

ASSESSMENT OF WASTE MANAGEMENT IN MARKET PLACES IN MOROGORO MUNICIPAL, MOROGORO REGION

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ABSTRACT

This paper aimed to analyze types of solid waste generated in market places, the costing of solid waste collection from the market places to dumpsites and the capacity of the solid waste collection's agent. The paper adopted a case study design in order to understand the situation in depth and get more accurate data. A sample size of 60 respondents was drawn using simple random sampling so as to avoid biases and meet many respondents. Questionnaires, interviews and observation were used to collect data, and data collected were analyzed by using Statistical Package of Social Sciences (SPSS) as well as Capacity Performance Index (CPI) tool and presented in tables and figures. The findings revealed that the types of solid waste generated are paper, food remnants, plastics and rag but mostly are plastics and the most dangerous wastes are food remnants because they are easy to get rotten and cause air pollution as there are some diseases that may occur. Also people tend to pay for solid wastes though they are not satisfied with the rate of waste disposal from those collection agents. And the capacity of waste collections agents was pleasing since only one group scored higher than others three hence make difficulties in managing waste because the rate of waste generated is higher than the capacity of agents to collect wastes. The paper recommended that, the frequency of collection of solid waste should be at least thrice a week and mostly in market places, the local government should enact by-laws that guide people on how to dispose wastes, the agents of waste collection should be promoted or learn from the group that perform well so as to collect wastes in proper way.

Keywords: Waste management, market places, Capacity Performance Index.

INTRODUCTION

Solid waste management means reduces or eliminates adverse impacts on the environment and human health and supports the economic development and improved quality of life, whereby a number of processes are involved in effectively managing waste for municipality which includes monitoring, collection, transport processing, recycling and disposal (Muller,1998).

The rapid urbanization that has been taking place during the 20th century virtually transformed the world in to communities of cities and towns facing similar challenges on environmental issues in which most of them have to be addressed at international level (Smith, 2010). Among those environmental issues solid waste management is a critical one because as long as humans have been living in settled communities, solid waste generation has been an unavoidable and critical issue both in developed and developing nations. As a result, solid waste management became a worldwide agenda at united nation conference on environment and development in Rio de Jenairo in 1992 with a great emphasis on reducing wastes and maximizing

environmentally sound waste reuse and recycling at first step in waste management (UNEP, 1996).

In developing countries, solid waste management is considered to be one of the most serious environmental problems confronting most urban areas (Sinha and Enayetullah, 2000). In African countries, management of solid waste is the responsibility of local authorities, which have low capacity in terms of financial, operational, institutional structures, management and inappropriate technologies, which affect the availability, or sustainability of solid waste management services (Onibokun, 1999).

Solid waste management in Tanzania has been highly centralized, using special department which collects wastes using special trucks from the collection points to the dump sites. Yet due to increase in the amount of solid wastes produced, more efforts have been done to decentralize and more involvement of both private and community in the issues of solid waste management (Environmental Management Act, 2004).

These wastes have diverse sources such as households, commercial areas, industrial activities and hospitals. It is noted that the rural area where the poor lives are experiencing high rates of poor solid waste management due inadequate knowledge and negligence by town officials who are involved in collections of solid wastes. Tanzania Local Government Act (Urban Authorities) No. 8 of 1982 required the Local Government Authorities to conduct solid waste management services in their local authorities and allowed them to charge the community the solid waste fees.

According to population and Housing census of 2012 the population of the Morogoro municipality was 2,218,492 people which was higher than the pre census projection of 2002 which was 2,209,072 in the ration of 49.61, women (114,839) and 50,395 men (114,839), the growth rate in the Municipality is 4.7% per annum and the average income of a person per year is Tshs. 539,375.00 (NBS, 2007).

Traditionally, solid waste management in Tanzania has been dealt with public health regulation which includes a joint command and control approach. In particular, human existence is dependent on the use of material resources which finally produces wastes. These wastes then are grouped into two parts normally soft and solid wastes. Increase in population and expansion of towns has increases production of solid wastes. Since the year 2000, Tanzania has experienced rapid expansion of cities which have been accompanied with an increase in economic activities and populations (Tanzania National Human Settlements Development Policy in 2000).

These town cities have adverse activities such as social activities like education, health, trade and business activities such as hotels and manufacturing activities. All of these have jointly produced more solid wastes (Liyala, 2011). As in other cities of East Africa, solid waste management in Tanzania has been highly centralized, using special department which collects wastes using special trucks from the collection points to the dump sites. Yet due to increase in the amount of solid wastes produced, more efforts have been done to decentralize and more involvement of both private and community in the issues of solid waste management (Environmental Management Act, 2004).

Statement of the problem

Municipal Solid Waste Management is an essential service that is provided to protect the environment and Public health, promote hygiene, recover materials, avoid waste, reduce waste quantities, decrease emission, and residuals and prevent spread of diseases (Tanzania Environmental Management Act, 2004).

In Morogoro Municipality about 200 metric tons of solid waste is generated daily, but the Municipal authority can only collect and dispose less than 35% of the generated waste (SUMO, 2003). About 35% of the uncollected waste is disposed in refuse pits while 30% is dumped in streets, streams and rivers (SUMO, 2003). If not properly managed, solid waste creates favorable breeding ground for vermin and insects and causes a serious risk of communicable disease. In addition, solid waste in waterways causes pollution of the water as well as blocking the flow of water causing flooding during heavy rains (Mombo, 2012).

The Morogoro municipal authority has been setting strategies to ensure that solid wastes are collected at a single point in all market places and are disposed in time to avoid inconveniences and make the market environment clean and maintain hygiene.

However, managing market solid wastes is becoming more challenging in Morogoro municipal. In the municipal market places there have been hills of wastes due to improper waste disposal in market places that create unsanitary conditions. These conditions in turn leading to pollution and persistence outbreak of water and vector borne diseases eruption in the municipal such as diarrhea, typhoid and cholera.

This study assessed solid waste management in market places in Morogoro municipal so as to know how they manage solid waste, amount and cost of collecting wastes as well as capacity of the waste collection's agents based on frequency waste collection from market places to dump sites. The paper was set to appraise solid waste management in market places in Morogoro municipal, whereby specifically it analysed types of solid waste generated in market places in the municipal, costing of solid waste collection from the market places to dumpsite and assessed the capacity of the waste collection's agents.

METHODOLOGY

The research study was conducted at Morogoro Municipal because it is one among the cities that develop faster with an increase of population growth and potential economic activities since it is the center of business to the most of people that lead to high solid waste generation. The Municipality lies within Morogoro district, is one of the Six Councils of Morogoro region. The Municipality has 29 administrative wards. Its major physical features include the famous Uluguru Mountains, which lie in the south eastern part, and Mindu mountains, which lie in the western part. There are three main rivers with several tributaries, which form a number of alluvial flood plains. These rivers are the Morogoro, Kilakala, Bigwa. Despite the variation of climatic conditions throughout the year the weather is attractive because of its high altitude.

Simple random sampling was used to collect data from different people in order to avoid biases and also it was simple to meet many respondents. The study covered 60 respondents whereby, interview and questionnaire techniques were used to most appropriate sample size to collect data. Respondents included entrepreneurs, Local Government Authority officials (environmental and public health) as well as non-government organizations dealing with environment and waste management. Since the respondents were selected randomly, solid

waste from dustbins and other collection containers for different groups were identified for physical contents.

Data collection methods

The study used different methods depending on primary and secondary data that were gathered. The study used questionnaire to gather information related to waste generation, collection and disposal facilities located at market places in Morogoro Municipal. The questions prepared were disseminated to entrepreneurs because they are many and this method saves time.

Interview

This is a form of verbal questioning administered by one person to another for the purpose of seeking information concerning some important matters. This was used so as to get primary data from the respondents since it gave chance for researcher to get more and accurate information. The study used interview to ask questions to respondents so as to know the type of solid waste generated, amount and cost of collecting waste and frequency of collecting waste done by waste collection's agents in Morogoro municipal. The researcher conducted an interview with Local Government Authority officials (environmental and public health) and waste collection's agents because they provided clear information since they are responsible for solid waste management in Morogoro municipal.

Observation

The study used observation method collecting data as the researcher wrote information that are seeing direct from the field without asking questions to the respondents. This method helped in finding the real situation at market places.

Data analysis

Data that were collected through questionnaire on solid waste management in market places were processed by using Statistical Packages for Social Sciences (SPSS) and descriptive statistics (frequencies, percentages, mean and standard deviation) and interview questions on capacity of waste collection were analyzed by using Capacity Performance Index (CPI) tool (Figure 1). Qualitative analysis provided necessary explanations to the quantified data and data collected through observations method.

RESULTS AND DISCUSSION

Socio economic characteristics

Female respondents were higher than male respondents as shown in the table below. The numbers of female respondents were 60% while that of male respondents were 40%. This means that majority of the samples population were female. Table 1 shows that majority of the respondents fall under the age between 19 and 49 years, this show that respondents were adults and they can respond to waste management. Marital status of the respondents

The results presented in Table 3 reveal that the majority of the respondents were married that is 56.7% while 30% were single respondents, 6.7% were widow while the rest 6.7% were separated. This indicates that married ones exceeded the single nearly two times. The results suggest that most of the people involved in this study were married.

Table 1: Characteristics of respondents

Sex	Frequency	Percent
Female	36	60.0
Male	24	40.0
Total	60	100.0

Marital status

Single	18	30.0
Married	34	56.7
Widow	4	6.7
Separation	4	6.7
Total	60	100.0
Education level		
Primary	20	33.3
Secondary	20	33.3
College	20	33.3
Total	60	100.0
Main occupation		
Self employed	44	73.3
Employed	16	26.7
Total	60	100.0

Educational level of respondents

The results indicated that 33.3% attended primary and secondary school as well as the same percent attended college that makes total of 100%. The findings imply that most of the respondents had gone to school and so they understand about solid waste management in market places and other areas.

Main occupation of the respondent

The study observed that the main occupation of the respondents are self-employed as they earn their living through business in market places (73.3%) and so they know kind of solid waste generated in the market places and how to manage them. Also 26% of respondents are employed in different institution and government.

Age of the respondents

The minimum age of respondent was 19 years and the maximum were 49 years. The mean of the respondents' age was 32.2 and the age tends to deviate from the mean by 8.0 (Table 2). This implies that most of the sampled population were youth.

Table 2: Descriptive analysis on age

Statistics	n	Minimum	Maximum	Mean	Std. deviation
Age	60	19.00	49.00	32.2	8.0
Hh size	60	1.00	15.00	5.87	3.53

Household size

Majority of respondents' house hold size as described in the table below was one person for minimum size and the maximum size was 15 people; where by the mean 5.8696 approximations to 6 and the number of people were deviate from one another by 3.53302 (Table 2). The average of house hold size in Morogoro municipal is 6 which is greater than the house hold size in Morogoro region that is 4.4 (URT, 2012).

Types of solid waste generated in market places in the Municipal

Results from Table revealed that a major type of solid waste generated in market places are plastic that has higher percent than other types of solid waste. According to respondents 43.3% of common solid wastes in market places are plastics, 11% are food remnants (vegetable and fruits), 4% are papers and 2% are rags. All these solid wastes are generated in market places since people sell different products that produce different wastes. Also the researcher through

observation in different dustbins there was more plastics wastes (plastic bags and used plastic bottles) than other wastes.

Table 3: Response distribution on solid wastes nearby market

Common solid wastes	Frequency	Percent
Paper	8	13.3
Food remnants	22	36.7
Rag	4	6.7
Plastics	26	43.3
Total	60	100.0

Table 4 shows that 80% of respondents said that wastes are not proper collected while 20% said there is proper collection of solid waste in market places. This suggests that solid wastes are not properly collected.

Table 4: Are solid waste proper collected

Answer	Frequency	Percent
Yes	12	20.0
No	48	80.0
Total	60	100.0

Figure 2 shows that 66.7% of the respondents said that there are dust bins, 23.3% responded that there are plastic buckets while 10% of respondents answered iron bucket as waste disposal in most of the market places found in the Morogoro municipal.



Figure 2: kind of dustbins wastes are collected

Also this was noted by the researcher through observation method as in market places there are people who use plastic buckets so as to dispose their waste while waiting for those waste collectors to collect and transport to dump sites.

Table 5 shows that the 66.7% of respondents said that wastes are mixed on the question that if there are separate bins for waste collection while 33.3% said yes based on their equipment for waste collection they have and this shows that there is still a problem on solid waste management in market areas.

Table 5: Are there separate bins for a waste collection

Answer	Frequency	Percent
Yes	20	33.3
No	40	66.7
Total	60	100.0

Table 6 shows that 53.3% out of 100% said that people who are responsible in waste disposal are municipal as they select people to clean and collect wastes in market areas, 23.3% said responsible people are agents as there are agents of waste management who sign contract with the municipal, other 23.3% of respondents said they don't know who is responsible for waste disposal. Thus people perceive that the municipal has full responsibility on waste management.

Table 6: Responsible person for waste disposal

Responsible person	Frequency	Percent
Municipal	32	53.3
Agents	14	23.3
I don't know	14	23.3
Total	60	100.0

4.3 Costing of Solid Waste Collection from Market Places to Dumpsites

Table 7 shows that 90% of respondents answered Yes that they pay for waste management and 10% said No since they are like street vendors they are mobile with their products.

Table 7: Are you paying for waste management

Answer	Frequency	Percent
Yes	54	90.0
No	6	10.0
Total	60	100.0

Table 8 shows that the cost charged for the service ranged from 1500 to 5000 Tshs depend on the size of shop and the business that they conduct in market places. According to them they have to pay so as to contribute for the cost of managing waste that is done by the municipal and agents of waste collection.

Table 8: Descriptive analysis for amount paid for waste management in Tshs

Amount	n	Minimum	Maximum	Mean	Std. deviation
How much	60	1500.00	5000.00	1138.90362	2.58333

Although 66.7% of respondents as shown in Table 9 complained that this cost is relatively high compared to the service they are getting since the frequency of waste collection is once or twice per week which is low frequency compared to the rate of waste they generate, this decreases their willingness to pay and the rate of satisfaction. The results are also comparable to URT, (2002) who reported that respondents complained that the cost of 800 to 2400 per month was high.

Table 9: Are you satisfied with the rate of waste disposal

Answer	Frequency	Percent
Yes	18	33.3
No	38	66.7
Total	56	100.0

Table 10 reveals that 86.2% of respondents said yes that there is a fine for those who fail or delay to pay or waste collection while 13.8% of respondents said there is no fine for those who fail or delay to pay for waste collection. This implies there are strict rules so as to make people pay for waste management.

Table 10: Is there any fine for those who fail to pay waste collection fee

Answer	Frequency	Percent
Yes	50	86.2
No	8	13.8
Total	58	100.0

Table 11 shows that the amount of money they pay for fine when delaying or fail to pay for waste collection is 500 Tshs as minimum amount and 50000 Tshs as maximum amount. The mean of such amount is 20949.6 and the amount for fine is deviate from the mean by 1.7.

Table 11: Descriptive Statistics for fine on failing or delaying payment for waste collection in Tsh

Amount	n	Minimum	Maximum	Mean	Std. deviation
Fine	53	500.00	50000.00	20949.60	1.73

The Capacity of Waste Collection

The assessment of the capacity of the agents that collect and dispose waste was analyzed using the Capacity Performance Index (CPI) and its decisions based on the Figure 3 below. Data that collected through interview were entered and coded in Microsoft Excel which gave the results that fell into three levels (level 1, 2, and 3). Each level had its own organization or enterprise stage as Forming or Storming for level 1, which was characterized or expressing that at this stage the group is gaining understanding the purpose and what they intend to do, but is full of conflicts and competition, since it is at early stage and thus difficult to compete with others. Then norming for level 2 that characterized by a group or organization that becomes cohesive unit and the last level is level 3 that means performance as characterized by high productivity, unity amongst members, loyalty and supportive towards each other and focus on fulfilling the groups purpose or goal.

In Morogoro municipal there are different waste collection agents that enter into contract with government to work in wards, these agents collect wastes from dustbins to the collection dump site located at Mjimpya where by later on municipal transport wastes from collection dump to the main dump site that is located at Mkundi ward. The study aimed at measuring capacity of the waste collection agents by using Capacity Performance Index (CPI) tool as shown in figure 3, and the following are the results from four agents;

The first one is Umoja wa Watunza Mazingira Morogoro (UWAMAMO) that is allocated at Uwanja wa Taifa, this group is at level 3 with 85% score in CPI that indicates performance this shows that the group has high productivity, unity among members, loyalty and support toward each other as well as focus on fulfilling the group's goal that is to manage environment by keeping it clean. This group is performing at low score in professional capacity where it got 50%.

The second group is Chapa kazi group that is located at Mafiga ward. The group is at level 2 with 63% that is B-, this implies group is at norming stage where by group becomes a cohesive unit that means still is growing and its performance is normal not the best.

The third group is Kindimbwa found in Boma ward, this is under level C+ with 59% score, which is forming storming that implies the group is still in formulation stage a there is high level of conflict and competition and they are gaining understanding of the groups purpose and governance structure. The group cannot carry all responsibility because of low capacity hence can lead to poor performance. This group score best in marketing by getting 100% and score worst in production management and income diversification, hence the group needs more support to perform better.

The last group is Nguvukazi that is found at Uwanjawandege ward that scored 57% in level C+ which is forming storming that shows low capacity of a group as they are in stage of formulation where there is high level of conflict and competition as well as getting to understand their goal. This is the last group that scores lower percent but in each part it scored above 50% different from Kindimbwa.

CONCLUSIONS AND RECOMMENDATIONS

The type of solid waste generated in market places in Morogoro municipal are paper, food remnants, plastics and rag, It was found that there was a high generation of the plastic material wastes as agreed by 43.3% of respondents and the most dangerous wastes are food remnants such as vegetable and fruits because they get rotten within few days and cause air pollution in market places that may lead to occurrence of vector bone diseases that are transported by organisms such as diarrhea. The responsible people in waste management are municipal that enter into contract with agents of waste collection who collect wastes from different places like market places and collect to the disposing center, then the municipal collect wastes from disposing center to dump sites. Although the disposal of wastes is slow which is twice a week as answered by 72.4% of respondents and there is no separate bins for waste collection because wastes are mixed that shows there is still a problem on solid waste management in market areas in Morogoro municipal.

The costing of solid waste collection from market places to dumpsites includes the cost of transporting wastes and the amount of solid wastes collected. As answered by the respondents there is the cost charged for the service that is ranged from 1500 to 5000 Tshs and the rate of waste disposal is low since people are not satisfied because the cost of collecting wastes is relatively high compared to the services they get that decrease their willingness to pay for waste management.

The capacity of waste collection's agents was pleasing because just one agent was at the stage of performance of CPI that scored 85% as it perform well in accountability 91%, income diversification 83%, strategic potential 75%, production management 100%, marketing 80%, participation 100% and advocacy 100% while the rest were in norming and forming level of stages as they perform poor in participation, income diversification and personal capacity.

RECOMMENDATIONS

The frequency of collection of solid wastes should be at least three times per week so as to avoid accumulation of solid wastes in the bins and as well as air pollution in market places. This should be supported by training of wastes collectors on best methods of solid waste handling and disposal (how to collect and dispose solid wastes safety).

The local government should enact by-laws so as to guide people on how to dispose waste also should establish strict penalties for people and institutions that fail to comply with the by-laws of SW management strategy after being established especially improper waste disposal like what has been announced by regional commissioner of Dar es Salaam towards environmental cleanness.

The government should work harder in supervising market wastes, advice and coordinate the environmental policies, plans and activities that can have positive impact on the environment. Also they may adapt ways of solid waste management from other Municipals like Moshi Municipal.

There should be provision of awareness to the community members through massive information dissemination so as to be active participants in waste management from the generation stage and change the culture of throwing wastes every place to keep environment clean.

In order to promote separation of waste, collection points should be divided into parts so that people should dispose separated waste to specified part. That will help in avoiding dangerous wastes like broken bottles that may cause injury to those who collect wastes; also it will help in recycling wastes like plastic bottles.

Because still there are wastes around market places and other places, the Municipal should assess agents of waste collection by using CPI tool and the contract should be given to the agent who performs well in all parts so as to provide services in effectiveness and efficiency. As all groups are not well in professional capacity they score below 50%.

Other agents should learn on participation, advocacy and product management from UWAMAMO group that score high so as to perform well in waste management and keep environment clean.

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