
34th WEDC International Conference, Addis Ababa, Ethiopia, 2009**WATER, SANITATION AND HYGIENE:
SUSTAINABLE DEVELOPMENT AND MULTISECTORAL APPROACHES****Sustainability of private sector in municipal
solid waste collection: Is it possible?**

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This paper discusses the sustainability of private sector participation in urban service delivery in developing countries. The solid waste collection service in Dar es Salaam –Tanzania is used as a case study. Cities in Africa are rapidly urbanising as a results municipalities have not been able to cope with the rapid increase of solid waste coupled with the rapid population increase. This resulted in a relatively large quantity of solid waste remaining poorly managed and uncollected, which left with a need for other stakeholders to participate in service provision. The private sector in DSM took the opportunity, in the early 1990s, to fill the gap left by the public sector. The paper deals with the question of operational sustainability and explores whether such an approach is possible or not. The purpose of the paper is to share experience with urban developing countries with similar characteristics to DSM- Tanzania.

Introduction

Improving sanitation has the major impact to the public health. The link between poor sanitation and poor health is very strong. Throughout the world every year more than five million people die from a combination of dirty drinking water, dirty environments, and the improper disposal of waste (Reed and Shaw 2008). Improper solid waste management is one aspect that results dirty environment and hence contributes in diseases and cause of the death to the millions of people in the world.

Until 1991 the city of Dar es Salaam (DSM) Tanzania was generating about 1400 tones of solid waste per day out of which only 5% of the daily generation was being collected (Kassim,2003: Kassim 2006). Currently the solid waste generation is 3400 and about 50% of waste is collected with the public- private partnership (Kassim, 2008). Despite this success, the scheme has faced constraints during its implementation, and efficiency is still low. Privatization covers 43 wards out of 73 city wards and about 33 private organizations are involved (Kassim and Ali, 2005; Chinamo, 2008). As the private sector is the main service provider this paper makes emphasis on private sector activities' towards the sustainability aspect as on what measures should be taken to improve the current situation and make the private sector to sustain in service provision for the improvement of Sanitation and hence meet the Millennium Development Goals.

Background of the study location

Dar es Salaam city located in the eastern part of Tanzania in East Africa; is situated along the Indian Ocean. The city has a warm temperature, moist monsoon climate, cold and dry from April to October, hot and humid from November to March. The average annual precipitation in Dar es Salaam is between 150 – 300mm occurring between March and May due to long and heavy rains. The average temperature is 240C whereas the maximum temperature is 350C and the minimum temperature is 130c (Yhdego, 1995). This temperature demonstrates the necessity for quick removal and disposal of wastes due to rapid decomposition process that takes place in this tropical climate and to the high organic content in the waste generated.

Dar es Salaam is the centre of economic activities in Tanzania. It has an estimated population of 2.5 million and an average growth rate of 4.3 % per annum (Census, 2003). Dar es Salaam is the principal city and administrative, commercial, and industrial centre in Tanzania. It constitutes a high percentage of the country's population. The rapid increase of population in the city, coupled with the increasing growth of

commerce and trades has increased the solid waste generation at a rapid rate. Average domestic solid waste generation rate is estimated at 0.50 – 0.79 kg/cap/day and total waste generation is within the range of 3400 tons/day (ERC, 2004). In Dar es Salaam the majority of the population lives in unplanned areas and it is estimated that more than 70% of the city population live in over 40 unplanned settlements (Halla and Majani, 1999a; Chinamo 2003; Kasseva & Mbuligwe 2003). Solid waste management is administered by three municipalities of Temeke, Ilala and Kinondoni under Dar es Salaam City Council (DCC).

Methods of the study

This paper is based on a field study conducted in Dar es Salaam city - Tanzania; during the period of 2004 to 2006 and later some aspects were updated in 2008. The purpose of the field study was to explore what is happening on site regarding the whole system of the private sector dealing with the solid waste collection service in Dar es Salaam. The techniques used in the field were; survey questionnaires; three hundreds (300) questionnaires were administered, 100 questionnaires from each municipality, interviews to private organizations; 11 organizations actively participated in the study, interviews to public sector responsible for solid waste management (i.e. municipalities and Dar es Salaam city council), focus group discussion – a one day workshop of solid waste professionals/officers, private sector and households representatives was conducted, desktop survey and observation concerning solid waste management.

Presentation and discussions of results

Characteristic of solid waste in DSM

In Dar es Salaam, the available studies indicate that solid wastes generated are primarily composed of vegetables (about 39% of waste generated) and other putrefied materials (ERC 2004). The moisture content is very high, typically in the range of 55- 75%, high organic content (70%) and the average solid waste density was estimated at 310 - 390 kg/m³ (Yhdego, 1995; JICA, 1997; Mbuligwe, 2004). The figure compares well with the bulk density data given in literature for developing countries 300-500 kg/ m³ (Diaz *et al.*, 1998). However, the density increases during the rain seasons due to the increased moisture content and higher availability of fruit and vegetables. Such data on solid waste characteristics are useful for the evaluation of alternatives on; storage, collection and disposal techniques.

This characteristic of the waste identified in Dar es Salaam requires an immediate collection service, because it can easily decompose and harm the environment. It is also noticed that large volume of waste are generated from households. The study carried out by Kasseva and Mbuligwe (2003) shows that the households alone generate about 56% of total waste generated. This result sets out the need for household waste to receive the appropriate collection and disposal services for the better public health and clean environment.

Operation methods of the private sector in Dar es Salaam

In Dar es Salaam the authorised local contractors and Community Based Organizations (CBOs) collect wastes and transfer to the disposal site. They receive payments from the residents, and the council pays for other services such as cleaning the public offices, sweeping of the streets etc. There are no differences for the contract duration for both the contractors and the community groups in a particular municipality. It is found in the literature that the local contractors serve only in the high income areas and the community groups serve only in the low income areas (Kassim, 2006). From this study the case in Dar es Salaam differs from the literature as some of the local contractors for example Omjaga Company serves in low income areas and some community groups such as TECA serves in high income areas and both perform very well. The municipalities should therefore consider this opportunity for the sustainability and improvement of the sanitation through the private sector.

Door-to-door collection by trucks and pushcarts: The method of door-to-door collection by trucks is used mainly by contractors who serve in high and medium-income areas. Other studies revealed similar results (Baud and Post, 2003; Post, 1999; Swai, 2003). Door-to-door collection is also practised by pushcarts which are done either to dispose wastes in the trucks or to the transfer stations.

The collection style is slightly different with other cities in developing countries like Accra in Ghana where they offer door-to-door by trucks and use of communal containers, i.e. the households are required to put their waste in a shared containers (Addo -Yobo F and Ali, 2003), that means the customer has to walk some distance with his/her waste to the place where the storage container is located. (Post *et al.*, 2003)

discovered that the efficiency of the communal container is minimal compare with the door-to-door service. The appreciation of door-to-door service is high since the households are in a position to ensure that the service provided by the collection workers that is a “customer-client” relationship. This has been supported also by the (World Bank, 2001b) that the people are typically more willing to pay for direct door-to-door service, especially to people that they know and trust to deliver the service.

It is revealed that in Dar es Salaam there are also some individual collectors (informal sector) who collect wastes and get payments from the households. Similarly (Obirih-Opareh and Post, 2002) reported that some residents in Accra pay waste pickers to carry out their wastes to the communal areas. This is an evidence that the households prefer to receive a door-to-door service. The findings are also supported by the World Bank (2001c) which found that door-to-door systems, even if by pushcarts, are preferred and this might lead to a greater willingness to pay charges. The main advantage of door-to-door service is the close link between the customers and the service providers, which might help the households to be encouraged to participate and to pay for the service they receive from their home. This will make the people work in the sector to continue earning and survive their life and improve the sanitation services.

The use of local vehicles is very common in developing countries. In Dar es Salaam vehicles used in collection are mostly pushcarts and trucks. (Ahmed, 2004) gave an example of Bangladesh cities where they use tricycle vans for primary collection. It is also mentioned by UNCHS (1988) that the uses of human-powered, animal-powered vehicles and three wheeled vehicles are the most appropriate in high density areas with poor access roads like Dar es Salaam. These vehicles are locally made and easy repaired. This finding suggests that the appropriate vehicles lead to the citizens getting a reliable service.

The collection system of the CBOs in Dar es Salaam is slightly different from other urban cities in developing countries such as Cote d’Ivoire, Bangalore, Madras, Manila and Jakarta where the organizations/groups from the community collect wastes to the transfer station only, and the municipalities’ trucks transport the wastes to the disposal sites (Doan, 1998). It is interesting to note that the community groups in Dar es Salaam are responsible for collection and transportation of wastes from the households to the disposal site; municipalities only assist them rarely when they fail to transport from collection stations to the disposal site.

From the above discussion it can be concluded that door-to-door collection method using trucks and pushcarts sounds suitable in Dar es Salaam. The use of available vehicles like pushcarts is a good indicator for the sustainability of the sector i.e. a local problem to be solved locally. This situation gives a sign for the private sector to further develop and continue for long period of time. The municipalities should also encourage and motivate the private sector so as to sustain this service.

Capacity of the private sector organizations

Human capacity

The availability of human resource is the key factor for sustainability and further development of the private sectors, since people are needed to work in this sector. Most of the activities of solid waste collection service done by local private organizations are manual, so they need people to work. Studies have shown that there are large variations in the number of workers required to provide solid waste collection service in a given city. For instance relatively poor countries like Tanzania may require as many as 10-50 workers for every 10,000 people, whereas middle-income countries may substitute some capital for labour and use 5-10 workers per 10,000 people, while developed countries might use just five workers per 10,000 people (Doan, 1998). This indicates that the private sector creates employment to a number of residents in Dar es Salaam who depend their livelihood from the solid waste collection activities. In the case of Dar es Salaam, the private organizations have enough employees to work in their organizations and each organization employs and pays its workers. This needs to be appreciated and supported by the authorities responsible in solid waste management. It is discovered that the staff employed by the private organizations are categorized into; full-time, part-time and casual workers. Figure 1 and Table 1 below shows the number of employed by the organizations in the study.

In terms of human resources, this study shows clear similarities with study conducted by Swai (2003), which revealed that most of private organizations in Dar es Salaam have adequate employment of human resources. The salaries paid to employees range from 51,000 to 100,000 TShs¹ per month. The finding shows that the organizations paid their staff within the range of government salary, though in a low-scale level. Other researchers found that the solid waste collectors employed by private sector are low paid (Plummer and Slater, 2001; Post et al., 2003). Despite the low payments they receive from the organizations,

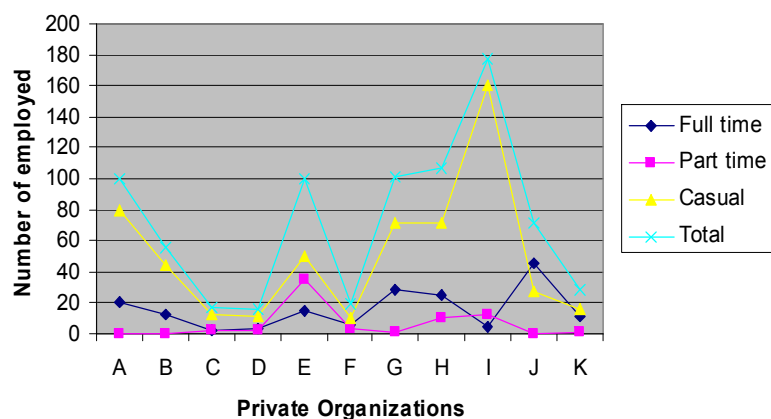


Figure 1. Categories of employment

Table 1. The number of employed in different categories

| Private organizations | Labourers | | | |
|-----------------------|-----------|-----------|--------|-------|
| | Full-time | Part-time | Casual | Total |
| A | 20 | - | 80 | 100 |
| B | 12 | - | 44 | 56 |
| C | 2 | 2 | 13 | 17 |
| D | 3 | 2 | 11 | 16 |
| E | 15 | 35 | 50 | 100 |
| F | 6 | 3 | 10 | 19 |
| G | 28 | 1 | 72 | 101 |
| H | 25 | 10 | 72 | 107 |
| I | 5 | 12 | 160 | 177 |
| J | 45 | - | 27 | 72 |
| K | 11 | 1 | 16 | 28 |

the people in Dar es Salaam are ready to work in the sector so as to survive their living and on other hand to improve sanitation services. The organization workers receive training through seminars, workshops, short courses and demonstrations fieldwork inside and outside the country which helps them in their provision of services.

Equipment and collection vehicles

The collection vehicles and equipment are other important factors to consider for the sustainability of the private organizations. Sufficient vehicles and equipment will ensure the provision of good service in a specific area. In this study most of private collectors interviewed reported that the vehicles and equipment they have are not sufficient for the service and some are poorly maintained. Observations made also indicated that most collection vehicles used by the organizations are in poor condition, trucks used are poorly maintained most of them are worn. (Post et al., 2003) also found similar results in the urban solid

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waste collection in Accra (Ghana). They stated that the most vehicles used for solid waste collection are not in a good condition for the service, the private sector often use old and used second-hand vehicles. This results in low efficiency of the service, for instance in Dar es Salaam on the way to collection activities many vehicles suffer mechanical problems². This result may contribute to environmental pollution. However, one of the problems found in Dar es Salaam is that the local authorities fail to give awareness to the people, so the private sector fails to collect enough money to buy and maintain their vehicles. Lack of capacity of the private sector in terms of vehicles and equipment could undermine the sustainability of the private sector. If the private sector has enough equipment and vehicles it could improve and extend the service as it was mentioned during the interview with the author. Table 2 below shows the available equipment and the needs of the private organizations.

| Table 2. Private organizations indicate their available equipment and their need | | | | | |
|---|----------------------|---------------------------|---------------------|------------------|---|
| Solid waste organizations | No. of trucks | Tractors/ trailers | Small pickup | Pushcarts | Needed for the service |
| A | 4 (7 tons) | 2 (3 tons) | - | 21 | 6 trucks |
| B | 2 (7 tons) | - | - | 10 | 5 trucks |
| C | 1-(3.5 tons) | - | - | - | 4 trucks |
| D | 1 (6 tons) | | | 3 | 5 trucks |
| E | 10 (7 tons) | - | - | 12 | Enough |
| F | 1 (7 tons) | - | - | 10 | 1 trailer, 6 trucks, 15 pushcarts |
| G | 3 (7 tons) | 5 – (3-4 tons) | - | 14 | 8 trailers, 5 trucks |
| H | 7 (7 tons) | - | 2 (3.5 tons) | 8 | 9 trucks |
| I | 8 (6 tons) | 9 (0.5 tons) | - | 30 | Enough |
| J | 5 (7 tons) | | - | - | Not stated |
| K | 3 (10,7 tons) | - | 1 (2 tons). | 1 | Not stated |
| L | 1 (7 tons) | 1 (5 tons) | - | 11 | 1 tractor, 2 trailers, 5 trucks |
| M | 4 (7 tons) | - | 1 | - | 7 trucks |

Note: The last column (right) shows a number of collection vehicles needed by the private organizations for their daily activities.

Cost recovery

Cost recovery is part of the overall design of each private organization. The sustainability and further development of the private sector depends mainly on the recovery of the running costs, and in the case of Dar es Salaam this comes mainly from the service recipients. Other studies identify that a key element of any sustainability criteria is that the cost of the service must be recovered from the users (Choguill, 1996). Solid waste collection charges from the households are now commonly practised in many developing countries. Countries with good examples include India, Bangladesh, Ghana and Burkina Faso in which the private sector collects charges from each household (World Bank, 2001a). In Dar es Salaam the collection charge is supposed to cover the cost of collection and transportation of waste, and the wages.

The study found that collection of fees from the households is not sufficient for cost recovery. Among the reasons for this includes; lack of public awareness regarding the importance of the service, and the enforcement of the regulations and bylaws (about 49% of households in the study do not know that their

service provider is private sector, only 41% are aware about the private sector and the rest 10% understand that the service provider is a public sector). The collected charges for the last six months (by the time of this study) are less than 50% for most organizations, 7 organizations in the study failed to collect even 50% of their collection fees, only 4 private organizations managed to collect more than 50% of the fees, no action has been taken for the defaulters. The assumption here is that there is a need for education of the people to understand their role in solid waste collection. The private sector needs the regulations to be enforced and actions to be taken against the defaulters. This reflects the lack of support from the public sector. Indeed, in a situation like this the input from the public sector is very much needed, to create awareness among the people and to take effective action against the defaulters. Limited resource recovery could undermine the sustainability and further development of the private sector.

Thapa (1998) mentioned that the “polluter pays” principle is the basis of private sector sustainability in solid waste management. In this situation the private sector is supposed to collect enough fees in order to provide a reliable service and for the service to sustain as well. Limited financial resources translate into service that is often not as efficient as it could be (Massoud and El-Fadel, 2002). Baud and Post (2003) mentioned the case of Nairobi, Kenya where the people are charged for solid waste collection through their water bills but, they receive little or no collection service from the public sector; for those who receive service from the private sector they pay twice for collection service i.e. to the private sector and to the water bills. They also mentioned the case of Hyderabad, India where the private sector receives payments from the municipalities. From the analysis above we can find that the private sector needs to recover the running costs in order to sustain in service provision and to make profit as well in order to develop further in terms of expanding the service and progressing better.

Contribution of the private sector in the solid waste service

The private sector in Dar es Salaam currently contributes about 50% of the solid waste collection service. Table 3 and the figures below shows the comparison of contribution of the public and private sector in solid waste collection. They mentioned that there are number of benefits to remain in service. Research has shown that the promotion of the private sector is an effective way of extending affordable service in developing urban communities (World Bank, 2001c). In recent years the private organizations have shown that they can deliver the services in a more efficient manner and at a more economic cost than the government (Choguill, 1999; World Bank, 2001c; Massoud and El Fadel 2002). (UNDP and YALE, 1999) claimed that in cities throughout the world, governments have found that the private sector involvement have greatly improve the quality and expand coverage of the service and lowering costs, thereby improving the lives of their citizens.

Table 3 and Figure 2 below shows the comparison of contribution of the public and private sector in solid waste collection in Dar es Salaam.

| Year | Solid waste collector | Weight in % |
|------|--------------------------------|-------------|
| 2001 | Private sector | 36 |
| | Public sector (municipalities) | 56 |
| | Other institutions | 8 |
| 2002 | Private sector | 42 |
| | Public sector (municipalities) | 51 |
| | Other institutions | 7 |
| 2007 | Private sector | 50 |
| | Public sector (municipalities) | 43 |
| | Other institutions | 7 |

Source (Chinamo; 2008)

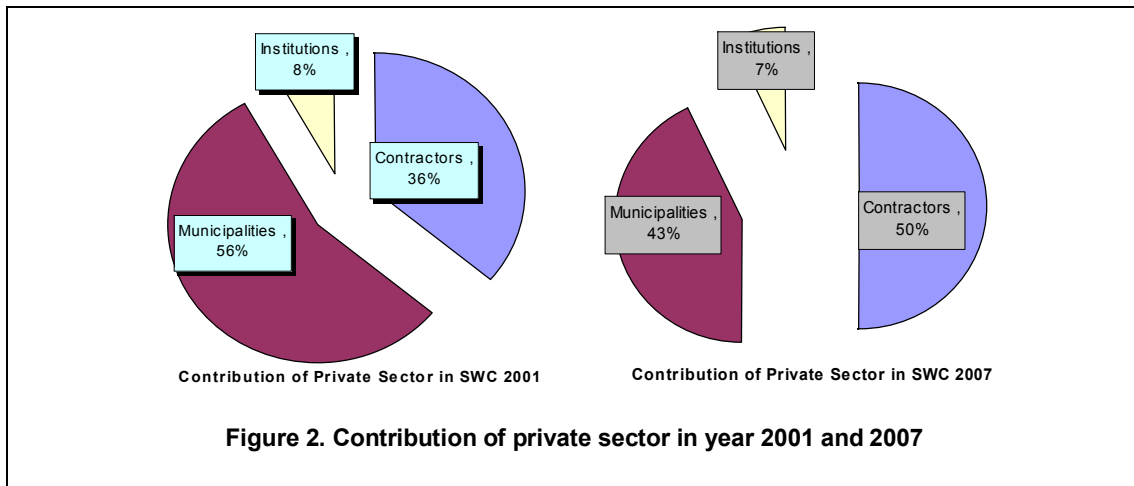


Figure 2. Contribution of private sector in year 2001 and 2007

The head of Solid Waste Management department at Dar es Salaam City Council confirmed that the private organizations contributes a lot and are willing to continue with the service. The increase of solid waste collection trend is a good indicator for the improvement of the collection service and their willingness to contribute to the service. See Figure 3 and Table 4 below. Only one private organization started to provide service in the city, but during the study 33 organizations were registered to DCC. This is a good indication that the private sector might continue and sustain with the service in Dar es Salaam.

There is an increment of solid waste collected in the city by the private sector from (1994 to 2008). Currently about 50% of wastes generated are collected and 50% out of waste collected are done by private sector, so the progress.

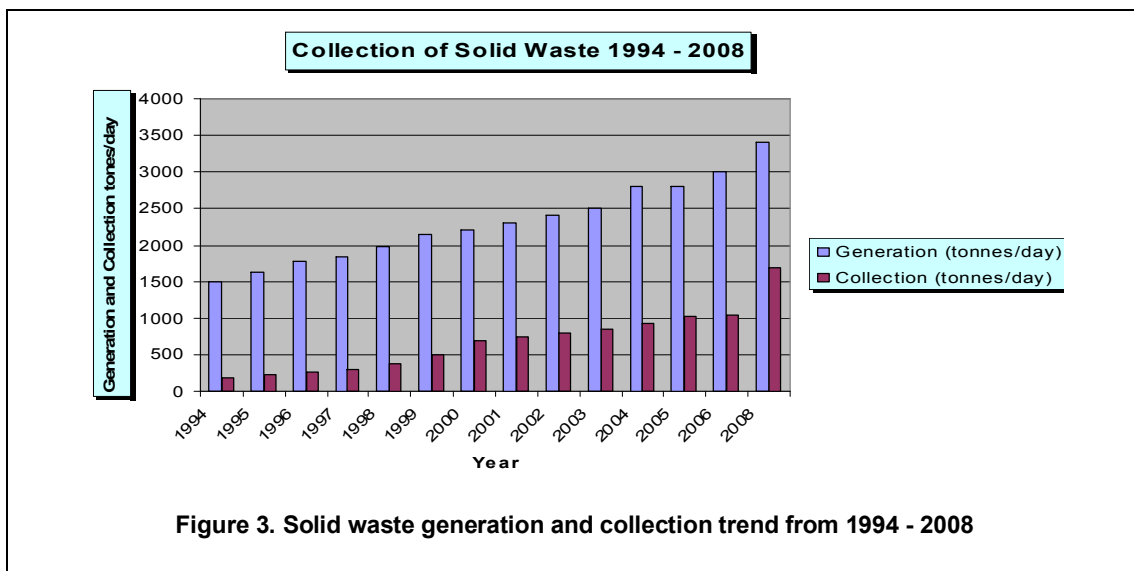


Figure 3. Solid waste generation and collection trend from 1994 - 2008

Conclusion

The involvement of the private sector in solid waste management has proved to be possible and promising alternative in the solid waste management services; leading to the improvement of sanitation in developing countries. In Dar es Salaam for instance, solid waste collection leads to increased performance efficiency and environmental protection and has created employment to many. For the sustainability of private sector there rise a need to develop mechanisms which guarantee a long term service and efficient performance. Firstly, it needs a favourable working condition, and secondly; the commitment of the private sector itself in the service. The success of the private sector and sustainability is justified by the arrangement which offers the correct incentives, sufficient flexibility in management and the need to compete in a market. Going along with this argument the private sector needs the appropriate financial and human resources and technological know-how. However, more support is needed from the government and other institutions to this sector.

Good governance is of fundamental importance; as the public sector responsible for the system should actively play their major roles and work hand in hand with their partners - the private sector. The environmental standards, legislation and contractual obligation should be enforced and upheld.

| Year | Generation (tonnes/day) | Collection (tonnes/day) | % |
|------|-------------------------|-------------------------|------|
| 1994 | 1500 | 185 | 12 |
| 1995 | 1620 | 230 | 14 |
| 1996 | 1772 | 260 | 14.5 |
| 1997 | 1850 | 300 | 16 |
| 1998 | 1980 | 380 | 19 |
| 1999 | 2144 | 490 | 23 |
| 2000 | 2200 | 700 | 30 |
| 2001 | 2300 | 750 | 32 |
| 2002 | 2400 | 800 | 33 |
| 2004 | 2800 | 930 | 35 |
| 2005 | 2800 | 1035 | 37 |
| 2006 | 3000 | 1040 | 38 |
| 2008 | 3400 | 1700 | 50 |

Source: (Chinamo, 2003; fieldwork, 2004, DCC, 2008)

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Keywords

Solid waste collection, private sector, Dar es Salaam, Sustainability, developing countries.

Notes

1. Currently 1 USD equivalent to 1310TShs.
2. During her field survey she found a collection truck stopped for 3 days with solid waste on its way to the disposal site, due to the failure of the truck.

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