Environmental Research & Technology, Vol. 2 (3), pp. 141-157, 2019

Environmental Research & Technology

http://dergipark.gov.tr/ert

RESEARCH ARTICLE

Public private partnerships for successful solid waste management and prospects for reducing public health risks in Kinondoni Municipality-Dar es Salaam, Tanzania

Proscovia Kamugisha[1,*], Julius Ludete[2], Sebastian Mhanga[3]

[1]Mzumbe University, Morogoro, TANZANIA
[2]Mufindi District Council, P.O.BOX 223, Mafinga, Iringa, TANZANIA
[3]Menonite Development Associates (MEDA), Box 3182, Morogoro, TANZANIA

ABSTRACT

In Tanzania only 40% of solid wastes in urbanized areas are collected and transported to the dumping sites. The remaining 60% are illegally disposed along road sides, sewage canals and reserved open spaces that contribute to floods and breeding of rodent vectors that eventually spread diseases such as intestinal schistosomiasis and soil transmitted helminths. Public Private Partnership (PPP) has been adopted to address Solid Waste Management (SWM) in various countries and yielded robust results. However the PPP model has not been effective for Tanzania since its initiation in 1995. Therefore this paper examined factors influencing performance of PPPs in SWM at Kinondoni municipality. A cross sectional survey was employed to collect data that was analyzed using descriptive and multiple regression model. Findings showed that poor monitoring and evaluation practices influenced poor performance of PPP in SWM. Moreover, low capacity of the contracted companies, limited accessibility of residential areas and weak enforcement of laws and regulations governing solid waste management had negative influence at 0.05 significant levels. The study recommends the system should establish regular plan in combination with imprompt monitoring to eliminate the effect of possible falsified compliance. Furthermore, the municipal council has to improve town settlements to access the households easily for SWM. Lastly research on end use products of the waste should look at the technical, economic viability of the waste markets for the products processed from the waste for mitigating public health risks associated with SWM.

Keywords: Solid waste management, Kinondoni, Tanzania, public-private partnership, public health, health risks

1. INTRODUCTION

Generation of solid waste is linked with urbanization and economic development. This is because as economies urbanize, people's incomes increase due to increased economic productivity. In turn the increased income rises consumption of goods and services that enlarges the amount of solid waste produced [1, 2] Tanzania's urbanization is accelerating at an annual rate of 5.2%, or more than twice the world average (at 2.1%) and higher than the average for Africa (3.5%). Dar es Salaam which is the metropolitan city of Tanzania is growing at 5.6%; and it is the fastest growing city in Africa [3, 4].

In Tanzania only 40% of wastes in urbanized areas are collected and transported to the dumping sites [5-7]. The remaining 60% are illegally disposed along road sides, sewage canals and reserved open spaces that contribute to floods and breeding of rodent vectors that eventually spread diseases [8, 9].

At global level UN- Habitat [10] estimated the incidence of diarrhoea and acute respiratory infections to be twice and six times higher respectively, for children living in the households where solid wastes are dumped at homesteads compared to children living in the households where wastes are dumped away. In Tanzania the situation is even worse because 50% of Tanzanians suffer from intestinal schistosomiasis and soil transmitted helminths resulting from haphazard solid waste dumping [11]. Sakijege et al [12] estimated the presence of total coliform in drinking water to stand at 70 and 23 counts/100 ml compared to WHO recommended rate of zero (0) coliform/100 ml (coliform free water) in the drinking water [13]. The results imply presence of pathogens causing

Corresponding Author: ppkamugisha@mzumbe.ac.tz (Proscovia Kamugisha)
Received 5 August 2019; Received in revised form 21 September 2019; Accepted 23 September 2019
Available Online September 2019
Doi: https://doi.org/10.35208/ert.601999

infectious waterborne diseases such as cholera, dysentery, typhoid fever and schistosomiasis. In fact Sakijege et al [12] determined the incidence of diarrhoea, schistosomiasis, and typhoid to stand at 53, 21 and 17 cases respectively at just one dispensary in Keko Machungwa, Dar es Salaam within three months of March, April and June 2009.

In response to this situation various efforts have been made by national governments and researchers in an attempt to address the issue of solid waste management in urban areas. The most common model for addressing the issue in various countries of the world has been Public Private Partnership (PPPs) [10, 14]. The PPPs model has proved useful for SWM in countries like India [15], South Africa [16], European countries [17] and Japan [18]. However, this model in Tanzania and Kinondoni in particular has not performed well since its initiation in 1995 when only handful (5.5%) of the SW was collected and disposed to the dumping site [19]. Since then a slight improvement in solid waste collection and disposal have been experienced with only two fifth of SW being collected and disposed in the country [5, 20].

Characterisation of solid waste in Tanzania is based on material composition and source or generator of the waste. Based on material composition solid waste is classified into five groups which include organic, recyclable, electrical, hazardous and toxic wastes. Organic waste is mainly generated from food, kitchen waste and green waste. Recyclable waste is generated from glass, bottles, plastic and metals. The electrical waste is created from used up electrical appliances and electronic appliances such as televisions and computers. Harzadous wastes are generated from corrosive materials such as paints and chemicals. The last category of waste is toxic waste which is waste generated from poisonous materials such as pesticides and herbicides (pesticides, herbicides) wastes [21]. Organic wastes form the major component (64%) of solid waste generated in Tanzania's urban centres; followed by plastics (11.9%), Hazardous (8%), papers (6.6%), leather & rubber (6%). The rest is composed of other other that include glass, textile wastes, electronics and other solid wastes not mentioned [22]. Alternatively, characterisation of solid waste from its origin is generated from households, institutions, market, industries and streets [23]. Households form major source of solid waste accounting for 56% of all solid waste generated from in the countries urban centers [24].

Numerous studies related to SWM have been done in Tanzania [5, 6, 7, 25, 26, 42). The scope of these studies is limited to compliance on regulatory framework and economics of solid waste management. Based on the current research work there is limited empirical evidence showing the key drivers of inefficiency in Public Private Partnership. Therefore this paper examined factors influencing performance of PPPs for pro-health SWM in Kinondoni municipality. Specifically the paper analysed the policy, legal and regulatory environment, the operational capacity of contracted private companies for SWM, accessibility to the residential areas and the monitoring & evaluation practices in place.

2. METHODOLOGY

2.1. Study area

This study was conducted in Kinondoni municipal council located in Dar-es-Salaam city which is also the biggest commercial city in Tanzania as indicated in Figure 1 below.

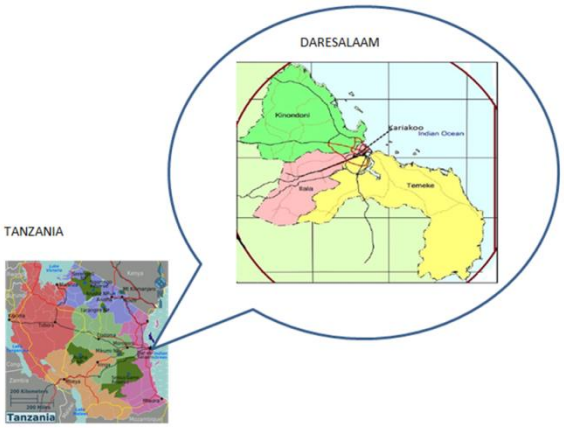


Fig 1. A map of Kinondoni municipal council

2.2. Analytical conceptual framework

The Agency Theory forms the foundation of this paper by looking at the relationship between public and private entities in solid waste management projects as principal and an agent respectively. The principal delegates an agent to perform the work on its behalf [16]. It is assumed that agent will represent the interests of the principal and not focusing on the self-interest. When the principal and the agent are motivated by inherent self-interest conflict may occur during implementation of the project. Therefore to minimize the individual inherent conflicts of the principal and the agent, there must be a sound legal and regulatory framework. Moreover, motivation for the agent to abide to the principal's interest have to be given so as they work as a union; meanwhile clear information on the performance of the agent to the principal must be in place.

Principally, the performance of PPP in SWM is influenced by several factors: well drafted output specification, robust business case, committed senior management, full consultation to end users, good political will, capacity of the garbage collection companies, monitoring and evaluation, transparent and competitive procurement, and public participation. However this paper investigates four main factors in the solid waste subsector which are more relevant in Tanzania context: Policy, legal and regulatory environment, monitoring and evaluation practices, capacity of the PPP contracted companies to implement the project successfully and accessibility of residential areas (Figure 2).

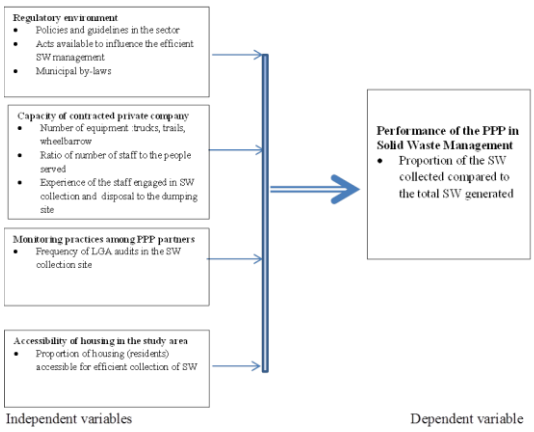


Fig 2. Conceptual framework

Policy, Legal and Regulatory framework

The policy, legal and regulatory framework encompasses national policies, Acts and regulations on environmental protection, municipal by-laws that govern issues of the solid waste management and tendering procedures in sub-contracting the companies to collect, transport and dispose the waste. It is acknowledged that Enabling legal, regulatory, and policy framework are key elements to a sustainable partnership project [27, 28, 29,]. A strong regulatory framework enhances the successes of the PPP project while a weak regulatory framework hinders the performance of PPP in various sectors and solid waste management in particular.

Monitoring and evaluation

Monitoring and evaluation entails routine tracking of information on a project and its intended outcomes based on the target set during planning process. When monitoring and evaluation is performed correctly informs the management to understand whether the project being implemented is going in the proper direction as planned or not. It gives early warning indicators in the performance of the project. In fact monitoring and evaluation have been acknowledged to influence the performance of PPPs on solid waste management [30, 31] and other sectors of the economy [32]. It can be generalized that a well framed monitoring and evaluation procedures enhances the performance of PPPs while a weak monitoring and evaluation structure hinders the performance of PPPs particularly in solid waste management. Therefore, monitoring and evaluation was assumed to have positive relationship with performance of PPPs in solid waste management in the study area. The monitoring and evaluation was measured in terms of frequency of auditing conducted by the entrusted bodies (LGAs and ward executives for making follow up to see whether the planned targets are attained.

Capacity of the PPP companies

The contracted companies whether Community Based Organisations or Private Company needs to have proper capacity to undertake the task of solid waste collection and disposal to the landfill or dumping site. The capacity referred here includes financial health, trained and experienced work force and equipment for the task at hand. Various authors acknowledge the influence of capacity for the contracted company to undertake the solid waste efficiently [27, 30, 33]. The proper capacity requirements are further made important by increasing urban population and changing socio – economic and demographic profile that necessitate quality services [30]. In this study, the capacity of the engaged company was thought to be measured in terms of number of staffs employed (refuse collectors), the work experience of the staff employed in contracted companies and equipment possessed by the company that can be used in solid waste collection and disposal. It is hypothesized that the number of refuse collectors employed has positive relationship with the performance of the PPP performance as the work will be distributed to the number of refuse collectors, hence less work per individual will enhance the collection and disposal of the waste. Moreover, longer experience improves skills to work efficiently; therefore it is assumed that the experience of the refuse collectors has a positive relationship to performance of the PPP in solid waste management. Furthermore, the equipment possessed used in SW collection and disposal is of paramount important for the efficient performance of the engaged company.

Accessibility to residential areas

Un-planned settlement is acknowledged to hinder the solid waste collection and disposal since some of settlements can-not be reached. Because in these kinds of settlement the roads tend to be narrow such that the motorcars can-not pass between houses. Therefore, this pose a serious challenge when comes to collection of solid waste from these locations. In fact, most of settlements (>70%) are located in unplanned settlements [4, 34, 35, 36]. The issue of unplanned settlements is prominent in Tanzanian urban cities and Kinondoni in particular. In this paper, accessibility of the homesteads was assumed to have positive association with performance of the PPPs.

The model was summarized using equation 1 below;

$$PPP_{pf} + \beta_0 + \beta_i X_i + \sigma \quad (1)$$

whereby

PPP_{pf} - Performance of the PPP contracted company to collect and dispose the solid waste measured by proportion of the solid waste collected and disposed to the dumping site

β_0 - Constant

χ_i – A vector of factors influencing performance of PPP contracted company

β_i – A vector of coefficients measuring the effect of independent variables on the performance of PPP contracted companies

σ – The error term measuring the effect of other variables not included in the model

Empirically the model can be expanded to read as;

$$PPP_{pf} + \beta_0 + \beta_1 Stfnn_1 + \beta_2 Stfexp + \frac{\beta_3 Stf}{ps} + \beta_4 hhaccess + \beta_5 Compcap + \beta_6 Monito + \sigma \quad (2)$$

whereby;

$Stfnn$ - Number of refuse collectors employed by companies engaged to collect and dispose the waste

$Stf\ exp$ - The experience of staff employed by companies engaged to collect and dispose the waste measured in years

Stf/ps – The ratio of refuse collectors per number of people served

$hhaccess$ – Accessibility of houses by motor vehicle in the study area

$Compcap$ – The capacity of the contracted company as measured in terms of equipment used in the collection and disposing of solid waste to the dumping site

$Monito$ – Monitoring and evaluation practiced among LGAs and ward officers responsible for solid waste management.

2.3. Data collection

Cross sectional survey research design was employed in the study. Multi-stage, stratified and random sampling techniques were used to select 91 respondents who were involved in the PPPs SWM (Table 1). All of respondents were involved in the PPPs solid waste management through their positions as they are entitled by the Environmental Impact Assessment (EMA) policy of 2004 and its subsequent solid waste management regulations of 2009. In practice the above mentioned respondents were chosen due to their decision making position for contracting companies to be involved in the SWM in their respective areas.

Structured questionnaire was used to interview ward councilors, municipal environment officer, members of Environment & health committee, ward executive officers, sub-wards executive officers, sub-wards chairpersons. Interview guides were used to solicit information from private companies' managers and refuse collectors during January – March 2016. The data collected included wards and sub-wards respondents' information on capacity of private company on solid waste collection and disposal and monitoring and evaluation practices on the part of participating companies and the municipal. Environmental policy, laws and regulations were solicited from the ministry of environment for review.

Table 1. Sample composition in the study area

Sample Type	Population	Sample	Percent (%)
Members of Ward Health Committees	59	15	25.0
Ward Executive officers	15	15	100.0
Members of Sub-wards Health Committees	59	15	25.4
Sub-wards Chairpersons	59	15	25.4
Sub-wards Executives Officers	59	15	25.4
Refusal Collectors	60	15	25.0
Ward councilors	15	15	100.0
Private companies managers	15	5	33.3
Environmental officer from KMC	1	1	100.0
Total	**342**	**96**	**32.5**

2.4. Data analysis

The study employed descriptive statistics and content analysis methods to analyse the policy, legal and regulatory environment. A multiple regression analysis was used to analyse factors influencing the performance of public private partnership (PPP) using Statistical Packages for Social Science (SPSS) software version 20.

Upon data analysis, various tests on the assumptions of regression in the model were performed to identify whether they were violated or not using SPSS software version 20. These tests included homoscedasticity test, autocorrelation test and collinearity test (Appendix IV, V and VI respectively).

3. RESULTS & DISCUSSION

3.1. Policy, legal and regulatory environment

Generally the study findings from content analysis show that, Tanzanian regulatory framework on solid waste management is well articulated with some minor defects. The major challenge is that it lacks enforcement procedures and levels of penalties for non-compliance. Moreover, the framework is entrusted to be implemented by diverse population (wards) with relatively less education on issues regulating the processes. Could the process of contracts be vested on experts at Local government authorities would, the situation would be harmonized.

The Tanzanian regulatory framework is composed of one policy, and four legislations that govern environmental issues and solid waste management in particular. The policy is the National Environmental Policy (NEP) [37] at one hand and Tanzania & Local Government (Urban Authorities) Act 1982, and the Environmental Management Act 2004 [38]. The Public Private Partnerships of 2010, The Public Private Partnerships Regulation 2011.

The National Environmental Policy (NEP) [37], addresses six (6) environmental problems land degradation; lack of accessible, good quality water; pollution of the environment; loss of wildlife habitats and biodiversity; deterioration of aquatic systems; and deforestation. In the case solid waste in towns is considered to affects health of people such that it raises concerns. In this regard NEP [37] addresses the issue of solid waste management through the issue of environmental pollution that is cited on its section 11 part (iii) that pollution in towns and countryside affects health of many people and lowers the productivity of the environment. Moreover, in its section 28 the policy highlights the need for technology which when used bears in the quality of a product in the type and amount of the resulting waste and emissions. It is emphasized that environmentally sound technologies in the context of pollution are "process and product technologies" that generate low or no waste for prevention of the pollution. Moreover, in its section 29 stipulates the emphasis for recycling of wastes and products and handle residues wastes in a more acceptable manner.

The main objective of the Environmental Management Act 2004 [38] is to promote the conservation and management of the environment. In this Act some aspects that are directly associated with solid waste management include (i) The legal framework for the overall management of the environment giving power and responsibilities for various organs and institution the enforcement mandate. (ii) Establishment of administrative and institutional framework for the management of the environment. In its Part IX Caption 114 -119, the Act stipulates roles and responsibilities of LGAs in managing the solid waste. It can be generalized that the role of the LGAs is to ensure minimization of the solid waste in their areas of jurisdiction. The Act gives mandate to the Local Government Authorities to involve the private sector and Non-governmental Organizations (NGOs) in solid waste management activities. Moreover, the Act requires the waste to be separated based on its type. However, separation of the solid waste practices did not exist during the data collection.

Institutionally, the NEP [37] stipulates advisory bodies in its sections 98 – 100 to protect the environment. In addition to the policy, the Environment Management Act 2009 provides the room for establishment of National Environmental Management Council (NEMC) that is charged with formation and evaluation of policies, acts, plans and guidelines on environmental based issues and advice the government appropriately. Moreover, NEMC is also charged with the responsibility of making environmental impact assessment on projects and advice appropriately.

In its section 97 – 101, Local Government Authorities (LGAs) has been entrusted to construct, operate, control and maintain economic, social and environmental infrastructure. The section 102 the LGAs has been empowered to oversee the planning processes and establish the local environmental policies and regulations. This policy is well articulated with regard to the Local government (Urban Authorities) Act 1982, the Act entrusts urban authorities the responsibility to ensure that their areas of jurisdiction and sanitary conditions are kept clean as stipulated in its section 55. Moreover, the Act delegates the urban authorities with the mandate to make their own by-laws to enable them to execute their responsibility of waste management in their respective areas of administration.

With regard to the Public Private partnerships, also the legislations are well articulated on the performance of the task at hand. The function for each part (public sector, private or other stakeholders are stipulated in Public Private Partnership Act 18 of 2010 and its subsequent Public Private Partnership Regulations 2011.

Hence legally, Dar es Salaam city council is entrusted to manage solid waste at the dumping site currently being disposed at Pugu dumping site for all three LGAs (Kinondoni, Ilala and Temeke) that has been expanded to (Kinondoni, Ilala and Temeke, Ubungo and Kigamboni). In Kinondoni Municipality there are 34 wards that are charged with mobilization of establishment of Community Based Organisations (CBOs) for offering the service of solid waste collection from the household homesteads and nearby waste collection points to the disposal dumping site. The wards are also entrusted to engage private companies in contracts to provide the service of solid waste to the dumping site. In fact the wards are responsible for the waste in the households and the collection points while LGAs are responsible with the collection of the solid waste from public centers like at schools, governments and in the market premises.

With the above regulatory environment, it was observed that solid waste collection and disposal in the study area was fairly poor during data collection, since only 42% of the generated solid waste was collected and disposed to the Pugu dumping site. The rest (58%) was left unmanaged to illegal sites and drainage systems that can lead to endemic diseases outbreak. The pandemic diseases such as cholera have been reported in Tanzania particularly Dar-es-Salaam (Sekijege et al., 2012; Outwater et al., 2013) that can be associated with the mismanaged solid waste. Moreover, the situation is worsened by the limited number of collection points (Table 2) that leads to improper disposal of the waste. In addition to that frequency of solid waste collection was reported to be low (Table 2) when compared to the daily generation of the waste. This finding is similar to the findings by Huisman et al (2016) who observed that in most cases the collection points in Dar-es-Salaam seemed as a dumping site since the garbage stays longer in the collection points.

Different agents were involved in solid waste collection and disposal in the study area. Table 3 shows that private companies participate in PPPs for

street cleansing by 100% and participate in open space cleansing by 66.7%. Meanwhile, the private companies accounted for only 6.7% of household waste collection and disposal. The Community Based Organisations accounted for 93.3% of the solid waste management from the household sources in Kinondoni Municipal (Table 3). Engagement of the CBOs in household waste collection and disposal can define the inefficiency observed in the study area. This is defined in the moral hazards and free riding paradox whereby the CBOs lacks owner. Hence their commitment is questionable to afford the heavy task of the CBOs. Moreover, the distribution of the earnings from the service offered is not known. On the other hand, the private companies seem to prefer to offer services mainly in the open space and streets (Table 3). This associated with the fact that most homesteads (72%) were not accessible in the study area. This would add up to the cost of management since some people with trolleys or pushcarts would be necessitated to be hired to collect the waste to the nearby collection points. Coupled with inefficient collection waste fee collection observed in the study and other studies (Huisman et al., 2016) the profit margin would be minimized that demotivates private sector to get involved in the household waste collection and disposal.

Table 2. Attributes of the SWM in the study area

	Frequency	Percentage	Cumulative percentage
Presence of waste collection points			
Yes	10	13.3	13.7
No	65	86.7	100.0
	75	100.0	
Frequency of waste collection			
Once per month	29	38.7	38.7
Twice per month	9	12.0	50.7
Three times per month	20	26.7	77.3
Four times per month	17	22.7	100.0
		100.0	
The companies responsible for waste disposal			
Community Based Organisations (CBOs)	44	58.7	58.7
Private companies and CBOs	31	41.3	100.0

Table 3. Roles performed by different companies in Kinondoni Municipality

	Frequency	Percentage	Cumulative (%)
Street cleaning			
Community Based Organisations	0.0	0.0	0.0
Private companies	2.0	100.0	100.0
	75	100.0	
Open space cleaning			
Community Based Organisations (CBOs)	1.0	33.3	33.3
Private companies	2.0	66.7	100.0
		100.0	
Households			
Community Based Organisations (CBOs)	14.0	93.3	93.3
Private companies	1.0	6.7	100.0
		100.0	

3.2. Capacity of contracted companies in PPPs for SWM

The capacity of the privately contracted companies was sought in terms of equipment, human resources, experience, and financial resources owned by the contracted companies. Table 4 express the capacity of contracted companies for SWM in the study area.

Down to the details of descriptive statistics, findings of the study indicate that SWM contracted companies had 28 trucks, 6 tractors, 6 trails, 69 pushcarts and 127 wheelbarrows. However, the equipment had the average capacity of collecting only 42.2% of solid waste generated in the area under study. The effects of about two third of the generated wastes (equivalent to 1,216tons/day) being left without proper management regime cannot be overestimated. These wastes are really dumped in the illegal sites (Figure 3) that would lead to health hazards to the public. These findings are in line with finding by Breeze [5] who revealed that about 76% of the respondents were not served since they had no access to the door to door equipment for solid waste collection in Dar es Salaam city. This implies that PPP agents have a deficit of facilities and equipment for disposing garbage. In addition to that the trucks were not specialized for the waste collection to easing the task of waste disposal (Figure 4). The finding of illegal dumping of SW in the study area is more or less similar to the study findings by [39] who found that shortage of SW disposing bags in houses and long distance to waste containers caused illegal dumping in the street and in the water drainage canals.

Table 4. Equipment capacity of private contracted companies for SWM

Sub-ward	Type of equipment					Average Collection (%)
	TRU	TRA	TRL	PU	WH	
Kwatumbo	2	1	1	5	10	40
Kilungule	1	0	0	6	8	45
Kinzudi	1	0	0	4	8	44
Kumbukumbu	2	1	1	5	9	43
Azimio	1	0	0	5	8	38
Mkunguni B	2	0	0	6	10	46
Mbezi beach A	3	1	1	3	8	56
Bunju B	1	0	0	4	8	42
Hondogo	2	0	0	3	8	44
Tegeta	1	0	0	3	10	40
Idrisa	3	1	1	5	9	40
Kigogo mkwajuni	3	1	1	6	9	35
Mwenge	2	1	1	6	8	45
Kilungule A	2	0	0	5	6	30
Njeteni	2	0	0	3	8	30
Total	28	6	6	69	127	42.2

Key: TRU=Trucks; TRA= Tractors; TRL=Trails; PU=Pushcarts and WH = Wheelbarrow

Fig 3. Uncollected solid waste disposed along the water canals

Fig 4. Non specialized truck collecting Solid waste at Magomeni informal market

Moreover, for delivering efficient waste collection services, the contracted companies in PPPs require enough staff to manage the waste in their areas of operation. The finding indicates that average persons served per staff is 941 (Table 5) compared to the staff needed in Pakistan that ranged between 280 and 1613 persons per staff [40]. However, the extremes were noted in two sub wards (Azimio with 1750/staff and Kilungule A with 1759/staff). Moreover, the findings revealed lack of experience among human resources employed in the contracted SW collection companies. It was revealed that most staffs in contracted companies had an average working years of 1.71 as opposed to the reasonable minimum experience of 3 years. This implies that companies' employees have inadequate experience for performing their daily responsibilities. The low level of experience may lead to inefficiency in garbage collection as it is acknowledged that experience is a teacher. In fact; the contracted companies had no sence of permanence in employing their staff. This finding is different from the findings by [41] which revealed that limitation of labour force was the major constraint in SWM in Uganda cities.

Another factor related to capacity of contracted companies which contributes to influencing performance in SWM is the financial soundness of the companies. Financial strength of the PPP agent is important for delivering quality and sustainable SWM services. Five companies contracted for SWM were interviewed to find out the amount of money that is needed to be topped up on a weekly basis for a smooth running of their SWM activities. Findings showed that all (100%) of the company managers for the contracted companies acknowledged to suffer from financial deficits for meeting their financial operational costs. The deficit was maximum at 4,000,000Tsh/week and minimum at 1,000,000Tsh/week. On average the contracted companies were running short of TZS. 2,290,000 ± 903,033 Tsh/week for efficient solid waste collection in the study area. The finding indicates that agents were failed to meet SWM obligations and therefore poor performance of PPPs due to weak financial capability. The major reason for deficit was the fact that the refusal collection fee was not enough to cover 100% the refuse collection operational costs. This finding is in line with the study findings by [5] in Dar es Salaam City and Arusha which found that there is poor financing strategy by PPP agents. Moreover; the results is similar to the results by Maziku [36] in his study on Solid Waste Management in the Dar-es-Salaam Coastal Belt who pointed out that there was existence lack of financial motivation within waste collection agents. Lack enough Huisman et al, (2016) revealed that if the prevailing solid waste collection fee could be collected efficiently at 100%, it suffices to cover the operational costs and retain a reasonable gross margin for investors in the SWM.

The results from multiple regression analysis (Table 9) revealed that an increase of one refuse collector employed by contracted companies to manage the waste leads to an increase of 1.64% of the solid waste collected and disposed to the dumping site. This calls for increase of number of refuse collectors to the adequate available quantities of the waste in Kinondoni municipality. Coupled low experience of refuse collectors estimate at only 1.7 years and the fact that experience had positive association with performance of the PPPs contracted companies, there should be harmonised working should be retain them rather than just being employed as labourers. The results reveal that an increase of one year of experience for the refuse collector improves the solid waste management by 1.11%. (Table 9). The proportion of staff/people served ratio, experience and expatriates has been reported by other authors as an important factor influencing the PPP companies performance elsewhere in the globe (Lop et al., 2017; Minjire and Waiganjo, 2015).

Table 5. Staff in solid waste collection in private companies

No.	Sub-wards	Number of Staff	Average working	Population	Persons
1	Kwatumbo	14	1	10,066	719
2	Kilungule	9	1	11,068	1,230
3	Kinzudi	9	2	5,880	653
4	Kumbukumbu	13	2	5,854	450
5	Azimio	9	1	15,754	1,750
6	Mkunguni B	12	1	8,184	682
7	Mbezi beach A	13	3	18,499	1,423
8	Bunju B	9	2	5,614	624
9	Hondogo	10	2	6,369	637
10	Tegeta	11	2	13,784	1,253
11	Idrisa	14	2	5,380	384
12	Kigogo mkwajuni	14	3	21,173	1,512
13	Mwenge	12	1	9,156	763
14	Kilungule A	8	1	14,071	1,759
15	Njeteni	10	2	6,273	627
	Total	**167**	**1.71**	**157,125**	**941**

3.3. Monitoring and evaluation

Monitoring and evaluation is considered as an important component in the successfulness of the project. Hence monitoring and evaluation practices exercised in Kinondoni municipality were identified. These include 'imprompt audits', 'daily follow up' and 'after crisis follow up'. Findings from the regression analysis revealed that the proportion of SW collected by PPP contracted companies declined by 2.63% when using 'after crisis follow up' procedures compared to when using the imprompt follow up approach (Table 9). The imprompt follow up has its strength in the fact that the agent (contracted company) would not know exactly when the audit will be conducted and for that case; the agent would get prepared at any time such that the principal should come at any time and find things right. In addition to that, the imprompt audit's strength is based on its identification of the problem and resolves the problem before things get worse. The solid waste collection fee from households was associated with a positive increase in solid waste collection and disposal. Hence improved efficiency in user fee for solid waste collection will lead to improved performance of the PPPs in solid waste collection and disposal. In fact Huisman et al, (2016) established that the current solid waste collection fees structure can meet the costs of operation and normal profit margin if it is collected efficiently.

Results from descriptive statistics revealed that 100% of respondents had reported that there were no any documented monitoring schedules in their authority. Moreover, the auditing frequency from the Principal (LGAs and ward executive officers) to the waste source was limited (Table 6). More than 45% of respondents acknowledged the audit exercised was 'after crisis follow up'. This portrays the fact that SWM is poorly exercised in the study area.

Table 6. Monitoring and evaluation practices Kinondoni Municipality

	Frequency	Percent	Cumulative Percent
Occasional Audits	20	26.7	26.7
Daily follow up	21	28.0	54.7
After crisis follow up	34	45.3	100.0
Total	**75**	**100.0**	

3.4. Accessibility of residential areas

Unplanned settlements pose difficulties in solid waste management. Congested houses and informal pathways are among the major challenges towards management of the solid waste. Findings from the multiple regression analysis revealed that a one per cent increase in accessibility of the houses was associated with a 0.63% increase of the solid waste management though not significant. In fact it was established that the proportion of SW collected by PPP contracted companies increased by 2.99% where there was SW collection centers compared to collection of SW without solid waste collection centers (Table 9). In this case, the insignificancy of the factor might be attributed with the fact that there were solid waste collection centers nearby homes where accessibility was a problem. However, the collection centers were not properly managed since the waste took long on the site such that, they were seen as dumping sites. This was also observed by Huisman et al, [26] in Dar-es-Salaam, Tanzania. The interviewed respondents estimated the proportion of accessible houses in Kindondoni to range between 20 and 40% with average accessible households of 28 ± 7.5% using trucks, trailers and wheel barrows. This justifies the reason of private companies to avoid tendering in unplanned settlements. The finding suggests that establishment of refuse collection points within accessible household premises in the unplanned settlements is inevitable.

Factors influencing PPPs performance using regression model

The regression model fit was found to be good fit to the data with an adjusted R square of 0.804 (Table 7) and significant F statistic at significance level of $P<0.05$ (Table 8). The model is well fitted to the collected data such that it accounts for 82% of variations in the solid waste performance in the study area. The remaining 18% can be explained by other factors not included in the model. The same model applies to the capacity of the contracted companies, accessibility to the residential areas for solid waste collection and monitoring and evaluation of the PPP for solid waste management which constitute the independent variables of the model.

Table 7. Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.905[a]	0.820	0.804	2.71173

a. Predictors: (Constant), Average person served by one staff, average working years for the staff engaged companies, Proportion of houses accessible in the locality, After crisis follow up vs occasional follow up, presence of waste collection centers vs no waste collection centers, Number of staff for the engaged private company in SW collection

Table 8. ANOVAa

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	2271.750	6	378.625	51.489	0.000[b]
	Residual	500.036	68	7.353		
	Total	2771.787	74			

a. Dependent Variable: Proportion of SW collected in your sub-ward
b. Predictors: (Constant), Average person served by one staff, average working years for the staff engaged companies, Proportion of houses accessible in the locality, After crisis follow up vs occassional follow up, presence of waste collection centers vs no waste collection centers, Number of staff for the engaged private company in SW collection

Table 9. Factors influencing performance of PPP contracted companies in SWM

	Unstandardized Coefficients		Std Coefc.	t	Sig.
	B	Std. Error	Beta		
(Constant)	14.858	1.931		7.696	0.000
Capacity of the contracted companies					
Staff numbers employed in SW collection	1.637	0.139	0.790	11.804	0.000
Experience of staffs in SW collection (years)	1.109	0.547	0.123	2.028	0.047
Ratio of staff/people served	0.003	0.001	0.225	3.441	0.001
Household accessibility					
Households' accessibility in the locality (%)	0.063	0.045	0.077	1.408	0.164
Solid waste fee collected from households (Tsh)	4.76E-008	0.000	0.124	2.037	0.046
Solid waste collection centres vs no waste collection centres	2.990	0.986	0.167	3.032	0.003
Monitoring and evaluation					
After crisis follow up vs occasional follow up monitoring	-2.627	0.653	-0.215	-4.023	0.000

4. CONCLUSIONS & RECOMMENDATION

Just to reiterate that about 60% of solid waste in Kinondoni municipality are left uncollected and disposed in illegal sites that poses health risks to the general public in the area to be vulnerable to endemic disease outbreaks such as cholera. Findings of the study showed that poor monitoring and evaluation system of the PPP initiatives for solid wastes collection was the main factor influencing poor performance of solid waste management in Kinondoni municipal. Other factors included low capacity of the contracted companies in terms of manpower and financial stability, limited accessibility of unplanned settlement areas and weak enforcement of laws and regulations governing solid waste management. The main conclusions of the study were that contracted companies have low capacity to perform, laws and regulations governing solid waste management are not effectively enforced, the unplanned settlements are not easily accessible and the monitoring and evaluation system in place is ad hoc where there is no regular plan that warrants learning and accountability check. The study recommends that the monitoring and evaluation system should be the primary target for improvement by establishing a clear regular plan in combination with imprompt monitoring in order to eliminate the effect of possible falsified compliance. As a long term solution the study recommends to the municipal council to improve towns and settlements planning for easy access to the households to improve garbage collection. Lastly but not least further research on end use products of the waste should look at the technical and economic viability of such end use products. Key aspects in the research that need to be clear is whether there is potential market for the end use products and whether the products can generate a reasonable profit margin that makes a business sense as a sustainable business. Positive outcome of the research will help to inform potential investors to make informed decisions on the business options available for converting waste into wealth. A study such as costs and benefits analysis of compositing organic fertilizers that accounts for a major portion of the solid waste is a potential research topic. Both short term and long-term solutions are expected to highly contribute in mitigating health risks associated with the solid waste mismanagement.

ACKNOWLEDGEMENTS

The author would like to thank Kinondoni municipal director on behalf of other municipal staff for their heart fully cooperation and more specific ward and sub-wards executives of whom their cooperation is very valuable.

REFERENCES

[1]. S. Countreau, "Occupational and environmental health issues of solid waste management: Special emphasis on middle and lower countries", Urban Sector Board and the World Bank, Washington, D.C. 48 pp, 2006.

[2]. IFC [International Finance Corporation, World Bank Group], "Handshake IFC's Quarterly Journal on Public – Private Partinerships", Issue 12, 84 pp., 2014.

[3]. IGC [International Growth Center], "Urbanisation in Tanzania. An internation growth center", Number 2, 55 pp., 2014.

[4]. L. Worrall, S. Colenbrander, I. Palmer, F. Makene, D. Mushi, J. Mwijage, M. Martine and N. Godfrey, "Better urban growth in Tanzania: Preliminary exploration of the opportunities and challenges", *Coalition for Urban Transitions, London and Washington, DC.* Available at: http://newclimateeconomy.net/content/cities-working-papers. 90 pp., Accessed on 16.11.2018 2017.

[5]. R. Breezes, "Municipal solid waste management in Dar-es-Salaam", A report prepared for the World Bank Washington, DC. 23 pp, 2012.

[6]. N.B. Mnyanyi, Assessment of solid waste management in Kinondoni Municipality", *A Dissertation Submitted in Partial Fulfilment for the Requirements for the Degree of Master of Environmental Studies (Science) of the Open University of Tanzania*, 2014.

[7]. E.L. Mollel, "Economic analysis of the solid waste management options in Morogoro Municipality", *A Dissertation Submitted in Partial Fulfilment of the Requirements for the Award of Degree for Master of Science in Environmental and Natural*

Resource Economics of Sokoine University of Agriculture, Morogoro, Tanzania, 67 pp., 2016.

[8]. C. Zurbrugg, "Urban solid waste management in low- income countries of Asia, How to cope with the garbage crisis", *A paper presented for: Scientific Committee on Problems of the Environment (SCOPE). Urban Solid Waste Management* Review Session, Durban, South Africa, November, 2002. 13 pp., 2002.

[9]. P. Mgaya and L. Nondek, "Disposal frequencies of selected recyclable wastes in Dar es Salaam", *Waste Management*, Vol. 24, pp. 927–933, 2004.

[10]. UN-HABITAT, [United Nations Human Settlements Programme], "Solid waste management in the World's cities", 228 pp., 2010.

[11]. A.H. Outwater, S. Pamba and A.B. Outwater, "Water–related diseases of people using municipal wasterwater: Risks, exposure, effects on health and control approaches in Tanzania", *A Report Prepared for Dissemination of Sustainable Wastewater Technology of Constructed Wetlands in Tanzania*, 119 pp., 2013.

[12]. T. Sakijege, J. Lupala and S. Sheuya, "Flooding, flood risks and coping strategies in urban informal residential areas: The case of Keko Machungwa, Dar es Salaam, Tanzania", *Jamba: Journal of Disaster Risk Studies,* Vol. 4 (1), 10 pages, 2012.

[13]. WHO [World Health Organization], "Guidelines for drinking-water quality", *Fourth Edition Incorporating the First Addendum*. World Health Organization, Geneva, 541 pp., 2017.

[14]. UNEP [United Nations Environmental Program], "Summary report: Waste management in ASEAN countries", 64 pp., 2017.

[15]. K.P. Sigh, "Issues and prospects of public-private partnership in India", *International Journal of Multidisciplinary Research*, Vol. 1 (5), pp. 244 – 256, 2011.

[16]. C.J. Liebenberg, "Public private partnership solutions to waste management in developing countries in Africa, Menlo Park, South Africa", *Proceedings Sardinia 2007, Eleventh International Waste Management and Landfill Symposium*, S. Margherita di Pula, Cagliari, Italy; 1 - 5 October 2007 by CISA, Environmental Sanitary Engineering Centre, 2007.

[17]. G. Bel and X. Fageda, "Empirical analysis of solid management waste costs: Some evidence from Galicia, Spain", *Resources, Conservation and Recycling*, 54 (3), pp.187-193, 2010.

[18]. JETRO [Japan External Trade Organisation], "Public private partnerships in Australia and Japan facilitating private sector participation", 2010.

[19]. J. Palfreman, "Waste management and recycling in Dar es Salaam, Tanzania", DOI: 10.13140/2.1.3196.4482 Retrieved 02/05/2016 https://www.researchgate.net/publication/271441207, 2014.

[20]. J.H. Ludete, "Factors influencing public private partnerships in solid waste management for local government authorities: A case of Kinondoni Municipality-Dar es Salaam", *A Dissertation Submitted in Partial Fulfilment of the Requirements for the Degree of Master in Project Planning and Management of Mzumbe University*, Morogoro, Tanzania, 2016.

[21]. M.K. Karija, Q.I. Shiua and Y.S. Lukaw, "The impact of poor municipal solid waste management practices and sanitation status on water quality and public health in cities of the least developed countries: The case of Juba, South Sudan", *International Journal of Applied Science and Technology,* Vol. 3 (4), pp. 87–99, 2013.

[22]. J.P. Senzige, Y. Nkansah-Gyeke, D.O. Makinde, and K.N. Njau, "The potential for solid waste recycling in urban area of Tanzania: The case of Dar Es Salaam", *International Journal of Environmental Protection and Policy*, Vol. 2 (5), pp. 147-152, 2016.

[23]. C. Mgimba, and A. Sanga, "Municipal solid waste composition characterization for sustainable management systems in Mbeya City, Tanzania", *International Journal of Science, Environment and Technology*, Vol. 5(1), pp. 47–58, 2016.

[24]. A.O. Solomon, "The role of households in solid waste management in East Africa capital cities", (*Unpublished Doctoral Dissertation). Wageningen University. Netherland,* 2011.

[25]. J.D. Maziku, "Improving solid waste management in the Dar-Es-Salaam coastal belt, Tanzania", *A Thesis Submitted for Partial Fulfilment of Natural Resource Management of Novia University of Applied Sciences*, Finland, 140 pp., 2014.

[26]. H. Huisman, H. Breukelman and B. Keesman, "Expert mission on integrated solid waste management (ISWM) to Dar es Salaam, MAT16TZ01 Report of findings, 31pp. 2016.

[27]. F. Contreras, T. Aramaki, S. Ishii and S. Connors, "Drivers in current and future municipal solid waste management systems: Cases in Yokohama and Boston, Doi 10.1177/0734X09349417, 2009.

[28]. ADB [Asian Development Bank], Government of Mongolia, "Public-Private Partnership Development (Financed by the ADP's Technical Assistance Special Funds – IV)", Visited from https://www.adb.org/sites/default/files/project-document/156500/41203-022-tacr.pdf on 03.01.2019. 2013.

[29]. E. Minjire and E. Waiganjo, "Factors affecting the performance of public-private partnerships in healthcare projects in Kenya: A case study of the Ministry of Health, Nairobi", *The Strategic Journal of Business & Change Management*, Vol. 2 (36), pp. 717 – 746, 2015.

[30]. A.Z. Ndumbu, "Factors affecting public-private partnerships projects in solid waste management in Mombasa County", *A Research Project Report Submitted in Partial Fulfillment of the Requirements for the Award of Master of Arts Degree in Project Planning and Management of the University of Nairobi*, 75 pp., 2013.

[31]. K.L. Thyberg and D.J. Tonjes, "A management framework for municipal solid waste systems and its application to food waste prevention", *Systems 2015*, Vol. 3, pp. 133-151; doi:10.3390/systems3030133, 2015.

[32]. S.O. Babatunde, A. Opawole and O.E. Akinsiku, "Critical success factors in public-private partnership (PPP) on infrastructure delivery in Nigeria", *Journal of Facilities Management*, Vol. 10 (3), pp. 212-225, 2012.

[33]. N.S.B. Lop, K. Ismail, H.M. Isa and N. Khalil, "Factors affecting the operational performance of public private partnership (PPP) projects: Cases in Malaysia", *International Journal of Academic Research in Business and Social Sciences*, Vol. 7 (11), pp. 1394-1409, 2017.

[34]. A.G. Kyesi, "Formalization of unplanned settlements and its implications on poverty reduction: The case study of Dar-es-Salaam city", *The Tanzania Journal of Development Studies*, Vol. 8(2), pp. 421-427, 2008.

[35]. M.I. Rasmussen, "The power of informal settlements, the case of Dar-es-Salaam, Tanzania", *Platinum Journal of Urbanisation*, Vol. 26, pp. 1-11, 2013.

[36]. J.D. Maziku, "Improving solid waste management in the Dar-es-Salaam Coastal belt, Tanzania", *Degree Thesis for a Bachelor of Natural Resources*, Degree Programme in Integrated Coastal Zone Management, 2014.

[37]. NEP [National Environmental Policy], 32 pp., 1997.

[38]. The Environmental Management Act. 158 pp., 2004.

[39]. I.A. Al-Khatib, M. Monou, A.S.F.A. Zahra, H.Q. Shaheen and D. Kassinos, "Solid waste characterization, quantification and management practices in developing countries. A case study: Nablus district–Palestine". *Journal of Environmental Management*, 91(5), pp. 1131-1138, 2010.

[40]. PEPA [Pakistan Environmental Protection Agency], "Guideline for solid waste management", 142 pp., 2005.

[41]. O.J. Okumu and R. Nyenje, "Municipal solid waste management under decentralisation in Uganda", *Habitat International*, Vol. 35(4), pp. 537-543, 2011.

[42]. Mungure M. J. (2008). Governance and community participation in Municipal Solid Waste management, case of Arusha and Dar es Salaam Tanzania. M.Sc. In Environmental Management. Aalborg University; 2008.

APPENDICES

Appendix 1. Sampling Frame Kinondoni Ward-Random Sampling

No	Wards	Randomization
1.	Tandale	0.146654
2.	Bunju	0.921422
3.	Goba	0.9274
4.	Hananasif	0.254062
5.	Kawe	0.021533
6.	Kibamba	0.963947
7.	Kigogo	0.435602
8.	Kijitonyama	0.269693
9.	Kimara	0.40483
10.	Kinondoni	0.303324
11.	Kunduchi	0.751684
12.	Kwembe	0.047996
13.	Mabibo	0.749994
14.	Mabwepande	0.45121
15.	Magomeni	0.137539
16.	Makongo	0.784137
17.	Makuburi	0.28642
18.	Makumbusho	0.584824
19.	Makurumla	0.185209
20.	Manzese	0.664696
21.	Mbezi	0.446709
22.	Mbezi juu	0.566404
23.	Mburahati	0.885115
24.	Mbweni	0.23154
25.	Mikocheni	0.296323
26.	Msasani	0.456265
27.	Msigani	0.551432
28.	Mwananyamala	0.974451
29.	Mzimuni	0.002684
30.	Ndugumbi	0.440836
31.	Saranga	0.824436
32.	Sinza	0.3376
33.	Ubungo	0.000604
34.	Wazo	0.900414

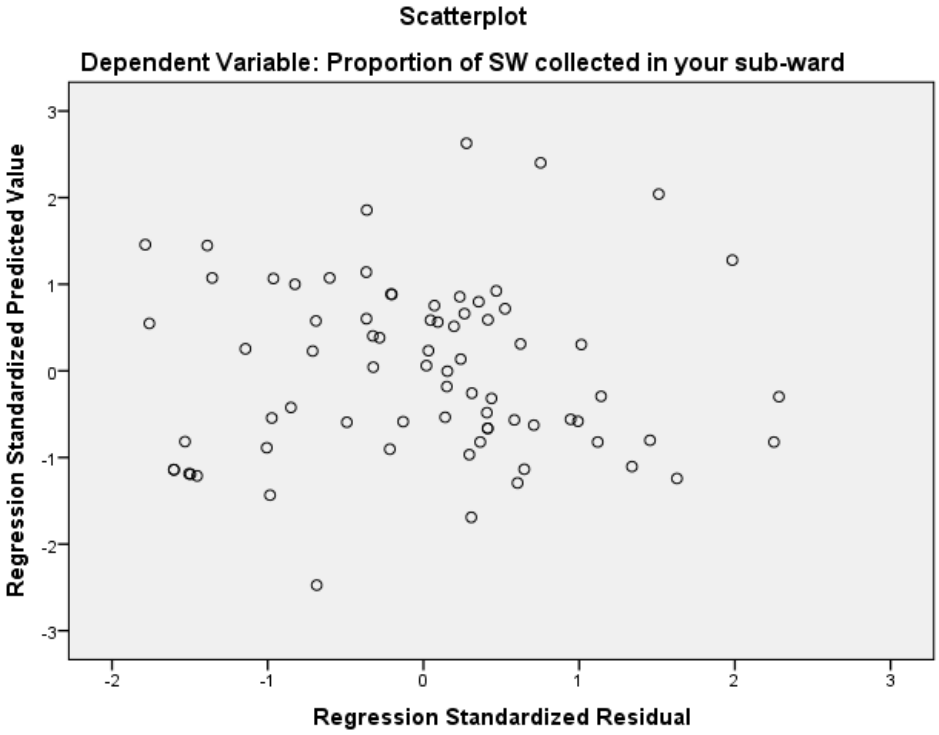
Appendix 2: Kinondoni sub wards sample randomisation

Tandale	**SAMPLE**		**Magomeni**	**SAMPLE**
Kwa Tumbo	0.075071		Idrisa	0.167576
Muharitani	0.176397		Suna	0.275869
Pakacha	0.157774		Makuti 'A'	0.711817
Mkunduge	0.240282		Dossi	0.829765
Mtogole	0.21575		Makuti 'B'	0.842808
Bunju	**SAMPLE**		**Kigogo**	**SAMPLE**
Kilungule	0.317763		Kigogo Mkwajuni	0.390857
Mkoani	0.857956		Kigogo Mbuyuni	0.401399
Dovya	0.303795		Kigogo Kati	0.470745
Bunju 'A'	0.448043		**Kijitonyama**	**SAMPLE**
Boko	0.59702		Mwenge	0.019171
Basihaya	0.639859		Mpakani 'B'	0.221142
Goba	**SAMPLE**		Bwawani	0.323158
Kinzudi	0.076682		Alimaua 'A'	0.335052
Goba	0.168094		Mpakani 'A'	0.370354
Kibululu	0.212996		Nzasa	0.659541
Kulangwa	0.346676		Kijitonyama	0.791616
Tegeta A	0.501734		**Kimara**	**SAMPLE**
Muungano	0.579218		Kilungule 'A'	0.431577
Kunguru	0.604377		Kimara Baruti	0.647166
Matosa	0.675902		Baruti	0.712707
Kinondoni	**SAMPLE**		Kilungule 'B'	0.815839
Kumbukumbu	0.337883		Golani	0.977632
Ada Estate	0.406938		Mavurunza	0.984488
Kinondoni Mjini	0.796189		**Kwembe**	**SAMPLE**
Kinondoni Shamba	0.915387		Njeteni	0.065044
Mabibo	**SAMPLE**		Kisopwa	0.108169
Azimio	0.069893		Mjimpya	0.158615
Matokeo	0.172786		Mpakani	0.34381
Mabibo	0.442699		Mlongazila	0.366894
Jitegemee	0.660802		King'azi	0.464077
Mabibo Farasi	0.904298		King'azi B	0.870209
Kanuni	0.967078		Msakuzi	0.919394
Hananasif	**SAMPLE**		Luguruni	0.925365
Mkunguni 'B'	0.129536		Kwembe	0.946006
Kawawa	0.752135		**Mabwepande**	**SAMPLE**
Hananasif	0.194384		Bunju 'B'	0.025515
Mkunguni 'A'	0.795273		Mjimpya	0.14652
Kisutu	0.606761		Mabwepande	0.293288
Kawe	**SAMPLE**		Kihonzile	0.700156
Mbezi Beach 'A'	0.078782		Mbopo	0.917578
Mzimuni	0.169442			
Mbezi Beach 'B'	0.640253			
Ukwamani	0.697305			
Kibamba	**SAMPLE**			
Hondogo	0.006939			
Gogoni	0.047898			
Kibwegere	0.37248			
Kibamba	0.444402			
Kiluvya	0.555327			
Kunduchi	**SAMPLE**			
Tegeta	0.278271			
Kondo	0.358668			
Kilongawima	0.643346			
Pwani	0.851544			
Ununio	0.96956			
Mtongani	0.970093			

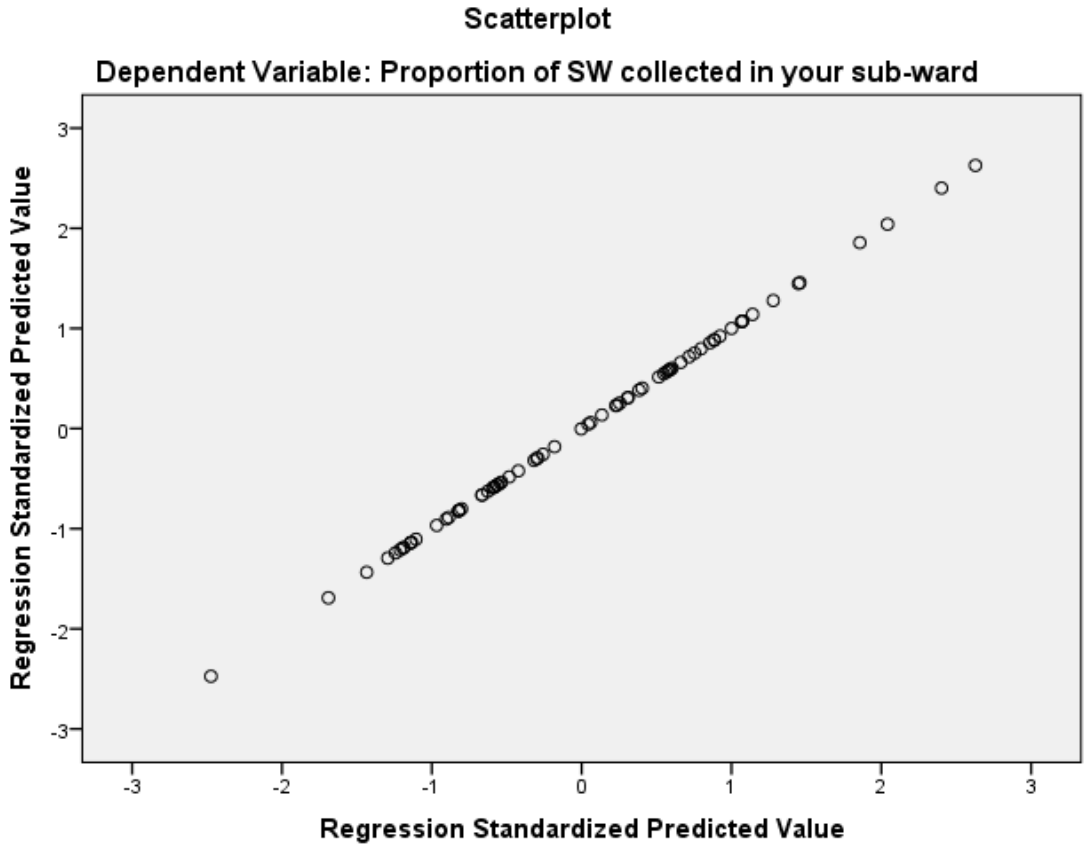
Appendix III. List of Cleansing Contractors at Kinondoni Municipal Council

No	Name of the company
1.	A. J. M COMPANY LTD
2.	BAM WASTE MANAGEMENT
3.	ENEA GROUP
4.	KURO ENVIRONMENTAL CARE LTD
5.	GORDIAN Z. KIKARUGA
6.	JUHUDI COOPORATION CO. LTD
7.	KIFUNA HERSHODAN INTER.CO LTD
8.	KINONDONI ENVIRONMENTALIST
9.	KIWODET
10.	UUGAI NENGA CO. LTD
11.	LYCAM INVESTMENT
12.	LUGOLI ENTERPRISEE
13.	MNEMVU TRADERS CO. LTD
14.	QUALITY SYSTEMS (T) LTD
15.	SKY MARS SERVICES CO. LTD
16.	T.T.M. GROUP
17.	ZUBISH ENTERPRISES

Appendix IV: Testing of homoscedasticity in the residuals



Appendix V: Test of normality in the error term (autocorrelation test)



Appendix VI: Collinearity tests

Model	Unstandardized Coefficients		Std Coeft	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	14.858	1.931		7.696	0.000		
Staff numbers employed in SW collection	1.637	0.139	0.790	11.804	0.000	0.566	1.767
Experience of staffs in SW collection (years)	1.109	0.547	0.123	2.028	0.047	0.687	1.455
Ratio of staff/people served	0.003	0.001	0.225	3.441	0.001	0.595	1.682
Households' accessibility in the locality (%)	0.063	0.045	0.077	1.408	0.164	0.844	1.185
Solid waste fee collected from households (Tsh)	4.763E-008	0.000	0.124	2.037	0.046	0.682	1.466
Solid waste collection centres vs no waste collection centres	2.990	0.986	0.167	3.032	0.003	0.833	1.200
After crisis follow up vs occasional follow up monitoring	-2.627	0.653	-0.215	-4.023	0.000	0.887	1.128

a. Dependent Variable: Proportion of SW collected in your sub-ward