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Research Article

THE ASSESSMENT OF SOLID WASTE PRODUCTS MANAGEMENT IN ETHIOPIANS MUNICIPAL URBAN AREAS

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Abstract

Due to the rapid and immense quantities of solid wastes products in our city, municipality and urban areas have been increasing day by day due to developments of new Industries. As a result of increasing number of Industries a huge amount of wastes is produced daily in all developing nations and Ethiopia being among them and has surpassed the USA as the world's largest solid waste (SWM) generator since 2004. The phenomena and critical issues of SW in Ethiopia has inspired this paper to investigate and analyze the SW in an urban area of Ethiopia by comparing the increasing rates of the SW generation with Solid Waste Management (SWM). It is noted that very little effort is being made in handling Solid waste management (SWM) which is one of the public service areas where effectiveness can be easily be gauged, and should not be regarded as a matter of luxury. Addis Ababa in general faces problems which are associated with poor SWM. This study deals with the assessment of Governance in SWM in Addis Sub city. Therefore governance is used as a framework for the study because currently it dominates development discourse and governance policies are implemented by governments aiming at improving urban services such as SWM. The paper has employed both qualitative and quantitative approach with descriptive types of research. Quantitative data was analyzed using statistical tools whereas qualitative data was analyzed in narrative explanation and discussion. The main findings revealed in the paper are: containers are not properly emptied on time, insufficient of support from SWM office, due to the absence of processing and recovery system by MSEs, lack of awareness and poor public attitude towards solid waste management, weak monitoring and evaluation system.

Key words: Solid Waste Management; source reduction; composting; biogas; incineration; landfill

Introduction & Background

Continuous economic activities, rapid urbanization, population growth and the rise of living standards have greatly accelerated the generation of solid waste (MSW). This has posed as a considerable challenge to the government ministries, civil society and private sectors for protecting and promoting environmental and sustainable developments.

From the days of primitive society humans and animals have used the resources of the earth to support and dispose wastes. In early times, the disposal of human and other wastes did not pose as a significant problem, because the population was small and the amount of land available for the assimilation of wastes was large. Problems with disposal of wastes can be traced from the time when humans first began to congregate in tribes, villages, and communities and the accumulation of wastes became a consequence of life (Tchobanoglous, 1993)

Thousands of tons of solid waste are generated daily in Africa. Most of it ends up in open dumps and wetlands, contaminating the surface and ground water which poses as a major health hazards. Most wastes in Africa are not collected by municipal collection systems due to poor management, fiscal irresponsibility or malfeasance, equipment failure, or inadequate waste management budgets (USAID, 2009).

Solid waste management (SWM) is a growing public concern in Ethiopia. In many cities of the country, waste management is poor and solid wastes are dumped along roadsides and into open areas, endangering health and attracting vermin. Access to sanitation is also among the lowest in the world (Kontogianni, 2012).The condition in Addis Ababa also seems to be similar to that in most African cities. The quantity of waste generated is increasing because of rapid population growth and urbanization. This has outpaced the financial and a manpower resource of municipalities in dealing with the provisions and management of services of solid waste (AASBPDA, 2003). Currently SWM is insignificant in Addis Oromia's Sub-City, which is one of the 10 sub-cities of Addis Ababa. It in therefore noted that very little research has been done which is not enough in improving the existing service delivery in the Sub-city. This study is conducted in the sub-city to help concerned bodies to evaluate the performance of SWM of the sub city and improve the service delivery. It is centered

on SWM because the issue is directly related to environmental, sanitation and public health.

The solution to this problem is to adopt an effective SW system. The waste hierarchy approach provides an integrated process of waste minimization, reuse, recycling, recovery and disposal of waste Fig 1. Oromia's, a city in Ethiopia is challenged by a substantial quantity of solid wastes. The case studies for two cities' SW system shall be compared and analyzed to explore barriers and possible solutions for Oromia's achieving optimal SW system. When a safe and environmentally sound SW system is in place at all levels, great potentials are anticipated to improve the living standards for residents and improving the economic benefits for them.

One of the most important urban environment problems of today is managing wastes. As populations increase and cities become more industrialized, the volume and composition of wastes generated grows and changes. This is especially significant for cities in the developing world where populations and economies are rapidly expanding and the infrastructure necessary to manage the ensuing problems is inadequate (Getachew, 2006).

Although there are some efforts to improve the effectiveness of SWM, these efforts have failed to yield sustainable solution to the problems, because the efforts could not cope up with the rate of SW generation in the sub cities, municipality or urban areas. The piles of wastes dumped illegally on open areas, in river courses, and etc are undisputable evidences of the poor SWM system of the sub-city. Therefore, this research which is concerned with assessing governance in solid waste management practice shall provide additional data to assist decision makers and designers evaluate the performance of the sub-city and can have a foundation to decide, plan and implement sustainable SWM systems so as to address the bottle necks.

This paper is centered on solid waste management because the issue is directly related to environment, sanitation and public health and has a high effect in Addis Oromia's a sub-city. Hence, the purpose of this study was to assess the existing problems of solid waste management in Addis Oromia's Sub City through identifying major factors which influence the promotion of sustainable solid waste system. Hopefully, this research shall yield possible solutions that can help and minimize the problems/challenges of solid waste management.

Conceptual Framework

According to the principles of sustainable development include integrating the environment into the decision making process, reorienting technology and management of risks, conserving and enhancing the resource base, and strengthening international cooperation (UNEP, 2005). Thus there is a need for sustainable SWM to bring sustainable development.

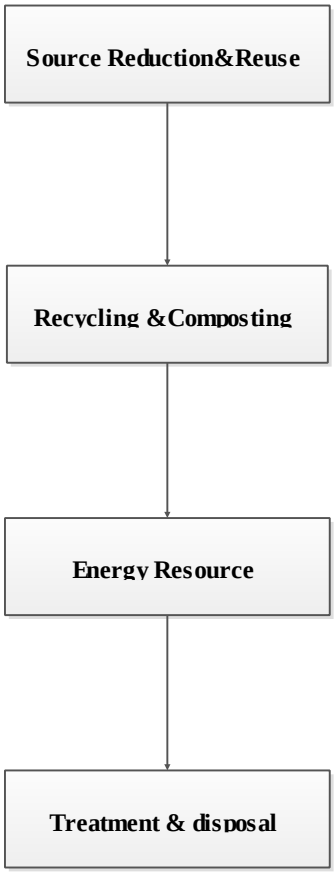

Fig. 1: An Illustration of Solid waste management Hierarchy.

FDRE SWM proclamation No. 513/2007 Article 2/6 and 7 (FDRE, 2007), "Solid Waste" means anything that is neither liquid not gas and is discarded as unwanted. It is also defined by (Tchobanoglous, 1993) as solid wastes include all solid or semisolid materials that the possessor no longer considers of sufficient value to retain. As (Nigatu, 2011) stated it could be refuses from residential, commercial, or any institutes as yard sweeping, food remains, ash and chat leftover, saw dust, piece of wood papers, glasses, metals, batteries, plastic, grass, and vegetables, bone of animals, dead animals and other materials that cause poor environmental situation. Solid waste management(SWM) means the collection, transportation, storage, recycling or disposal of solid waste, or the subsequent use of a disposal site that is no longer operational (FDRE, 2007). Solid waste management is a complex task which must go beyond purely technical considerations to political, institutional, social, financial, and economic aspects (Fig. 1). Based on literature review, discussion with experts, empirical studies, and personal observation, the conceptual framework for the study is formulated.

Population

According to the 2015 Census, Addis Ababa City Administration has a total population of 98,942,142 among this the number of female population is equal to 1,511,558 (52%) and the number of male is 1,304,518(48%). The sex ratio (number of males to number of female populations) is 1.03in the indicated year. The population size of Addis

Oromia sub city is 255,092. Total area coverage of the sub city in kilometer square is 284,538 which is the smallest of all sub cities. But its population density per sq. m is 25,560; the highest of the rest (ATLAS, 2015).

Topography

The lowest and the highest annual average temperature of the sub city is about 10°c and 25°c respectively. The climate is divided into three distinct seasons, the period of big rains (Keremt) commences between June and September. The dry period (Bega) is between October and January, and the small rains (Belge) commences between March and May, while the average annual rain fall is 1100 mm to 1200 mm (MAA, 2002).

Data Sources and Methodology

Description of the Study Area

Addis Ababa is the federal capital city and the seat of the federal government and parliaments. It is located in the central part of Ethiopia and its geographic location is between 8055' and 9005' north latitude and 38040' and 38050' east longitude in the central part of Ethiopia. All sides of the city are bordered by Oromiya Regional State, and cover an area of 530 sq. km or 53,000 hectors. It is at 2408 meters above sea level (ATLAS, 2015).

Addis Ababa is divided into ten sub cities which are the second layer of the Addis Ababa City Government. Addis Oromia sub city which has 10 Woredas is one of them. The subcity is bordered in the North by Gulele sub-city, in the East by Arada sub-city, in the South by Lideta sub-city and in the North-west by Kolfe keranyo sub-city.

Data Source and Data Type

All required data for this study were collected both from primary and secondary sources such as households, commercial area societies, MSE operators, street sweepers and SWM office workers and officials The primary data were collected from sampled HH respondents and key informants. Similarly, thorough review of all available published and unpublished documents of relevant organizations The data sources of the study was conducted.

Sampling Technique

To decide the target population size of the study, systematic random sampling and purposive sampling were used. Purposive sampling was applied to select key informant respondents which include waste workers, the Community, Sub City and Woreda SWM offices workers, Rule regulators at sub city and Woreda level, and other relevant organization. In setting up sample, care was taken that all socioeconomic groups are represented.

Sample size determination

The sample size for the systematic random sampling technique was calculated by using sample size determination formula and some assumptions.

Assumption

Since there was little information about solid waste management in the Sub city, it was not possible to guess the proportion. The reasonable estimate for a key proportion to be studied is 50%. Therefore, 5 % degree of precision and 95% confidence interval was taken. Then:

$$n = \frac{z^2.p.q.N}{e^2\,(N-1) + z^2.p.q} \text{----- (1) (Kothari, 2004)}$$

Where, z= confidence interval (1.96); p= estimate proportion (50% = 0.5); w= degree of accuracy; ni= sample size to be drawn before reduced; N= total number of population (12,336)

$$n = \frac{(1.96)^2 \quad (0.5) \quad (0.5) \quad (12{,}336)}{(0.05)^2\,(12{,}336) \;+\; (1.96)^2(0.5)\,(0.5)} = 368$$

Even if the calculated sample size is 345, which is a large number to manage. Therefore the sample size is reduced into 265(2%), because the items for the universe are homogenous, the standard of accuracy and the level of precision is small and the size of the study population is very large. The paper result indicates that there is a practice for waste reduction and the reuse for different purposes such as, cans, used plastic containers of water and lubricants for sale, old cloths and shoe for exchange, plant origin waste for fuel and recycled by composting etc. The practice of reusing and recycling waste is not well practiced among the respondents except exchanging materials producing immediate values. So, it has to be a habit for proper and sustainable SWM.

Method of Data Collection and Analysis

The data collection was done using checklists which were pre-tested prior to the actual field work. The bulk of the data generated for this study were qualitative and to attain comprehensive assessment for management and organization of solid waste management service in Addis Oromia Sub City, both primary and secondary data was collected.

The primary data was collected through interview, questionnaires, physical observations supported by digital photographs and focus group discussions. Face-to-face personal interview was conducted with selected households, micro and small scale enterprise members and street sweepers to gain individual perspectives of the different stakeholders.

Questionnaires consisting of closed and open-ended questions were set in English and translated in to Amharic in order to make communication easy. Pilot or a pre-test study was carried out, so as to modify any ambiguous in the questionnaire before the commencement of actual data collection, hence the questionnaire was modified based on the results of the pre-test.

Deep focus group discussions were made with MSE operators, responsible officials, street sweepers and Woredas' SWM office workers. Observations were take

place to understand and corroborate the data gathered from informants about status of the present SWM system. Secondary data was collected from archive, statistical reports and abstracts, published and unpublished materials, internet sources, proclamation, policy guidelines, journals and different reports of the sub-city.

Result and Discussions

Solid Waste Products Composition

SWM is one of the most important urban management issues as it is the most obvious and visible service determining the livability of a city. The impact of improper SWM causes multiple pollutions, i.e. air, soil and water. It damages surface and ground water, enters food chain through the production of fruits and vegetables using polluted surface water. It also obstructs drainage systems and creates suitable media for the breeding of disease causing microorganisms and insects and creates and intensifies flooding during rainy seasons.

This part deals with the findings delivered from questionnaire, interview, FGD and observation in a descriptive and qualitative analysis. The result is organized in a way that it will fit with the specific objectives stated in Chapter one. The first part is the existing practice of SWM in Addis Oromia sub city, the second part is KAP of respondents and the last part is challenges of SWM.

The findings of the study is discussed from Good Governance and functional elements of SWM point of view There are six functional elements associated with SWM namely: Waste generation, on-site handling and storage, collection, transfer and transport, processing and recovery, and disposal of solid wastes. The findings of implementation of these functional elements are discussed here in relation to Good Governance. Thus, efficient implementation of these functional elements is useful so as to get a good result from the SWM activities in the sub city.

When considering the solid organic waste production across different origin/nature (plant, animal and industrial), the plant origin was found on among of 265 total sample; from households, commercial areas, street sweepers, MSE operators and SWM office workers; 242(91.3%) were respondents while 23(8.7%) were non respondents. Among the respondents, 180(74.4%) were from households, 13(5.4%) were from commercial areas, 21(8.7%) were from MSEs, 12(5.0%) were from street sweepers and 16(6.6%) were from SWM office workers.

Demographic Profile of Respondents

With regard to waste generation rate the survey result shows that among a total of 242 respondents, 135(55.8%) were male, 106(43.8%) were female and the remaining 1 respondent (0.4%) was missing. The result of the age of the respondents show that 23(9.5%) was below the age of 18, 118(48.8%) was between 18 and 30 years, 76(31.4%) was between 31 and 50 years and 24(9.9%) was above 50 years old. As Table 2 shows the illiterate, those with primary education, those who completed grade 9th to 12th account for 16(6.6%), 57(23.6%), and 76(31.4%) respectively. Furthermore, college diploma holders were 56(23.1%), whereas those with first degree and above were 32(13.2%) and missing were 7(2.1%). With regard to marital status, 122(50.4%) of respondents said they are not married while 116(47.9%) said they are married (Table 1).

Table 1: Demographic Profile of Respondents

Variables		Frequency	Percent
Sex of respondents	Male	135	55.8
	Female	106	43.8
	Missing	1	0.4
	Total	242	100
Age of respondents	Below 18	23	9.5
	18-30	118	48.8
	31-50	76	31.4
	Above 50	24	9.9
	Missing	5	0.4
	Total	211	100
Educational status	Illiterate	16	6.6
	Primary school (1st-8th)	57	23.6
	Grade 9th- 12th	76	31.4
	College diploma	56	23.1
	1st degree and above	32	13.2
	Missing	7	2.1
	Total	242	100
Marital status	Single	123	50.4
	Married	116	47.9
	Missing	3	1.2
	Total	242	100

[Source: Field Survey, 2015]

The demographic profile of MSE operators and street sweepers are also assessed separately to see some relationships existing between the two groups. Hence, the sex compositions of the individuals engaged in solid waste MSE activity in the study area revealed that 76.2% of the enterprises were run by male operators whereas only 23.8% are run by female operators. This shows that male operators are larger by far than female MSE operators in the study areas. The sex composition of street sweepers is 8.3% of them are male while 91.7% are female. This shows that more females are involved in street sweeping than males.

Most of the solid waste operators had gone through primary education to grade 12/preparatory level. 23.8% of the operators were illiterate while about 52.4% of the operators have attended primary education level/1st -8th grade, and 23.8% have attended secondary education. When we see the education level of street sweepers, 58.3% of them are completed primary level while 41.7% of the learned from grade 9th to 12th. This shows that most of the MSE operators and street sweepers are educated people who are engaged in self-employment. As the result indicated, level of education is not a major criterion for employment in solid waste MSEs street sweeping. However, from the FGD it

was identified that almost all of the enterprise operators and street sweepers were not trained in SWM activity.

About 47.6% of the MSE operators in the study areas were not married, whereas 52.4% were married. Moreover, 58.3% of street sweepers were single while 41.7% are married. This shows that most of the operators have a family which is directly dependent on them. Thus solid waste MSEs can play a significant role in urban poverty reduction strategy.

Ways of disposing waste by households

The FGD and interview results showed that different types of wastes are generated by households and commercial areas. Some of the wastes commonly collected by enterprises and street sweepers are: left-over and spoiled food, vegetables and fruits, plastics and rubber, grass extracts and bones, ash, sand, paper, textiles, glass, bottles and ceramics, old cloths and metals. Households were asked how they usually dispose their household waste. The result of the response is summarized in Table 2. The households which gate the disposal service delivered by MSE operators are 67.2%. The remaining 32.8% of the respondents use other methods like disposing waste on open fields, roadsides, in the nearby river, burning in their compound etc.

Table 2: Ways of discarding solid waste by households

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Discarding in hole around the house or burn	14	7.8	7.8	7.8
	Throw it on open space or street	2	1.1	1.1	8.9
	Throw it into nearby river	5	2.8	2.8	11.7
	Take it to nearby secondary storage receptacle or "Genda"	33	18.3	18.3	30.0
	Waste collectors/MSE members take it	121	67.2	67.2	97.2
	Others	5	2.8	2.8	100.0
	Total	180	100.0	100.0	

[Source: Field Survey, 2015]

The chi square test confirmed the correlation between distance of containers and ways of solid waste discarding of households. According to the result of the study, majority of households who are far away above 150m discard within the compound, throw in open space and street, as well as provide waste for collectors while households found within 150m from containers take waste to the nearby container and throw to rivers near the compound (Table 3 and Table 4).

Table 3: Cross tabulation of Ways of discarding solid waste by distance of containers

		Distance of containers from the house		Total
		Less than 150m	Above 150m	
Ways of discarding solid waste	Discarding around the house or burn	4	6	10
	Throw it on open space or street	0	2	2
	Throw it into nearby river	1	0	1
	Take it to nearby secondary storage receptacle or "Genda"	14	10	24
	Waste collectors take it	21	62	83
	Others	1	3	4
Total		41	83	124

[Source: Own made, 2015]

Table 4: Chi-Square Tests of the cross tabulation of ways of discarding solid waste

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.532[a]	5	.028
Likelihood Ratio	12.936	5	.024
Linear-by-Linear Association	1.882	1	.170
N of Valid Cases	124		

7 cells (58.3%) have expected count less than 5. The minimum expected count is .33. [Source: Field Survey, 2015]

About 60 MSE were engaged on primarily collection from households to municipal container hence it has improved collection of waste and created jobs for unemployed youths. However, in the result it was observed that about 1/3rd of the respondents were not being served by MSE operators. The reason why they go for other options as identified from interview is, because waste collectors do not come regularly. One important aspect that should be noted in the usage of waste collecting containers in the sub-city is that these days the main actors are not the households that are taking their wastes to the containers. As stated above the greatest share is performed by the recently organized MSEs. Of course, there are households who never use the MSE's service at all.

The finding from interview, FGD and observation further revealed that most of the households which did not use MSEs service are: people living very near containers, households who live near river courses, very poor households incapable of paying the monthly fee and those who possess large compounds so that they discard their solid waste inside their compound. Respondents said, quite often, waste collectors come up with scavenging domestic animals including stray dogs for food from collection

materials; tear the container causing offensive smells in the surroundings.

During the interview there were respondents who stated that there are no collection services in their Woreda. According to the study, this is due to the topographic location of the houses or due to inaccessibility caused by lack of roads. Transportation of wastes to the containers is possible using hands and hand pushed carts. In each woreda strategic locations are assigned where collectors make ready for the vehicle transportation/ temporary storage sites.

Then from our result on how respondents dispose waste revealed that 32.8% of them in the study area dispose their waste unlawfully, a habit which results into health hazards in the area. Different studies described that this waste is creating health and environmental problems in the Sub-City, where there is no proper waste management.

Frequency of collection

On the other hand, the researcher has tried to assess MSEs' frequency on solid waste collection and the result indicated that out of the total number of respondents, 48.6% reported that MSEs collect household solid waste four times a month; 32.0%% stated that the MSE's collect household solid waste eight times a month, 12.6% of the respondents said that they get the service less than three times a month while 6.8% the respondents get the service more than eight times a month. The mean service delivery frequency is 6.46. Similar result was gained both from the questionnaire and the focus group discussion. This strengthens the complain that MSEs most of the time do not collect solid waste from households as required by the law through regular programs i.e. eight times a month. The implication of this is that untimely evacuation of waste in the study area could be partly responsible for a health hazards in the area.

Availability of solid waste container

Households in the study area were asked about the availability of waste collecting containers. Only 101(56.1%) of the households stated that there is no solid waste collecting container within 150m distance from their houses while 79(43.9%) of them affirmed that there is a container within the limit (Table 5).

Table 5: Availability of solid waste container within 150m

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Available	79	43.9	43.9	43.9
	Not available	101	56.1	56.1	100.0
	Total	180	100.0	100.0	

[Source: Field Survey, 2015]

Money paid for the service by households

In solid waste service delivery, it is the SWM office that is in charge of the service fee collection. The MSE operators do not collect service charges from residents. When the sample households were asked whether they pay some amount of money for the services rendered by the municipality, they stated that 5% of the money paid for water service goes to the solid waste service. The mean payment which a households pay for the service is 8.97 birr, the minimum payment is 1.00birr while the maximum is 50 birr.

The respondents have stated that during the previous years, a financial source for the MSEs was the monthly fee that is collected from the service beneficiaries by themselves. The payment for the service is first done by negotiation between waste workers who are assigned for specific location and individual households in that area. However, from experience, the government realizes that the private worker collect payment from the households while they dump the waste anywhere. Moreover, there were some households that do not pay the monthly fees.

Thus, Waste collection service payment to MSE operators performed in a way that the office collects service fee from households with the rate of water consumption fee and then deliver for the MSEs according to their performance. "Hence the current system is better for the MSE operators to get payment for the service they delivered" the respondents said. Hence nowadays, the waste is collected by the waste workers while payment for the service is collected by the government.

Household's Waste Storing Materials

For temporary storage, households prepare different types of receptacles. The findings indicated that temporary materials for collecting waste vary from household to household. Table 6 shows that about 71% of the respondents use "madaberia, 21.6% use plastic bags, 3.9% use other materials.

Table 6: Materials for Collecting Household Waste in Addis Ketema Sub-city

Type of material	Frequency of respondents	Percent of respondents
"Madaberia"	128	71.1%
Plastic bags	39	21.6%
Local basket made up of bamboo	2	1.1%
Others	7	3.9%
Missing	4	2.2%
Total	180	100%

[Source: Field Survey, 2015]

The above result shows that 128(71.1%) use sacks locally known as 'Madaberia', 39(21.6%) use hard festal or small plastic bags, 2(1.1%) of the respondents use local basket made up of bamboo and 7(3.9%) of the respondents use other collecting materials such cartons, barrels, clothes, paper, cans, plastic pails etc. These solid waste collecting materials in almost all households serve to temporarily store the waste which the MSE members take from residential areas to the waste collecting containers. Most of the plastic and metal receptacles are not purchased for storing solid waste but are used for this when they are not important any

more to serve what they are bought for initially. In most cases the storage receptacles are inappropriate with no lids, and the waste is dispersed off the containers by chickens and other domestic animals. This becomes the source of unpleasant view and smell resulting in a favorable condition for fly breeding which can transmit various diseases.

Public participation in SWM activities

The households and commercial units were asked whether the woreda's SWM office activity was participatory or not. Among the respondents 110(57.6%) replied as the office is participatory while the remaining 81(42.4%) answered it is not participatory. This reflects that the effort of the office to incorporate the public and other stakeholders in planning and implementation is weak. It is one of the indications of lack of good governance (Table 7).

Table 7: Participation of the public on SWM

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	110	57.0	57.6	57.6
	No	81	42.0	42.4	100.0
	Total	191	99.0	100.0	
Missing	9999	2	1.0		
Total		193	100.0		

[Source: Field Survey, 2015]

Ways through which the public is involved in SWM activities

Some of the ways respondents are being participated are: through providing payment for the service, through participating in general environmental sanitation campaign, in individual cleaning of surroundings, through participating in awareness creation programs about the impacts of improper solid waste disposal.

Regular monitoring of solid waste malpractices by SWM office:

The question is "Are there regular monitoring and Evaluation exercises being carried by households' and commercial premises in disposal of wastes illegally"? The result is 110(57.6%) replied there is no regular monitoring while 81(42.4%) responded there is regular monitoring. We can see from the result that a large number of respondents (76.7%) replied that the monitoring takes place 4 and less than four times per month which shows there is loosen monitoring of solid waste handling of households according to this study.

Frequency of monitoring per month

Those respondents who agree the existence of regular monitoring were also asked, how many times per month the inspectors monitor improper solid waste handling? 26.0% of them said once per month, 20.5% said twice per month, 16.8% 3 times, 23.3% said 4 times and 9.6% said it is 8 times per month.

Measures taken on illegal solid waste practices

Whether or not penalty is being given to outlawing community member was also asked. The response showed that 39.1% of the respondents agree that there is punishment while 58.7% of the respondents stated there is no punishment taken on individual who dispose waste in unauthorized place. Previously, let alone the penalty, even system for inspection was nonexistent. These days monitoring is rarely accessible and monetary penalty for improper SWM is given and the amount is birr 10.00 to 1000.00 Birr in most instances. The punishment is determined in social courts according to SWM proclamation article 13/1996.

However, despite the presence of regulatory provisions aimed at controlling solid waste handling, improper discarding is not fully avoided. The respondents also point out that the punishment rate is small in amount. Some people preferred to dump waste anywhere instead of providing to MSE members or taking it to the collection containers.

Source of income of the SWM office

Respondents from SW office were asked "what is the source of their income for the woreda and sub city particularly for SWM operation activities? 98.3% of the respondents stated that the sub city runs the delivery of the service through the annual budget allocated by Addis Abba City Administration (AACA) while 6.3% replied the source of income is from service fees collected from the public (AACA, 2010). Higher officials were interviewed the amount of the budget and they replied "it is 8,471,470.00 Birr per year". However they said auditors do evaluate the utilization of the allocated budget regularly. Also it was mentioned that "the SWM office reviews its annual budget and submit an additional request ranging from 5 to 10 percent". The reason for the increment they mentioned was solid waste generation increases from time to time with the increase in the number of population.

Service Years of Street sweepers and MSE operators

Wastes along the roads are cleaned by the sweepers operating with brooms, collect waste and keep them in small heaps in temporary transfer sites. There are no permanent transfer stations prepared for this purpose but public areas, close to bus stands, temples, etc., which are accessible by the trailers, are used for this purpose. The storage bins used in the Sub-City are not standardized bins, not regularly repaired when doors are broken and they are located only on main roads with the assumption that those roads are the popular ones. Respondent were asked for how long they have been involved in SWM activities. The result is, the mean service years of MSE operators and street sweepers was 9.48 years, the minimum years of service year was 1 while the maximum was 24. In addition, 42.4% of them have served for less than 5 years, 24.2 for 5 to 10 years and 33.3% served for above 10 years (Table 8).

Table 8: Service Years of Street sweepers and MSE operators

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5 years	14	42.4	42.4	42.4
	5- 10 years	8	24.2	24.2	66.7
	Above10 years	11	33.3	33.3	100.0
	Total	33	100.0	100.0	

[Source: Field Survey, 2015]

Working hour of MSE operators and street sweepers

Both the MSE operators and street sweepers were asked for how long they give the service per day. The result show that 39.4% of the respondents work for 2 to 4 hours per day, 15.2% work for 4 to 8 hours and 45.5% work for above 8 hours (Table 9).

Table 9: Duration of service provision per day

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2-4 hours	13	39.4	39.4	39.4
	4-8 hours	5	15.2	15.2	54.5
	Above 8 hours	15	45.5	45.5	100.0
	Total	33	100.0	100.0	

[Source: Field Survey, 2015]

From FGD and interview the researcher has identified as working hours of the street sweepers is divided into two shifts. The first shift is from 6:00AM to 12:00AM while the second shift is from 12:00AM to 6:00PM. However, the street sweepers working around "merca to" said that there is only one shift, they normally start work at 4 a.m. and finishes at around 9 a.m. in order to finish up their job before the traffic gets congested. There is some variation regarding the working hours of the employees, because the waste generation frequency of the area made the working hours longer. This implies employees working hours are dependent on the waste generating capacity of the area. Moreover, the working hour of MSE fluctuate and depends on the availability of transporting vehicle.

Money earned by MSE operators and street sweepers

The MSE operators and street sweepers were asked how much they earn per month. The result showed that; the mean income of MSE operators was 761.90 Birr, the maximum salary was 900.00Birr while the minimum was 600.00 Birr. Whereas, the mean income of the street sweepers was 917.75 Birr, the maximum income was 1,170.00 birr and the minimum income was 817.00 Birr.

Satisfaction of MSE operators and street sweepers with their income

Both MSE operators and street sweepers were requested to express their attitude whether the income they earn was sufficient to support their family or not. About 90.5% of MSE operators and 100% street sweepers were not satisfied with their income (Table 10).

Table 10: Income of MSE operators and street sweepers per month

	Minimum	Maximum	Mean	Satisfied (%)	Not Satisfied (%)
Street sweepers	817.00	1,170.00	917.7500	0%	100%
MSE operators	600.00	900.00	761.9048	9.5%	90.5%

[Source: Field Survey, 2015]

Hence, low wage payment of the workers may reduce their working ethics and moral which in turn has a negative impact on sustainable waste management. In addition they have stated as their salary is not being paid on time rather on 45th and above days. This is an indication that MSE participants and street sweepers cannot support their lives properly from the incomes they derive. The interview result has shown that most of the participants were unemployed, street men and immigrants who were suffering from poverty before they join the solid waste activity.

Commercial area Societies' Characteristic on the current Situation of SWM

The results on the common ways of solid waste discarding from the commercial establishments shows that 69% of the respondents answered that privately employed waste collectors take it, 23.1% throw on open spaces or on the street and 7.7% respondents answered other methods. Table 11 gives its summary.

Table 11: Ways of discarding solid waste in commercial areas

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Throw it on an open space or on the street	3	23.1	23.1	23.1
	Waste collectors take it	9	69.2	69.2	92.3
	Other	1	7.7	7.7	100.0
	Total	13	100.0	100.0	

[Source: Field Survey, 2015]

Reasons for using the current ways of discarding solid waste

They were also asked to explain the reasons "what prompted them to make an option of choosing previously mentioned means of disposing"? They answered "It's due to easy availability of private waste collectors such as night guards and cleaners whose payments are negotiable". (Not known by authorities).

Ways of storing solid waste

The study discovered some of the ways of storing of the wastes. Respondents have stated that the most common materials used to store wastes temporarily were plastic materials. This could be due to a result of easy availability of plastic bags and containers which are highly introduced in the market. This can also be partly explained by the provision of plastic bags by the private solid waste collectors.

Money paid by commercial area respondents for the service

Respondents were also asked how much money they spend to get the service. The result shows that the minimum payment was 10.00 birr, the maximum was 25 birr and the mean payment of the commercial establishments was 16.15 birr per month which is relatively higher than the mean payment by households which was 8.97. This shows individually employed collectors require more money than MSEs.

Frequency of collection by MSE

The respondents were asked the frequency of solid waste collection. Above 70.2% of the respondents get the service eight times and above per month while about 30.8% get the service 4 and less than four times (Table 12).

Table 12: Waste collection rate per month

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	7.7	7.7	7.7
	2	1	7.7	7.7	15.4
	4	2	15.4	15.4	30.8
	8	3	23.1	23.1	53.8
	10	1	7.7	7.7	61.5
	30	5	38.5	38.5	100.0
	Total	13	100.0	100.0	

[Source: Field Survey, 2015]

The finding shows that, the frequency of waste collection by individually employed collectors is quite better than the MSE's frequency of collection. This shows the service being provided by individual collectors is efficient though it slightly more costly.

Availability of containers

Among the respondents, 35.8% answered there is a waste collection container around a nearby commercial establishment within 150m while 61.5% of respondents said there is no container within the bound. The result of availability of container within 150m area show, the scarcity of the containers in commercial area is higher than residential area by 5.5%. Location of containers has direct impact on SWM service. Of course there are different distances required for the placement of containers. But, placement of containers 150 meters away from residential areas is usually recommended by the municipality and the nearest container and the more the chance of using the service (regardless of its negative impact on health), and vice versa.

An observation made on the discarding of waste in merkato area showed that solid waste that is collected is higher on Mondays. The reason for this is that, since there is a large road-side market on the merkato on Sundays, the left over from the sales of commodities and plastics, cardboard, residue of 'Chat' etc would be a challenging heap of rubbish. The commercial area "Mercato" typically has a large number of stalls placed closely together. The stalls face narrow passages that are usually thronged with pedestrians and littered with wastes. Generally, sweepers brought the wastes from the passages to a central storage point which typically is a large pile on the ground which stay sometimes for days without being picked. From time to time, waste collection vehicle collects and disposes the piles of waste.

Knowledge level of respondents about SWM

Respondents were asked about their knowledge level about SWM. The result shows 90(37.2%) of respondents have very good knowledge on SWM, 116(47.9% good knowledge level, 26(10.7%) have poor knowledge level and 10(4.1%) have very poor knowledge level (Figure 2).

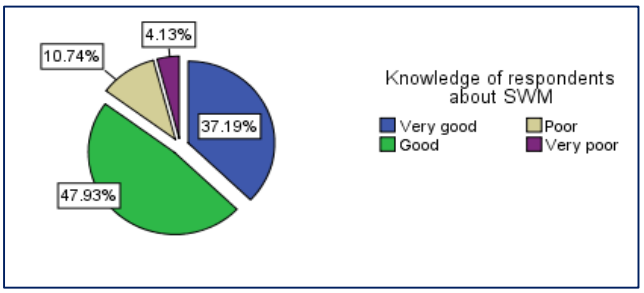

Fig. 2: Knowledge Level of Respondents about SWM [Source: Field Survey, 2015]

When we see the relationship of knowledge of respondents and ways of solid waste discarding, the Chi squire test indicated that respondents having better level of knowledge about SWM uses appropriate ways such as providing the waste to MSE operators or taking to the containers by themselves while those with unsatisfactory knowledge use other means such as throwing in an open space and into the nearby river (Table 13).

The result shows that about 85% of the respondents have better understanding about SWM, but there is still improper solid waste handling. So, we can understand that lack of knowledge is not the main cause of the problem of SWM in

the sub city, but there is lack of attitudinal change. There is a considerable number of individuals that deliberately dump their solid waste near the containers (Plate 3, annex 3). During FGD participants have mentioned attitudinal problem of the society in SWM. They said the public either do not properly handle its waste by itself or assist or cooperate with SWM.

Table 13. Cross tabulation of Ways of discarding by Knowledge about SWM

		Knowledge of respondents about SWM				Total
		Very good	Good	Poor	Very poor	
Ways of discarding solid waste	Discarding in hole around the house or burn	3	5	3	3	14
	Throw it on open space or street	0	2	0	0	2
	Throw it into nearby river	3	2	0	0	5
	Take it to nearby secondary storage receptacle or "Genda"	19	10	3	1	33
	Waste collectors take it	44	66	9	2	121
	Others	3	1	1	0	5
Total		72	86	16	6	180

[Source: Own made, 2015]

Impacts of improper solid waste handling on the public

The impacts of improper solid waste handling was also asked and the result, among the respondents was 208(87.8%) of them know the impacts while 29(12.2%) of them do not know. This shows knowledge level determines knowing the consequences of improper solid waste handling and this result has also confirmed the above mentioned knowledge level of participants.

Respondents who know the impacts of improper solid waste disposal were also asked to mention some of the impacts. The response stated the following "transmission of communicable and vector borne diseases due to it creates favorable ground for breeding insects, emits unpleasant odor, contribution of accumulated garbage to the increase in floods in blocking drainage system during the rainy season and block sewerage pipes at household level, children mainly affected by various diseases, contaminate the environment, garbage thrown on open areas and along roads are awful for eye and reduce the aesthetic value of green areas, sharp objects thrown with the waste will result injury specially for children and waste collectors, the environment become unfavorable for residence and work etc".

Availability of awareness creation programs about SWM

The question about availability of awareness creation about SWM was raised for all participants except SWM office workers. From the table 14 we can see that 93(41.3%) replied there is awareness creation while 132(58.7%) respondent said there in no awareness creation taking place by the SWM office professionals. But, as it is mentioned above 85% the respondents have better knowledge on SWM. Thus, we can understand from this result that the respondents are not gaining knowledge only from the office but also they are acquiring knowledge from different sources

Table 14: Awareness creation about SWM

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	93	38.4	41.3	41.3
	No	132	54.5	58.7	100.0
	Total	225	93.0	100.0	
Missing	11	1	.4		
	System	16	6.6		
	Total	17	7.0		
Total		242	100.0		

[Source: Field Survey, 2015]

Knowledge of respondents about Legal prohibition of improper solid waste handling

The knowledge about legal prohibition of improper handling of solid waste is also asked. 153(80.5%) of households and commercial area society knew as it is legally prohibited while 37(19.5%) of them did not know as it is legally prohibited (Table 15). This result shows that, most respondents who are improperly handling solid waste are doing it due to ignorance or intentionally or due to the loose procedures of monitoring by responsible body.

Table 15: knowledge about legal prohibition of throwing waste on open spaces

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	153	63.2	80.5	80.5
	No	37	15.3	19.5	100.0
	Total	190	78.5	100.0	
Missing	Missing 33	3	1.2		

[Source: Field Survey, 2015]

Reducing, Reusing and Recycling

In the questionnaire, the households were asked a question about separation of different types of wastes in their respective nature i.e sorting. Most of the respondents said that they separate some items from the waste such as metal, old water container jar , plastic made containers of food oils to sell to individuals locally known as" Koralio". Moreover these respondents said old cloths and old shoes are not discarded as waste, but exchanged with kitchen utensils from individuals locally called as "Lewach". A portion of

the respondents said that they don't separate waste at the household level. In few households, organic wastes like plant origin were sorted for the purpose of reusing in their gardens and as fuel after the waste gets dried. The commercial area respondents were also asked how waste containing reusable items is sorted. The result shows that there was no any sorting by the respondents, rather they said there are individuals who collect plastic materials and carton from the waste.

The study result indicates that there is practice of waste reduction and reuse for different purposes like can, used plastic containers of water and oil for sale, old cloths and shoe for exchange, plant origin waste for fuel and recycled by composting etc. However, the practice of reusing and recycling waste is not well practiced among the respondents except exchanging materials producing immediate values. So, it has be a habit for proper and sustainable SWM.

Households were asked whether they practice composting for their own use or not. The result shows that, households practicing composting were 7(4.0%) which is very few while those respondents who were not practicing were 167(96%) (Table 16). Respondents who were not practicing compost were also asked to mention the reason of not practicing. Most of the respondents replied shortage of composting land, lack of knowledge about compost preparation etc.

Table 16: Preparing compost in the compound

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	2.9	4.0	4.0
	No	167	69.0	96.0	100.0
	Total	174	71.9	100.0	
Missing	66	6	2.5		
	System	62	25.6		
	Total	68	28.1		
Total		242	100.0		

[Source: Field Survey, 2015]

The MSE operators and street sweepers were asked for a selection of reusable items from the waste they collect. Among the respondents 63.6% answered they do not separate reusable items while 36.4 of them said they separate reusable items (Table 16). Those MSE operators who are practicing separation of reusable items replied during interview, that they separate valuable items such as metal, plastic materials, shoes etc and store in the enterprise's office then sell to recyclers and small industries. The interviewees have said the income from the reusable items is used to buy push carts, repairing of non-functional ones and for saving. The researcher has observed the activity during field observation.

Table 17: Selection of reusable items from the waste

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	36.4	36.4	36.4
	No	21	63.6	63.6	100.0
	Total	33	100.0	100.0	

[Source: Field Survey, 2015]

The interview made with SWM office professionals confirmed that there is no recovery and processing of solid waste for a reuse of the wastes except the selection of water containers locally known as "highland" to sell for reusing. Although there are some hopeful efforts, the result showed that currently reusable materials are little separated by MSE operators and street sweepers too. During the FGD, participants have mentioned shortage of machinery and problem of land provision and other constraints as reasons for not practicing compost processing and recycling of wastes. Hence, the study identified that almost all solid waste generated in households is disposed together i.e. there is less sorting habit of organic waste at the household level.

The existence of SWM problem in the sub city Problem

Respondents were asked whether there is SWM problem in the sub city or not. From the result it is found that about 193(80%) of the respondents replied there is SWM problem in the sub city while 49(20%) of them answered they are satisfied with the existing service delivery. The result shows the service delivery is enclosed with different barriers. This suggests that there is need to increase/improve the level of facilities and human resources in the Waste Management activities to ensure sustainable SWM in the sub city.

Shortcomings of the existing practice

Respondents were further interrogated to state their primary concerns with current practice of waste management in their community. The main problems identified in order of priority are: negative attitude of the community towards the work(25.3%), containers are not picked-up on time(23.2%), shortage and inappropriate containers and transportation vehicles(16.2%), lack of coordination and mismanagement(13.1%), lack of initiative and working moral within the employees (6.1%), shortage of finance(5.1%), lack of trained man power in the SWM office and MISS(3.0%) and lack of commitment among the leaders(1.5%) (Table 18).

Table 18: Shortcomings of SWM service delivery

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Negative attitude of the community towards the work and workers	50	20.7	25.3	25.3
	Containers are not picked on time	46	19.0	23.2	48.5
	shortage and inappropriate containers and vehicles	32	13.2	16.2	64.6
	Lack of coordination and mismanagement	26	10.7	13.1	77.8
	Lack of initiative and moral of employees	12	5.0	6.1	83.8
	Others	12	5.0	6.1	89.9
	Shortage of finance	10	4.1	5.1	94.9
	Lack of trained man power in the SWM office and MSE	6	2.5	3.0	98.0
	Lack of commitment among the leaders	3	1.2	1.5	99.5
	SWM proclamation problem	1	.4	.5	100.0
	Total	198	81.8	100.0	
Missing	System	38	15.7		
	666	6	2.5		
	Total	44	18.2		
Total		242	100.0		

[Source: Field Survey, 2015]

During FGD some respondents blame insufficiency of inspection on the condition of waste handling, loose management action for punishment, lack of accountability by the SWM office, community member and poor encouragement of MSE by officials and the society. Lack of attitudinal change by the society was also given attention during discussions. They said "although the society knows the consequences of improper solid waste handling most members of the society is careless on handling waste properly, we are being insulted due to our job".

In the light of the discussion made with the SWM workers, experiences of solid SWM have shown that service provision was influenced by many of the constraints. One of the factors that affect the service delivery was vehicle problem i.e containers did not get emptied regularly. The operators collect waste door to door and fill the containers located at the temporary storage areas. The vehicle takes only one container per day, however the wastes generated from the specific area that MSE working at was beyond what it was disposed by the vehicle. Amazingly, according to the head of the MSE operators, if the containers were emptied frequently, they were able and willing to collect the generated waste and their income is also determined by the number of containers they provide for disposing. Moreover the vehicles will not take the waste for days; therefore unless the filled containers are not emptied regularly, MSE operators could not collect waste efficiently. The irregularity of waste removal from the containers in turn was affecting the health of the nearby community and the surrounding environment.

Problem of temporary storage site for the collected waste was also raised during FGD. Wastes are found scattered in the nearby areas of temporary dumping sites and transfer stations because of shortage of the sites, the respondents stated. Inadequate and unsustainable training for the street sweepers, MSE operators and office workers who are engaged in solid waste related activity might contribute for inefficient SWM and low health protection of the workers in the study areas. The MSE operators and street sweepers in study area generally confirmed that lack of working tools and finance were their major problems for the progress of the enterprises. Shortage of finance was the core of the problem in both study areas. This is because the availability of capital means the availability of working tools like pushcarts, vehicles and other hygiene protecting materials. Legal framework was not mentioned by many respondents as a main problem in the study areas. It was indicated that the municipality has issued a solid waste policy and procedure. The legal framework provided by the city administration was not found as such problematic. This is because the new guideline allows all enterprises to engage in solid waste activity. As it is discussed in the coming pages, most of the respondents have preferred MSEs' provision of the service, which is hoped to be the reason of the respondents not to contradict the regulation. The guideline was also challenged by some of the interviewees, and they have mentioned as it is contrary to open-competition.

Workers of SWM office at sub city level were asked about the problem of emptying filled containers. The reasons for the problem of low trip rate according to the sub city SWM office worker are: delayed dumping at the disposal site (at Repi), traffic problem, lack of commitment of drivers and shortage of vehicles. Out of 17 vehicles at sub city level, two of them were in garage for more than two months. That was also why wastes that were collected could not be timely disposed off. The reason why vehicles stay for such a long period of time in garages was the fact that the trucks have served for so many years and spare parts were not easily available in the market. Because of these two reasons, the

transportation service could not be under operation as expected, the worker stated.

Accountability of SWM office for Poor Service Delivery

Households and commercial area society were asked about the existence of accountability when there is poor solid waste management service delivery by the office. The result shows about 49.7% of the respondents said there is accountability while 48.1% replied there is no accountability. Interview made with the woreda and sub city officials indicated that they blame the residents that complain about the garbage scattered around open areas, near roads and elsewhere and for the bad smell and the health hazards that it pose in the neighborhoods. Those respondents who do not agree the existence of accountability of the office explained their reason as follows. There is poor follow up, lack of awareness creation effort, there is lack of punishing malpractices, poor assessment of the relationship between the public and waste collectors, absence of feedback seeking and absence of response for complains.

Evaluation of quality of SWM service delivery

When asked to evaluate the SWM service delivered by the Sub City solid administration office, only 9.6% household and commercial area respondents said it is very good, 34.0% said it is good, 31.9% has said it is poor and 24.5% said it is very poor (Fig. 3).

Fig. 3: Evaluation of quality of service for SWM delivery [Source: Field Survey, 2015]

The result about the evaluation of quality SWM service delivered by the office shows that about 56% of the respondents are not satisfied with services delivery while not less than 44% of the respondents are comfortable with the existing services. Households who were using the services responded during the interview that they had seen improvement of solid wastes in their area. They described the improvement in their surroundings is being prompted by MSEs active role. As expected the majority of respondents were not satisfied with the existing SWM in the sub city. The respondents who felt the current service is far below the standard required.

Summary and Out look

This paper presented the effectiveness of SWM service is dependent on sustainability of the management of the services. Sustainability in its turn depends on among others, such as planned management services, Institutional and financial capacity of service provider with supporting organizations; choice and use of technology; private sector involvement; and community participation. Provision of effective and sustainable SWM service requires going even further to formulation of specific objectives and implementation of appropriate measures regarding political, institutional, social, financial, economic and technical aspects of the service. This paper is conducted on the governance in solid waste management of Addis Oromia Sub City and it has showed that the problem of ineffective and inefficient SWM has mostly been associated with the governance capacity of the SWM office. The findings for this study mainly indicate that: there is inefficient in waste collection methods adopted, and the coverage of the collection has always been insufficient; there is poor implementation of rules and regulations to bring sustainable SWM; there is poor public and stakeholders' involvement in SWM activities; there is insufficient support of MSE and street sweepers as well as other office workers, capacity building, promotion and etc. Waste management has always been inadequately funded and there has been a problem in recovering costs, including an inappropriate system of disposal of the same products which is being practiced. Although the public has good knowledge level its attitude towards solid waste management needs to be reviewed a fresh.

In this paper, it IS found that the public in the sub city is delivering SWM service full of constraints. some of the shortcomings are: economical constraints, use of open dumps for MSW, illegal dumping of wastes, limited participation of public private partnership in SWM, Inclusion approach is not being observed, clearly there is a large gap between policy and its implementation.

Although there are problems, there are also promising efforts started by the Sub-City, among them, organizing the MSEs mainly for door-to-door waste collection which is relatively more effective was the main one.

Poor SWM in the sub city has many implications for lack of Good Governance. The Sub City SWM suffers from acute shortage of skilled manpower and purposeful leadership which lacks personal motivation and therefore could not motivate their employees. It is also evident that human capital development is very low and decision making is not participatory. Solid waste management involves not only SWM offices but also wide range of actors directly or indirectly involved in the service delivery such as: governmental organizations like health offices, Environmental protection offices, CBOs, NGOs and direct service users such as households and different business organizations. However, the result of the study has

indicated that the SWM office has loosen mutual coordination among these sectors. The complexity of the service and the requirement of high level of organizational, technical and managerial capacity makes it difficult to be handled by the sub city single handed. Besides, in some cases, unethical conduct, lack of transparency and failure to deliver standardized service are the indication of SWM of the sub city.

Therefore effective service delivery requires cooperation between numerous stakeholders in both the private and public sectors. For successful operation, it is advisable to integrate stakeholders from the very beginning. Thus, smooth functioning of the service requires the cooperation and coordination among all actors, partners and service users.

Even if there is a SWM regulation which was taken as an important operation, its implementation proved un satisfactory. As wastes were still being seen in the open space, along streets, wastes were blocking the drainage system. Therefore, the researcher requests the SWM officials to increase the rate of monitoring and evaluation. Punishment along the awareness creation efforts from the office .From the result of chi square about the correlation of distance of containers by ways of discarding, it can be concluded that those households that do not use MSE's service and their homes are far away from the containers, illegally disposal of wastes somewhere or discard it within their compound since traveling a long distance is always boring for them. Hence, containers have to be distributed in a way that it can create convenience to all stake holders and the entire population, also the rate of solid waste generation on one hand, and the optimum distance that beneficiaries travel, on the other hand.

Although more cities in the world nowadays are reclaiming the benefits of reusing solid organic waste material through composting, it was not be practiced in the study area (96%). This shows that large amounts of the waste were discarded as it is and recyclable and compostable materials were least separated. Thus MSEs in the study areas are not privileged enough from sorting of usable waste materials. In general, reusing, recycling such as composting, recovery and processing of solid waste in general was not well implemented. Even though, some of the respondents use different mechanisms in SWM, since the majority of the respondents were using and preferred MSEs, the researcher believes that MSEs involvement in SWM has brought improvement to some extent because they are providing door to door collection service with service charge that is affordable by the majority of the households. Thus, current practice i.e. state run and MSEs participate, is the preferable option. But strong follow up and support is crucial.

Lower wage rate was one of the influential factors that affect the activities in waste management. i.e. since solid waste service providers are not paid equal pay for what they perform, this in turn decreases the moral condition of the workers. Therefore, the sub-city should consider all the factors that affect the service of SWM and give immediate response to the problems.In the sub city, the wastes deposited on the streets create a negative visual impact, particularly on visitors, and thus indirectly affects the economy of the sub city. Only the main roads are swept. Since not all of big roads are paved, a relatively high portion of the Sub-City did not receive street sweeping services and those swept become dirty within a moment. A considerable amount of waste associated with street sweeping is due to inappropriate behavior on the part of the public, such as discarding waste on the street and lack of enough waste bins.

Generally, governance is directly involved in decision and management processes regarding the provision of solid waste services within the Sub City and is an important concept for understanding the underlying reasons for the decisions made and current practices in this regard. Thus, Governance of SWM is about how the service is managed, resources are mobilized and allocated and how the economic interests are handled. The study has identified that SWM service delivery in Addis Oromia Sub City has shortcoming such as: efficiency and effectiveness, managerial and organizational efficiency, accountability, legitimacy and responsiveness of the office are weak. Furthermore, transparent and participatory decision making processes were weak which hinder the office to achieve sustainable results. Accordingly, SWM should be seen not merely as a technical issue, but as a production process affected by the actors involved, and their interactions at various scales.

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