disposing.
3. Introduce a well-designed collective action cleansing management charging system.
4. To make the cleansing management a self financing with application of a user charged sanitation service.
5. To provide high cleansing management service coverage at low service charged fees.

Methodology of the Study

To carry out the task of the study as per the TOR with my agency officer has used the following methodologies:-.

Data collection and compiling

Both primary and secondary data’s/information’s have been collected for study reports. Focus group discussion and visual observation were the main primary data’s/information sources. Published, unpublished and electronic documents were the

secondary data's/information's sources that supplement the findings of the study, Structured and non-structured interviews of the relevant officials and experts.

Data analysis

Quantitative and qualitative analysis, computation and tabulation of solid waste management service charge.

Results and Discussion

Primary collection

Primary collection operation enables to transfer solid waste from the sources of generation to the secondary collection facilities.

Door to door: Before the introduction of the Mekelle/1998 Market-led MSWM experience in the city BPR/2001, the door-to-door solid waste collection has two options: The first option is that households take their solid wastes and dispose it in to a container nearest to their home, The second option is having contract agreement with private sanitation enterprise to collect their wastes to the container. Now the door to door waste collection service is fully out sourced to share enterprise at a price rate of Birr 90/m^3. The implementation of this market-led cleansing management encourages the sanitation service providers to collect more and earn more income that improve the sanitation coverage from <40% to 100%. In the budget year 2009, the agency has paid Birr 274000000 to 578 MSE's (5989 members 90% are women) for the 9078 m^3 waste per day collected comprising 96% service coverage.

Though the Business processing Reengineering (BPR) market-led Municipal solid Waste Management (MSWM) system has earned a remarkable improvement as compared with the former command and control systems; still there are drawbacks that discourage the service providers MSE's to collect waste from households that are far from the communal garbage container. However, these residences are obliged to pay sanitation service fees for the services that they are not provided. Such residences are committed unauthorized dumping of the garbage in drainage lines, open spaces, street sides, or informally burned.

Street sweeping: The agency provides street sweeping services daily (1x) for a total of 2031 km. The whole service is done manually by 4762 laborers; using tools like straw broom, wheel barrow and shovel. Wheel barrow is used for primary collection of wastes from street sweeping disposed into containers located in nearby (+ to Private Solid Waste Collection (PSWC) and share enterprise). The other handling method that gets primary collection service by street sweepers is street side posted dust bins. Currently there are more than 7500 dust bins posted on the main streets. The street users and pedestrians are expected to drop their solid waste piece in the dust bins when they are out of their homes and business offices. The numbers of the dust bins are inadequate and the public are not accustomed to drop solid wastes especially paper and plastic materials on the dust bins, accordingly in the budget year 2009 the agency has expensed Birr 11408512 to collect 6% of the waste production from the total.

Secondary collection and transportation

Communal storage containers: In communities where house-to-house collection is not appropriate, the assembly was designated using a communal storage sites where solid waste can be discharged into the fixed or moveable container. Addis Ababa cleansing management agency sited 506 communal storage containers all over the neighborhoods because it believes the storage allows safe retention of the solid waste for a sufficient period of time between primary collection from the different sources and secondary collection. Though the city sanitation regulation obliges residences to clean 20 meter radius of their premise, the agency cited garbage containers <20 meter distance even beside of the residences property line. Most of the residences don't agree with the current location of the garbage collection container: Some believe that "It is so near to their residence unit" it increased vulnerability to bad odor and diseases, some other believe that as "it is far from the residence "the service providers were negligence to collect waste from their residences (**Figure 1**).

Skip loaders: The communal storage containers were designed to be mounted by the skip loaders and the agency is the only institution having 112 skip loaders, 7 side loader and 44 compactors for collecting and transporting to Koshe disposal site. The trucks and compactors have a carrying capacity weighed 2112 to 26400 kg at a time but the skip loading hydraulic system was designed to lift 30 quintals at a time. As a consequence the trucks are working at 25-30% efficiency and the cost is higher. The costs of SSWC provided by the skip loaders costs Birr 55.40/m^3, now this cost is higher than Birr 90/m^3 whereas the SSWC provided by the private sanitation plc is paid Birr 90/m^3. These skip loaders daily collect, transport and dispose 9078 m. cube waste comprising 96% coverage. For this service the agency expensed Birr 400000000/annual **(Figure 2)**.

Figure 1 Secondary waste collection place.

Figure 2 Skip loading cars to carries waste.

Compacters: There are 44 compacters owned by the 87 private sanitation plc that provides a door to door waste collection from the business sector and transport to the damping sites daily 1700 m^3 at a price rate of Birr 90/m^3 (**Table 1**). This year the agency has paid Birr 107000000 to the private sanitation plc for the 1700 m^3/day solid waste disposal service provided (64%).

Existing disposal facility

The project office uses dozers and different earth moving heavy machineries for proper disposal of the solid waste. There are two disposal systems namely Koshe open disposal site and new sanitary landfills under construction.

According to the budget year 2009 E.C the project office has expensed Birr 298212300 for properly disposing 9078 m^3 solid waste daily (costs Birr 4/m^3) (**Table 2**).

Financial aspects

Modes of service payment: PAYT systems fall into volume-based and weight-based categories, described in the following section [5]. PAYT offers a market-based solution that encourages behavioral changes that serve the public welfare [6]. Economists often advocate unit pricing approaches like PAYT because of their efficiency [7]. Residents frequently overuse solid waste services in a flat fee system because local tax levies or flat fees for solid waste collection remain largely invisible to consumers [7]. The residents are made to pay the sanitation fee by surcharging from 5-20% cost on taped water monthly bill (Birr from 12-54 mill/annual) and the business sector are paying a flat rate of 42.5% during a renewal of the annual business permit (Birr 5 mill/annual). The taped water supply price rates are categorized/graded into residences and non-residence though there are various land uses. Therefore; it is not possible to determine here the rates of sanitation services charges separately for the various sources of solid wastes. The criteria used to determine the sanitation charge categorization for the waste collection service is administrative importance rather than any rationality.

Service fee collection versus budget requirement and budget allocation: In Japan unit-charging programs for waste were available in 30% of municipalities in 2003 and, interestingly, South Korea had initiated a nationwide payas-you-throw (PAYT) program back in 1995 [8]. According to the Agency financial sources, the gap between what the public pays for the sanitation service and the actual cleansing management expenditure is one of the critical problems in the solid waste management.

For instance in the budget year 2009 the agency has cost Birr 400 million for 9078 m^3 waste collection daily, transportation and disposal comprising 30% service coverage. And the sanitation revenue collected from the service takers were Birr 121 million. This means what the public pays for the service provided comprise 1/3 of the total service expenditure rendered by the agency. Therefore the budget required to collect and dispose fully the solid waste generated in the city, the contribution of the public pays would share 1/3 coverage.

Consequences of the poor sanitation service coverage

As a result of the low financial capacity and communal garbage storage situated far from the residences caused low service coverage that compelled the residences to dump their garbage illegal is the cause for environmental impact disease in the city remains higher. Today most of the city environment impact

Table 1 Comparisons of capacities of compactor, non-compactor/flat bed/and skip loader trucks.

Item	Type of secondary solid waste collecting vehicle		
	Compactor truck	Non compactor/flat bed	Com cont skiploders
Waste density at household (kg/m^3)	350	350	350
Waste density in truck (kg/m^3)	730	480	480
Volume occupied by waste (m^3)	9.9	17.8	8
Payload (kg)	730 × 9.9=7,200	480 × 17.8=8,500	8 × 480=3840
Weight of truck unloaded (kg)	9,500	7,000	11160
Total weight of loaded vehicle (kg)	16,700	15,500	15000
Cost per m^3 (Birr)	>35	30	>80

Table 2 Cost by type of service.

Type of service	Amount of solid waste collected in m^3	2009 Annual cost in Birr	Price rate	Remarks
Door to door collection by MSE	9078	298212300	Birr 90/m^3	Previous cost from 10 to 40 birr/m^3
Street sweeping	544.6	33618241	Birr 7221/m^3	2 kilo meters by 3 person
Skip loaders SWC transported to dump site	132,005	112710425	Birr 85/m^3	Before BPR Birr 54.4/m^3
PLC primary and secondary solid waste collection	1634	107000000	Birr 90/m^3	From business society
Disposed	1407035	5628140	Birr 4/m^3	
Total		400,000,000	Birr 444/m^3	Average to pay more than 400 Ethiopia birr

diseases comprising >70% are caused by environmental problems of water, air, and land pollution. Now living in Addis Ababa is getting health riskier. City residences are spent >Birr 300/annual/cap in damages from unhealthy level of environmental pollution (source MoH 2007/8 health cost was US $16.1/annual/cap) but on contrary a lot of waste producers business sector pay nothing/insignificant for their part in this assault.

Projection of solid waste generation and service cost

According to the recent administrative set-up the city administration is organized in 10 sub-cities and 119 Woredas with a total population of 3.1 million (CSA). Now the average per capita solid waste generation rate, according to the agency is 0.45 kg/day. Now the city generates 3000 tones or 9078 m^3 solid wastes every day. The waste generated by source comprises residence 76%, business 9%, street sweeping 6%, hotel 3%, and hospitals 1%, Assuming that the existing 5.3% population growth rate would remain the same for the planning period seems unjustifiable as it is difficult to control and dictate the natural population growth, migration, the economic growth rate, etc. the projected waste generated and service costs for the coming 10 years will be as follow in **Table 3.**

The Ethiopian climate resilience green economy document states in 2010 the GDP per capita was US$ 380 and the waste generated in the urban is 0.33 kg/cap/day. By 2030 the GDP per capita is projected US$ 1838 and the waste generated in the cities will be 0.44 kg/cap/day (based on Ethiopia solid waste study and IPCC benchmark for sub Saharan countries).

Cleansing management charge collection mechanisms

Market-led MSWM: An environmental policy was developed in 1997 by Ministry of Economic affairs and EPA to assure the constitutional environmental rights to citizens.

• Legislative tools: Proclamations developed from such policy tools are characterized by the Do's and Don'ts laws and command and control regulations. For instance the city Addis Ababa 2001 BPR study plans to control the illegal damping activities by rising the regulatory from 10% to 100% coverage using a 7/24 working scheduled and obligating residences to do their responsibility of keeping clean 20 meter radius out of their premise.

Such laws are hard to put on the ground in the absence of environmentally sound residences. Even sometimes the municipality abuses the laws by citing a communal garbage container in nearby <20 m or beside to the premises of the residences.

• Communication tools: Proclamations developed from such policy tools are characterized by public participation and awareness laws like waste reduction, reuse, recycle and willingness to pay for the sanitation service providers. Such awareness should be supported by attitudinal changes and finally supported by action. The 2001 BPR was planned to raise the awareness from 19% to 100% to make the city clean.

Awareness ⇒ Attitudinal ⇒ Action for 3R's and willingness to pay for the sanitation service providers is a long process. Those residences passed throw the process and willing to pay for the private sanitation service providers.

If the level of the service were confined to those individuals who are willing and able to pay, the service would be underprovided with negative health consequences to all inhabitants including to those who afford to pay for the service. This is true also in Addis Ababa before the BPR/2001 implementation.

• Market/economic tools: Proclamations developed from such policy tools are market oriented laws like polluter pays, effluent charges, user charged taxes, eco-friend incentives etc as a pollution control and environmental service charge. In Ethiopia this policy tool based laws and regulations in the area of MSWM are not well practiced.

This problem-solving cleansing management charge study uses the economic policy tool of charging a sanitation fees as per the service taker amount of waste generated and pay for the cleansing management service provider MSE's as per the unit price and amount of waste collected, transported and disposed. For the first time it was implemented in Mekelle (February, 1998). Later on after a national consensus reached on project study in the 2nd city day, Adama was selected model city for testimony and further developed in collaboration of our consultancy firm, Adama City Administration and FDRE Minister of Urban Plan Development and Construction. This make the municipality to fully contract out the cleansing management to MSE's and develop a self financed public service sector.

Table 3 Projected waste regeneration and budget require.

Year	Projected		
	Population	Waste generated in m^3	Cost required
2011	2,966,645	1,550,409	204,654,022
2012	3,028,944	1,582,967	208,951,756
2013	3,092,552	1,616,210	213,339,743
2014	3,157,496	1,650,150	217,819,878
2015	3,223,803	1,684,804	222,394,095
2016	3,291,503	1,720,185	227,064,371
2017	3,360,625	1,756,310	231,832,723
2018	3,431,198	1,793,191	236,701,210
2019	3,503,253	1,830,848	241,671,936
2020	3,576,822	1,869,296	246,747,046

The cleansing management fee collection mechanisms

Based on the socio-economical conditions of the residences in association with the nature of the solid waste generated, different countries use different sanitation service charge collection mechanisms. The different practices from local and overseas experiences are described below:

The direct method: This method of sanitation charged fee collection mechanism makes the service takers pay directly to the sanitation service providers on the volume or weight unit pricing rate of the solid waste disposed. Variable rate or volume-

based disposal fees simply means that the customer pays for the amount they dispose. The types and elements of such systems include:

1. Volume based/Prepaid system:

- Variable can system: Customers are billed on the number and/or size of cans subscribed.
- Prepaid bag system/Pay-by-the-bag: Customers purchase special garbage bags with logos.
- Prepaid tag or sticker: Customers purchase tags or stickers that are affixed to the waste containers set out for collection and disposal.

2. Postpaid system/Weight-based system.

- Weight-based systems charge households for each kilo gram of waste disposed.

3. "Pay-as-you-throw" system.

- This is making the polluter to pay by surcharging variable rates on source of waste consumable goods for the waste generated disposal costs. Communities that implement the "pay-as-you-throw" variable rates influence consumer purchasing behavior by giving them an incentive to reduce household garbage and buy less wasteful packaging that reduce tonnage waste going to disposal facilities.

These price signals are an effective way of influencing customer behavior. Charging refuse rates that vary with the level of waste disposed can bring market-style decision-making to solid-waste management customers. This provides an incentive for waste reduction; however some indications that the prepaid/postpaid bag implementation programs contributed to an increase in backyard burning and roadside dumping. When compared to the other alternate methodologies the direct method is the most fair way of charging because it is directly proportional to the amount waste generation and disposal costs. It is applied on cities of the developed countries having well developed socio-economic and environmentally sound society.

The indirect method: This method of fee collection is important in cities where the application of the direct method is hardly possible. It is based on the analysis that the volumes of solid waste generate vs. individual's income i.e. an individual with a relatively higher income (high purchasing power for consumable goods) will generate relatively higher amount of solid waste than the lower income. An individual's utility services expenditure and revenue tax are determined by the level of economic income. That is an individual with a relatively higher income will have a relatively higher expenditure for utility of services, pays higher amount of tax and also generate relatively higher volume of solid waste than the lower income one. Based on the above relation, there are two different kinds of cleansing management charge collection mechanisms:-

1. Surcharging on utility services bills: The logic of this fee collection uses the relation of utility service bills for solid waste generation. Each service taker's utility services expenditure will determine the sanitation surcharge. The basic utilities services that are highly associated with income and solid waste generation are: electric, telephone and taped water supply.

- Surcharging on electric bills: This method of fee collection use the relation of monthly electric consumption of the service taker's for the solid waste generation. It is applied in cites with >90% of the residences use electricity for cooking food. The logical relation between electric consumption is directly proportional to food cooking and this will also determine the solid waste generation. The monthly amount of sanitation surcharged is determined by the service taker's amount of electric consumption i.e. a service taker with high electric consumption, he/she will generation relatively higher volume of solid waste and surcharged high sanitation fee and vice versa.

Higher economic class ⇒ High electric consumption⇒ High waste generated

Lower economic class ⇒ Lower electric consumption⇒ Lower waste generated.

- Surcharging on telephone service: This method of sanitation surcharged fee collection is based on the logical relation between monthly telephone service bills of each sanitation service taker with the level of income and solid waste generation. It is applied in cities with > 90% of the residences have at least a single phone line access.

The sanitation surcharged is determined by the service taker`s telephone bills i.e. a service taker which has relatively high monthly telephone bill, he/she will pay relatively high sanitation surcharge and vice versa.

Higher economic class ⇒ High telephone consumption⇒ High waste generated

Lower economic class ⇒ Lower telephone consumption⇒ Lower waste generated.

- Surcharging on tape water bills: This method of fee collection is based on the monthly water consumption of the service taker. It is applied in cites with >90% of their residences use tap water for their day to day activities. It uses the logical relation between water consumption and income levels in association with solid waste generation i.e. higher income individual consume more goods and water that causing to generate more solid waste than the lower income individual (**Table 4**).

The sanitation surcharged is determined by the service taker monthly water consumption bills i.e. service taker consuming more water will pay relatively higher amount of sanitation surcharge and vice versa.

Higher economic class ⇒ High water consumption⇒ High waste generated

Lower economic class ⇒ Lower water consumption⇒ Lower waste generated.

2. Surcharging on revenue tax: It is an indirect method

Table 4 Water consumption vs. solid waste generation.

Country	Water consumption	GNP per Capita[1] (1995 USD)	Current Urban MSW Generation (kg/capita/day)
Low income	50-100 lit/cap/day	490	0.64
Middle Income	200-300lit/cap/day	1,410	0.73
High Income	>350 lit/cap/day	30,990	1.64

fee collection mechanism based on surcharging on the revenue tax. The service taker's revenue generated determines the revenue tax and solid waste generation i.e. high income individual will pay high revenue tax and also will generate high volume of solid waste than the lower revenue taxed one`s.

More wealth and business ⇒ More property and business tax ⇒ High waste generated

Low wealth and business ⇒ Less property and business tax ⇒ Lower waste generated.

This could be applied in residences with good revenue recording accounting system for their revenue generated from their business activities.

- **Flat rate payment:** This method of fee collection mechanism uses a fixed payment rate which is the same to all the households of a given city. The monthly or yearly amount that each household pays for the service of solid waste collection and disposal is set by a negotiated agreement reached between the service takers and the sanitation service provider.

The requirement for the application of this technique in any given city is that most of the societies in that city must have an equal range of economic status. The mixed land use strategies and also the wide range of income disparities within the population of our country cities are the main reasons that make the application difficult and willingness to pay has to be established with the different income levels households and businesses.

The success of such cleansing management charge collection mechanism depend more on awareness, attitudinal change and action to willingness to pay of the households to sanitation service providers. Therefore, they tend to concentrate on households that can afford to pay for the sanitation service providers. It was well known that the safe disposal of refuse has wider public health benefits. If the level of the service were confined to those individuals who are willing to pay in the form of user fees, the service would be underprovided with negative health consequences to all inhabitants including to those who afford to pay for the service.

Sanitation service charge collection mechanism in most of our country cities that is provided by the private sector use this flat rated charging system and the sanitation service were limited only to those willing to pay.

Proposed cleansing management charge rates

General principles: In order to determine the solid waste service charge rate the full costs of solid waste service provision must be calculated even though a policy decision is required as to what portion of the full cost components should be recovered. Then the proposed service charge revenue collected for the cleansing management should consider the following logics and principal assumptions.

1. Logic of collective action: It was well known that the safe disposal of refuse has wider public health benefits. If the level of the service were confined to those individuals who are willing and able to pay in the form of user fees, the service would be underprovided with negative health consequences to all inhabitants including those who afford to pay for the service. Therefore user charged sanitation fees has to address all the beneficiaries and it should not allow free riders. Such a collective action charge-benefit sanitation system would make the polluter to pay for the cleanup cost and benefit all the residences.

2. User charged: In reality, nothing in life is free, and always there are real costs to the society in providing any service. The Polluter Pays Principle is a principle where the polluting party pays for the impact caused to the natural environment. With respect to waste management, this generally refers to the requirement for a waste generator to pay for appropriate disposal of the waste.

User charges should be levied on the direct recipients of benefits of the cleansing management services. The lower economic class residence produce less wastes are charged lesser and higher income residents that have better purchasing and produce more wastes are charged more.

3. Purpose-linked: Thus, the main economic rationale of user charges is not merely to generate more revenue but to promote economic efficiency and rationality. Therefore, sanitation charges should be purpose-linked and used for the intended purpose cleansing management. Public acceptance tends to be higher for purpose-linked charges than for taxes. This public service will improve the efficiency with which the local urban government makes use of resources/revenue collected.

4. Cross subside: The EFDR tax policy states that the higher income people have a moral and legal obligation to subsidize the lower class using different progressive tax rates (equity distribution). Because of variations in affordability of different income groups to pay for the service provided, the sanitation charges fees should be determined based on cross subsidy.

Therefore; cleansing charges should be designed to make the wealthy pay proportionately more to offset the undesired impacts using progressive charge rates. It would need to be lowered even more for poorer people. From logical point of view the high income residences are responsible for generating more wastes whereas the low income people and kids are the most vulnerable for environmental pollution due to low immunity. The clean environment benefits more to the poor and kids <5 year old. Pro-poor implies that the overall aim is beneficial towards the poor/however there is also a view that the poor do not

generate significant waste, that they reuse and minimize waste as a survival mechanism.

5. Revenue neutral: The cleansing management charges should not put a burden on the business community i.e. service charges should not influence behavior to consume the product/non-effluent charge.

6. Instant charge: The sanitation charges should be instant charging rather than the periodical charging because service takers are happy and ready to instantly charged sanitation service fee collection mechanism while he/she is generating the waste.

7. Rationality: According to FDRE MOH the per capita annual health cost in 2007/08 was US$ 16 and 75% of the disease are caused due to lack of environmental sanitation. Therefore; the sanitation charged costs are insignificant as compared to the health benefit earned.

Modes of cleansing management service fee collection: Taking into consideration the above general assumptions, the existing financial cost analysis and the projected sanitation service expenses, the following charged fee collection mechanisms are proposed to develop a self-financing cleansing management sector. The unit price rates charged as per the nature and amount of solid waste generated are described as follow:

1. Surcharging on taped water for residence sanitation service: Solid waste generated from the residences comprising 74% of the city waste and the sanitation service fees should be collected through surcharge on taped water bill, because >95% the water supply comes from taped water and the taped water consumption determine the income level and solid waste generation. This mode of service fee collection mechanism is fair and enforces each individual to pay for the sanitation service. Addis Abeba is the first city in the country to introduce a sanitation surcharged of 5% on taped water bill since 1996 and now scale up to 20% surcharge.

According to the information from Addis Ababa Water Supply Office, the monthly water consumption of the city is around 4 million meter cube. Using the existing cleansing management service surcharged 20% cost on water bill as per the AAWSA payments block rates already modified and in use starting from January 2003, the agency can generate revenue amounted Birr 93071329.70/ann (42.5% rise in the agency revenue b/c of the newly introduced AAWSA water bill progressive rates) for the cleanup cost of 1,087,558 m^3/ann solid waste generated from the residences (**Table 5**).

2. Surcharged on revenue tax: This sanitation charged collection mechanism is important to the wastes generated from the non taped water consuming business sector which are responsible for 26% of the city waste generated. Therefore; the business sector should be responsible to pay for cleanup cost by surcharging on the annual revenue tax.

3. Surcharging on business tax: In AA annually 382,115 m^3 wastes is generated from the business society, therefore agency has to surcharge 5% cost on the annual revenue taxed to earn Birr 34302171 for the cleanup.

4. Surcharging on property tax: The public transporting taxi, minibus, midi bus, city bus, intercity bus etc, which are parking fee exempted, are the source of waste generated in the fermatas/bus stations and they are the beneficiaries from the street and bus station sanitation provided. For instance in Adama a sanitation service surcharged Birr 18/annual during the annual business permit. Therefore these service takers have to be charged for the cleanup cost through surcharging on annual property and business permit tax as per the number of seats (**Table 6**).

5. Surcharging on cement bags for construction wastes: According to the FDRE solid waste management proclamation No. 513/2007 stated: Construction permit shall be issued only when the building contractor deposits a legal valid and/or any other instrument to insure the environmentally sound dispose of construction debris or excavated earth. But actually construction wastes are being disposed illegally on streets and open spaces. Therefore, the city administrations have to surcharge on the cement bags for the cleanup costs of the construction wastes because construction waste generated is determined by the amount of cement used.

Table 5 Proposed sanitation fee surcharged on taped water consumption of January 2011.

Customer type	Block type	No. of water meter	Water bill	Volume of water used	Water bill cost in %	Volume of water consumption in %
Domestic	0 to 7 m^3	155,148	1,315,655	517,824	3	11
	8 to 20 m^3	67,862	2,633,431	808,396	7	18
	Above 20 m^3	20,883	7,735,572	1,105,022	20	24
DOM Total		243,893	11,684,658	2,431,242	31	53
FOU/public uses	0 to 7 m^3	249	787	249	0.002	0.01
	8 to 20 m^3	189	5,390	2,743	0.01	0.06
	Above 20 m^3	961	147,667	78,691	0.4	1.72
FOU Total		1,399	153,844	81,683	0.40	2
Non Domestic	0 to 7 m^3	15,445	234,576	44,773	1	1
	8 to 20 m^3	10,688	750,971	134,906	2	3
	Above 20 m^3	11,238	25,398,264	1,871,857	66	41
NONDOM total		37,371	26,383,811	2,051,536	69	45
Grand total		282,663	38,222,312	4,564,461	100	100

Table 6 Sanitation surcharge on public transport per seats.

Category	No. vehicles	Surcharged fee rate	Revenue generated
Taxi less than 5 seat	9,679	75	725,925
Taxi Seat between 9 and 11 (mini bus)	8,550	75	641,250
Midi bus (seat between 25 and 30)	649	200	129,800
Bus seat between 31 and 45	368	250	92,000
Bus seat greater than 45 AA Plate Code	310	300	93,000
Bus seat greater than 45 AA and ET plate Code	2,004	300	601,200
Sum	21,560		2,283,175

Table 7 Throwaway crown corks.

Beverage type	Sales in bottles				Revenue from service charge 10 cents/crown cork
	2000	2001	2002	2003-plan	
Beer					
St, George	56,714,856	64,811,616	69,634,944	72,754,668	7,275,466.80
Dashen				18,720,000	1,872,000.00
Meta plan				15,000,000	1,500,000.00
Harar	6,294,270	7,757,625	9,362,420	7,644,569	764,456.90
Bedelea	7,643,773	6,172,012	7,838,993	7,379,878	737,987.80
Sum				121,499,115	12,149,911.50
Soft drinks					
Moha bottling	55,515,168	56,213,280	59,928,720	72,044,544	7,204,454.40
East Africa bottling		172,429,824	167,985,840	184,724,568	18,472,456.80
Ambo Mineral water	41,131,687	36,088,968	38,861,863	36,486,575	3,648,657.50
Sum				293,255,687	29,325,568.70
Total sum				414,754,802	41,475,480.20

Higher Construction ⇒ High Cement consumption ⇒ High waste generated

Lower Construction ⇒ Low Cement consumption ⇒ Lower waste generated.

Therefore by surcharging 25 cents per cement bag, the city can generate an annual revenue amounted Birr 2500000 from 5 million quintal cement (data needs to be justified).

6. Pay-as-you-throw unit pricing: These are wastes throwaway by people after they have used. Such throwaway wastes are cleaned by street sweeping sanitation service. The introduction of these instant charged, which is revenue neutral, on throwaway wastes will help to cross-subside the cleansing management costs.

7. Charging on throwaway crown corks: At national level more than 1 billion crown corks are throwaway annually from drinking bottled beverage. In Addis Ababa too annually more than 400 million crown corks are throwaway from bottled beverage uses. Therefore; using a sanitation charge of 10 cents per bottled beverage for the cleanup cost of the throwaway crown corks, the city can generate annual revenue amounted Birr 40 million (**Table 7**).

8. Charging on throwaway bottled spring water: Currently due to the good investment opportunity the number of investments in the purified spring water production is increasing from time to time. The major potential market areas are the cities and Addis Ababa takes the lion share. In Addis Ababa annually more than half million plastic bottled spring water were sold comprising 75% out of the nation sales. Therefore; by charging 10 cents per bottled spring water for the cleanup cost of the throwaway plastic bottle, the city can generate annual revenue more than 20 millions birrs.

9. Charging on Throwaway pre-paid mobile voucher cards: Currently at national level 261 million pre-paid mobile voucher cards are throwaway from cell phone customers. In Addis Ababa too annually from the sales of 106 million pre-paid mobile voucher cards, that would be throwaway as waste after use, the agency has to charge for the cleanup costs provided. Then by surcharging 10-25 cents per voucher card, it can generate an annual revenue amounted Birr 16.1 million (**Table 8**).

10. On throwaway chat Gereba: In Addis Ababa the waste generated from chat chewing/GEREBA is higher in proportion in the streets. Therefore for the cleanup cost of the 13800 tone chate from the street, the city administration has to charges 20 cents/kg chate (700 Birr/NPR-Isuzu) to generate an annual revenue amounted Birr 2700000.

11. On Throwaway Lottery cards: The Ethiopian National Lottery (ENL) is the only institution authorized to do a lottery business in the country. ENL sales annually 40 million cards and 70-80% of the

cards are losers lottery throwaway as wastes. Addis Ababa market share comprises 54% of the country sales and it is the highest in the country that losers lottery cards disposed. Therefore for the cleanup cost of this huge amount of discarded lottery wastes, the city administration has to charge 5 cents per the loser lottery to earn revenue amounted Birr 2 million/ann (**Table 9**).

Generally from the above cleansing management charges, the city can generate annually Birr >197 million to fully collect and dispose >115 million m^3 waste generated in the city at full cost recovery and make the cleansing management a self-financing public sector (**Table 10**).

Hazardous wastes service charges: Hazardous wastes require special care, handling, transportation and incineration sanitary landfill facility. Therefore; with a close regulatory and follow up of the cleansing management agency, this sanitation service have to be provided by MSE with a special contract agreement with the hazardous waste generating institutions (medical, industries, factories, research etc).

For the determination of the cleansing management monthly fees using the direct and/or the flat rate systems, the following factors has to be considered: Toxicity of the waste, income, income, service required, complexity of the prevention mechanism, development opportunity/external cost.

Collective responsibility implementation modalities

For the implementation of the logic of collective action charge-benefit cleansing management system in the city, the compulsory implementation modalities the agency has followed are described below:

1. Concusses: Arrange a consultative meetings with the different stakeholders that are important for the cleansing management

Table 8 Surcharging on throwaway cell phone voucher cards.

Type of the voucher card	No. of voucher card sold from January to July 2011		Sanitation Surcharged rate	AA Annual Sanitation charge Revenue in Birr
	At national level	In Addis Ababa		
5 birr cards	530,600	295,000	5 cents/card	177,000.00
10 birr cards	2,648,800	1,021,000	5 cents/card	612,600.00
15 birr cards	54,834,280	20,277,195	10 cents/card	3,476,090.57
25 birr cards	67,834,997	26,995,091	15 cents/card	6,941,594.83
50 birr card	21,895,249	11,011,257	20 cents/card	3,775,288.11
100 birr card	4,542,137	2,202,401	25 cents/card	943,886.14
250 birr card	3,355	3,100	50 cents/card	18,600.00
500 birr card	4,922	4,100	1 Birr /card	49,200.00
1000 birr card	2,965	2,800	2 Birr/card	67,200.00
Sum	152,297,305	61,811,944		16,061,459.66

Table 9 Charge on throwaway lottery sales.

Type of lottery	Lottery sales in number				5 c/lottery sanitation charge
	2000 plan	2001 Act	2002 Act	2003 plan	
Regular lottery					
regular	4,480,075	4,545,239	4,697,359	6,077,333	303,866.65
Zihon	272,000	258,120	269,480	318,530	15,926.50
Loto	1,095,367	3,525,201	5,459,301	666,422	33,321.10
Sum	5,847,442	8,328,560	10,426,140	7,062,285	353,114.25
Instant Lottery					
Instant 1 Birr	18,522,032	12,958,372	23,529,075	16,353,477	817,673.85
Instant 2 Birr			3,795,500	10,359,189	517,959.45
Bingo	196,762	266,425	79,233	9,510	475.50
Sum	18,718,794	13,224,797	27,403,808	26,722,176	1,336,108.80
Seasonal Lottery					-
Enkutatash	448,000	523,780	554,800	520,125	26,006.25
Edil	240,000	260,820	301,900	283,031	14,151.55
Liyu 1 and 2	320,000	289,570	665,480	794,503	39,725.15
Yegena sitota	256,000	240,440	293,000	351,600	17,580.00
Tinsaea	262,000	269,940	405,600	360,334	18,016.70
Tombola	422,400	662,370	511,300	632,022	31,601.10
Sum	1,948,400	2,246,920	2,732,080	2,941,615	147,080.75
Total	26,514,636	23,800,277	40,562,028	36,726,076	1,836,303.80

Table 10 Projected cleansing management revenue that can be generated in the coming five years.

Type of revenue collected surcharging on	Revenue generated projection in year (inc. 10%)					
	2003	2004	2005	2006	2007	2008
Taped water bill	93,071,330	102,378,463	112,616,309	123,877,940	136,265,734	149,892,307
Annual business tax	34,302,171	37,732,388	41,505,627	45,656,190	50,221,809	55,243,989
Public transport and business permit	2,283,175	2,511,493	2,762,642	3,038,906	3,342,797	3,677,076
Cement bag	5,000,000	5,500,000	6,050,000	6,655,000	7,320,500	8,052,550
Pay-as-you-throw	62,100,000	68,310,000	75,141,000	82,655,100	90,920,610	100,012,671
Sum	196,756,676	216,432,343	238,075,578	261,883,135	288,071,449	316,878,594

N.B. assuming 4% population growth and 6% increment in consumption.

charged fee collection and the beneficiaries. Involving a number of players in the decision making process can increase acceptance and smooth implementation of the community-sponsored charge-benefit rates and determine the service provider MSE payment rates too.

There are signs of a change in attitude. Many willingness-to-pay surveys have shown that people of all income levels, even from the lowest income groups, understand the need for a clean environment and are prepared to pay for a good waste collection service. However, it has also been frequently found that there is a lack of confidence on the part of the householders and the business community in the ability of local authorities to use the revenue from fees to provide a satisfactory service. This lack of confidence is evident in the reluctance to pay new waste collection charges before a reliable and adequate service is seen to be operating. It is therefore advisable that an improved service is being provided before increased service charges are introduced.

2 Enacting the cleansing management charge regulation: Political support is important for approval of the cleansing management charge regulation by the city council.

3. Collective responsibility: Identify the "Principal institutions" with direct responsibility for the implementation of the regulation and sign a legal binding agreement based on the enacted regulation and "allied sector agencies" which play a supporting role for the regulation implementation.

4. Fund administration: The agency has to have a purpose-linked financial system of saving the charged fees and using it for the intended purpose of paying (unit prices) to the service provider MSE as per the amount of solid waste collected, transported and disposed. Besides of the annual revenue generating Birr >200 mill/ann, it will also introduce a modern system of self-financing public services delivery and serve as a model indicator for future out sourcing other similar public services.

In view of the above consideration of socio-economical, environmental and political facts, the implementation of the project should be given one of the first priorities by all concerned authorities.

Recommendations

People of all income levels, even the lowest income groups, understand the need for a clean environment and are prepared to pay for a good waste collection service. However they lack of confidence in the ability of local authorities to use the revenue from fees to provide a satisfactory service. This lack of confidence is evident in the reluctance to pay the waste collection charges before a reliable and adequate service is seen to be operating. Therefore before introducing the service charges, it is highly recommended to improve the cleansing service by introducing and operating a market-led MSWM system i.e. charging a sanitation fee as per the amount of waste generated and pay to the service provider MSE as per the unit price rate of amount of waste collected and cost of disposal.

Out sourcing municipal solid waste management to micro and small enterprise

The agency has to contract out the cleansing management services to be Micro- and small enterprises. The market-led municipal solid waste management system encourage the service provider MSE's to collect more waste because they will be paid as per the amount of waste collected that benefits all.

Primary solid waste collection:

1. System: The collection crew enters each property, takes out the waste filled plastic bag into the secondary solid waste collecting vehicle and replace with a new/emptied plastic bag.

2. Frequency of collection: The frequency must be acceptable to the residents and desirable that the frequency does not vary, so that householders know when their waste will be collected. The frequency of collection should be once in a week and daily. In some communities having an intrusion on privacy the back door collection method should be affordable only if collection is infrequent, typically once per week. While during the Christian, Muslim festival and other cultural ceremonies were many families sacrifice sheep or other animals at their homes, and this can generate large quantities of bones and offal which should be collected within 24 hours.

3. Payment rate: Based on the municipality expensed cost per meter waste and a profit margin allowance, it is proposed to pay to the service provider MSE's at a unit price rate of 10 cents per kilogram (37.5 birr/m cube) solid waste collected and transported to the secondary solid waste collection.

Secondary solid waste collection:

1. Vehicle selection: The main factors which should be considered in selecting the preferred type of waste collection vehicle is to provide the service at minimum cost are the waste density in vehicle body and Local manufacture and sustainability for rapid supply of spare parts and access to maintenance facilities cities like AA having loading solid waste density 480kg/m^3, the proposed vehicle cap, chassis and load-carrying body should be a vehicle with flat-bed width of 2 m, long chassis and High-sided open top truck having loading height 2.0-2.2 m. Therefore NPR Isuzu vehicles which are light and flat-bed trucks commonly with load capacities of up to 4 tons (10-12 m^3 solid waste carrying capacity) and widths of 2.0 m have 16 inch tire sizes giving a low chassis height and a corresponding low loading height.

2. Payment rate: Based on the municipality expensed cost per meter waste and a profit margin allowance, it is proposed to pay the service provider MSE a unit price rate of 7 cents per kilogram (30 birr/m^3) solid waste transported to the disposal site.

Creating market opportunity for waste reuse and recycling

It is readily obvious to anyone in the recycling field that stable markets for collected materials are vital to any successful reuse and recycling program. Then the residences will shift from paying to waste disposing service provider to selling the waste items to the waste purchasers that will be supplied (raw material) to the recycler industries. This would develop an environmentally sustainable economy that waste recycling industries will replace the garbage disposal municipalities of today.

Therefore AA city administration has to create a favorable market for each waste items and recycled products. It has to do the tasks:

Organize the waste purchasers: The "Koryalew' and "Liwatch' seekers travel from door-to-door and collect reusable items (tins, plastics, old garments and shoe etc.) has to recognize and formalize their activities as legal. Hence, agreements could be made with the recycler industries or handcrafts that enable the collectors to sell their waste items at reasonable profit.

Promote recycled product marketing: So an encouraging factor for marketing the recycled products has to be favored that altered the economics of recycling like tax incentives and low interest loans Recycled product marketing.

Encourage the participation of recycler private sector in:

1. Composting/nutrient recycling (Organic MSWM): In AA >65% of the waste generated compose of organic waste. This situation calls for an analysis of options for municipal organic waste recycling for the benefit of urban agricultural, urban greenery, and environmental sustainability in the rural-urban continuum (**Figure 3**). Large scale composting using automatic compost plant and Small scale Composting: Biofarm Association experience in Addis Ababa has shown that at household level, especially in the more crowded areas, there may not be enough space to make compost or only a small amount of household waste is available. In such cases, the local NGO has promoted basket gardening which uses only a little space.

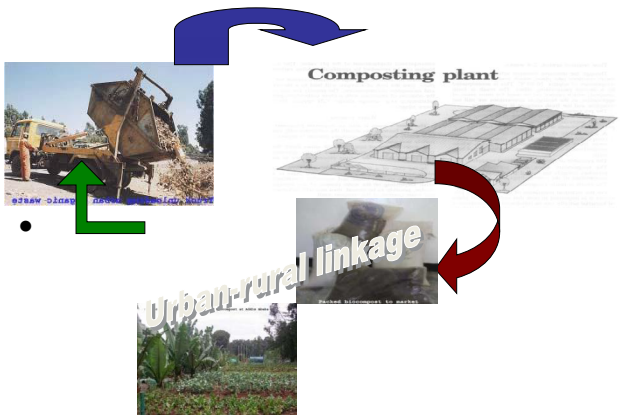

Figure 3 Composting/nutrient recycling.

2. Recycling Non Organic MSW: Levying tax on non-recycled plastic bag producers and importers. For instance oblige factories to import only <40% raw material and recycle 60% of the plastic product to recycle. In Bisheftu, Oxford Plastic Factory is buying the throwaway plastics bottles, festal, materials, furniture, etc. from the collector MSE's/KORALLE at a reasonable price of Birr 30-50/waste plastic. Such efforts of the recycling factories have to be encouraged and supported with a legal framework. The case study for metal scraps market opportunity can be created and develop reuse like the MENYALESH TERA craftsmen producing different valuable material products from the scrap waste materials.

Conclusion

Volume-based waste fee (VBWF) is generally effective at reducing waste and improving recycling, it is most effective in communities that have a robust voluntary curbside recycling program established. VBWF charges were found to work in part by channeling recyclables away from the waste stream, and was the second most important factor predicting waste prevention, following only residents' membership in environmental organizations. Finally such creating a market valuing forever waste items will enable the waste generators to sale their waste materials to the recycling industries. This will also create larger number of job opportunities to 18000 citizen's waste collectors, piling and packing MSE. Then the existing waste disposal sector will shift to waste recycling sectors. The motto "Waste is a Resource" could be put on the ground if and only if we have created a recyclable market opportunity for every waste item. This could be realized by implementing the creative problem-solving concept of Market-Led Municipal Solid Waste Management.

A clean environment is a collective good for all. Then the collective action cleansing management charges should enforce all to pay as per the amount of solid waste disposal. This will enable to provide the service at lower service charges and enhance a self financed cleansing management development.

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References

1 National Treasury (2011) Local Government Budgets and Expenditure Review.

2 Bahl R, Linn J (1992) Urban public finance in developing countries. Oxford University Press, New York.

3 Palatnik RR, Brody S, Ayalon O, Shechter M (2002) Greening household behaviour and waste.

4 Tadesse T, Hadgu S (2009) Demand for improved solid waste collection services: A survey in Mekelle City. Journal of the Drylands 2: 32-39.

5 US Environmental Protection Agency (2008b). Volume - vs. weight-based systems.

6 Folz D, Giles J (2002) Municipal experience with pay as you throw policies: Findings from a National survey. State and Local Government Review 34: 105-115.

7 Van Houtven G, Morris G (1999) Household behavior under alternative pay-as-you-throw systems for solid waste disposal. Land Economics 75: 515-537.

8 Sakai A, Ikematsu T, Hirai Y, Yoshida H (2008) Unit-charging programs for municipal solid waste in Japan. Waste Management 28: 2815-2825.