

The Assessment of Integrated Municipal Solid Waste Management in Case study Addis Ababa, Ethiopia

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Abstract: The purpose of this study is to assess the integrated municipal solid waste management case study Addis Ababa city. To conduct this study, the descriptive survey method was employed. The study was conducted in five sub-cities and thirty districts of Addis Ababa city. The subjects of the study were micro-enterprise workers of integrated municipal solid waste, communities, Administration and Agency workers of integrated municipal solid waste management and Addis Ababa city and Administration officer of Integrated municipal solid waste management. Thus, 500 micro-enterprise workers of integrated municipal solid waste management and the communities and 65 Administration and Agency workers of integrated municipal solid waste management, 12 Addis Ababa city integrated municipal solid waste management Administration officers were taken as a sample. For micro-enterprise workers of integrated municipal solid waste management and communities' sample were taken through random sampling techniques, Administration and agency workers of integrated municipal solid waste management and Addis Ababa city Administration of integrated municipal solid waste management officers were taken as a sample through purposive sampling techniques. Finally, to reduce the challenges of integrated municipal solid waste management it is recommended for integrated municipal solid waste management to give relevant training, seminar and workshop and implementing various options to strengthen the integrated municipal solid waste management to sustainable.

Key words: Assessment of municipal solid waste, municipal solid waste management, Urban environment.

1. Introduction

Solid waste management is becoming a big concern for cities administration task in developing countries. This is mainly due to the magnitude of rapid urbanization and increasing population growth; which in turn has greatly accelerated municipal solid waste generation rate in the urban environment (Hayal Desta, 2014). According to World Bank (2012), every year developing nations spend nearly \$46 billion on managing their municipal solid waste. These investments could exceed \$150 billion per year by 2025. Solid waste management (SWM) in Africa is often weak due to lack of appropriate planning, inadequate governance, poor technology, weak enforcement of existing legislation and lack of economic incentives (UNEP, 2005). Global researchers in the field are trying to work out for a common understanding, what waste is and show it is understood by defining and redefining as it is important for communication, designing strategies and collaboration; otherwise, any effort against the waste problem without common understanding is a futile attempt. How to deal with it in general and in a beneficiary way in particular depends on how we understand it. Perceptions of waste, as Dracker, M. (2005) argues, are important parts of local waste management systems, and the understanding of such perceptions might increase the effectiveness of waste management campaigns.

In Ethiopia, solid waste management was highly centralised until 2003. As part of a broader decentralisation effort in that year, the city administration of Addis Ababa was divided into ten sub-cities and 117 districts that comprise the local administration (FDRE 2003). The purpose of reorganising the city was to give more power to lower levels of the city administration, and to empower local

communities and their institutions (Taye and Tegegne 2007; Paulos 2007). As part of the reforms, the city government promoted integrated solid waste management by local administrations, and strengthened the role of both formal, informal, public and private sectors in solid waste collection, transportation, disposal and recycling activities (FDRE 2003). At the beginning of the reform, many informal private enterprises were involved in the collection and disposal of waste, and were allowed to operate without paying taxes. In a very short period, the number of actors involved in solid waste collection and disposal increased significantly. There was high competition among the informal operators and this reduced the price they charged for their services. The problems related to solid waste in the city were subsequently reduced; more waste was collected and the city became cleaner (Zelalem 2006; Bjerkli 2015).

2. METHODS

Study area: This study is conducted at Addis Ababa City which is the capital city of Ethiopia. It is also the largest city in the country by population, with a total population of 3,384,569 according to the 2007 census. However, it is believed that this number was inaccurate when recorded and underestimated the city's population. The city has through recent years seen a strong annual growth rate, and population counts as of 2017 are growing closer to 4 million. The next census is scheduled for the 2018 to 2019 fiscal year, as it was delayed by security concerns between 2017 and 2018. Addis Ababa is a chartered city and as such, is considered both a city and a state. It is the largest city in the world located in a landlocked country. (Addis Ababa population Agency 2007)

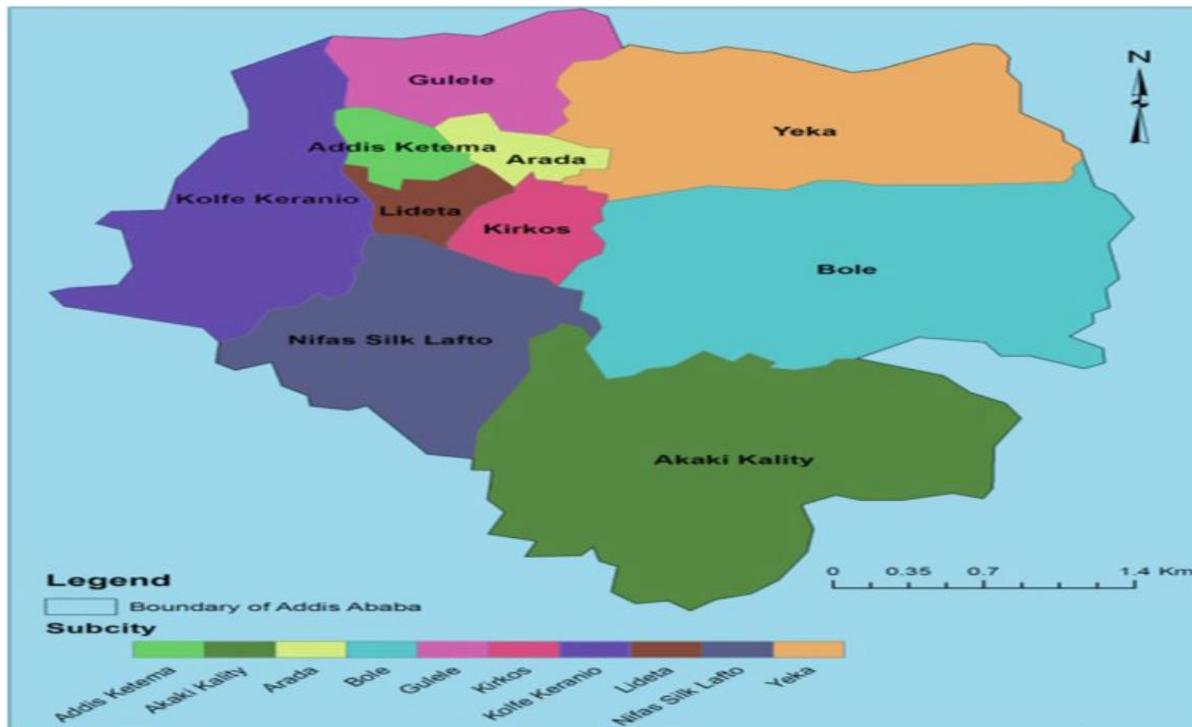


Fig 1. Daniel W. Ambaye (2015) Land rights and expropriation in Ethiopia

Data collect and analysis methods : In this study survey methods will be selected and the questionnaire used to collect quantitative data, while for the qualitative data interview is employed (Muijes,2004) cited Abebe(2014). A survey, according to Kathari (2004) ,is a method of securing information concerning an existing phenomenon from all or selected number of respondents of the concerned universe, while interview facilitate to have or to get in depth data on the Integrated Municipal Solid Waste Management System in

Addis Ababa city. To the line the qualitative approach is incorporated in the study to validate and triangulate the quantitative data. Physical survey were carried out by visiting the variance existing waste collection point and by examining the available equipment being used to manage the waste.

McLaughlin et al (2001:18) believe that for information that cannot be obtained through quantitative method (which relies mainly on close-ended questionnaire to collect data), the qualitative method and be effective in obtaining such information. In fact, open-ended questionnaires and some structured interview all the respondents to elaborate on their points with respect to the variable being studied.

Primary Sources of Data

To collect firsthand information about the research, the study will be used questionnaires to micro enterprise workers of integrated municipal solid waste management and communities as well as for administration and agency workers of integrated municipal solid waste management and interview to Addis Ababa city and questionnaire to Addis Ababa city administration officers of the integrated municipal solid waste managements, and to Agencies who are involved in collecting ,transporting and disposing integrated municipal solid wastes.

Secondary source of data

The secondary sources of data will be the Addis Ababa city administration published and unpublished data documents about solid waste management document- records. These files that observed to strengthen the data obtained through questionnaire and interviews.

3. RESULTS AND DISCUSSION

3.1. The community awareness creation: In the respect to the procedures of community awareness creation, respondents were asked whether or not the procedures have been implemented appropriately for awareness creation.

Table 1, the overall response were given by both respondent groups of the micro enterprise workers and the community as well as the administration and agency workers of integrated municipal solid waste management were lower performance. The weighted mean of both respondents framing to reinforce and there no difference between the groups of both respondents in rating the items that they perceives the task in a similar way.

The micro enterprise workers and the community were not visit on how to collected, store and separate the solid wastes, the integrated municipal solid waste management workers carried out their activity without plan and made no mutual agreement with the community taking in to account on the sustainable time at which they collected and store the solid wastes, and they did not arrange the peers (colleges) to create awareness among themselves and no awareness creation on how to use storage facilities, and also on how to separate the solid wastes in to the proper and respective item and properties. The t-test for significance were employed. It shows that there were no statically significance difference between the mean values of responses of the respondents groups.

No	Item description	Respondents
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		Micro enterprise worker and community		Administration and agency workers of IMSWM		w.m	t-value
		(n=500)		(n=65)			
		X	Std	x	std		
1	The Integrated Municipal Solid Waste Management workers make visit after informing the communities to collect the solid waste they generate properly.	2.23	0.81	2.34	0.76	2.24	-1.02
3	The Integrated Municipal Solid Waste Management workers arrange the peers /colleagues/ to create awareness among the communities themselves.	2.09	0.65	1.43	0.53	1.74	-1.1
4	The Integrated Municipal Solid Waste Management creates awareness on how to use the storage facilities, bins and material.	2.29	0.61	2.43	0.68	2.3	-1.75
5	The Integrated Municipal Solid Waste Management creates awareness to the communities on how to collect and store the solid wastes.	2.95	0.63	3.38	0.69	2.99	-1.68
6	The Integrated Municipal Solid Waste Management creates awareness to separate the solid wastes in to recycled, decompose and un decomposed, etc.	4.3	0.623	3.68	0.64	4.23	-7.6

Table 1: Communities awareness creation

The interview made for Addis Ababa city administration of integrated municipal solid waste management officer and agency workers were supported the opinion of majority of the group of respondents. They said, “There were no strong and effectively works were made on these areas. In the future we hope we will work a better performance. This can be made by with a bather community’s participation, by identifying and by solving our practical challenges and by proper implementation of integrated municipal solid waste management.”

In the future we hope we will work a better community participation by identify and by solving our practical challenges and by proper implantation of integrated municipal solid waste management. In this one can concluded that there were no this much workers were done. Thus it needs more attention and effective works in those areas.

3.2. The Strength of IMSWM to be sustainable:

As show item description 1, of table 2, respondent were asked to rate there agreement level private and small enterprise to practice self- directed of integrated municipal solid waste management. Accordingly, micro enterprise workers and the community (x=3.12, std =1.54) and the administration and agency workers of integrated municipal solid waste management (X=3.45, std= 0.75) were not sure about the issue. The weighted mean value 3.38 shows the uncertainty of the majority of the respondents with issue. Therefore, it can be concluded that the opportunities for private and small or micro enterprise to practice self-directed of integrated municipal solid waste management activities were unsatisfactory.

As response had given items 2, of table 2, the responses were given by both respondent group of micro enterprise workers and the community as well as the administration and agency workers of integrated municipal solid waste management were (x= 3.61, std = 0.95) and (x=3.94 std=0.83) respectively. The weighted mean (3.65) showed that it were high performance. The t-test for

significance were employed (-2.65), which implies. There were no significance difference between the opinion of two respondent groups. Hence peers or colleagues were created to organized for awareness creation among themselves.

The interview made for Addis Ababa city administration of IMSWM officers and agency workers were supported the opinion of majority of the respondent groups.

They said, “peers or colleagues were organized for awareness creation among themselves and helping the activity of integrated municipal solid waste management were about ten association organized per sub city level”.

As shown in item description 3, of table 2, respondents were asked to rate their agreement level on the implementation of face to face interaction (or door-to-door) with the community to improve awareness. The micro enterprise workers and the community ($x=3.40$, $std.=1.14$) were undecided. The administration and agency workers of integrated municipal solid waste management ($x=3.22$ $std=1.28$) were uncertain. The weighted mean of both the respondent groups were (3.38) were moderate. One can observe the uncertainty of the respondent groups about the issue. The two respondent groups were not satisfied regarding the implementation of face-to-face (or door-door) interaction with the community for awareness creation.

As shown in item description 4, of table 2, respondents were asked whether or not micro enterprise workers and the community as well as, the administration and agency workers of integrated municipal solid waste management ($x=1.47$, $std=0.65$) and ($x=1.54$, $std=0.66$) respectively were strongly disagree. The weight mean (1.48) were showed very low performance. The t- test (-0.78) shows no significance difference between the opinion of the two respondents. Thus role models of active participants were not awarded or given incentives from the communities who timely, properly collect, store, separate it in to its item and property, hence, were not implemented effectively this way.

Interview made for the administrative groups of integrated municipal solid waste management officers said, “We are not actually awarded or were given incentives for role-model groups or individuals from the community. Because of failing to do this awarded some people mix solid wastes having difference properties together, even they add some gravel or stone to raise its weight. Because payment was made or calculated based on the mass of the solid wastes, 115 birr per m³ (1m³=264kg) or 1kg solid wastes cost 0.66 birr.” Thus, there were no strong effective works were done on those area. So that this is another important option to strength the integrated municipal solid waste management to sustainable.”

	Respondents
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No	Items description	Microenterprise workers and the community		Administration and agency workers of IMSWM		m-w	t-value
		(n=500)		(n=65)			
		X	Std	X	std		
1	Opportunities given for private and small enterprises to practices self-direction of Integrated Municipal Solid Waste Management.	3.12	1.54	3.45	0.75	3.38	0.86
2	Organizing peers /colleagues/ and create awareness among themselves to work with Integrated Municipal Solid Waste Management	3.61	0.95	3.94	0.83	3.65	-2.65
3	The implementation of face to face interaction with the communities to improve awareness in Integrated Municipal Solid Waste Management	3.4	1.14	3.22	1.24	3.38	1.24
4	Awarding role model or actively participants from the communities who timely or properly collect, store, separate recycled solid wastes etc and cooperate the Integrated Municipal Solid Waste Management.	1.47	0.65	1.54	0.66	1.48	-0.78

Table 2: Municipal solid waste management to be sustainable

3.3. Challenges Against Minimizing the problem of IMSWM.

As it can be seen from item 1 and 2, of table 3, micro enterprise workers and to community, as well as, administration and agency workers of integrated municipal solid waste management were asked whether or not integrated municipal solid waste management workers incompetent to do there work properly and have not taken relevant training and have no skill, accordingly (x=2.28, std=1.02) and (x= 2.08, std =0.76), (x=1.66, std = 0.52) and (x=1.74, std =0.44) respectively were disagree that the respondents were not accept the opinion raised. The weight mean (2.26 and 1.67) respectively indicates the disagreement of the opinion.

Therefore, it can not possible to say that the integrated municipal solid waste management workers were incompetent enough to do there work and not taken relevant training and have no skill. Thus, one can concluded that the integrated municipal solid waste management workers were competent enough to do there work and have taken relevant training and have skill. As it can be seen from the item 3 and 6, of table 3 above, micro enterprise workers and the community as well as the administrative and agency workers of IMSWM rated there level of agreement regarding the IMSWM workers were over loaded with different work activity and lack of coordination of stoke holders. Accordingly {(x=1.88, std =0.60) and {(x=2.04, std=0.75) and (x=2.08), std= 0.65} respectively were disagreement on the opinion.

Therefore, it can not possible to say that the integrated municipal solid waste management workers were over loaded with different work activity and lack of coordination of stoke holders .Thus one can concluded that the integrated municipal solid waste management workers were not over loaded with different activities and also stoke holders work with coordination.

As it can be seen from item number 7 to 11, table 3 above, the respondents were asked there rate of agreement indicates they were undecided, which means they were not satisfied with the opinion. The weighted mean also showed moderate performance. Therefore, there were lack of storage facilities or transporting vehicles for the solid wastes, in some places solid wastes are dispersed, some how communities were not cooperative with integrated municipal solid waste management works and were resistant and also lack of follow up the activities of integrated municipal solid waste management workers.

The interview made for Addis Ababa administrative officers of integrated municipal solid waste management and agency workers of municipal solid waste management support the opinion of majority of the respondent groups. They said, that “Of course, we have not enough budget allocated to do and work all the activities of integrated municipal solid waste management. It is very vast; so we don’t have enough resources to cover all these things. Budget constraints are our main problem. As much as possible, even if the budget is not enough, we try our best to allocate the limiting budget fairly to carry out the activities of integrated municipal solid waste management.”

No	Item description	Respondents				
		Micro enterprise workers and community		Administration and agency workers of IMSWM		m.w
		N=500		N=65		
		X	std	X	Std	
1	The Integrated Municipal Solid Waste Management workers are incompetent enough to do their work properly.	2.28	1.02	2.08	0.76	2.26
2	The Integrated Municipal Solid Waste Management workers have not taken relevant training and they have no skill.	1.66	0.52	1.74	0.44	1.67
3	The Integrated Municipal Solid Waste Management workers are overloaded with different work activities in the city.	1.88	0.6	1.74	0.44	1.87
4	There is adequate number of enterprise workers to cover the jobs properly	3.64	0.5	3.51	0.62	3.62
5	There is insufficient allocated budget for Integrated Municipal Solid Waste Management program in the city.	3.9	0.73	3.89	0.68	3.9
6	Lack of coordination of stake holders in collecting, storing and transporting of the solid waste in the city.	2.04	0.75	2.08	0.65	2.04
7	Lack of storage facilities from waste you generate , or transporting trucks (vehicles)	3.13	0.74	4.14	0.7	3.24
8	Solid waste stored for very long and dispersal and communities do not respond or pay no attention.	3.21	0.69	3.09	0.72	3.2
9	Communities are not volunteer or not cooperative with the Integrated Municipal Solid Waste Management workers.	3.16	0.74	3.23	0.66	3.16
11	Lack of follow of the Integrated Municipal Solid Waste Management workers by the management bodies’.	3.16	0.81	1.98	0.88	3.09

Table 3: Challenges Minimizing the problem of IMSWM.

4. Solid waste collection Policy: The solid waste collection in Addis Ababas has been decided by the city administration. According to the existing policy, solid waste are collected by the government employees, private companies based on contractual agreements and micro and small enterprise.

The interview made for Addis Ababa city administration officers of integrated municipal solid waste management that whether any policy or/and legislative system support the integrated municipal solid waste management in the city or not.

They said “ There are policies to regulate the proper administration of integrated municipal solid waste management. But there were no policy or legislation that ban or protect not to use any plastic or polystyrene material which is related to solid wastes. The integrated municipal solid waste management policy of the city were not protect or ban before they produced plastic material, polystyrene or any others or even after conception (or after used up) and generated as in the form of solid wastes, from house hold, business areas or the factory itself”.



Fig.2. Storage on street sides



fig 3. Damping on the road side

5. FINDINGS OF THE RESEARCH

5.1. Summery of the major findings :

The major findings of the study were summarized in this parts of the study, general conclusion were drawn on the bases of their findings and recommendations forwarded for all concerned integrated municipal solid waste management in Addis Ababa city. Therefore, the central purpose of this study was to assess the integrated municipal solid waste management in Addis Ababa city.

Different kinds of analysis tools were employed for the analysis and interpretation of the collected data. The quantitative data gathered through questionnaires were analyzed in frequency count, percentage, and mean for the characteristic of the respondents and mean value, standard deviation weighted mean, t-value test was utilized to check the tactical significance where there is difference or not between the opinion of the respondents. Whereas, the qualitative data gathered through the open-ended questionnaire, interview and documents were analyzed by narration. Hence, the analyses made to substantiate the major findings of the study are summarized as follows:-

Among the different options used to strengthen the integrated municipal solid waste management to be sustainable that the majority of the respondents indicated were self-directed practices of private and micro enterprise face to face (or door to door) interaction for awareness creation and awarding or giving incentives to encourage the role model (or active participants) among the community itself were possible options used to strengthen the integrated municipal solid waste management to be sustainable were not implemented effectively in the city. But among the different options peers(or colleagues) organized for awareness creation among themselves and helping the activities of integrated municipal solid waste management were about 10 associations organized per sub city level. Whereas, the rest of possible option were not implemented effectively in the city.

Based on the majority of the respondent groups that respond through questionnaire or interview, the findings of the study confirmed that during and after awareness creation the communities and the micro enterprise workers were not visited on how to collect separate and store the solid waste and also the respondents revealed that they were carried out the above activities without plan and taking in to account the suitable time by mutual agreement with the communities. They also gave no feed-back and they were not discussed with them about the problems and the appropriateness of the objectives. They did not collect and record data on the community participation. They were ineffective in this way.

The findings of the study revealed that administration and agency workers of integrated municipal solid waste management were not efficient and effective in conducting regular meeting and discussion for awareness creation with the communities and the micro enterprise workers and integrated municipal solid waste management and the micro enterprise workers of integrated municipal solid waste management and in organizing conference workshops and training ,to increasing there awareness and incentives for encouragement were not give. Of course, if thus was made effectively it has an adverse effect in helping the community to cooperate and actively participate in helping the activities of integrated municipal solid waste management workers.

The finding of the study also indicates that there were factors that hinder the implementation of integrated municipal solid waste management activities in the school were the budget constraints. The shortages of allocated budget to facilitate the integrated municipal solid waste management activities were factor that hinders its implementation effectively.

6. CONCLUSION

Based on the findings of the study the following conclusions are drawn: Implementing effective awareness creation and orientation improves stack holders active participation in cooperation and working with integrated municipal solid waste management. This requires positive perception and commitments of all stake holders. This in turn increasing the improvements of the activities of integrated municipal solid waste management. This leads to the attainments of the desired objectives of the integrated municipal solid waste management. However, the research findings showed that the communities and the micro enterprise workers of integrated municipal solid waste management were not well oriented to the potential activities and benefits of integrated municipal solid waste management, could bring to the communities themselves or to the stack holders, where they lacked awareness of the activities of integrated municipal solid waste management. From this, it can be possible to conclude that community and micro enterprise workers of integrated municipal solid waste management in Addis Ababa city have limited understanding about the significance and the purpose of integrated municipal solid waste management activities.

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