



ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

Plastic Bag Waste Management in Addis Ababa

**A Thesis Submitted to the School of Graduate Studies,
Addis Ababa University, in Partial Fulfillment of the
Requirements for the Degree of Masters of Arts in
Environment and Development**

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Addis Ababa, 2007

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**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

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Title

Plastic Bag Waste Management in Addis Ababa

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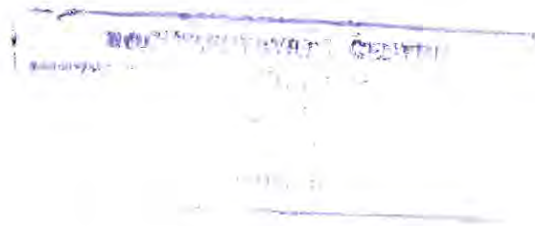
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ACRONYMS

A.A - Addis Ababa
CBOs- Community Based Organizations
EIA- Environmental Impact Assessment
EPA- Environmental Protection Authority
ERM- Environmental Resources Management
HDPE – High Density Poly – Ethylene
IUCN - International Union for Conservation of Nature and Natural Resources
KK- Kefle-Ketema (Sub-City)
LDPE – Low Density Poly- Ethylene
MSW - Municipal Solid Waste
MEs- Micro Enterprises
NGOs- Non Governmental Organizations
PSP - Private Sector Participation
Pvt. – Private
SBPDA - Sanitation, Beautification and Parks Development Agency
SMEs - Small and Micro Enterprises,
SEs - Small Enterprises
UNEP - United Nation Environment Program
UNIDO - United Nation Industrial Development Organization
UMI - Urban Management Institute

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ABSTRACT

Plastic bags are largely used for shopping because they are light weight, cheap, water and moisture resistant. They are also convenient for quick services at supermarkets, kiosks and Groceries. The plastic bags manufacturing and trading industries have created employment opportunity. On the other hand, unless managed in an environment friendly way, the adverse environmental, social and economic impacts emanating from plastics bags waste are serious and could outweigh their benefits.

The Federal Government of Ethiopia has issued policy, proclamations and regulations in order to foster sound waste management practice throughout the country. The Addis Ababa City Government has, based on the measures taken at the Federal level, issued regulations and established the necessary institutions. One of these measures is the issuance of the Addis Ababa City Government Regulation No.13/2004 regarding waste management, collection and disposal. To date, the implementation of the regulations, in particular provisions on plastic bag waste management in Addis Ababa is not researched.

The objective of this study is, thus, to assess as to whether the on going practice pertaining to plastic bags waste management in Addis Ababa is done in accordance with the internationally accepted sound solid waste management principles and requirements as contained under the relevant policy and regulatory instruments. Accordingly, implementation and effectiveness of the policy, proclamation and regulations, and their impact in promoting sound management of plastic waste in Addis Ababa is evaluated based on analysis of documents, interviews, questionnaires and observations.

The study reveals that currently plastic bags waste in particular and solid wastes in general are not managed in an environmentally sound way. According to this study, the prohibitions, prescriptions and incentives contained under the regulations are not adequately implemented. The mechanism to ensure their enforcement is weak. Various factors are identified for this weak performance. First of all, measures to prevent the generation of waste are inadequate. Second, waste recovery is not encouraged through reuse and recycling. Third, the current practice regarding collection, sorting and transportation are not done timely and properly. Finally, there is no adequate facility for the final disposal of wastes. The one that is assigned for waste disposal, which is called *Repi (Koshaie)*, is not a landfill. It is rather an open disposal site which is neither properly constructed nor well protected. Thus, recommendations are given to improve situations.

CHAPTER I: INTRODUCTION

1.1. BACKGROUND

Waste is anything that is no longer useful and needs to be disposed. It could be solid, gas or liquid FDRE (2007). Urban wastes are generated from small, medium and large scale industries, residences, different service centers like hotels, hospitals, clinics, etc. If waste is managed in an environment friendly manner, it can be a useful raw material for the production of similar or other products (like plastic bags, baskets, etc)

Initially plastic bags were introduced in cities to solve inconveniencies that users faced in carrying goods purchased from market. Environment Australia (2002). In addition, they are used for packaging and storing agricultural produces and industrial products. Plastic bags have also disadvantages. Unless managed well, they adversely affect the natural and human made environment and the well being of the dwellers of Addis Ababa. It also creates conducive situation for reproduction of rats, flies, insects, etc., that causes human health problem.

Plastic bags are one of the major solid waste causing serious problems in Ethiopia. They are largely used in towns than in rural areas and their demand is higher in bigger cities than in smaller ones. Furthermore, Addis Ababa is a capital city of Ethiopia, and a seat for African Union and United Nations bodies. Therefore, putting in place an efficient waste management system to keep the beauty of the city is a must. This will help to foster increased efficiency in resource use and thus the creation of more job opportunities, maintain health, conserve wealth and protect environmental pollution.

In Addis Ababa city, plastic bag waste in particular and solid wastes in general are adversely affecting animal and human health, blocking drainages and affecting quality of the soil. The City Government has, thus, issued regulations on the management of plastic bag waste in order to promote the advantages that can be obtained from plastic bags and to minimize the disadvantages they entail. For this to materialize, strict follow up of the implementation of the following sound solid waste management principles is critical. This will help to adequately manage waste and ensure the wellbeing of the people, protect and conserve the natural and human made environment.

In this regard, the first step demands intervention in production, importation or use in order to prevent and/or minimize the generation of waste. The other is known as saving resources by sorting, reusing and recycling. The third one is to collect, treat (For example to reduce bulk or neutralization, etc.) disposable waste and to properly transport it to a land fill site. After taking all these measures, ensuring disposal of unavoidably created wastes at the properly constructed and maintained land fill site is the last step. Undertaking periodical monitoring in order to reduce the danger that likely would occur from landfill sites; to follow up and create a mechanism in which the land fill will ultimately be used for another useful purpose is also important to foster efficient resource utilization EPA (2006-A).

Thus, in light of this, the study assesses the level of implementation and effectiveness of the policy and regulatory system issued on solid waste management by the City Government.

1.2 SIGNIFICANCE OF THE STUDY

Sound waste management program has potential in terms of controlling waste flows and optimizing natural resources, and thereby creating new jobs and so forth. However, its viability is not far from difficulties,. This is because the issue is of a cross-sectoral nature. Therefore, this study explores measures that help build capacity of stakeholders to regulate and coordinate the available resources as well as activities in relation to plastic bag waste management. As a result of this, many stakeholders could benefit from the outcome of this study. In particular, it may enable policy makers of the Addis Ababa City Government may enable them to revisit the existing policy of solid waste management, especially that of plastic bags. Other stakeholders, like students, manufacturers, importers, consumers can use it for reference and for education and awareness.

1.3 SCOPE AND LIMITATION OF THE STUDY.

There are different categories of wastes, such as liquid, gas and solid. The study, however, focuses only on plastic bag with especial emphasis on plastic shopping bags which is one of the solid wastes. In order to cope with shortage of time and resources the geographical scope of the study focuses to five kebeles that are located within two sub-

cities of the Addis Ababa City Administration. The Sub-Cities and the Kebeles are selected because the Addis Ababa City waste disposal site is found in these sub cities. Secondly; they are highly populated and the flow of waste in these areas is more to show the problem. In addition the study did not consider the following. One is chemical components, properties or density of plastic bags in the market. The other is those plastic bags coming to the country/region through illegal means. Plastic waste generation rate is also not known.

1.4 STATEMENT OF THE PROBLEM

Addis Ababa city is divided into 10 Kefle-Ketemas (Sub-City) and 99 Kebeles. In the city there are about 3.8 million population and a diversity of socio-economic development activities. Plastic bags are largely used for shopping than any other bags in Ethiopia with an estimated yearly local production of 10,000 tones apart from the importation. The total plastic imported to the country in the year 2005 for example is amounted to 2,984,007.96 kilograms; out of which 269,664.71 kilograms that is about 9.04% are plastic bags. EPA (2006-C) Though, they seem less in weight they are large in number; because most of the quantities are thin plastic bags which are light in weight. Consumers use these bags largely because they are light weight, cheap, water and moisture resistant, they also help for quick service at supermarkets, kiosks and groceries. At least 2 million plastic bags are handed out every month EPA (2006-C). The per Capita Generation Rate of Municipal Solid Waste in Addis Ababa is 0.252 Kilograms Gordon (1995). Though the plastic bags industry has given employment opportunity, their adverse environmental impacts are of serious concern unless managed efficiently.

Production, importation and use of plastic bags have many advantages including creation of employment. Poorly managed plastic bag waste production, usage and disposal would create environmental problem. For instance, plastic has a life span up to 1000 years to decay Environment Australia (2002); hence, handling plastic bags waste improperly will create public health problem and environmental pollution for a longer period of time. Poor plastic waste management results in blockage of drainages and sewages. Further, plastic bags can be eaten up by animals and hence adversely affecting their health and life. As a whole, the cost of inadequate plastic waste management could entail irreversible impact. Therefore, this study, aims to assess relevance, efficiency and

effectiveness of the laws, rules and regulations issued to ensure the proper plastic waste management in Addis Ababa City Government.

1.4.1 Research Question

- ✓ Are policies, laws and regulations issued at federal and city level effectively practiced?
- ✓ Do the existing regulatory regimes promote effective Municipal Solid Waste (MSW) (in particular that of plastic bags waste) management in Addis Ababa?
- ✓ Do stakeholders have proper awareness about sound plastic bags waste management?
- ✓ What is the current Municipal Solid Waste (MSW) management situation in Addis Ababa?

1.5 OBJECTIVE

1.5.1 General Objective

The general objective of the study is to assess and analyze the plastic bag waste management in Addis Ababa and effective implementation of Regulation No. 13/2004.

1.5.2 Specific Objectives

The specific objectives are to:

- Evaluate the implementation modalities and effectiveness of regulation No.13/2004 at Kebele, Kefle-Ketema, Sanitation, Beautification and Parks Development Agency (SBPDA) , Federal Environment Protection Authority and Addis Ababa Environment Protection Authority.
- Assess the degree of awareness about waste management (benefits and impacts) at all levels including the community;
- Recommend alternative options to the existing plastic bags waste management that helps to address the adverse effect and enhance the positive impacts.

1.6 APPROACHES AND METHODOLOGY

1.6.1 General Approach

The focus of this work is to evaluate impacts of the existing policies, rules and regulations and their proper implementation. It tries to adapt the principles of effectiveness, efficiency, impact, relevance and sustainability of solid waste management in Addis Ababa.

1.6.2 Specific Approach

Instruments and methods used for the collection of information for the data analysis include:

- **Literature and Documentation Review:** Literature, documents and reports relevant to plastic waste management are reviewed. This includes the detailed review of articles that are related to the policy, proclamation and implementation of plastic waste management. Studies and evaluation report done on the plastic waste management, as well as proposals and, reports written with regard to plastic waste management are included.
- **Observation:** The researcher directly observed activities and operations taking place at stakeholders' institutions, groups and individuals at the Addis Ababa City Government, Kefle-Ketemas (Sub-Cities), and Kebeles that are relevant to plastic waste management. A general understanding is reached about the situation within which the plastic waste is managed with different stake holds that are actively involved in the issue.

The researcher noted all the observed activities of the collectors at Kolfe-Keraneo Kefle-Ketema (Sub-City), Kebele 06, 13/14 and Nefas-Selk lafto Kefle-Ketema Kebele 14/02, 02/03. Also a discussion was made with sorters and washers and observed their activities at Repi land fill and those who wash the plastic bags near and in the river called "Jemmo" which is close to Repi disposal site.

The researcher has also observed the Small and Micro Enterprises (SMEs) carrying waste in poly-bags ('madaberia') on their backs collecting them from

individual houses, while dumping to the containers, and also while emptying the bags to the vehicles directly from the poly-bags.

- **Interview, Questionnaires and Discussions:** Additional information to supplement the documentation review were collected using interviews, questionnaires and discussions, which are conducted randomly with the main stakeholders - Environmental Protection Authority of Ethiopia and Addis Ababa, Sanitation, Beautification and Parks Development Agency of Addis Ababa City Government, Kefle-Ketemas (Sub-City) and sanitation and beautification coordinators at kebeles, factories, SME collectors, sorters, washers. Where as questionnaires were distributed to households randomly and their responses were collected. This has helped to have a practical and deeper understanding of the procedures followed and problems encountered during waste management. Carefully prepared checklists were used to guide the interviews and discussions. The questionnaires and checklists were developed in accordance with the general objective and following the issues addressed in the overall framework and approaches towards waste management. Discussion and interview with manufacturers, sorter, washers, collectors (SMEs), drivers, guards, Kebele coordinators were done randomly.

Questionnaire, interview and discussion with relevant stakeholders as listed under Annex I was conducted. The list was carefully and deliberately prepared to include the key informants, the necessary institutions, groups, individual experts. Questionnaires were distributed to house holds because most of the municipal solid wastes are generated from the households. In Addis Ababa city 76% of the solid waste is generated from the households. Gordon (1995)

The two sub-cities, Kolfefe-Keraneo and Nefas-Selk Lafto are selected because of two reasons. 1) These sub-cities are where the Rapie disposal site is found and is where the problem is more clearly seen. 2. These sub-cities specially Kolfe- Keraneo is highly populated than other sub-cities in Addis Ababa. Thus, is believed that the problems and improvements at all steps or hierarchy of solid waste management can be observed better. Thus questionnaires were distributed to more number of households in Kolfefe-Keraneo sub-city than Nefas-Selk Lafto. Therefore, questionnaire was distributed to 100 and 50

households of Kolefe-Keraneo and Nefas-Selk Lafto sub-cities respectively. Also discussion and interview was held with 5 and 1 micro-enterprises of Kolefe-Keraneo and Nefas- Selk Lafto respectively. The individuals and more number of groups of collectors (that is 5) were interviewed from Kolfe Keraneo sub-cities. While one group was from Nefas-Selk lafto. And the sorters and washers group of male and female are naturally assorted from both sub-cities i.e out of the 22 Female and male, 9 from Kolefe-Keraneo, 6 from Nefas-Selk Lafto and 7 were from different Kebeles and different sub-cities.

Table 1.1. List of Small and Micro Enterprises with who interview and discussion was conducted.

S.No.	SME's (Collector's)Name	Sub-City and Kebele	Association members/ Employees			Remarks
			F	M	Total	
1.	Selam Betegle Association Micro Enterprise	Nefas-Lelk Lafto Kebele 02	15	0	15	
2.	Seleam Tsedat Association Micro Enterprise	Kolefe-Keraneo Kebele 06	10	0	10	
3.	Hebret Pvt.,Sanitary Service, Micro Enterprise	Kolefe-Keraneo Kebele 13/14	3	3	6	Focused group discussion with both and female separately was done
4	Telese Pvt.Sanitary Service Micro Enterprise	Kolefe-Keraneo Kebele 02/03	0	3	3	
5	Negat Pvt. Sanitary Service Micro Enterprise	Kolefa-Keraneo, Kebele 06	6	6	12	Focused group discussion with both and female separately was done
7	Individuals (in Group) from different Kebeles of both Kefele-Ketemas (Sub-Cities)	Kolefe-Keraneo & Nefas-Selk lafto Sub-City different Kebeles	9	13	22	Most of the Female are involved in washing. Focused group discussion with both and female separately was done
8	Dynamic Pvt. .Sanitary Service- Small Enterprises	Work through out Addis Ababa				Discussion was done with the manager

1.7. ORGANIZATION OF THE PAPER

This thesis is organized in to four chapters. Chapter one deals with the introduction. Chapter two discusses the literature review and document analysis. Chapter three assesses finding of the study and discuss results after analyzing data collected through interview, questionnaire and observation. Chapter four presents conclusion and recommendations forwarded to improve plastic bags waste management in Addis Ababa.

CHAPTER II: LITERATURE REVIEW

2.1. OVERVIEW OF PLASTICS BAGS

Plastic bags which are the concern of this study are made from ethylene, a bag that is produced as a by-product of oil, gas and coal production. www.mclaren-plastics.co.uk, (2005). Ethylene is made into polymers (chains of ethylene molecules) called polyethylene. This substance is made into pellets which are used by plastic manufacturers to produce a range of items, including plastic bags. There are two types of plastic shopping bags: lighter and heavier bags. The lighter, filmy bags are used by supermarkets and other food outlets made of High Density Poly Ethylene, (HDPE) while the heavier bags are used by retail outlets made of Low Density Poly Ethylene (LDPE), like clothing stores. The thickness of the lighter plastic bag is at most 0.03 millimeters meters, while the thickness of the heavier plastic bag is above 0.03 millimeters SOS Addis (2006).

The lighter and thin plastic bags are not reusable or have very low probability to be reused. The reason is that they can easily be thorn and their prices are insignificant that people do not mind to buy new instead of being bothered to keep and reuse them. Consequently, they are seen littered everywhere and dispersed by wind and/or washed by running water. Besides polluting the environment, they are more likely to be eaten by open field pasturing animals such as sheep, goat, cow, (which can be a cause for death). In general all non biodegradable plastic bags waste create different health, social and economic problem if not managed well.

2.2 THICKNESS OF PLASTIC BAGS USED IN ETHIOPIAN MARKET

Thickness of plastic bags as per the Ethiopian Quality and Standards Authority laboratory test result and their price in the market) is summarized in the following Table 2.1.

Table 2.1 Summary of Thickness of Plastic Bags and Their Price in A.A

S. No.	Test No.	Thickness (in mm)	Price of bags (in the market)
1.	1a	0.017	Birr 1.00
	1a	0.027	Birr 1.00
	1sa	0.032	Birr 1.00
	1sb	0.037	Birr 1.00
2	-	0.013	Birr 0.10
3.	-	0.022	Birr 0.10
4	4a	0.016	Birr 0.50
	4b	0.012	Birr 0.50
5	-	0.015	Birr 0.25

Source: adapted from EPA (2006-C)

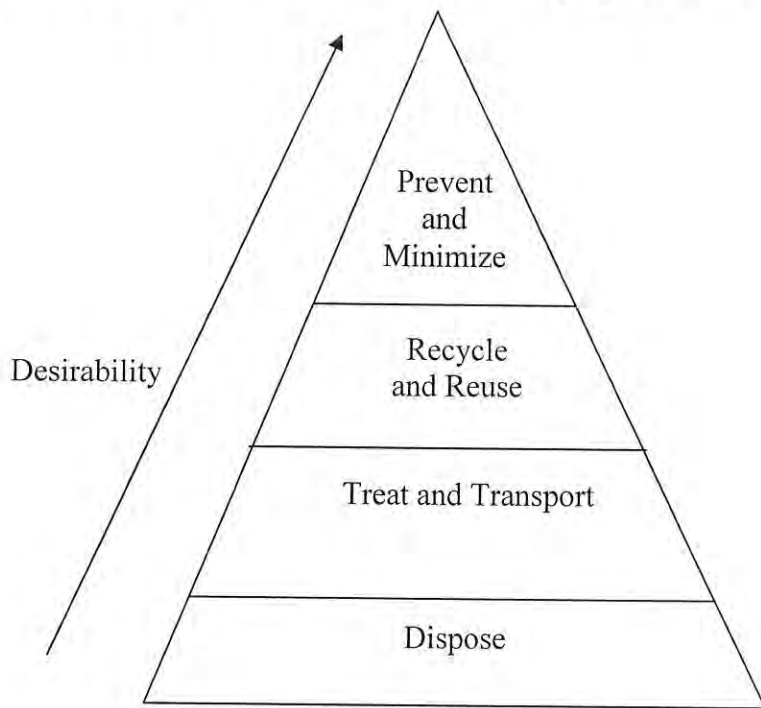
As shown in the above table the price and thickness of the plastic bags are not reasonably synchronized. One can not judge the quality (strength, thickness, etc.) of plastic bags from its price.

2.3 PRINCIPLES OF SOUND SOLID WASTE MANAGEMENT

2.3.1 Conceptual and Analytical Framework

Waste management options are often arranged in a hierarchical manner to reflect their desirability. The first priority is waste avoidance that is not generating waste in the first place. If the waste must be generated, then the quantities should be minimized. Once that has been achieved, the next step is to maximize, recovery, reuse and recycling of suitable waste materials. Once the possibilities for waste prevention and minimization and recovery have been exhausted, the next step is to reduce waste by extracting useful resources or converting into energy or reducing bulk, etc. before undertaking the final disposal

Figure 2.1 Solid Waste Management Hierarchies Upright Cone Shape



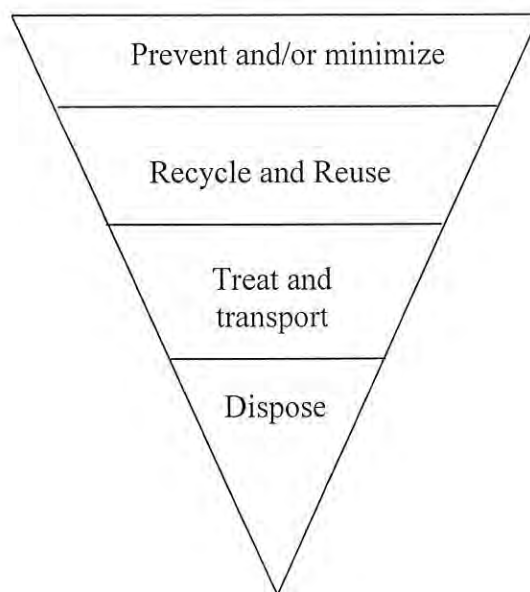
Source: Adopted from (UNIDO, UNEP 1998)

Figure 2.1 represents this hierarchy as an upright cone, with the most desirable option waste avoidance, at the apex. By coincidence, the volume of each of the layers in the cone is also roughly proportional to the relative quantities of waste currently being managed by each of the options in most countries around the world (UNIDO, UNEP, 1998). In other words, while there is general agreement on the order of desirability of the various options, in practice the current situation in terms of relative quantities is generally inversely proportional to desirability. Another representation of the hierarchy, in which the volume of the layers is proportional to their desirability, is as an inverted cone (Figure 2.2) rather than an upright cone. This reflects the relative quantities of waste which the introduction of a sustainable waste management strategy seeks to achieve.

A comparison of Figures 2.1 and 2.2 enable one to draw another correlation with waste management in practice. An upright cone is a stable structure, while the inverted cone is inherently unstable. To elaborate this, waste is naturally generated with human involvement to satisfy the day to day need of plastic bags and other materials. Unless

there is deliberate policy, laws, regulations, etc. intervention to change consumption habits of the society, technology, production system, over all waste management behavior of the users of plastic bags for example, the principle of waste prevention and/or minimization will be dealt with very insignificantly and will remain as it used to be. But if there is policy intervention to change the situation waste can be prevented and/or minimized to the possible best level. This situation will be unstable due to different reasons. For example, to sustainably keep large amount of waste to be prevented and/or minimized at the top and small amount of waste to be disposed finally as shown in figure 2.2. It really needs continues policy support to keep the situation stable. Otherwise, it will go back to its natural position or even might get worst. To shift from the current situation in which the majority of wastes are dealt with by final disposal to one where waste prevention becomes dominant, it is essential for governments to give some support through policy measures. Thus, policies which support waste avoidance and waste minimization are to be preferred over those which focus purely on further encouraging present efforts in recycling recovery and reuse.

Figure 2.2 Solid Waste Management Hierarchy Inverted Cone Shape



Source: Adopted from (UNIDO, UNEP, 1998)

The attainment of sound waste management depends on capacity to attract and encourage investment on waste management service, implement the polluters pay principle (that is shifting the cost of bad waste management to the polluter him/her self from the public, and facilitate and promote partnerships at all levels. In general, sound waste management system follows four steps to secure that waste is controlled well from its creation to its disposal (EPA.2006-A) Such waste management steps will be valuable when applied in an economically viable, environmentally sustainable and socially acceptable way. The four steps depicted in Figure 2.1 and 2.2 are discussed in detail hereunder.

2.3.2 Prevention and/or Minimization of Waste Generation

Waste generators should use production systems, practices and processes that create the least minimum possible waste. Preventing waste from being generated is the first goal of any waste management program. The waste prevention and minimization approach encourages minimizing waste through proper organization and maintenance, changing inputs, process and product; for example, using technology which requires fewer amounts of raw materials to produce the same or better quality plastic shopping bag. Or use a technology which can produce a shopping bag from biodegradable raw materials; and or assign a qualified, personnel, etc. EPA (2006-C)

2.3.3 Reusing and/or Recycling

Waste generator (or any other user) must make the best use of the waste being generated. Reusing encourages users to reuse a product or pass it to those who can reuse products like, used plastic bags, clothes, papers, bottles, tins, etc. Recycling program consist of recovery of recyclable wastes, processing into new materials or products and the marketing of these products; for instance, recycled plastic bag, smokeless charcoal, filler for painting, etc. Recycling has got the advantage to generate additional employment option, to reduce the ever increasing demand for natural resources, to reduce amount of disposables and overall consumption, etc. (Joanna 2007. SOS Addis, 2006).

2.3.4 Treatment and Transportation

Once waste is produced, something should be done with it. Some wastes can be compacted to take up less space and can be treated (for example, sorting, crashing,

covering and adding some chemicals that can suppress bad smell or blowing of dusty content) so that it becomes less dangerous. Wastes that are treated, physically, biologically or chemically are more convenient to transport and dispose them in an acceptable way. This is explained further in the following Chapter.

2.3.5 Disposal

The fourth step deals with all wastes remaining after taking the previous three steps. [This step requires disposal of solid wastes in properly constructed, fenced and protected site. Such disposal should be taken in a manner that makes sure that the waste finally disposed does not negatively affect ground water. In addition not pollute the environment, be taken by wind or flood or be eaten by animals, etc. Further more when the land fill is full and finishes its purpose, there should be a mechanism by which the area is used for another useful purpose. Because land fill sites are essential components of any waste management. EPA (2006-A)

2.3.6. Problems in Implementing Integrated Municipal Solid Waste Management

A number of obstacles may be encountered in the course of introducing new and better concepts of integrated municipal solid waste management like attitudinal, financial, systemic and technical implementation. ERM (2004). To address these barriers, efforts should be made on identifying, planning and using environmentally sound technologies, promoting environmental education and creating awareness, networking of industrial waste information system adoption, empowering non-state actors and communities to ensure their safety and environment. Mobilizing and channeling resources to finance improved waste management initiatives are very important.

"Waste Management, Collection and Disposal Regulation No.13/2004" is issued in accordance with Sound Solid Waste Management Principles and the desired goals/objectives of the Addis Ababa City Government; is so as to protect human health and environment, and foster rational use of the natural resources EPA (2006-A). Thus, in this study the current solid waste management situation in Addis Ababa is assessed to know if the desired objectives are met. The gap between the desired objectives of the

proclamations, the regulation and the existing situation is the main problem to be addressed.

2.4 ADVANTAGES OF PLASTIC BAGS AND THEIR INDUSTRIES

As described by EPA (2004), plastic waste management has the following advantages

- Investors, manufacturers, importers and distributors can contribute to the development of the industry and also get profit from the operation to add to the growth of the economy. The establishments of such manufacturing and trading operations give employment opportunity.
- The general public use plastic bags for their day-to-day activities. Because they are easily available in every shop and are some times given free when goods are purchased (like in case of bread, clothes purchase). Because plastic bags are cheaper in price and are available abundantly compared to paper, textile and other bags.
- Plastic bags can be used to carry wastes.
- Some Plastic wastes can be recycled and be a raw material for similar or other products. Those which can not be recycled with the current technological capacity of recyclers (in Addis Ababa) can be mixed with other material and be used as additional mixture for other products.
- Alike other bags, plastic bags are water repellent. They can protect items from rain better than other bags. They are also more appropriate and advantageous to contain liquid and semi liquid products.

2.5 DISADVANTAGE OF PLASTIC BAGS AND THEIR INDUSTRIES

In general plastics are not dangerous. But if the plastic waste management is poor, plastic has the following disadvantages (Big Fish Internet, 2005, www.mclaren-plastics.co.uk, 2005; EPA, 2004, Tchobanoglous et. al 1993):

- They create environmental and health problems.
- All plastic bags imported or produced in Ethiopia are non biodegradable.

- Plastics take about up to 1000 years to decay. By staying in the soil they degrade the quality of the soil. Thus, the problems related to plastic wastes will remain a problem until they decay.
- Poorly managed plastic bags are easily and carelessly thrown to fields, rivers, etc. As a result, they block drainages; create unpleasant smell and favorable situation for the reproduction of insects that affect human and animal health and life. Plastic wastes carelessly thrown to fields can be eaten by animals and create health problem that affect their lives to death.
- Thin plastic bags, though, they may be very small in weight, they are large in size as they are the most largely used product in the market. Thus, they can spoil large areas. They can easily be dispersed by wind and can create environmental problems like ruining beauty of parks and other areas.
- If plastic waste is not reused and/or recycled due to lack of technology, machinery etc., producers will continue to use virgin materials which will cause more outflow of foreign exchange and also will negatively contribute to the depletion of natural resources.

In order to respond to this problem, the Addis Ababa City Government has issued Regulation No.13/2004 (the detail is discussed in section 3.7) for solid waste management, collection, recycling and disposal to curb the problem.

2.6. PLASTIC BAGS MANAGEMENT IN DIFFERENT COUNTRIES

Plastic waste management experience of other countries is discussed in the following section Environment Australia (2002).

2.6.1 Australia

In Australia, 75 % plastic shopping bags are locally produced. There is a high level of reuse of plastic shopping bags, with an estimated 60% of bags with an “at home” destination cascading to a second use before disposal. Recycling level is 3% in 2001/2002 due to this reuse, inadequacy or inconvenience of current recycling systems and general consumer indifference, plastic shopping bags appear to be approximately 2% of the litter stream. The impact of this litter is increased due to the material’s persistence

in the environment. This is a lesson to consider plastic bags waste seriously than shortly decomposable wastes. The increase in the impact of the plastic litter in Australia shows that plastic material persists to stay in the environment. Thus, one can learn increase in reuse alone without increasing the recycling can not solve the problem. Because finally the reused ones are subject to disposal (littering).

2.6.2. Hong Kong

In 2001, it was estimated that nearly 4 bags per person per day were disposed in Hong Kong. That is in excess of the consumption level in Australia of just under 1 bag per person per day. Hong Kong has, therefore, implemented a campaign of “NO PLASTIC BAGS, PLEASE,” and prohibits retailers from providing a limited size of bags to consumers free of charge. The program has been designed to educate the public on alternatives to plastic bags and to encourage customers to make environment friendly decisions on purchase of shopping bags. Along with the public campaigns there is an environmental tax on products for which an environment friendly alternative is available. Recovery facilities for plastic bags are provided within supermarkets. Combining different approaches especially awareness campaign, the tax and recovery facilities has helped. To learn from such experience taxing plastic bags can force the retailers not to give plastic bags free. To implement recovery facilities may be impractical for the majority of the plastic bags users in Addis Ababa. Because the mass of the population is purchasing from ‘Merkato’ (the largest open market in Addis Ababa) or similar markets and kiosks..

2.6.3 Bangladesh

Bangladesh suffers extensive problems with littering of plastic bags. Serious flooding resulting in major loss of life has been linked to plastic bags blocking drains. These problems were combined results of lack of public infrastructure and a reliance on scavenging of valuable materials, lack of consumer responsibility and profound environmental and social consequences. A ban on manufacture and use of plastic bags was introduced. Prior to the bans, out of the total consumption of plastic bags in Bangladesh only 10-15% were placed in bins, with 85% littered into the environment. In Addis though, what is largely seen littered is thin plastic bags. The thicker ones also will

finally be disposed to the environment. Thus, providing alternative bags to the consumers and banning non environment friendly bags can help to improve the situation in Addis Ababa also. Of course proclamation to ban thin plastic bags is issued by the Federal Government.

2.6.4 India

Like Bangladesh littering of a broad range of products is the major problem in India. There is very little recycling and waste infrastructure in many areas. And there is heavy reliance on low technology for recovery and sorting. The low value of light weight plastic shopping bags means that many bags are not recovered through scavenging activities. Thus, light weight plastic wastes remain in the environment and find their way into rivers and drains in large numbers. In 2000 the manufacture and use of plastic shopping bags was banned in some regions, in an effort to reduce the number of plastic bags clogging storm water drains and causing flood. Large fines and suspension of trading for one month was applied if retailers are caught using plastic bags. In Addis Ababa light weight and thin plastic bags are mostly used, little recycling, low technology for recovery and sorting like in the case of India is prevailing. Thus, Banning of plastic bags and providing alternatives can help the users to shift to other environment friendly bags. Temporary banning can not make the plastic bags waste management sustainable

2.6.5 Canada

Wide education campaign for recycling programs in Canada has included plastic shopping bags and the system has proved to be very successful. Education campaign and also continuous awareness creation activities help to bring changes. Though, learning from the experience of other countries can help, what has worked in Canada may not be easy to implement in Addis Ababa. Because the difference in the standard of living, education, market system, culture, etc. varies. But it should be noted that education and awareness creation are indispensable components for sustainable municipal solid waste management.

2.6.6. Denmark

As part of “Green Taxes” (which was announced in 1993), a tax on plastic carrier bags was introduced in 1994,. The aim was to promote the use of reusable bags (that is textile bags). The relative tax levels are intended to account for the fact that plastic bags are lighter than the paper ones. Levying tax on shopping bags reduced consumption of plastic bags by 66%. The tax is included in the price of bags to the retailer and is not clear to consumer, therefore, not likely to produce or maintain dramatic reduction in bag usage. Accordingly, the impact on consumer behavior has been less dramatic than in Ireland where the consumer is directly charged the levy. Charging the consumers directly is more effective. To implement such experiences in Addis Ababa, is not easy. But levying environmental tax on non biodegradable plastic bags and informing the society about the issue can discourage usage of plastic bags.

2.7 RECYCLING ACTIVITIES OF PLASTIC BAGS

Recycling helps to reduce the littering of waste that can not be reused and also help to conserve usage of virgin materials. Thus, there are countries that had shown rapid improvement in recycling SOS Addis (2006).

- The Netherlands increased municipal waste recycling from 16% to 42% between 1990 and 1996
- In India the recycling rate rose from 21% to 62% within nine years.
- In South Africa municipal waste recycling rates increased from 19% to 39% between 1994 and 2000.
- In USA recycling increased from 24% in 1993 to 42% in 2000

Summary of measures taken for sound management of plastic bags waste in some countries is presented in table 2.2 hereunder.

Table 2.2 Measures Taken on Plastic Bags in Different Countries

S. No.	Country	Measures taken	Reasons
1.	Denmark	Increased tax on plastic and paper bags	To encourage people to use reusable bags, like textile bags
2.	Hong-Kong	Organize awareness creation forum to limit the thickness of plastic bags sold by retailers	To make consumers use environmentally accepted alternative bags.
3.	Bangladesh	Place ban on plastic bags	To avoid plastic bags are littered per day to the environment.
4.	Canada	Created awareness creation program to collect, reuse and recycle.	To reduce the impact of littered plastic bags.
5.	India	Banned thin plastic bags	To prevent environmental pollution
6.	Ireland	Increased tax on plastic bag users	To prevent pollution by shifting plastic users preference to environmentally acceptable bags
7.	Italy	Increased tax on plastic bags	To make the society use environmentally acceptable bags
8.	South Africa	Banned plastic bags which are below 0.03 mm thickness	To avoid thin plastic bags
9.	Taiwan	Banned shopping plastic bags	To reduce environmental pollution
10.	Great Britain	Levied tax on shopping bags	To reduce environmental pollution
11.	Kenya	Banned plastic bags with thickness below 0.03 mm and increased tax on those which are above 0.03 thicknesses.	To reduce environmental pollution
12.	Rwanda	Banned plastic bags below 0.01mm thickness	To reduce environmental pollution
13.	Ethiopia	Issued law to ban plastic bags with thinness of 0.03mm and less	To reduce environmental pollution

Source: adapted from EPA (2006-C)

2.8 WASTE GENERATION IN ADDIS ABABA

Significant amount of tones of plastic bags are produced monthly. As per the study conducted by the Environment Protection Authority EPA (2006-C) more than 10,000 tons of plastic bags are produced by 5 factories (Oxford Plc, Inova Poly Bags Plc, Lion Plastic Factory, Ream Plastic and Flexible Plastic). These industries are involved in production of plastic bags in addition to other plastic products. Significant amount of plastic bags are imported yearly; at least 2 million plastic bags are handed out every month. This transaction has created employment opportunity. Other benefits associated with plastic bags are potential growth in plastic industry, convenience and cheapness (EPA 2006-C, Tchosanoglout et.al.1993). Basically plastics take up to 1000 years to break down so is the problems associated with them. Improper plastic bag waste disposal entails environmental and public health problems. Particularly, thin plastic bags are torn apart easily and frequently, and are susceptible to dispersal by wind and water.

In general according to Gordon (1995) total daily generation rate of municipal solid waste is 851 Tones Per Day and in cubic meters it is 2,297 Cubic Meter Per Day.

According to Gordon (1995) plastic waste generated in Addis Ababa in 1995 is 1.98%. The waste generated is dumped into open ditches and sewers (Yonas 2003).

Table 2.3. Solid Waste Production and Collection

S. No.	Description	Amount		Remarks
1.	<u>Per Capita Generation Rate</u>			
1.1	Kg/capita/day	0.	252	(for solid waste)
1.2	Litter/capita/day	1.	23	(liquid equivalent)
1.3.	Density = 205 to 370 average Kg/ Meter Cube	333		
2	<u>Total Generation Rate</u>	851		
2.1.	Tones/day	2,297		
2.2..	Meter Cube/day			
3	<u>Collection /day</u>			

3.1..	Meter Cube	1,482		
4.	<u>Yearly Production</u>			
4.1.	Meter Cube	838,405		
5.	<u>Yearly Collection</u>			
	Meter Cube	540,788.	72	
6	<u>Percentage of waste destination</u>			
6.1.	Collected, transported and Disposed to landfill	65%		
6.2.	Recycled	5%		
6.3.	Composted	5%		
6.4.	Illegal dumping	25%		

Source: adapted from Gordon (1995)

Table 2.4. Different sources of Solid Waste by percentage

S.No.	Sources	%
1.	Households	76
2.	Commercial	9
3.	Street	6
4	Industrial	5
5	Hotels	3
6	Hospitals	1
	Total	100

Source: Addis Ababa Administration Health Bureau (1997)

Other studies (EPA 2006-B, Joanna 2007) also showed that waste management in the country and in Addis Ababa is poor, has affected health, life and the environment badly. As the population of the country and flow of people to Addis Ababa is increasing, it is

obvious that waste generation will also increase in general and that of plastic bag in particular. They will block drainages, be ingested by animals and adversely affect public and animal health and life. These problems could have been dealt with if sound waste management is in place. This requires segregation and collection at source, temporary storage/transfer site, reuse/recycling and market for goods made from plastic waste and proper land fill site to dispose off those that could not be recycled.

The issue of plastic waste management involves many stakeholders, who may have conflicting interest due to lack of awareness about the long term adverse impact of the poorly managed plastic waste. The stakeholders who have similar or different interest and opinion are the private sector who may like to maximize profit in manufacturing, importing and distributing plastic bags of all sorts. Those who may like to use plastic bags and yet throw it away with no much care are unaware of its consequences. Their concern is only about its affordability or to continue getting it freely from the shops whenever they purchase commodities (bread, clothe, etc). There are also other groups who may not mind to use any alternative bag as far as it is cheaper and convenient.

The Government organs attempt to proactively ensure the right of every one to live in a healthy and clean environment without entailing bankruptcy to business and unemployment. To addresses waste management in Addis Ababa, the City Government has already issued Waste Management, Collection and Disposal Regulations No. 13/2004. This measure to comply with polices and legislative measures taken by the federal government in order to address waste management.

2.9 POLICY AND LEGISLATIVE MEASURES IN ETHIOPIA

2.9.1. Environmental Policy of Ethiopia

The Environmental Policy of Ethiopia which was approved by the Council of Ministers of the Federal Democratic Republic of Ethiopia on April 2, 1997. The goal of this policy is ‘to improve and enhance the health and life quality of all the people in the country and to promote sustainable social and economic development without compromising the ability of future generations to meet their own needs. In addition it aims to meet the needs

of the present generation through sound management and use of natural, human-made and cultural resources and the environment as a whole'' FDRE (1997)

The key guiding principle states, among others, the importance of awareness creation on conservation, culture and environmental issues among all levels of stakeholders. Particularly, in the area of waste management and pollution control, the policy states the following:

- To establish safe limits for the location of sanitary landfill sites,
- To review and develop guidelines for waste disposal, public and industrial hygiene and techniques.
- Establishment of a system for monitoring compliance with land, air and water pollution control standards and regulations, the handling and storage of hazardous and dangerous materials, waste disposal and water quality.
- To maintain environmental audits to ensure the adoption of environmentally sound practices in all public and private development, to promote waste minimization processes, including the efficient recycling of materials and to cultivate better understanding of users by enforcing the conditions of information for the treatment and disposal of waste.
- To develop effective methods of stakeholders and/or public participation in the planning and implementation of environmental and resource use and management.
- To ensure environmental costs and benefits, to adhere to the principle that the right to live in a clean and healthy environment requires to be informed about environmental issues and to develop an appropriate information system.

2.9.2. Environmental Protection Organs Establishment Proclamation No.295/2002

The Federal Democratic Republic of Ethiopia issued Proclamation No. 295/2002 for establishment of "Environment Protection Organs" with the objective to formulate policies, strategies, laws and standards, which promote social and economic development in the way that enhance the wellbeing of humans and the sustainable safety of the environment ensuring the effectiveness of their implementation. Thus, the establishment of Federal and Regional Environment Protection Authority has helped to give relatively concentrated attention to the environmental issues like solid waste management.

For example it is the Ethiopia Environment Protection Authority that studied and proposed the issuance of different proclamations to improve the solid waste management including the management of plastic bags waste.

2.9.3. Environmental Impact Assessment Proclamation No.299/2002

Environmental impact assessment is used to predict and manage the environmental effects of newly proposed development activities or as a result of modification, expansion or termination of the already existing one and help attain the deliberated development. Thus, impact assessment of the environment prior to the approval of investment and/or operation permit, provides an effective means of harmonizing and integrating environmental, economic cultural and social considerations into a decision making process in a manner that foster sustainable development. To this effect the Federal Democratic Republic of Ethiopia proclaimed "Environmental Impact Assessment Proclamation 299/2002"

The implementation of the environmental objectives preserved in the constitution would be promoted by the management of likely adverse environmental impacts, and the maximization of their socio-economic benefits. Thus, assessment of the environmental impact serves to bring about administrative transparency and accountability, as well as participation or engagement of the public, in particular, communities in the planning and decision making of the issues which may affect them and the environment. The environmental impact assessment ensure not only the consideration of physical and biological impacts but also tackle social, socioeconomic, political and cultural conditions for public and private sector development.

2.9.4. Environmental Pollution Control Proclamation No.300/2002

Some social and economic development activities may cause environmental harm making the activity counter-productive, since the protection of the environment and human health and wellbeing, as well as the maintaining of the visual value of nature, are the duty and responsibility of all. Thus, it is appropriate to eliminate pollution as it entails an adverse consequence to social and economic development activities. Therefore, it is in this regard that the Federal Democratic Republic of Ethiopia proclaimed Environmental Pollution Control Proclamation No.300/2002. It deals, among others, with control of

pollution, management of hazardous waste, management of municipal, environmental standards to meet the objective of protecting the society and environmental resources from pollution. Issuance of the law is a step forward. Though, the law is in place some requirements to enforce the implementation of the law are not yet in place. For example standard for pollution is not yet set. Further effort is required to fulfill the enforcement.

2.9.5 Waste Management, Collection and Disposal Regulation of the Addis Ababa City Government Regulation No.13/2004

It is issued by the Addis Ababa City Government to implement the Environmental Policy of Ethiopia. It deals with many waste streams out of which plastic waste is one. The targets are protection of human health, protection of the environment and fostering rational utilization of natural resources. The strategies are collection, recycling and disposal. The instruments of implementation are penalty and prescription, incentive, and public participation. Waste management collection and disposal regulations (i.e. Regulation No. 13/2004) of the Addis Ababa City Government is issued because it is found appropriate to manage collect, transport and dispose waste generated from the City of Addis Ababa in a manner that does not pollute the environment and harm health of the society. It also required amending the existing hygiene regulations No. 1/994 by harmonizing with the current situation so as to make the city cleaned and its natural resources balance is maintained.

The following important provisions for Sound Municipal Solid Waste Management included in regulation 13/2004

As stated in page 280 Article 3 sub article 1,2, 3, 4 and 5 any person is prohibited to 1) store improperly or litter waste generated from a household or organization.2) have the obligation to store waste generated from a house hold or an organization until it is collected and disposed in a container having a cover or in a material that may hold it properly. 3) have a responsibility to sort out type by type when it is found necessary as compostable, non compostable, re-usable, non-servable, and special and hazardous waste. 4) store them, in environmentally friendly way. 5) Any person or organization shall not manage or store waste in a manner that may cause, health problem or environmental pollution due to delay.

Page 281 Article 7 Sub articles 1 to 7 about usage and management of solid waste storages facilities and containers stated the following

- When placing communal dumpsters any sanitary organization shall take in to consideration the amount of waste generated in the vicinity.(Sub-Article 1).
- Sub-Article 2 prohibits to carry to dumpsters or remove out of the dumpsters special solid waste. Also a person shall carry to dumpsters only that solid waste which might be within the holding capacity of the dumpsters.
- It is prohibited to remove the waste out side the dumpster. And a person shall have the obligation to properly dump solid waste he carried to the dumpsters. (Sub-Article 3)
- In Sub-Article 4, it is stated that any private sanitary organization shall assign a guard to prevent littering of the waste by animals and persons and also keep the container, in which solid waste is stored, clean.
- Sub-Article 5, requires any sanitary organization to pick up the container and emptied the waste before it over flows or causes health problem due to prolonged stay.
- Sub-Article 7 .Save a body concerned with matters related with the management of the dumpster of solid waste, it shall be prohibited for any one else to transfer the dumpster to another place or to put its contents in disorder

In page 284 Article 14 sub article 1 and 2 which deals with burning of waste and incinerator prohibits to burn or cause to be burnt waste in the street, public place or organization unless it is in the waste-burning incinerator duly made and at the authorized place prepared for same. And unless it is in the burning incinerator duly made or through employing techniques that do not pollute the environment, it shall be prohibited to burn bitumen, plastics, or similar matters in any place.

Article 25, Sub-Article 1 & 2 states that any person who receives sanitary service to pay sanitary fee for the service received. And manufactures to pay tax or special service fee for products having polluting impact.

Article 29, about incentives in sub article 4 and 5 states that the government may facilitate condition particularly for cooperatives, engaged in sanitary service, for obtaining long term loan that enables them to expand and strengthen the service. And the government may provide land for free for sectors that have outstanding contribution in improving management of the waste generated in the city

Article 30 about Penalty Sub article 1, 2 and 3 state that any person who repeatedly did not obey to the regulations should be penalized and also should collect and dispose the waste with his own expense.

Page 281 article 6 sub article 1 and 2 prescribes that any person shall have the responsibility to minimize the wrapping or covering material that he uses, to reuse or to convert the amount of the waste to valuable product. And that any person who manufactures or imports plastic like wrapping materials for commercial purpose shall ensure that they are reused for prolonged time as well as environment friendly.

Article 6 and 7 states that any person shall have the responsibility to keep the area clean covering up to 20 meters in front of and away from the end of his household, organization or institution,. And shall not be allowed to render sanitary service in a manner contrary to healthy waste transfer system or that may pollute the environment or harm health of the community.

It is also prohibited in Article 4, Sub-Article 1a and 1b to discard solid waste or cause it to be discarded in high ways, sidewalk, public place, fields, river, water bodies, parks, or any other unauthorized sites and to fix, advertisement paper, on the wall, electric or telephone pole or in any other unauthorized places not prepared for such purpose in a manner that destroys the beauty of the City.

Page 282 Article 8 which deals with transportation of solid waste and other vehicles sanitation states in Sub- Article 1 and 2, any person who transports waste by a vehicle shall use vehicles appropriate to prevent environmental pollution and community health problem. And shall transport waste to transfer or disposing sites by vehicles having cover so as to avoid littering waste in every part of the street or not to be taken by the wind. Further more no driver or passenger shall throw waste through the windows or gates of the vehicle. And any open vehicles moving in or crossing the city shall, prevent from littering of material or getting the city dirty, by covering them with appropriate materials.

Page 284, Article No18. Sub-Article No. 1 states that any person or a cooperative, or micro and Small Enterprise (SMEs) that provides sanitary service, shall take appropriate safety measures, to protect the health of the community and preserve the welfare of the environment.

Page 286 article 21 Sub-Article 6 gives the power and function Sanitation Beautification and Parks Development Agency to encourage private investors, cooperatives, and micro and small enterprises, non-governmental organizations and community associations to engage in solid waste and toilet service and facilitate conditions for same.

Article 22 Sub-Article 2 d has given responsibility to police officer on duty to control and to take to justice any person who is removing waste in unauthorized places. .

In selecting waste transfer station the threat or fear and opinion of the community is required to be studied and be considered as per Article 15.

After the regulation was issued different measures were taken for effective municipal solid waste management. Such as organizing Small and Micro Enterprises (SMEs) for sanitary service and started collection from households and other waste generators. Allowing Small Enterprises to dispose the waste they collect to Repe disposal site with any charge. And also allowing the Micro Enterprise to dispose the waste they collect to the vicinity containers freely. Deploying street cleaners, guards for containers. Supporting Sanitation Beautification and Parks Development Agency, preparing new

land fill site for construction. Some initiatives have started sorting plastic bags waste for recycling. Different projects have started involving in Municipal Solid Waste Management activities like collecting, sorting, and training. Some Local and International NGOs have tried to involve than any time before. Though, it needs more effort in the future to implement the regulation fully, the initiative taken is to be appreciate.

2.9.6 Solid Waste Management Proclamation No.513/2007

Collection, recovery and disposal of solid waste are weak and solid waste management in general is inadequate in the country (EPA, 2006). In particular plastic bags waste is littered to the environment and cause different problems (like hampering drainages, deteriorate soil, etc.). To solve this problem, the Federal Democratic Republic of Ethiopia, issued Solid Waste Management Proclamation No. 513/2007. The objectives of this proclamation are promoting community participation in order to prevent the adverse effects and improve the benefits resulting from solid wastes. This is to ensure community participation through solid waste management action plans designed by, and implemented at the lowest administrative units of urban Governments.

CHAPTER III: RESULTS AND DISCUSSION

The results and discussion regarding the prevailing situation of solid waste management in Addis Ababa are discussed in the following order: 3.1) *prevention and/or minimization of waste* 3.2) *reuse and recycling* 3.3) *treatment and transportation* and 3.4) *disposal*. In addition 4.1) *institutional regimes* and 4.2) *assessment of degree of awareness* are also discussed.

3.1 PREVENTION AND/OR MINIMIZATION OF WASTE

Producers and importers are not preventing and/or minimizing waste, nor do the households store or dispose the waste they generate in environment friendly way unlike to what is stated in the regulation No.13/2004. This has caused health problems, resource destruction and environmental pollution. As this study reveals only about 20% of the households use the service of licensed collectors. Thus, different types of wastes are found stored inappropriately or littered into open drainages, fields or rivers or near streets causing health and environmental problems. Until recently, waste containers are uncovered until they are transported. Therefore, proclamation No. 300/2002, which empowers Sanitation Beautification and Parks Development Agency to take administrative and legal action on any person who pollutes the environment so as to keep it safe and clean, is not yet implemented fully.

In general, production and importation of plastic bags has served the demand of the Addis Ababa city dwellers. It has also provided employment opportunities to youth and women of the region. It is serving in the supermarkets and other shops. But the adverse effect of plastic bags waste is not taken care of due to inadequate solid waste management. There is a need to encourage and force manufactures to bring into their factories new machines and system which can help the prevention and minimization of plastic waste, and also conservation of natural resources. This can be achieved through, for example, by replacing the current obsolete machine with new or designating different line which can produce biodegradable plastic bags or other environment friendly bags

(at the same time serving the need of the consumers) and also by introducing a technology or applying practices which uses less quantity of raw material to produce light weight but very strong shopping bags. Meanwhile, there is a need to inform users that the plastic bags they use are non biodegradable or not. Informing how best to dispose them is also equally important.

The law states that any manufacture or importer of plastic for commercial purpose shall ensure that they can be reused for prolonged period and should be environment friendly FDRE(2004). It further makes any person responsible to reduce the wrapping material to reuse or recycle. It has also given the responsibility of announcing periodically the prohibition production or importation of non environment friendly products. But the enforcement law was not put in place. Currently the Federal Democratic Government of Ethiopia issued a proclamation No. 513/2007 which ban thin plastic bags with a wall thickness of 0.03millimeter, which the Addis Ababa city government will consider to adapt.

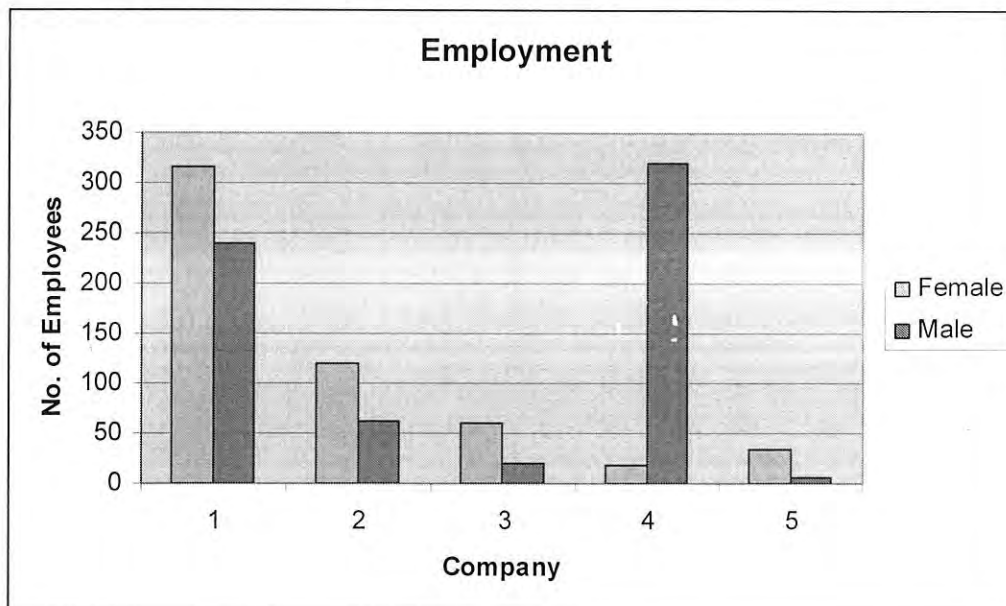
Generally in almost all proclamations no special consideration is given for non biodegradable waste for example the current plastic waste in Addis Ababa are non biodegradable.

3.1.1 Production of Plastic bags

Some plastic bags which are available in Addis Ababa city are produced locally. They all are non biodegradable (Discussion with EPA, Head of Solid Waste Management). Out of the total of 520 companies involved in production and sales of plastic products from the year 1992 to 2006, there are ten companies that produce plastic bags with different thicknesses. Among these, Inova Plastics Plc., Oxford Plc, and Flexible Plastic Plc., respectively produce 95%, 83% and 78% plastic bags having a thickness of less or equal to 0.03mille meter. Correspondingly they also provide 184 (121 female and 63 male), 557 (316 female and 241 male) and 42 (35 female and 7male) employment opportunities. For example, two of the above companies Oxford and Flexible Plastic company together produce about 6 million kilograms of plastic bags per year as shown in Figure 3.2 (EPA, 2006 - C). Plastic bags local production and employment opportunity for example is

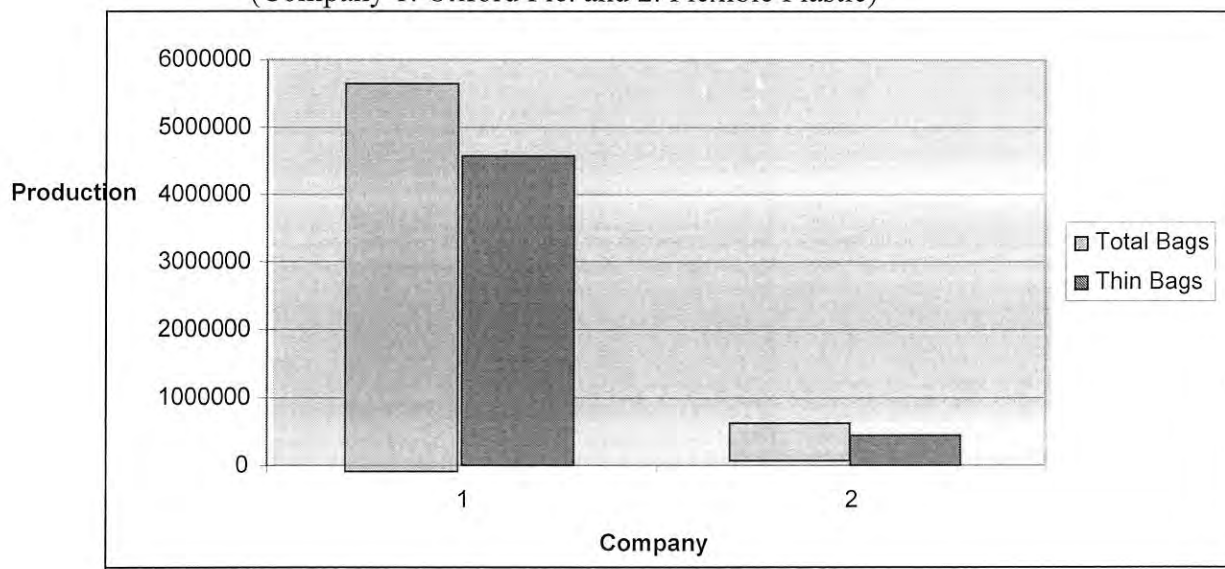
depicted in Figure 3.1., for the following manufacturing companies, respectively: (1 Oxford Plc., 2) Inova Plastic bags Plc. 3) Lion Plastic Factory, 4) Ream Plastic Factory and 5) Felexable Plastic Factory in Addis Ababa in the year 2006

Figure 3.1 Employment opportunities by five plastic bag manufacturing companies.



(Source: adapted from EPA 2006)

Figure 3.2. Production of plastic bags by two manufacturing companies
(Company 1. Oxford Plc. and 2. Flexible Plastic)



(Source: adapted from EPA 2006)

In addition to the five mentioned above in 3.1.1, Kurtu, MA The mo Plastic, Ferew Plastic, Summit, Wabi and Moplaco (have branch at Addis Ababa and factory at Dire Dawa) are also producers of plastic bags (Interview with Moplaco Plastics company).

Investments that involve in production of products that may adversely cause environmental problems need to make EIA before and while in the process of production and expansion of the project FDRE (2002-b). Contrary to this, almost all plastic manufacturers did not undergo the environmental impact assessment (EIA) process before their establishment. Because the requirements of Investment office that issue investment certificate and Ministry of Trade and Industry that issue operation license and Environment Protection Authority is not synchronized. Even though there is no enforcement law yet in place, Addis Ababa EPA is trying to communicate with both to help the implementation of the proclamation. The enforcement regulations are not yet in place. Therefore, there is need to synchronize the operation of investment certificate, operation license and the duty of the Environment Protection Authority; also to put the enforcement law in place and further add more action for its implementation. If at least the new ones are able to go through the EIA process, they could have been advised to shift their manufacturing line to wards production of environment friendly bags. Thus, there must be a requirement of EIA approval from Addis Ababa Environment Protection Authority to be issued for new investors before they get operation license. It also requires building the capacity of the executing institutions in terms of trained manpower,

Product labeling to inform consumers about the nature of goods that they are consuming is necessary. In this context, basically plastic bag manufacturers and sellers should provide information to their customers. For example, whether the plastic bags they offer for sale are biodegradable or not and also should inform the user how to dispose them carefully. But the situation in Addis Ababa, as witnessed by the households, is stated as follows.

Table 3.1 Existence of product labeling to show how plastic bags should be disposed

S. No.	Description	Number of respondents	Percentage
1.	Households who have seen labeled/ printed warning on plastic bags	6	7.5%
2	Households who have not seen any labeled/printed warning on plastic bags.	74	92.5%
	Total	<u>80</u>	<u>100%</u>

(Source: researcher's survey result)

About 91% of the households have never seen any labeling or print on the plastic bags they purchase. This means that producers are not informing their customers in order to prevent and/or minimize the generation of waste.

Most of the plastic bags produced in the country are thin. These plastic bags have very low probability to be reused, as compared to thick ones. The reason is that thin plastic bags can easily be thorn and their prices are insignificant that people do not mind to buy new instead of keeping and reusing them. Thus, they are not handled properly and are seen littered everywhere and dispersed by air and/or washed by running water. Besides polluting the environment, they are more likely to be eaten by open field pasturing animals and be a cause for them to die. According to the discussion the researcher made with the Repi disposal site collectors and sorters, about 17 out of the 20 have confirmed that they knew and also have learnt from their neighbors that domestic animals have died because of eating plastic bag waste along with the grasses in the field. Most of unmanaged plastic bags waste clogs drainage and sewage systems. This obstacle in turn creates a pungent odor and pollutes the air which makes the whole environment inconvenient.

3.1.2 Importation of Plastic bags

Many of the importers import mainly thin and cheap plastic bags based on the demand of the market. Regulation No. 13/2004 article 6 sub article 2 states that any person who imports plastics should ensure that they are environment friendly. But the current importers import non biodegradable ones because they are cheaper. Certain plastic bags are coming into the country along with different products. Side by side to such activities a large number of plastic bags are smuggled into the country through illegal means (Discussions with producers and other experts).

Table 3.2. Imported plastic bags and other plastic products

Year	Total Plastic Products Imported in Kg	All types of Plastic Bags Imported		R e m a r k s
		In KG	In %	
2003	3.460,919.--	unknown	unknown	Since the quantity of plastic bag is not segregated the total plastic products imported is considered.
2004	88,495.06	784.24	8.9	Since the bags are not segregated in their thickness the quantity shows all type of plastic bags.
2005	2,984,007.96	269,664.71	9.04	

Source: adapted from EPA (2006-C)

As shown in figure 3.2 the total plastic products imported to the country in the year 2005, for example, amounted to about 3 million Kilograms. Out of which 269,664.71 Kilograms, that is, about 9.04% are plastic bags. Though, the percentage and the weight of plastic bags seem small, they can be many in terms of quantity and can pollute large areas if not managed well. This shows that plastic wastes (especially non biodegradable ones) are one of those wastes which require utmost care in the solid waste management

because since they stay in the environment with out decaying additional littered plastic bags simply add to the already existing and aggravate the problem of pollution.

3.1.3 Households' and Others Generators of Waste

Solid waste generation in the city is 0.252Kg/capita/day and daily generation rate is 851 Tones/day. Regarding the source of generation 76% is generated from the house holds. Gordon (1995) consumption or usage habits of households are also one of the major sources of waste generation. Households can prevent and/or minimize waste generation by using either environment friendly bags, or using thicker plastic bags. Regulation No. 13/2004 states that any person should ensure reusing, sorting for recycling.

Table 3.3 Plastic bags that households get freely or buy mostly

S. No.	Type of plastic bags obtained free or households buy mostly	Number of respondents	Percentage
1.	households who get free or mostly buy very thin plastic bags	79	98%
2.	households who get free or mostly buy thicker plastic bags	2	2%
	Total	81	100%

(Source: researcher's survey result)

As shown in the Table 3.3, 98% of the households are mostly getting free or buy very thin plastic bags to carry commodities. Such bags are easily thorn and are mostly seen littered carelessly. Because they are non biodegradable, they remain in the soil for long time with out decaying and deteriorate the soil condition. Though, the thin bags seem less in weight, they are very large in number. For example, with the measurement taken and weighing exercise done by the researcher on the thin plastic bags with about 0.017millimeter in thickness, which are sold in the market with Birr 0.10 - 0.15 per piece, one kilogram is equal to 1000 pieces. This can pollute a large space when thrown carelessly and cause a lot of problem to the environment, economy and health.

Table 3.4 Households way of disposal of solid waste generated at home

S No.	Description	Number of respondents	Percentage
1	Use service of collectors	17	21%
2	Burn in my premises	47	58%
3	Dispose to container	15	18%
4	Others	<u>2</u>	<u>3%</u>
	Total	<u>81</u>	<u>100%</u>

(Source: researcher's survey result)

As shown in the above table about 58% of the household burn solid waste (including plastic) generated at home, 21% use service of collectors and 18% dispose to container. The households' disposal of solid waste neither help conservation of resources by protecting from burning, nor sorted for recycling to minimize waste. Thus, they destroy the resource that can be recycled and be used as a raw material for similar or other products. Furthermore they pollute the environment by burning waste.

Burning plastic material unless in an incinerator duly made is prohibited FDRE (2004). But, in practice people burn different wastes, including plastic bag wastes in open fields in their own premises, near streets, etc at ordinary times and during the sanitary campaigns. This is because of lack of awareness about its adverse effect and inadequate enforcement of the law.

Almost all households who use the service of collectors store the waste in poly-bags ('madaberia') and deliver it to collectors within 5 to 10 days. Concerning the payment, 90% pay Birr 10 and 10% pay Birr 12 per month for service they get. But during the discussion with collectors they have confirmed that there are few house holds and some companies who pay them up to Birr 15, and some households who pay Birr3 up to 5 only.

Table 3.5 Households willingness to use paper bags and long life textile bags

S. No.	Description	Willingness to use paper bags		Willingness to use textile bags	
		Number of respondents	percentage	Number of respondents	Percentage
1.	Willing to use	49	63.64%	42	52%
2	Not willing to use	28	36.36%	39	48%
	Total	77	100%	81	100%

(Source: researcher's survey result)

As summarized in the Table 3.5, 60% and 52% of the households are willing to use paper bags and textile bags, respectively. It is a good sign to start introducing environment friendly alternative bags. Those who are not willing to use textile bags gave their reasons as follows: 47% of them said that they do not remember taking bags with them for shopping; 27% do not want to pay high initial cost; 11% give both the above reasons. In addition, they cited reasons like the need to use different bags for different products. Thus, it is expensive to use more of textile bags, and also they do not want to carry textile bags along with themselves, etc. Thus, it is important to consider incentive mechanisms like shifting promotional costs to be incorporated to the production of environment friendly bags while advertising company's products at the same time selling the bags to make the entail cost attractive to users. Or need to study which type of incentive work better and which can be easily implemented.

In the other hand according to the observation of the researcher and discussion with Kebele coordinators households and other waste generators are carelessly littering different types of plastic bags on the streets, near by rivers, drainages, and cause clogging of drainage which in turn cause health problem creating bad smell and also enabling environment for insects to breed. Sample of clogged drainage is shown in Figure 3.3.

Picture 3.1 Drainage clogged with plastic bags waste Kolefe-Keraneo, Kebele 13/14



(Source: researcher's survey result)

Most of the Households do not want to use the sanitary service because they do not want to pay the service fee. On the other hand manufacturers are still producing only biodegradable plastic bags of which the major quantity is the thin plastic bags which are more subject to frequent littering This is because the law does not force any one to use the service of the licensed collectors, nor does it enforce households to properly and legally dispose the wastes they generate. There are also different reasons from the side of households such as lack of awareness and/ or money, etc. As a result of which most of the households are not using the service of the collectors

Any person who illegally disposes waste is to be panelized and also should collect the waste with his own expenses FDRE (2004). The Kebeles try to implement the penalty

when they found persons guilty for committing the unlawful activity. But they could not stop the practice; because the problem is that most of the illegal dumpers throw waste in the absence of guards. The container guards stay on duty only for eight hours; that is during the government regular office hours. The issue is though most of the people know that improper dumping is illegal, their activity of doing the same is not changed. Unless there is a change in their behavior i.e. in the way they manage the waste they generate they can not be considered as an aware society.

3.2 REUSE AND RECYCLE

A lot of plastic bags are littered in Addis Ababa. There is no adequate recycling of plastic bags, except that insignificant initiatives started by some NGOs and manufacturers. In general waste recovery is still minimal. Thus, a lot of resource is wasted, health and environment is affected. It is because there is no mechanism established for waste recovery that people do not sort at home. Some people reuse some items like bottles, tins, thick plastic bags, etc. For some items like glass bottles, Jerecans, Textile, etc either households trade in or sell to those who go around residential areas and collect in exchange for other products or buy in money. Such actors are traditionally called 'Korale' (survey result)

Reuse and recycling are ways to minimize waste and also save natural resources to certain extent.

Solid Waste Characteristics (Physical composition)

- 60% Organic
- 15% recyclable
- 25% others
- Density = 333Kg/meter cube

(Source: Addis Ababa Administration Health Bureau, 1997)

5% is recycled out of the total municipal solid waste generated according to Gordon (1995).

Table 3.6 Households reusing other products and plastic bags before disposal

S. No.	Households reusing or not reusing	Reuse any item		Reuse plastic bags	
		Number of respondents	percent-age	Number of respondents	Percent-age
1.	Those who reuse	45	56%	47	58%
2	Those who do not reuse	36	44%	34	42%
	Total	<u>81</u>	<u>100%</u>	<u>81</u>	<u>100%</u>

(Source: researcher's survey result)

As indicated in the Table 3.10 about 56% of the households reuse different products and 58% reuse specifically plastic bags and minimize waste generation.

Table 3.7 Households supplying plastic waste to recyclers

S. No.	Description	Number of respondents	Percentage
1.	Those who supply plastic bag waste to recyclers	4	5%
2	Those who do not supply plastic bags waste to recyclers	<u>77</u>	<u>95%</u>
	Total	<u>81</u>	<u>100%</u>

(Source: researcher's survey result)

As shown in Table 3.7, 95% of the households have never supplied plastic bags waste to recyclers as a raw material for producing similar or other products. One of the problems is unavailability of buyers of plastic bags waste.

Table 3.8 Willingness of households to sort out and sell waste generated

S No.	Description	Number of respondents	Percentage
1.	Those who are willing to sort out and sell the waste they generate if there is buyer in the future	62	77%
2	Those who are not willing to sort	<u>19</u>	<u>23%</u>
	Total	<u>81</u>	<u>100%</u>

(Source: researchers' survey result)

If there are buyers of wastes, about 77% of the households are willing to sort out plastic bags waste or other wastes in the future. Those who do not want to sort out gave their

reason as follows: some do not think it helps. Others do not understand the benefit. Some think that waste is waste which is nothing but to be simply disposed. This shows that there is a need to create the market by encouraging the private sector to involve in such a business. Since sorting at source is useful, it needs to be coordinated through SBPDA so that households can be supplied with the necessary equipment and information and SMEs can collect accordingly. Factories who can benefit out of such recyclable products should be involved and be incorporate in the system to keep the operation going well.

As a result of the discussion and data analysis, it is revealed that plastic bag wastes along with other solid wastes are dumped to open containers and near by containers. Then depending on transportation schedule, the waste is finally transported to Repi disposal site where some sorters sort other products and plastic bags and get it washed at the near by Jemmo river. The bags they wash are contaminated with oily material, benzene, kerosene, etc. during their initial use and/or during dumping with other wastes. Thus, the cleaners use different detergents and soaps to clean the plastic bags; in doing so they pollute the river. No alternative is provided for such activities to do their jobs in environment friendly way to help the recycling process of collecting, sorting and washing the plastic bags. Figure 3.4 shows the washing activity and also partly clogged river due to plastic bags waste left as useless. To improve this situation, involving the private sector largely to the business in a profitable way should be given priority. In addition conducting effective awareness creation activity to sorting plastic bags waste at home should be encouraged. Other countries like Canada improved by increasing awareness creation program and have increased their recycling situation by involving the private sector in a sustainable way.

Picture 3.2. Washing activity of plastic bags waste at Jemmo River near Repi disposal site, Kebele 02/03, Kolefe-Keraneo Kefle-Ketema



Source (researcher's survey result)

Installing sound technology to prevent or reduce waste generation and applying recycling methods is the responsibility of any person engaged in production or activity which causes pollution FDRE (2002-c). Most of the factories are not recycling. Because collectors and sorters are not interested to do the business since it is not attractive. Though, most of the households know that waste is a resource for others, households and other users are not sorting as they generate the plastic bags wastes before they dispose it with other waste. Thus, as stated in proclamation No. 300/2002 the requirement for recycling is not adequately implemented. Regulation No.13/2004 requires that any person engaged in waste collection and disposal based on the list issued by the agency (in this case SBPDA) for the type of waste to be recycled shall sort put in specifically designated place and can transfer with chares or free of chare for any interested party. There is no adequate mechanism and markets established to encourage stakeholders to sort out wastes and get benefit out of it, or do it as a morale obligation to care for the environment.

Every person is legally responsible to reduce, reuse the amount of wrapping or covering material that he/she uses. Further, any manufacturer or importer of plastic materials for commercial purposes should ensure their repetitive use for prolonged time and also that it is environment friendly FDRE (2004). The most frequently produced, imported and used plastic bag in the country is the thin ones which are not mostly reusable. The new proclamation No. 513/2007 of the Federal Government of Ethiopia bans the production and importation of the thin ones. If the city government of Addis Ababa adopt the same and enforce the implementation, it will help to minimize the generation of waste; because people will be encouraged to use the relatively stronger or thicker ones. This of course will create inconvenience to users and shops. But will force them to look for other alternative bags like paper bags especially for small items.

Though the law states to reuse and/or recycle plastic bags there are no enforcement mechanism yet put in place. People do not sort recyclable wastes at household level and collector also simply dump waste to containers with out sorting. Except there are some initiatives started at Repi disposal site with some individual collectors; and the two projects started in cooperation with the Kefele-Ketema with the support of the Government of France (discussion with Kolfe-keraneo Kefele-Ketema). They have started only sorting, not recycling yet. They sort out and deliver it to the recyclers. No public-private partnership (PPP) is developed in this regard to involve private investors. For the sake of protecting the environment encouraging grounds for such PPP requires to tempt the private sector to involve in such business by providing land, credit facility exceptionally for such purposes until the business get reliable profit by developing the market for such products and services.

It is important to involve private investors to process the waste generated specially that of plastic bags (which stay longer with out being decayed and polluting the environment) so that they can be converted to a useful product (like furniture, smokeless charcoal, etc.).By doing so employment opportunity can be created, resources can be conserved, health and environment can be protected.

Generally the problem related to reuse and recycle is lack of sorting wastes which affects reuse and recovery. This is mainly attributable to lack of strong reuse and recovery industry. The high content of organic (virgin) wastes is also a significant constraint. Only

few institutions are involved in the sanitary service. The plastic bag manufacturers and importer are not trying to offer alternative bags to protect the environment except supplying the cheap and thin plastic bags. The other is the waste finally dumped to Repie disposal site is mostly organic waste which didn't finish its process to be further reused or recycled or be used for another purpose. Besides, no initiative is seen to introduce environment friendly bags. Recycling is started only by few manufactures, which is not in a sustainable way due to different factors. One of these is proportion of the recycled raw material and the virgin material mixture which is maximum 20% recycled to 80 % virgin raw material. Though, the recovery is 100%, using the recycled raw material is only helping a maximum of 20% to be mixed.

On the other hand, the time the collectors spend on collecting and sorting plastic bags waste is high while the weight of the waste they collect is very small. This does not help them to get attractive benefit since the manufactures can not afford to pay more than Birr 3 per kilogram. Many factories have tried to engage in the area, however, they are discouraged to continue. Other alternatives should be tried to involve non profit making organizations to work on the collection and sorting and if possible to deliver free or with a minimal cost. In addition private sector investors should be encouraged to produce products from recycled material at large scale and get profit to help them stay in the business. For example burn the whole non plastic waste in duly made incinerator and use it for making smokeless charcoal; the initiative of Solomon Waste Private Limited Company That is not yet started production for sell. That is started with the intention to produce smokeless charcoal and supply for the domestic and export market is one to be mentioned. Similarly products like furniture, paint fillers can be produced in a large scale from plastic and other wastes.

3.3. TREATMENT AND TRANSPORT

Out of the total waste generated in the city of Addis Ababa according to SBPDA 67% of containers are collected that is (36% with a capacity of 8cubic meter and 31% with 1.1cubic meter capacity)

The evaluation regarding prevailing practice of solid waste collection and transportation in Addis Ababa reveals that the on going plastic waste is not adequately and timely transported. There is great shortage of containers and vehicles. Containers are not under shade and not covered during storage; also not properly covered during transportation. Article 7 of Regulation No.13/2004 states that enough containers should be placed, be protected from overflow and be transported and be emptied timely. Solid waste transportation vehicles are not sufficient and are old. Some containers are placed where there are no all weather roads. Thus, are not mostly transported timely. Due to such problems, there is overflow of waste above the capacity of the containers and piles of different types of waste are dispersed during such periods causing health and environment problems. The respective Kefle-Ketemas are trying to put the containers near main roads temporarily during the rainy seasons to reduce the problems.

Since no sufficient containers are placed in vicinities, households and organizations, dump excess waste above the capacity of the container when it is full, and the contents of the dumpster are disordered by persons, animals, birds, etc. Due to this, dusty waste, thin plastic bags, etc., are carried away by wind and pollute the environment. But it is prohibited to pollute the environment, to dump waste above the capacity of the dumpster, dump dangerous waste, remove the waste outside the dumpster, or to put its waste in disorder (Regulation No.13/2004). The Kebele sanitation coordinators try to follow up the implementation of regulation No. 13/2004. They also form committee from the community to help stop unlawful dumping. But no significant change is observed on the side of the Kebele dwellers.

Every sanitary organization is required to consider the amount of waste generated in the vicinity when placing the communal dumpsters. (Proclamation No.13.2004) Thus, Sanitation, Beautification and Parks Development Agency of Addis Ababa is responsible to place sufficient containers. But the existing containers are not adequate. The law is not properly enforced. It is observed by the researcher and witnessed by the collectors, households and Kebele sanitation coordinators that some transfer sites have no containers at all. Thus, collectors store waste in poly-bags on open field until it is transported.

The sanitary service providers (collectors) collect and dump waste generated in their vicinity to the open containers or keep it at the transfer sites in poly-bags and load it to the transporting vehicle as per the Kefle-Ketema's transport schedule. In the Kebeles where the researcher observed, containers are not enough to accommodate the waste generated in the area; which requires providing additional containers. The containers at the vicinities are placed to serve only the disposal of households and those companies with a capital of below Birr 10,000 directly or through Micro Enterprise' (MEs) collectors especially since 2005. But since most of the companies with a capital of above Birr 10,000 are using the service of Micro Enterprises or dump their wastes by themselves to the containers and over load the containers at transfer sites instead of using the service of the Small Enterprises who directly dump the waste they collect to *Repie* disposal site.

Since the containers and poly-bags ('*madaberia*') used to store waste stay for long time at the transfer sites, street boys, domestic and wild animals as well as birds dismantle the waste outside the containers and/or poly-bags. This usually happen in the absence of the guards. In addition, according to the discussion that the researcher had with one of the guards, some people also dump illegally by leaving the wastes far from the containers in haphazard way even when the containers are not full. They are doing this to avoid the bad smell and ran away before the guards reach them.

Sanitation Beautification and Parks Development Agency (SBPDA) of Addis Ababa City Government who is the responsible organ for the city's solid waste management work with the Kefle-Ketemas (Sub-Cities) which are not accountable to the agency. The agency is trying to get things done through informal and formal communication and report exchange; also has difficulty to enforce several solid waste management issues. (Discussion with SBPDA)

Addis Ababa city is divided into 10 Kefle-Ketemas (Sub-Cities) and 99 Kebeles. In the city there is around 3.8 million population. There are more than 621 Small and Micro Enterprises (SMEs) (616 Micro and 5 Small Enterprises who have got 15 transporting vehicles), 63 Government Vehicles (all are above 15 years old and their efficiency is 58-60%), and 597 containers with a capacity of 8 cubic meters. In addition there are 331 small containers with a capacity of 1.1cubicmeters. Since 2005 companies with a capital of more than Birr 10,000 are instructed to dispose their waste by their own, either using

the private collectors or any other means. The city government is allowing the Micro Enterprises engaged in waste collection to dump the waste they collect in to containers at transfer sites free of charge. Also allow Small Enterprises, engaged in waste collection and transportation to dump the waste free of charge to Repie disposal site. This is to encourage them to stay in the business. But most of the companies with a capital of above Birr 10,000 are not using the service of the private collectors. Instead they use the Micro Enterprises to pay less (Interview with SBPDA and Kolfe-Keraneo Kefle-Ketema).

According to the observation of the researcher at the disposal site, at every corner of the city there are different types of uncollected and improperly disposed plastic bags solid wastes, which otherwise must have been collected by the SMEs, established to serve the same purpose. Further more, it is common to observe piles of solid wastes on the main roads of the city around waste containers. These waste accumulations, left un-disposed by the government agency (that is responsible for that particular task), contain a lot of plastic bags waste. It is also usual to see piles after pile of solid wastes around market areas, like Merkato as well as around big organizations, shops and supermarkets (view of this is shown in Figure 3.5). Containers at the vicinities of each Kebele (where the MEs and households dump the wastes generated from the households and organization with a capital of below Birr 10,000) are supposed to be collected on time by the government agency.

Currently solid waste is collected and disposed by Small and Micro Enterprise (SMEs), government agency, households and other waste generators. The SMEs are divided into two, the Micro and the Small. The Micro Enterprises are those licensed by their respective Kebeles, and the Small Enterprises are licensed by the Ministry of Trade and Industry.

3.3.1 Micro Enterprises

One of the existing bodies, as indicated above, that assume responsibility for collecting the solid wastes of the city is Micro Enterprises (MEs). These are collectors either organized in the form of association or individual enterprises established and licensed by

their respective Kebeles. Their service is limited to their respective Kebeles specific zones demarcated for them.

The research clearly identified the following about the Micro Enterprise: The Kebeles are issuing licenses to waste collectors that are organized as Micro Enterprises and also to those established as private initiative following the issuance of the regulation 13/2004. The demand for these services by households and other waste generators is minimal mainly due to lack of awareness and capacity to pay. The very fact that waste collection is started through licensed SMEs is one big move, though its sustainability (especially that of the MEs) needs further support.

The licensed Micro Enterprises do not have the necessary skill, except one or two people who have taken 2 days training regarding compost. As a result they are involved only in collection activities. Furthermore, the MEs are engaged in these activities only because they have no alternative job. The waste transfer sites and/or containers are placed far from most of the households creating inconvenience for the collectors. The wastes accumulated in the containers and in the poly bags at the transfer sites are not collected timely due to frequent maintenance of vehicles and lack of all weather roads to access them. The accumulation affects their health during loading, especially that waste in poly-bags

The number of Micro Enterprises in each Kebele that take the responsibility of solid waste collection task amounts to an average of eight. Responsibility of these enterprises is only to collect solid wastes from households and small businesses (whose capital is below Birr 10,000). Their responsibility ends after they dump the waste into the solid waste containers at the transfer sites or after they load (empty the waste they collected in poly-bags ('madaberia') to the vehicles). The Micro Enterprises charge Birr5-10 per month, for the service they render in collecting the solid waste from the households and small business.

Though the Kebeles have tried to force the collectors collect and keep the area clean, they could not convince most of the area dwellers either to use the service of the collectors or to dispose the solid waste generated from their respective houses properly by themselves. Discussion with the collectors and the Kebele coordinators revealed that out of the area

demarcated to each collector about an average of only 20 % of the households are using the service of such legal collectors. As per the interview and discussion of the researcher with Micro Enterprises they also collect waste generated by bigger hotels, organizations, etc., in their 'Kebeles' charging Birr 10-15 per month. However, not all these big establishments use the service of the collectors.

The Kebeles try to establish committees from the vicinities and also employ coordinator to coordinate waste management. However, this brought, no much change to stop households, (Kebele's dwellers) from littering and illegal dumping of their wastes into rivers, bushes, drainages, open fields and on street sides at nights and whenever they are not seen.

The government is expected to facilitate long term loans for cooperatives to strength the sanitary services and also provide land free of charges for those sectors that show outstanding contribution to improve the waste management FDRE (2004). As noted by the licensed collectors they have problem of getting financial loan to strengthen their work. Those who are interested to process waste further could not get land or working space for sorting or composting waste. That is one of the reasons why no further activity is carried on to sort for reusing and/or recycling, or composting the waste to help minimize wastage of resource.

Regarding the interest of the Micro Enterprises (MEs) to stay in the business, almost all of them stated that collecting activity is neither interesting job to do nor is beneficial for them. The demand for their service is very low that they collect only about 20% of the total households' out of the area demarcated for their responsibility of cleaning and collecting. Since households are not forced to use the service, the collectors themselves are trying to create relationship and convince the household heads. Few of the households simply want to support the collectors and decide to use their collection services. Most of them still do not use the collection service. Almost all the MEs are at a subsistent income level and their sustainability in the business of sanitary service is very doubtful. According to the discussion with the collectors, they have a problem in getting finance, medical service, shower, safety dresses, mask etc. due to lack of sufficient income from the services they provide as discussed in 3.3.3.

The percentage of households using licensed MEs (collectors) service in their respective Kebeles of Kolfe-Keraneo, Kebele 06, 13/14, and Nefaslik Lafto, Kebele 14/02 (with whom discussion was done in addition to Kebele coordinators, guards and drivers) is shown in Table 3.9

Table 3.9 Percentage of households using MEs' (collectors') service

S. No	ME's(Collector's) Name	Members/ Employees			Households demarcated to MEs for Collection	Households using Collectors' Service	No. of wheel Barrow ('Gari')	Charge (in Birr) per month
		F	M	Total				
1.	Selam Betegle Asso. K..02 Nefaslek-Lafto	15	0	15	about 1500	70(5%)	0	10
2.	Seleam Tsedat Asso. K. 06 ,Kolefe-Kerano	10	0	10	about 2000	136(7%)	0	3-5
3.	Hebret Pvt.,Sanitary Service, K.13&14, Kolfe -K	3	3	6	about 1000	150(15%)	1	10
4	Telese Pvt. 02/03	0	3	3	about 1000	100(10%)	1	3-10
5	Negat Pvt. K.. 06, Kolefa-Keraneo	6	6	12	about 1000	550(55%)	1	5-10
6	Tesfa Feker Wetatoch Asso K. 13&14, Kolefe-K	0	17	17	about 2000	180(9%)	1	0-15
7	Individuals (in Group) from different Kebeles of both Kefele-Ketemas	9	13	22	Sort out plastic bags at Repi disposal site. Some women wash plastic bags at Jemmo river at Kolefe-Keraneo Sub-City Kebele 02/03			

(Source: researcher's survey result)

In Heberet Private Sanitary Service female and male get Birr 150 and Birr 200 monthly salaries respectively. Female collectors carry poly-bags ('Madaberia') on their backs while male push the wheel barrow ('Gari'). The salary of the females starts from Birr 120-135 while Birr 160 is for male workers. Though the quantities they collect vary, the time spent by both male and female workers is similar. There is a need to improve the type of the wheel barrow to help the female workers to use and to move it easily so that they can deliver similar services (in terms of quantity) as the male workers. Otherwise, the salary difference for equal time spent discourages the female workers not to contribute to the sanitary service. But as observed and discussed with some collectors, some female collectors have organized themselves separately (with out male collectors) The Kebeles has encouraged both female and male who have no jobs to form Micro Enterprises and be licensed. But these Micro Enterprises are working at a very subsistence level.

The income they generate is not sufficient to keep them strong. Almost all of them have confirmed that they are working in such undertaking only because of lack of alternative jobs.

3.3.2 Small Enterprises (Collectors)

The second solid waste collectors are Small Enterprises (SEs), which are licensed by the Ministry of Trade and Industry to give sanitary service. The service of this SEs is not only limited to their respective Kebeles and Kefele-Ketemas. Currently there are only five enterprises that have fifteen vehicles for transportation of solid wastes from the source to Repie disposal site. These enterprises are responsible to collect wastes from organizations whose capital is above Birr 10, 000. These enterprises collect solid wastes by themselves, and transport it to the Repie disposal site using their own transportation. For their service they charge Birr 30 per one meter cube of solid waste. The service charge is set by the Finance Bureau of the Addis Ababa City Government. Despite being few in numbers, their capacity to transport the solid wastes is also limited to frequently disposing the waste to the disposal site.

The Sanitation, Beautification and Parks Development Agency of Addis Ababa City Government has established a regulation which obliges all organization with a capital of above Birr 10,000 to dispose the solid wastes they generate through the service of Small Enterprises. Organizations with a capital of above Birr 10,000 were served by the Agency prior to the regulation. To start implementation of the regulation the agency instructed them by letter to use the service of Small Enterprise from the year 2005 on wards.

The execution of the policy is handled by the respective Kebeles in which the organizations are located; and the overall implementation, control and follow-up of the regulation is overseen by the Sanitation, Beautification and Parking Development Agency of A.A. City Government through the Kifle-Ketemas. Nevertheless, the actual regulation implementation of the organizations which is followed up by the Kebeles is controlled by their respective Kefle-Ketemas (Sub-Cities).

Though, some Kebeles and Kefele-Ketemas have tried to stop organizations with capital of Birr 10,000 and above from using the service of Micro Enterprises and from dumping to containers in the vicinity's transfer sites, the study reveals that they are still using the service of the Micro Enterprise and also dump to the near by containers. This is because, first, they do not want to pay birr 30 per cubic meter(about Birr 240 per 8 cubic meter container) of waste, since they can get it collected by Micro Enterprise with only Birr 15-20 per month or dump it by themselves to the containers at the transfer sites. Second, the capacity of the Small Enterprises is limited to address the service demand of such organizations.

But, since the regulation is not mostly implemented well, the containers at transfer sites are over loaded by additional waste, which is supposed to be directly dumped from the source to Repie disposal site. Because of this and insufficient transportation capacity of government service, most areas around the containers are polluted. The SBPDA allows the Small Enterprises to dump the waste they collect at Repie disposal site free of charge; but it charge other organizations who directly dispose their wastes to Repie by themselves. Nevertheless, this did not bring any significant change to the situation. This shows that there is a need to develop the involvement of the private sector to create the market for the service and for the usage of the waste itself. The survey reveals that Small Enterprises have no space to further involve in other sanitary and solid waste management services like sorting and recycling (discussion with SEs). They have no space to build washing area and garage for maintenance of the vehicles. The amount of money they are requested to lease a certain area is exorbitant which discourages them to develop their businesses. Therefore, the government should implement the creation of enabling environment for the involvement of the private sector and should also promote their activities in practice.

3.3.3 Government Agency

Sanitation, Beautification and Parks Development Agency of the Addis Ababa City Government participates in the collection and disposal of solid wastes. Previously, the Agency was collecting solid wastes from large organizations and also disposes solid wastes which are collected and accumulated in containers by Micro Enterprises and/or

households at transfer sites free of charge. To transport and dispose one container with a capacity of 8 meter cube, from big organizations the agency was charging a total of Birr 240. Since organizations, with capital of above Birr 10,000 are not allowed to give the task of collecting and disposing their solid waste to Micro Enterprises, the government agency has taken the responsibility to dispose it. The agency was disposing the wastes from the big organizations not only because that particular task is not assigned to the Micro and Small Enterprises, but also because the number and capacity of the private enterprises, licensed to carry out the task is limited and unable to give the service to all big organizations. Since year 2005 the government has stopped giving collection service to those companies it used to serve; and decided to involve only in collecting the wastes in containers and poly-bags at transfer sites accumulated by the Micro Enterprises. This was with the intention of increasing the participation of the private sector which are the currently existing Small Enterprises.

The study reveals that there are only five Small Enterprises having only 15 vehicles that are old. They have no capacity to handle the waste that is generated by the companies with the capital of above Birr 10,000. As a result the SBPDA is indirectly bearing the same previous load of transporting. Because, most of the companies do not want to use the service of SMs for reasons indicated in 3.3.2 above. Thus, the scarce containers are loaded with the additional wastes of big organizations apart from that of households and companies with capital of below Birr 10,000. In addition, even, the numbers of waste collection vehicles owned by the government are limited and old. As a result that they provide in the city is inadequate. To improve this situation public private partnership in such businesses is required so that the government work on creating the enabling environment for such businesses and the investors create the market for the collection service and for further processing of the waste.

Keeping the solid waste storage clean, assigning guards to prevent littering by animals and humans and picking up the containers before overflowing is the responsibility of any sanitary organization FDRE (2004). Some of the Kefle-Ketemas (Sub-Cities) have assigned employees (guards) who clean the container, report when it is full, protect the container from illegal dumpers and from those animals and humans who disorder the

waste. Since the guards work only eight hours a day that is similar to the government office hours, some street boys, animals like dogs and birds disorder the content in searching for food in their absence. And some illegal dumpers also dump improperly or simply leave the wastes nearby or far from the containers in haphazard manner. During the discussion with the guards of the containers and the collectors, they have mentioned that they had worked hard to stop those who illegally dump some chemicals and hazardous wastes into the container or rivers by continuous following up and taking legal action, as a result of which there is a slight improvement in dumping hazardous wastes.

Usually the guards clean the area and put the waste back into the container. But, the researcher has observed that different types of wastes dispersed around the containers (even when the containers are not full). The guards, collectors, and Kebele Sanitary Coordinators have confirmed the same; and explained that such wastes are dumped in the absence of the guards. They have further clarified that the situation was worst than the currently observed before the slight improvement was seen.

According to the interview and discussion with Kefle-Ketema officials and waste collectors, containers are not transported on time as per their schedule especially during winter. Because most of them are placed in areas where there is no all weather road access. During the non-rainy season, wastes are collected from containers in a better frequency except during the break down of vehicles which mostly happens due to the old age of the trucks. Another problem is that there are no enough containers available for efficient collection.

The existing containers are not sufficient and are placed in a very far distance, discouraging collectors and households who dispose their wastes to the containers by themselves. In some areas collectors are forced to pile up the collected wastes in a poly-bag ('madaberia') on open field near residential areas until the municipal trucks come to collect. On the other hand no one accepts happily when a container is placed near by. This is firstly because of the bad smell of the waste accumulated in the container which pollutes the environment and affects health of the vicinity dwellers. Secondly, since containers are not covered until transported, animals like dogs, cats, etc disorder and misplace the contents out side the container whenever guards are not there. Thirdly,

individuals do not mostly dump the waste properly into the container. They leave it near the container haphazardly. Waste containers have to be well covered and be transported on time before and/or as they get full so as to protect the environment from pollution that affects human health.

Table 3.10 Transportation of Container Full of Waste

S. No.	Description	Number of respondents	Percentage
1	Households that responded waste containers are transported frequently	4	5%
2	Households that responded waste containers are not transported frequently	63	79.75%
3	No container around	12	15.19%
	Total.	79	100%

(Source: researcher's survey result)

As summarized in the above table about 77.5 % of households replied that the waste containers in their vicinity are not transported frequently. Thus, people suffer from the bad smell which causes health problem.

No waste bins are placed for rubbish on most public areas and streets. The Kebele administration is given the responsibility to ensure installation of waste bins in nearby streets and at public places and ensure the collection of wastes before overflow FDRE (2007). As per the observation and discussion with the concerned bodies, the Kebele administration has installed marked waste bins in some areas but most people do not use them. They simply litter plastic bags, papers, food ruminants, candy and chewed gums etc. because of lack of awareness. Most of the fixed waste bins are dismantled and others are fully removed from their places. The Kebele officials could not strengthen their control to know who did such illegal action.

According to the collectors most of police officers are busy with different social problems and do not get time to cooperate on such issues. Though, they may be on duty at night or during the day they can not watch all the areas at all times, except trying to

Concentrate on issues that they are more concerned about (issues like security). Police officers on duty are responsible to control and to take to justice any person who is disposing or littering waste in unauthorized place FDRE (2004). But such control is almost non-existent. On top of awareness creation activities, strengthening the controlling mechanisms until people change their behavior of careless littering is important.

To solve the above problem Kebeles have assigned one or two individuals (guards) to follow up and discourage illegal litters by giving oral warning. They also established committees who can assist the Kebeles on the issue to follow up such problems. Both measures/actions did not bring any significant change on the situation of the careless disposal of waste by the Kebele dwellers. This is because, only one or two old persons are assigned as guards to control. In some Kebeles committees of about 5 to 7 volunteers are formed for the whole Kebele. Such committee members are few in number and have their own day to day work which makes it difficult for them to get time to control. But according to the Kebele coordinator's opinion such committees have helped in bringing slight change in the attitudes of very few people.

The selection of waste transfer station to place container is done mostly based on the availability of open space, and access to road in some Kebeles. This is found to be contrary to the law which requires prior consultation with the nearby community. In selecting waste transfer station the threat or fear and opinion of the community is required to be studied and considered FDRE (2004). But most transfer sites are selected depending on the availability of open area which is not owned by individuals. In some cases, though the community is consulted, no one is happy to accommodate the site near their residences because of the bad smell and health problem it creates. Loading of waste from transfer sites that is accumulated in poly-bags is depicted in Figure 3.5. One can observe from the figure that there are no safety materials for those who empty the bags to vehicles.

Picture 3.3. Overflow of waste in container at transfer site (sample)



(Source: researcher's survey result)

Micro Enterprises collect waste from households and other waste generators in poly-bags and store them at transfer sites until they are loaded on waste collection vehicles. The Kefle-Ketemas try their best to synchronize the schedule of collection and transport. But due to shortage of vehicles and their being under maintenance, waste is not transported on time.

The accumulation of waste in the poly-bags has slightly helped to reduce easy disbursement of waste by wind. But the more they stay uncollected; the bad smell they create affect human health, and also they are exposed to different animals and be dismantled, though there are guards at the sites for a limited time in a day.

Picture 3.4 Waste accumulated at transfer site in poly-bags - partly dismantled



(Source: researchers' survey result)

Picture 3.5 Loading of solid waste by Micro Enterprises



(Source: researchers' survey result)

The researcher has observed the collectors while collecting and loading waste to the vehicles. The vehicles have a mechanism of shrinking the waste while loading. But health and safety requirements as envisaged or provided under the relevant law FDRE (2004) are not complied with. The sanitary organizations are responsible for the safety and health of online workers. It is the responsibility of any one who generates waste as well as who provides sanitary service, to take safety measures to protect human health and environment. Most of the SMEs are doing their best to protect the community and the environment while discharging their duties.

But according to the discussions and observation of the researcher collectors have no adequate protection for the dust, or any other pollution they may inhale while collecting, loading/unloading of the waste to the transfer sites and also during emptying the stored 'Madaberia' bags into the vehicles. They are highly exposed to different health problems. Though, few of the associations and most of the private employees have got working clothes, they do not have neither complete range of minimum safety requirements like mask, gloves, covers, shoes, appropriate working clothes to protect them well nor medical services. All of the collectors complained that there is no safety equipments or health services for problems that they face during waste collection; they can not buy as their income is very low even to cover their food, shower, etc. expenses.

Currently waste containers which are transported from the transfer sites to the Repi ('Koshaie') disposal site are covered with nets. As observed by the researcher, though it is a good start, the nets do not protect solid wastes from falling out of the most over piled containers during the movement of the vehicle. Also they do not protect the pollution of the bad smell and dusty wastes from being taken away by wind. Thus, improvement should be considered in the future.

Sanitation, Beautification and Parks Development Agency of Addis Ababa City Government is mandated with the power and function to encourage private investors, cooperatives, and Micro and Small-scale Enterprises (SMEs), non-governmental organizations and community associations to engage in solid waste services and to facilitate conditions for same FDRE (2004). At present the five private initiatives who are

engaged in sanitary service are not that much strong in their capacity (manpower, vehicles, etc.). As a result their service is limited only to collection activities; not even sufficient to address collection requirement.

The appropriateness of the vehicles, equipments and drivers is expected to be ascertained by the relevant urban government before serving the solid waste management FDRE (2007). All vehicles were purchased before the new regulation was set. As per the interview with one of the drivers they had not received any training about waste related issues. They were not happy with the salaries and benefits they get nor did they find the job pleasant. Rather they found job dangerous for their health.

Transportation of solid waste management also needs to be handled dominantly by private sector. The City Government has started subcontracting to the private collectors. Developing the capacity of bigger private sector companies, Small Enterprises and Micro Enterprises is very important so they can be profitable to stay sustainable in the business.

3.3.4 Households and Other Waste Collectors and/ or Generators

It is prohibited to discard solid waste in high ways, sidewalks, public places, fields, rivers, water bodies, parks, or in any other unauthorized sites by any person or to provide sanitary service in an environmentally pollutant way or in a manner that harms the health of the community FDRE (2004). The capacity to enforce the implementation of existing regulatory regime is so weak thus, could not minimize the problem let alone to prevent the malpractice all together. However, all the collectors and Kebele coordinators have confirmed that such practices could not be stopped. Even after the collectors have cleaned spoiled residential areas, fields and streets, sooner or later they find the area polluted with littering and dumping of wastes. Collectors noted that some households use the service of unlicensed individual collectors (daily laborers) and under aged children that facilitate illegal dumping usually at nights and in the absence of the Kebele guards.

Option for households need to be sought until the awareness gets improved and financial issues get solved. Either by organizing free collection by volunteer NGOs or by government.

Table 3.11 Households that know about existence of Kebele's control on litters

S No.	Description	Number of respondents	Percentage
1	Households that know that there is control and those who believe that though there is control, people did not stop illegal dumping.	49	60.5%
2	Those who do not know whether there is control or not	32	39.50%
	Total	81	100%

(Source: Researcher's survey result)

As summarized in the Table3.11, about 60.5% of the households know that even though there is control, people did not stop littering and dumping, 39.5% do not know if there is control by the Kebele on illegal dumpers. The problem indicates the lack of awareness of households about the negative impact of littering wastes carelessly.

Households and other waste generators are required to dispose the waste they generate properly; so it can be collected and disposed to the final disposal site.

Table 3.12 Disposal of plastic bags

S. No.	Description	Number of respondents	Percentage
1	Households who simply litter any where	13	16%
2	Who burn or dispose it with other wastes	68	84%
	Total	81	100%

(Source: Researchers survey result)

As shown in the Table 3.12, 84% of the households burn or dispose plastic bags waste with other wastes. Others simply throw away any where. So, burning of plastic bags waste is destruction of resource that can be further processed as a raw material for other or similar products. Those plastic wastes thrown away carelessly destruct of the scenery of the city, can be taken by wind or water and cause drainage problems, or can be even eaten by animals along with grass thus affecting their health and life.

Table 3.13 Type of plastic bags carelessly littered

S. No.	Description	Number of respondents	Percentage
1	Household who carelessly dispose plastic bags which are torn or not.	23	59.65%
2	Households who carelessly dispose very thin plastic bags	34	40.35%
	Total	57	100%

(Source: Researcher's survey result)

As summarized in the Table 3.13, 56.8 % of the households carelessly dispose plastic bags, torn or not, 42% dispose the very thin ones. In total about 99% of plastic bags are carelessly littered to the environment and can be causes for pollution. This may be because of the lack knowledge they have about the effects of waste.

Discussion with the Kefle-Ketema (Sub City) and Kebele officials Micro Enterprises reveals that most of the Kebele dwellers do not use the waste collectors' service. As a result, some of them burn it in their compound polluting the area and destroying resourceful wastes that can be recycled. Some of them improperly dispose it haphazardly as explained above while others use the service of underage children to dispose waste just by paying only Birr 2 per month. But the children after taking it from the individual households, throw it carelessly away in the near by areas. Though, it is stated that any person should obtain permit prior to his/her engagement in solid waste collection, transportation, use or disposal FDRE (2004). To solve this problem, the government has to organize them in associations and provide the necessary training so that they can properly serve as per the regulation; side by side with awareness creation to households to use the service of the licensed ones.

3.4. DISPOSAL

The Existing Disposal Site and the New Demarcated Land Fill Site

The existing disposal site Repie (traditionally called "Koshaie") is the only site for Addis Ababa where wastes from the transfer sites and from those big organizations is directly dumped to. According to sound solid waste management principles, a disposal site is

expected to be properly fenced, protected, and constructed land fill in an environment friendly way. (UNIDO and UNEP, 1998, FDRE 2004) But the existing disposal site at Repi is not a land fill site; it is simply an open field. It is neither adequately fenced nor protected. But there is one guard who stays at one side of the site. Different domestic animals (like cows, goats, etc.), wild animals (like hyena), birds, human beings, etc., dump, sort or disorder the dumped waste in the area. Accumulation of different types of waste including plastic bags waste is scattered spoiling quite a large area and polluting the environment.

Environmental auditing and environmental impact assessment is required on existing solid waste disposal sites to undertake any modification or new construction FDRE (2007). But according to the interview with the Addis Ababa Environment Protection Authority, Head of Solid Waste Management and Pollution Control and SBPDA, a new land fill site is demarcated by the Addis Ababa City Government near Gerje area at 'Yerere Bere ' in a place called 'Bole Arabesa'. Environmental Impact Assessment is done prior to its beginning. However, no environmental auditing is done to the already existing landfill site prior or after the regulation is in place.

It is the responsibility of the urban government to ensure that environmental audit and the necessary correction is done as per the outcome of the audit, if the site is considered risky for public health and environment. The urban government can come up with environmental requirement to decide the alternative use of a solid waste disposal site that has stopped operation due to the EIA result showing danger or full utilization of the area. FDRE (2007). The existing, Repie, site needs to be kept well and ways and means of using it for another useful purpose should also be studied and implemented. The new landfill site to be built requires considering proper construction to protect ground water, soil and air from being polluted. Another point to consider is constructing different sites at different parts of the city (That is West, East, North and South of Addis Ababa) so that time spent in transporting from far distances waste can be minimized.

Basically disposal site is meant to dump useless waste, after exhausting all the solid waste hierarchy and principle of minimizing, reusing, recycling, treating and to make

the final disposable waste very small as much as possible. Then it must be the waste that is totally useless that should finally be transported and be dumped at the properly constructed land fill site. But all the wastes collected and dumped at Repie disposal site are useful wastes which can further be reused, recycled or can be processed as raw materials. But as shown in Figure 3.6 different wastes including plastic bags are scattered all over the

Picture 3.6 Repie Waste Disposal Site (Disposal Site) area partly



(Source: researcher's survey result)

As discussed above most of the wastes dumped at the Repie land fill have not finished their usage. Some young and old women who work individually as well as young boys who organized themselves are sorting out the dumped waste according to their needs, for example, those who need food, paper, metal, plastic jerkins, bottles, plastic bags, old shoes, etc. The wastes are not buried, rather simply dumped on an open field. Thus, there is a great need to construct a land fill site which is environment friendly. Also, prevention and/or minimization of useful waste disposals should be encouraged.

3.5 EVALUATION OF IMPLEMENTATION OF REGULATION 13/2004 AND INSTITUTIONAL REGIME

Evaluation of law and regulation especially some articles of Regulation No.13/2004 are summarized here under though most of them are discussed in the previous sub titles.

As stated in Regulation No.13/2004 Page 280 Article 3 sub article 1,2,3, 4 and any person shall be prohibited to store improperly or litter waste generated from a household or organization. And have the obligation to store waste generated from a house hold or an organization until it is collected and disposed in a container having a cover or in a material that may hold it properly. And have a responsibility to sort out type by type when it is found necessary as compostable, non compostable, re-usable, non-servable, and special and hazardous waste, and store them, in environmentally friendly way. And states that any person or organization shall not manage or store waste in a manner that may cause, health problem or environmental pollution due to delay

The following improvements are seen since the regulation No. 13/2004 is issued. 1) The households have started storing the waste they generate in poly-bags until they dispose it. 2) About 5% have started sorting plastic bags waste for recycling. 3) About 20% of the house holds have started using the service of licensed collectors 4) Guards are deployed to keep containers clean and protected as well as covering the containers with net during the transportation to minimize pollution during transportation 5) Small and Micro Enterprises (SMEs) have been established and are working in sanitary service specially collecting municipal solid waste. 6) A lot of youth and women have created jobs for themselves, some have got employment. 7) Awareness creation activities like show of drama in television have been started.8) NGOs, Youth and Women Associations are encouraged to work on sanitary services and sanitation campaigns.

Though, some house holds do use the service of licensed collectors, different types of wastes are found stored inappropriately or littered in to open drainages, fields or rivers or near streets. This has increased dirty corners. The problem is most residential areas have no open space for placement of containers. Some have no easy access even for collectors

with wheel barrow (Gari).Lack of awareness, poor economic and social status of the people, lack of timely collection of containers, non existence of containers in some cases. Waste containers in vicinities are uncovered until they are transported. Coverage during transportation is not adequate to hold dusty and small particles from falling or polluting the area while movement. It happens mostly when there is waste over flow of containers.

As per Environmental Pollution Control Proclamation No. 300/2002 page 1960- Article 3 sub article 1 state no person shall pollute or cause any other person to pollute the environment by violating the relevant environmental standard. And Article 3 sub article 2 states that the authority or the relevant Regional Environmental Agency may take an administrative or legal measure against a person who, in violation of law, releases any pollutant to the environment.

.some individuals and organizations simply dump near by the container improperly or in any other corner or open fields. No significant control is done. No other option is provided for the households and others. Establishing NGOs or associations who can help free collection or to study some other alternative option is important.

Some interested individuals in a group or individually collect, sort out the plastic bags at Repi disposal site in 'Madaberia ' bags and get it washed in the near by river called 'Jemmo' and pollute the river. No alternative is provided for such activities to do their jobs in environment friendly way to help the recycling process of collecting sorting and washing the plastic bags. There is a need for providing them with some kind of incentive like working space and credit facility support.

The Waste Management Collection and Disposal Regulations of the Addis Ababa, City Government Regulations No. 13/2004. Page 281 Article 7 Sub- Articles 1 to 7 about usage and management of solid waste storage facilities and containers stated the following

Article 1, Any sanitary organization shall take in to consideration the amount of waste generated in the vicinity of communal dumpsters when he places it.

Containers are not enough to accommodate the waste generated in the area, but additional area near the container is prepared by the sub-cities to accumulate solid waste in poly-bags.

Article 2 A person shall carry to dumpsters only that solid waste which might be within the holding capacity of the dumpsters. And it shall be prohibited to carry special solid waste to these dumpsters.

It is experienced that some chemicals and different wastes which were dumped to the container and/or storage area or rivers, they have stopped such practice of chemical waste dumping by strictly following up and taking legal action.

Article 3, A person shall have the obligation to dump properly solid waste he carried to the dumpsters and it shall be prohibited to remove the waste out side the dumpster.

Article 4, Any private sanitary organization shall keep the container, in which solid waste is stored, clean and assign a guard to prevent littering of the waste by animals and persons. Guards are assigned, but do not cover the whole time in the day and nights.

Article 5, Any sanitary organization shall pick up the container and emptied the waste there in before it over flows or causes health problem due to prolonged stay.

Article 7 .Save a body concerned with matters related with the management of the dumpster of solid waste, it shall be prohibited for any one else to transfer the dumpster to another place or to put its contents in disorder

The researcher has observed that different types of wastes being dispersed far and around the containers even when the container is not full. Because they do not want to come closer to the container to avoid the bad smell they simply throw away the waste in half hazard manor. Waste stored in containers and/ or poly-bags are dismantled, disordered and removed by humans, dogs, birds and different animals in search of food and some items for 'korale' ('Korales' are buyers of reusable and recyclable items. Such things usually happen in the absence of the guards and when accumulated waste is not

transported on time due to shortage and lack of vehicles' efficient maintenance.
(Discussion with collectors, coordinators and guards)

In the same Regulation No. 13/2004 page 284 Article 14 sub article 1 and 2 it is prohibited to burn bitumen, plastics, or similar matters in any place, unless it is in the waste-burning incinerator duly made and at the authorized place prepared for same

Though the laws and regulations prohibit, people burn different wastes including plastic bag wastes in open fields in their own premises, near streets, etc during normal times and sanitary campaigns. In the results of the questionnaire out of 81 households about 59% some times burn waste including plastic bags waste generated in the households,

Regulation 13/2004 Article 25 Sub -Article 1 & 2 states that Any person who receives sanitary service should pay sanitary fee for the service received. And manufacturers to pay tax or special service fee for products having polluting impact.

Regulation 13/2004 Article 29 states about incentives states encouraging those who have outstanding performance by providing land free to them. And the new Proclamation No.513/2007 page 3525, Article 4, about General Obligations of Urban Administrations sub article 1 states that /Urban administrations shall create enabling conditions to promote investment on the provision of solid waste management services.

SMEs are currently engaged only in waste collection did not get working space or couldn't secure land for other activities like sorting, composting, etc.(Discussion with collectors, coordinators) There is a need to adapt proclamation 513/2007 and also encourage the SMEs so that they grow and involve in a better capacity and also attract other big investors to the field.

All most all the SMEs are at a subsistent income level and their sustainability in the business of sanitary service is very doubtful. they have a problem in getting finance, medical service, shower, guan, etc. due to lack of sufficient income from the services they give. Currently they only give the service of collecting only. No further activity is carried on to sort, or compost the waste to help minimize wastage of resource.

The Kebele administration is given the responsibility under proclamation No.513/2007 page 3526 Article 5 sub article 4 to ensure installation or waste bins by streets and public places and ensure the collection of wastes before overflow.

Though the proclamation is not yet adapted the Kebele administration has installed marked waste bins in some areas, but most people do not use them. They simple litter plastic bags, papers, food

ruminants, candy and chewing gum covers and refuses. Most of the installed waste bins are dismantled some are totally removed. The Kebele officials couldn't be sure to know who did such illegal action. The problem is lack of awareness.

Regulation No. 13/2004 Article 30 about Penalty Sub article 1,2 and 3 states that any person who repeatedly didn't obey to the regulations should be penalized and also should collect and dispose the waste with his own expense

The Qebles tries to implement the penalty when they found persons guilty for committing the unlawful activity. But they couldn't stop the practice. Because the problem is that the illegal dumpers and litter of waste are doing it when they can't be seen. There is a need to provide the dwellers with other options to help them legally dispose their waste. Like raising the awareness, providing free collection, etc.

As per Environment Pollution Control Proclamation No. 300/2002 page 1961 Article no. 3. Sub article 4. states that any person engaged in any field of activity which is likely to cause pollution, install a sound technology that avoids the generation of waste and apply methods for the recycling of waste.

Regulation No.13/2004 page 281 article 6 sub article 1 and 2 prescribes that any person shall have the responsibility to reduce the size of wrapping or covering material that he uses, to reuse the by products or to convert the waste to valuable product. And that any person who manufactures or imports plastic for commercial purpose shall ensure that they are put in to reuse repetitively for prolonged time as well as environment friendly.

Though the law states to reuse and/ or recycle there are no enforcement situations yet put in place. People do not sort recyclable wastes at household level or collectors do not sort the collected waste except simply dumping to containers. Only there are some initiatives like 'Korale' project, Enda Ethiopia, SOS Addis, Youth and Women at Rapi land fill area with some individual collectors and two started with Kolfe-Keraneo Sub-Cities with the support of the Government of France. They have started only sorting not recycling yet. They sort out and deliver it to the recyclers. Sustainable system and market for such services and products is not yet established.

It is also prohibited in Article 4 sub article 1a and 1b of the same Regulation 13/2004 to discard solid waste or cause it to be discarded in high ways, sidewalk, public place, fields, river, water bodies, parks, or any other unauthorized sites and to fix, advertisement paper, on the wall, electric or telephone pole or in any other unauthorized places not prepared for such purpose in a manner that destroys the beauty of the City

Regulation No.13/2004, article 6 and 7 states that any person shall have the responsibility to keep the area clean covering up to 20 meters in front of and away from the end of his household, organization or institution, And shall not be allowed to render sanitary service in a manner contrary to healthy waste transfer system or that may pollute the environment or harm health of the community.

It has become very difficult to stop such illegal practices of littering and dumping waste. (Discussion with collectors and Kebele coordinators) Even after the collectors clean areas, fields and streets, later or sooner they found the area polluted with littering and unlawful dumping of waste. Some collectors explained that some house holds use the service of unlicensed individual collectors and under aged children for such illegal dumping.

As per Waste Management Collection And Disposal Regulation 13/2004 Page 282 Article 8 states in Article one and two, any person who transports waste by a vehicle shall use vehicles appropriate to prevent environmental pollution and community health problem. And shall transport waste to transfer or disposing sites by vehicles having cover so as to avoid littering waste in every part of the street or not to be taken by the wind.

Currently waste containers which are transported from the transfer sites to the Rapi "Koshi" "Land fill" site are covered with nets to protect some waste not to be taken away by wind or fall down by the movement of the vehicle.

In the same regulation No. 13/2004 Page 284 Article No.18. Sub article no. 1 states that any person or a cooperative, or Micro and Small Enterprise (SMEs) that provides sanitary service, shall take appropriate safety measures, to protect the health of the community and preserve the welfare of the environment. Most of the MSEs are doing their best to protect the community and the environment while discharging their duties.

They are highly exposed to different health problems. Some private ones have got uniform, but not consistently supplied to them by the owners of the company. All of the collectors complain that they have no safety measures for their health working on waste collection. Their income for such operation is very small even not enough for subsistence as per their explanation. Almost all of them confirm that they are working in such undertaking only because of lack of alternative job.

Regulation No. 13/2004 Article No. 22 Sub article 2 d has given responsibility to police officer on duty during the night time to control and to take to justice any person who is removing waste in unauthorized places. .

Polices are busy with different social problems and do not get time to cooperate on such issue. Though, they may be on duty at night they can't keep all the areas the whole night, except trying to watch when they go around. Those who unlawfully dispose the waste are doing it intentionally when they can't be seen. (Discussion with collectors and coordinators)

As per Proclamation No.513/2007 Page 3529, Article 13 sub Article 1 and 2 the appropriateness of the vehicles, equipments and divers is expected to be ascertained by the relevant urban administration before serving the solid waste management.

The Vehicles are purchased before the new regulation (which is not yet adapted by A.A City Government) was issued. Even then except their being old and mostly stay in Garage for maintenance, they are not sub standard vehicles. As per the information received from AASBPDA all the vehicles currently existing are above 15 years old and their efficiency is only 58-60%.

Drivers have not received any training about waste related issues. They are not happy with the salaries and benefits they get. They found the job unpleasant and dangerous for health (interview with diver)

Though, Regulation No. 13/2004 Article No. 27 make the sanitary organizations responsible for the safety and health of on -line workers, they are not getting the proper safety and care for their health.

SMEs who are working for themselves organized in association and private enterprises who employ workers do not have sufficient safety equipments. No safety cover, guants,

gloves, etc. Those who are employed some times get working clothes some time do not get at all. There is no consistent supply as per the agreement or requirement. They have no health service. (observation, discussion with SMEs)

In selecting waste transfer station opinion of the community is required to be studied and be considered as per Regulation No. 13/2004 Article 15. . Even though the community is consulted no one is happy to accommodate the site near their residences because of the bad smell and health problem it creates. Due to lack of alternatives most transfer sites are selected because of availability of open area. (Discussion with Coordinators)

Though, Addis Ababa City Government prepared Waste Management, Collection and Disposal Regulation No. 13/2004 to implement the Environmental Policy of Ethiopia, evaluation of the solid waste management in Addis Ababa in particular that of plastic bags is not adequately done. Therefore, the problems could not be pin pointed to suggest solutions, thereby inhibiting the full implementation as per the objective of the proclamation.

In the regulation which is in place, the penalty and prescription to collect, recycle, transport and disposal of plastic bags waste may not foster market in plastic waste management, nor discourage littering and haphazard disposal if there is no dynamic and timely enforcement capacity.

Policies, laws, and regulations did not give any better attention and consideration to non biodegradable wastes like plastic bags; except the current proclamation issued by the Federal Democratic Government of Ethiopia which states banning of thin plastic bags that is not yet adopted by the Addis Ababa City Government. In general, including the new proclamation, non biodegradable wastes are not given adequate attention as to how to be managed considering their long lives and their problem in the environment.

Most of the laws, rules and regulations are not implemented. There is weak law enforcement situation. One of the major reasons is that there are some weaknesses in the institutional arrangements. For example there is not synergy and strict coordination between Regional Environment Protection Authorities and Federal Environment Protection Authority except exchanging reports and receiving and giving some supports. Like wise, there is no coordination and formal chain of command between Kebele-

Ketema(Sub-cities) and Sanitation, Beautification and Parks Development Agency. Thus, the Agency has no authority to command regarding solid waste management or about any issue to enforce the regulations (discussion with SBPDA) For example; waste vehicles were distributed on the basis of one vehicle to serve two Kefele-Ketemas. But it has created difficulty to mobilize the vehicles and other resources even temporarily as per the instruction of the SBPDA even though resources were idle at a certain time at one Kefle-Ketema while the other Kefle-Ketema is in difficulty. Before solving problems like finance, technology and human resource, such institutional arrangements need to be corrected soon. So that authorities discharge their duties and responsibilities designated to them and improve the current situation of solid waste management in general and that of plastic bags in particular.

3.6. ASSESSMENT OF DEGREE OF AWARENESS

Awareness in solid waste management is measured in terms of behavioral change. (EPA, 2007, Tchobanoglous et. al 1993), Awareness creation activity requires appropriate approach with continuous effort. The approach may vary according to the different backgrounds of stakeholders like educational level, culture, language, understanding capacity of individuals, attitudes, interest, etc. The fact that stakeholders are informed about the issues does not guarantee their actions accordingly. On the other hand, although stakeholders know and want to act positively, the mechanisms may not be available to help them implement what is required. For example, as per the results of questionnaire to the households the majority of them know that the waste they dispose is a resource for others; but due to lack of mechanism and non existence of market waste recovery, households are not sorting to minimize waste. As awareness entails behavioral change, to act in the right direction enabling grounds should be set to help them act accordingly.

In Addis Ababa a lot of awareness raising activities are taking place through television, radio and posters pertaining to sound solid waste management; but not specific to that of plastic bags waste. However, their impact in terms of creating critical mass that is able to take actions on the ground is minimal. Hereunder we assess awareness level of stakeholders in plastic waste management.

3.5.1 The Community

A society is considered aware when there is behavioral change in its practices. Most of the community has heard about general sanitation and solid waste management in one way or another through radio, television, poster, news papers, meetings, mouth piece information etc. As per the discussion with the collectors most of them are going around the households and requesting them to use their collection services and are informing them about the benefits. However, no much behavioral change is obtained in their practice regarding disposal of wastes illegally.

Households' awareness about the characteristics of plastic bags, its advantages and potential threats enables them to practice waste management. The researcher has analyzed households' response on different issues.

Table 3.14 How many households know that plastic bags they use are non decomposable?

S. No.	Description	Number of respondents	Percentage
1	Households who know that plastic bags they use are non decomposable.	65	80%
2	Households who do not know that plastic bags they use are non decomposable.	16	20%
	Total	81	100%

(Source: researchers' survey result)

As shown in the Table 3.14, 80% of the households know that the plastic bags they use are non decomposable. But as shown above in table 3.14 most of the households dispose the plastic bags waste simply with other wastes. Because there is no market for the plastic bags waste to encourage them to sort out and sell to recyclers. In addition, they may not be aware of the adverse impacts of the non biodegradable plastic bags waste on the environment and the health of the society as well as the economy.

Table 3.15 Households who know that wastes are resources

S.No.	Description	Number of respondents	Percentage
1	Households who know that wastes are resources	50	62%
2	Those who do not know that waste are resources	31	38%
	Total	81	100%

(Source: researchers' survey result)

From the response of the households about 62% of them believe that waste they dispose are resources for others. But as shown in their reply in Table 3.15, 95% of the households do not supply plastic bags waste to recyclers. Most of them either burn and/or simply dispose wastes. In addition, as per the interview with the collectors, they simply collect and dump them to waste containers; they do not sort, treat or process further for another use. From this situation, one can understand that if there are buyers of waste in the future more than half of the households and some of the SMEs are willing to sort out and sale plastic bags waste. By organizing continuous awareness programs and by taking different enforcement measures of the regulations, wastes that are littered can be used as useful resources in the future.

Table 3.16 Training or education received by households through stakeholders

S. No.	Description	Number of respondents	Percentage
1	Households who received training	9	11%
2	Households who did not receive any training	72	89%
	Total	81	100%

(Source: researcher's survey result)

As summarized in the above table 89% of the households replied that they have not received any training, education or information through the stakeholders about environment protection, solid waste management or specifically about plastic bags waste management at all.

Table 3.17 Households who have observed illegally dumped wastes

.S No.	Description	Number of respondents	Percentage
1	Households who observed illegally dumped waste in their vicinity	79	97.5%
2	Households who have not observed	2	2.5%
	Total	81	100%

(Source: researcher's survey result)

As summarized in the above table 97.5% of the households have seen plastic bags waste and other wastes dumped illegally. Though, households are informed and know that wastes are resources, they have not brought behavioral change in their way of disposing the wastes they generate. To improve this situation most of them suggested, firstly to educate people, secondly, to organize collectors to buy plastic bags waste, thirdly to award those who sort out and deliver to recyclers. They also explained about the problems of carelessly littered plastic bags as they noticed that it clogged drainages, spoil sceneries, etc.

The awareness of the community about solid waste management has improved after Regulation No. 13/2004. This is because of the establishment of SMEs to be engaged in sanitary services in their respective Kebeles and in Addis Ababa. Though, the households that are aware are using the collectors services, others still dispose unlawfully. As per the interview and discussion with the Kebele coordinators and collectors, it is only few people who can not afford to pay birr 3-10 per month for the collection service (some collectors charge birr 3-5 for those who can't afford to pay more). Nevertheless, most of them do not want to use the service of the collectors for lack of awareness.

As discussed in the previous chapters, no significant awareness creation program about solid waste management in general and that of plastic waste in particular is done in the study area for the community. The Kefle-Ketemas have tried to disseminate pamphlets to inform people about the waste management. The community has heard about sanitation and waste management, but no significant behavioral change is observed in the practice of their waste disposal, sorting, reusing, etc. One of the causes is their awareness level of

how plastic bags waste could cause damages to human beings and the environment. Therefore, to bring the awareness of the society to the expected level, it requires more effort using better and effective mechanisms, such as creating awareness through entertainment, printed matters on the plastic bags itself and/or on products that stakeholders usually use, on free gifts, T-shirts, caps, umbrellas, wall-watches, key rings, or conducting continuous media programs like question and answer, road shows, etc.

3.6.2 Government

The researcher has understood from the underling principles of strategic documents of Environmental Protection Authority that the awareness of the government organs is measured by looking at the action that it takes in formulating policies, proclamations, rules and regulations, in establishing executive organs, in allocating budgets, in evaluating reports, in establishing systems of feedback, in implementing enforcements and accountability.

The government of Ethiopia has adopted the International Environmental Convention which is the Basil Convention on the Control of Trans-boundary Movement of Hazardous Wastes and Their Disposal 1998, and has issued policy, proclamations, laws and regulations. The Addis Ababa City Government has issued regulation in conformity with the Federal proclamations' objective to protect the environment, and to ensure the sustainable requirements of health, social and economical issues. According to the discussion of the researcher with the Federal and Addis Ababa Environment Protection Authority the reporting system and practice is maintained. There is enforcement problem for Environmental Impact Assessment (EIA) requirement for those investments which may have adverse impact as well as on the illegal dumping and careless littering of solid wastes. Also the capacity building program which is started by the Federal Environment Protection Authority is helping the Regional Environment Protection Authority offices through training of trainers, and also through sourcing funds when they fail to do so. It also involved in directly training them when they couldn't manage by themselves. Such practices have helped to train and assign some people even if they are not environmentalists, to fill the gap of shortage of human resources in the field. Since the environmental issue itself is relatively a new concept, there is no adequate number of

human resources. There is also a need to design short and long term training on top of the effort started in the Institute of Development Research and Environmental Science Program in Addis Ababa University, etc. in producing professionals in the area.

3.6.3. Civil Society Organization

The awareness of the civil society organizations, such as Economic Association, Environmental Research Professionals Association, Consumers Association, Community Based Organizations (CBOs), like 'Edir', International and local Non Governmental Organizations (NGOs), on different projects like Enda, Gashe-Abera Molla project, SOS Addis, etc. is measured by the activities they perform in supporting the society on issues where the Government is not competent. Some of these include their involvement in awareness creation activities, organizing, educating, empowering, lobbying, supporting the sanitation and solid waste management initiatives, as well as, in their involvement in technological transfer and financial support.

In this respect, there are some initiatives who work on the awareness creation and capacity building program in Addis Ababa, NGOs like Enda Ethiopia and SOS Addis are also working on sorting plastic bags. Though, such initiatives are trying to inform people, behavioral change is not yet improved on the society's solid waste management. But such efforts might bring changes if they change their teaching methodology to make it more attractive and entertaining. Their involvement in awareness creation and lobbying the government to increase public private partnership so as to greatly involve the private sector in the solid waste management business is inadequate. There is an issue that hampers the activities of such civil society organizations like the unavailability of market for their sorting activity. But they can also work on the other hand to aware other stakeholder to create the market, to educate general public to care for the environment and to stop careless littering.

3.6.4 Private Sector

The awareness of the private sector is measured: (i) in their involvement in the business of Sanitary and Waste Management Service, (ii) in supporting the environment in their

business activities, (iii) in caring for the safety and health of the online workers and the community in their production process, and (iv) in designing the production system to prevent and/or minimize waste.

Some private companies have participated in sponsoring sanitation and environment protection initiatives, e.g. solid waste recycling projects, street side parks, etc

Only few institutions are involved in the sanitary service. The plastic bag manufacturers and importers are not trying to offer alternative bags to protect the environment except supplying the cheap and thin plastic bags. Besides, no initiative is seen to introduce environment friendly bags. Recycling is started only by few manufactures, which is not in a sustainable way due to different factors explained in 3.2 under title reuse and recycles.

3.7. EVALUATION OF IMPLEMENTATION OF LOWS AND REGULATIONS

CHAPTER IV: CONCLUSION AND RECOMMENDATION

This chapter of the thesis provides concluding remarks and recommendations that help improve the implementation of sound plastic waste management principles and requirements in the coming years.

4.1. CONCLUSION

4.1.1. Prevention and/ or Minimization of Waste Generation

Plastic bags which are imported and produced locally are more or less meeting the market demand well, in addition to generating employment opportunity. But the current producers and importers of plastic bags are dealing with non biodegradable bags and hence are not working in line with the principles of prevention and/or minimization of the generation of waste. For example, out of the total yield of the two companies sited above the share of thin plastic bags makes up about 80%.- an enormous quantity which is believed to contribute towards environmental pollution. For these plastic bags do not decay and stay for a long period of time they cause a lot of hazards to the community. Thus, to meaningfully lessen the negative environmental impacts of the product the need to ban the production and importation of non biodegradable plastic bags is a timely measure worth considering. There is a need to revise regulation No.13/2004 initially to consider adapting Proclamation No.513/2007 which ban thin plastic bags of wall thickness of 0.03 mille meter and less. And later on after evaluating the effect to move to the other steps of total banning of non biodegradables. However, prior to the taking of such measure a thorough assessment of its social and economic consequences is necessary. For one thing, the local producers can not easily convert their production line to manufacture other types of bags such as textile, paper, etc, without simultaneously changing the existing technique of production. In addition, it may create shortage of supply in the market. On top of these, due to its affordability, many of the consumers may prefer the cheapest bags. To that end, therefore, an interim period to shift towards environment friendly production process is necessary. Products should also be carefully designed and implemented.

Some may think that banning of importation may go against the free market economy policy. But the adoption of such a policy measure is acceptable as far as it is taken for the sake of protecting the environment. One of its adverse impacts at the national level is unintended workers lay off. In short, the current importation and production of plastic bags are aggravating the problems of waste management. For this reason the problem requires both short term and long term interventions.

Households are not supporting the protection of the environment using more durable and reusable bags to minimize waste generation. About half of them are dumping illegally. All plastic bags whether they are thin or thick that is imported or produced locally are all non biodegradable. Waste of such bags will cause health, economic, social and environmental problems if not managed in an environment friendly manner. The current importation and production of plastic bags are aggravating waste generation. The problem requires both short term and long term solutions. In the short term there is a need for discouraging consumers by of charging them for thin bags while they purchase products, taxing plastic bag producers, etc. In the long term the government should promote plastic bag manufacturers to change their production to environment friendly products like biodegradable plastic, textile or paper bags, design effective awareness creation activities in the society, etc.

4.1.2. Reuse and Recycling

Collection

The coming into picture of organized and licensed collectors in Kebeles and providing sanitary service is a positive move and about 20% of the households started using the service. This has created job opportunity for the jobless, though it is at the subsistence level and do not look sustainable. The collectors do not have access to proper safety and health care services. The temporary storage/ transfer sites and containers are not well protected and /or left uncovered on open field.

Most of the household are not using the service of the licensed collectors. Nor do all the households and other generators of waste dispose the waste they generate in a proper manner. About, 59% are burning the plastic waste with other wastes. In doing so, they

pollute the environment and also destroy the resource that could have been used as a raw material to produce similar or other products. To improve this situation, the concerned agencies of the City Government should assign employed personnel to control, educate and undertake interactive discussion with households in a reasonable frequency.

Sorting, Reusing and Recycling

Almost all the households are not sorting plastic bag waste for recycling. But, around half of them are sorting other products like, bottles, metal, textile, and other plastic products for reuse, sale, and exchange.

There are some initiatives started, by few youth and women around Repi area to sort out plastic bags waste from the disposal site and sell. Only very few NGOs in cooperation with Kebeles have started collect and sort plastic and other products as well as plastic bag manufacturers Oxford and Kurtu, have started recycling. But getting sorted plastic shopping bags waste is still a big problem since the collectors do not get attractive payment for the collected bags. The manufacturers purchase the plastic bag waste collected with about Birr 1.5 to 3.00 per kilogram. Though, the collected waste of plastic bags is large in number its weight is insignificant when measured for collectors to get reasonable payment. For the producers, to pay more is not profitable because, though it is possible to recover the waste fully; the standard production mix allows them a maximum of 20% recycled product to 80% virgin. Thus, in the short term NGOs should be established and be engaged in collecting and supplying freely or with minimum cost to the manufacturers. In the long term private sector should be practically promoted to do the business efficiently and profitable alone or in partnership with the public sector.

4.1.3. Treatment and Transport

The Sanitation, Beautification and Parks Development Agency of A.A and Kefle-Ketemas are doing their best to schedule the transport service. Assigning guards to protect the containers and the transfer sites are also a positive move. But the waste containers with accumulated waste at the transfer sites are not transported on time due to shortage of vehicles and due to lack of access road during rainy seasons. Therefore, the

accumulation of these wastes is causing nuisance and health problems, including unpleasant smell.

4.1.4. Disposal

There is only one disposal site called Ripe where all the solid waste from the Addis Ababa City is dumped. It is not a well prepared land fill site according to the principle of sound solid waste management specified in the proclamation. The area is open for sorters, domestic and wild animals and birds. It is not only the waste which is considered as useless that is dumped there, but also the waste that can be reused and recycled. For instance, plastic bags, bottles, metals, textiles, papers, etc., are simply dumped to this place. Most of the waste is not shrinked to save space and avoid and/or minimize pollution. The plastic bags waste is simply dumped and stay in the soil for long degrading its quality. They will even affect future use of the place since they do not decay up to 1000 years. Therefore, it is high time that new land fill sites are constructed and the existing one is audited and used for other useful purposes.

4.1.5. Awareness

Community

The communities are informed about the solid waste management. But no significant behavioral change is observed on the way they handle the waste they generated. This indicates that the level of awareness of the society about the danger emanating from improperly managed plastic bags waste is minimal. There is, therefore, need for designing and undertaking effective awareness creation program.

Government

Ratification of international environmental conventions and issuing proclamations, rules and regulations on the part of the Government is a positive move. It shows that the government has awareness about solid waste management. The problem is in the implementation and the law enforcement which most often requires greater commitment and action.

Civil society

The civil society is not taking initiatives in the area of awareness creation and capacity building. For one thing they do not have the necessary capacity. Added to this, the issue of environment protection in general and plastic bags waste management in particular is new to many of them. As a result it is observed that the civil society has not done much on issues related to plastic bags waste management. Hence, the civil society is expected to move more actively and aggressively to build its own capacity and address issues that are not or can not be well handled by government, for example in the area of awareness creation, capacity building, financing projects.

Private sector

Some private companies have participated in sponsoring sanitation and environment protection initiatives. Some of the examples include solid waste recycling projects, Gashe Abera Molla project, street side parks, etc. But this sector requires being more concerned about environment beyond profit. The current involvement of the private sector in the business of solid waste management or any other sanitary service is insignificant, since their capacity is limited. However, Private sector can do a lot in partnership with the public sector. Hence, there is a need to highly promote the involvement of private sector in the activities of Solid Waste Management.

4.2. RECOMMENDATION

Based on the above concluding remarks the following recommendations are made. So as to help concerned stakeholders take the necessary measures.

4.2.1. Prevention and/ or Minimization of Waste Generation

It is recommended that, in order to minimize waste generation, the Addis Ababa City Government should adopt or adapt Proclamation No. 513/2007 and implement the banning of production and importation of plastic bags with a wall thickness of 0.03 millimeter or less. In addition, the City Government should ensure that manufacturers, in the long term, produce biodegradable bags that are environment friendly and convenient to users. There is also a need to ban importation of non environment friendly bags with immediate effect and that of the manufacturers in the long term.

The concerned bodies of the city government and nongovernmental organizations should organize awareness creation activities (workshop, training programs, educating with entertainment through mass media, etc.) for households and other users so that they prefer environment friendly carrying/shopping bags.

It is also important to design and implement an appropriate incentive mechanism to encourage those factories that produce environment friendly bags. Discouraging those manufacturers that are producing and trading non environment friendly bags is equally important. Similarly, creating a mechanism by which consumers be charged a certain amount of money for plastic bags they use and prohibit free gifts and advertisements on non environment friendly plastic bags.

4.2.2. Reuse and Recycling

One way of promoting reuse and recycling is by designing a mechanism that enables households to use the service of licensed collectors. The other measure could be to organize waste collectors (associations, NGOs, etc.) who can give collection services freely and take other appropriate measures that help stop illegal and inappropriate littering and dumping. Parallel to this, promoting partnership and private sector involvement in collecting, reusing and recycling waste by their own means is one better alternative.

Provision of safety equipment and supplies such as gloves and masks, to keep online workers health and safety is very critical. To do this, stakeholders like NGOs and private companies can help by providing such support as a ‘‘give away’’ awareness creation kit, printed clothes, etc. These supports should be continued until the time the business of waste management becomes well established and developed to cover the necessary cost of the service providers with sufficient profit. The city government should make sure that waste storage containers are in place for sorting plastic bags at home, and these sorted bags waste are collected, reused or/and recycled so that they can serve as a raw material to produce similar or other products like handicrafts. Parallel to this the city government should also engage in educating people in order to enhance their awareness about plastic bag waste management.

4.2.3 Treatment and Transport

The city government should monitor and follow up the treatment and lessening of the size of wastes before transportation. It should also make sure the placement of adequate and appropriate number of waste containers in the vicinity and monitor whether they are properly covered during storage and transportation. It should also design proper transportation schedule and make sure that enough vehicles are made available for transporting wastes frequently and efficiently to waste to the disposal site. Governmental efforts could be supported by other actors. In this regard, SMEs should be assisted to be organized and private investors should be encouraged practically to engage in waste transportation activities. In addition NGOs, associations, etc. should assist in building technology transfer, local creativity and financial capacity.

4.2.4. Disposal

In order to address the existing problems of disposal site, government and private sectors should construct additional disposal sites. In addition to this, government should conduct immediate auditing of the existing (Repi, "Koshaie") disposal site and decide on its future use.

4.2.5. Awareness

Effective awareness creation program should be designed and implemented so as to educate households to change their behavior in disposing the waste they generate. Furthermore all the concerned stakeholders should demonstrate the benefits of environment friendly bags for the health and the environment so that they prefer to use environment friendly bags. Manufacturers should print information that shows whether the plastic bags are biodegradable or not. In addition they should provide information about the minimum thickness of the bag and also warn users to carefully dispose. Side by side the City Government should ensure that importers and manufacturers are importing or producing alternative bags which are environmentally acceptable. Encourage big companies to advertise their products on environmentally accepted bags.

4.2.6. General

There is a need to revisit the laws and regulations as to give special consideration and attention to management of non biodegradable solid wastes like non biodegradable plastic bags waste. In addition institutional arrangements should be improved to ensure proper coordination and synergy among concerned institutions and stakeholder. The government should put the enforcement laws and regulations in place.

The way in which financial, technological, etc supports could be secured, NGOs, CSOs, CBOs, Private Sector and government involvements can be coordinated should be studies and be implemented.

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APPENDICES

Annex I List of Stakeholders with whom interview, questionnaire and discussion is done.

Plastic bags waste management stakeholders with whom interview and discussion was done and to whom questionnaire was distributed and response was collected.

Interview and discussion was made with the appropriate institution authorities managers and expertise who know the issue.

1. Federal Environment Protection Authority

Deputy Director General
Head of the Solid Waste Management Section
Head of the EIA Section

2. Addis Ababa Environment Protection Authority

2.1. Head of the Pollution Control Department

3. Sanitation Beautification and Parks Development Agency of Addis Ababa

2.1. Head of Solid Waste Management Section

4. Kolfefe-Keraneo Nefas-Selk Lafto Sub-City

4.1. Head of Solid Waste Management
4.2. Sanitation Coordinators Kebele 13/14, 02/03,06
4.4. Waste Container guard
4.5. Waste Collection Vehicle driver

5. Manufacturers

5.1. Moplaco Plastic factory and
5.2. Excel Plastic factory

6. Small and Micro Enterprises

6.1. Head of Dynamic Small Enterprise Private Collector & Transporter
6.2. Selam Betegle Micro Enterprise (Association members are all women
Nefas-Selk Lafto Sub-City Kebele 02)
6.3. Selam Tsedat Micro Enterprise (Association members are all women
Kolfefe-Kerano Sub-City Kebele 06)

- 6.4. Heberet Pvt, Sanitary Service (Mico Enterpirse Kolfe-Keraneo Sub-City, Kebele 13/14) (Discussion was done with both Male and Femele together and with Female separately)
- 6.5. Telese Pvt. Sanitary Service (Mico Enterprise Kolfe-Keraneo Sub-City, Kebele 06.) (Discussion was done both with male and female group together and with female group separately)
- 6.6. Tesfa Feker Wetatoch Association Micro Enterprise (All member are only male)

7. Plastic bags waste sorters and washers

- 7.1. Group of individuals sorters at Rapie disposal site (all Male)
- 7.2. Group of individuals washers of plastic bags waste at Jemmo River near Repie disposal site.

8. Households

Questionnaire was distributed and responses were collected from the following

- 8.1. Nefas-Selk Lafto Kefle-Ketema (Sub-City) Keblele 02 (50 households)
- 8.2. Kolefe-Keraneo Kefle-Ketema (Sub-City) Keblele 13.14 (50 households)
- 8.3. Kolefe-Keraneo Kefle-Ketema (Sub –City) Keblele 06 (50 households)

Annex II Questionnaire for households

These questionnaires are for the research purpose of plastic bags waste management in Addis Ababa. Thus you are requested to respond to the questions carefully. Any information obtained from you will only be used for the purpose of the study, and will not be transferred to any other body. Therefore, its confidentiality is maintained.

We appreciate your contribution to environment protection by responding to the question.

1. Name. _____
2. Kefle-Kestema(Sub-City) _____
3. Kebele _____
4. House No. _____
5. How do you dispose plastic bags waste or other wastes from you house or premises?
 - Deliver to waste collectors _____
 - Burn in my premises with a certain time _____
 - Dispose to vicinity container through family members or servants _____
 - Throw away to a near by river _____
 - Throw away to any field or corner in the vicinity _____
 - Use as fertilizer (the non plastic ones) _____
 - Deliver to municipal vehicles that come to the vicinity _____
 - Use other means of disposal (Please explain) _____
6. Do you reuse some items like plastic bags, bottles, tins, etc. before you dispose as waste? Yes _____ No _____
7. Do you reuse plastic waste repeatedly? Yes _____ No _____
8. How do you dispose plastic bags waste?
Any where _____ burn/throw away with other wastes _____
9. Do you sort any waste like plastic bag, bottle, metal, textile, etc.?
Yes, I sort out _____ No, I do not sort out _____

10. Do you believe that the waste you disposed is wealth for others?
Yes _____ No _____
11. Do you prepare compost form decomposable waste generated from your household? Yes _____ No _____
12. For what purpose do you use the compost?
For my own premises fertilizer _____ For sale _____ To give free to others _____
13. Have you ever collected, sorted and sold or given free to recyclers plastic bags waste generated from your household ? Yes I have sold _____ Yes I have given free, No I have never given/sold _____
14. In the future if there are buyers of plastic bags waste, are you willing to sort out and sell? Yes _____ No _____ .
15. If your answer is no to question No.14 please give your reason _____

16. Which type of plastic bags do you buy mostly or get free when you purchase?
Very thin _____ a bit thicker ones _____
17. Which type of plastic bags waste to you dispose carelessly?
Which ever is torn _____ very thin ones _____ whether torn or not I simply dispose which ever is used _____
18. Do you know that carelessly thrown plastic bags waste are not decomposable and are creating environmental and other problems?
Yes I know _____ No I do not know _____
19. Within how many days do you dispose waste from your premises?

20. If you are delivering the waste generated from your household to licensed collectors within how many days do you deliver to them? In what do you store until disposal? (e.g. in a poly-bags once in a week)
21. If you are using the service of collectors, how much do you pay per month for their service? _____
22. Have you ever obtained training, education or information about plastic waste or other wastes management through stakeholders like Kebele, Eder, NGOs,etc.?
No _____ Yes _____ If yes, by whom _____

23. How you ever seen waste over flow at the containers in the vicinity? Or are containers collected/transported frequently?
Yes, I have seen overflow. Containers are not transported frequently _____
No, I have not seen overflow. Containers are transported frequently _____
24. Have you seen plastic bags waste and other wastes carelessly thrown near street, and corners in your vicinity?
Yes, I have seen carelessly thrown _____ No, I have not seen _____
25. Waste generated from you premises per month is estimated to be how many kilograms? _____
26. Do you usually see plastic bags waste in the streets and fields in your vicinity?
Yes _____ No _____
27. Are you willing to buy and use paper bags if supplied with a reasonable price?
Yes _____ No _____
28. Are you willing to buy and use textile bags which can last (serve) for about 2 years and above ? Yes _____ No _____
29. If your answer to question 28 is no, please give your reason.
- I do not want to pay higher initial cost _____
 - I may not remember to carry the textile bags with me when ever I go for shopping.
 - Other reasons, please explain _____
30. Have you ever seen printed warning on the plastic bags you use that states plastic bags waste carelessly littered create environmental problems?
Yes _____ No _____
31. Is there control by the Kebele on the illegal dumpers of waste?
I know if there is control _____ I do not know if there is control _____ Though there is control people did not stop illegal dumping _____
32. What do you think should be done to replace plastic bags with paper or textile or with other environment friendly bags _____

33. If you have useful opinion about plastic waste and other solid wastes

Management please jot down _____

We want to express our heart felt thanks for you cooperation to take your time to respond to the question.

Appendix III :

Guide Questions for Interview and Discussion with Small and Micro Enterprises (SMEs) (collectors)

These guide questions are used only for the research purpose of plastic waste management. Thus, the information received from SMEs will not be transferred any third party except for the same purpose.

1. Name of the Enterprise _____
2. Type : Association _____ Private initiative _____ others indicate _____
3. Address _____
4. Date established _____
5. Number of members _____
6. Within how many days do you collect waste from households and other _____
7. How much do you charge per month for the service you render? _____
8. Are you/members/owners/employees .etc?
9. Do you know the types of wastes that you collect?
10. Do you know that the waste you collect can partially or fully be used as a raw Material for other products or as a fertilizer?
11. Do you know that plastic bag waste can not decompose and can also endanger the environment in different ways?
12. Do you sort wastes in different categories while collecting? E.g., Plastic bags, bottles, papers, clothes etc
13. Do you have a sorting place for wastes? If so, how did you acquire it? through rent, purchase, or Kebele's cooperation?
14. Where do you take wastes after collecting them? What do you do with them?
15. Are there people who receive and sort wastes from you?
16. What specific type of wastes do they receive from you?
17. Do you have people that receive plastic products waste especially plastic bag waste from you? Which types of bags are mostly demanded? Why?
18. Who are these people? Individuals or organizations? Mention three of them

19. How do you give the wastes to these people? Do you sell it, trade it for something else or give it for free?
20. How do you transport the wastes?
21. If you normally transport it to your nearest waste container and if you find that container full, what do you do?
22. Do you collect wastes thrown in plastic bags or other materials on streets apart from wastes that you collect from individual houses or do you simply pass (leave) them?
23. Have you ever taken any training from kebeles or any other bodies about the different ways of waste collection, disposal and side effects of improperly disposed wastes?
24. Do you know that Plastic bags that are trashed carelessly can not serve as fertilizers as they do not decompose and also that they can bring harm to the environment?
25. What are the problems that you face while doing this job?
26. What are the benefits of members by doing this job?
27. If the benefit is getting a salary, how much?
28. Is the salary you earn sufficient for getting medical care and purchasing protective Clothes, gloves, etc.? How about for daily needs?
29. If you are employees, how much salary do you earn?
30. Are you provided with medical and safety wares?
31. Is there any support that you receive from Kebeles or other bodies in relation to your work? For example loan to purchase carts or trainings?
32. How often do the municipal waste collecting vehicles pick up waste containers in your area?
33. Have waste containers in your area over flown for not being picked up at the right time?
34. Does the Keble make supervision on carelessly thrown wastes on the streets? In what way How?
35. If you have a comment about solid wastes in general and the usage and disposal of plastic bag wastes in particular, please mention them.

Thank you for willingly allocating your time to discuss on such an important issue and for responding to all the questions.

**Appendix IV: Interview and Discussion with Ethiopian Environment Protection
Authority and Addis Ababa Environment Protection Authority -
Check list.**

These guiding questions are to support the study of Plastic Waste Management in Addis Ababa. Any information given to wards this questions is only for the said purpose and will under no circumstance be transferred or given to any other third party. Thus its confidentiality is kept.

1. Name _____
2. Educational Status (Background) _____
3. Work experience _____
4. Status or work title in the organization _____
5. What do you think is the ideal way of managing plastic waste?
6. Do you think prevention and /or minimization of generation of waste is maintained in Ethiopia in general and in Addis Ababa in particular?
7. What do you think about the status of Solid Waste Management in general and that of plastic bags in particular in Addis Ababa?
8. Do you believe that plastic bag waste generation is prevented and/ or minimized in Addis Ababa currently ?
9. If yes how? If No why?
10. According to the information or study you have do users/factories reuse or recycle plastic bags?
11. If yes, which types of plastic bags are reusable and/ or recyclable ? And Why?
12. Which type of plastic bags are not reusable or recyclable and why?
13. Do you believe out of the plastic bag waste generated the amount that could be recycled is recycled? If not how much is currently recycled?
14. What do you think is the reason? Technology, Finance, Manpower, policy, rules and regulations, system , luck awareness etc.
15. How is the enforcement of the existing law concerning recycling ?
17. Do you have any study or information which shows how plastic waste is collected, transported and finally be disposed?

18. Where is the place of disposal for plastic bag waste and for other solid wastes?
19. From your professional point of view do you think the transportation and disposal site and disposal activity and management is done properly?
20. If no why? Policy, law, technology, finance, system, manpower, etc?
20. According to the study or information you have regarding plastic bags waste management in Addis Ababa do you think what is stated in the proclamation for sound waste management is implemented ?
22. How much percent do you think it is implemented?
23. What do you think is the reason for not implementing?
Lack of enforcement mechanisms, Lack of incentive, lack finance, technology, lack of awareness, etc. lack of market for the recycled goods, etc.?
24. How is the enforcement of the law that requires manufactures of plastic bag to under go Environmental Impact Assessment before they start and also evaluate the impact after they start producing ?
25. If not implemented what do you think is the reason ?
26. Do you think the existing plastic bag industries in Ethiopia can produce biodegradable plastic bags?
27. If no what is the problem? Technology, Finance, System, etc?
28. According to the study or information you have is the users of plastic bag willing to use alternative bags of other materials like bags made of paper, textile ,etc.?
29. If not what do you think is the problem?
30. When you see the over all plastic waste management in the country and in Addis Ababa particular what do you think is the primary and secondary problem? Which hinders the Implementation.
31. Do you think Federal EPA, Addis Ababa EPA have got all the required manpower, and other resources to discharge their duties and responsibilities?
33. Are the activities of other concerned government and other organization and EPA well synchronized and net worked to deliver what is required?
34. What is the relationship between the municipality, other concerned government

organization and EPA to make things happen? How is the institutional arrangement? Is it enabling to discharge what is required to implement a sound solid waste management in general and that of plastic bags in particular?

35. What do you think should be done to improve the situation of Waste Management in General and that of plastic bags in particular?

36. If you have any other opinion which you think can help the study?

Thank you for taking you time to give the interview.

**Appendix V: Guide Questions for interview and discussion with
Sanitation, Beautification and Parks Development
Agency and Kefle-Ketemas (Sub-Cities)**

These interview and discussion guide questions are for research purpose of plastic bags waste management in Addis Ababa. Thus, any information received will not be transferred to any third party except for the same purpose.

1. Full Name _____
2. Job Title _____
3. Name of the organization _____
4. Please, explain about Municipal Solid Waste Management in Addis Ababa in general and that of plastic bags waste management in particular.
5. How do you see the policy, laws, rules and regulations in the country about solid waste management?
6. Is there any research done through your organization about Municipal solid waste?
7. Please explain the benefits and implementation status of Regulation No. 13/2004
8. Is there any research done about the implementation of Regulation No. 13?2004?
9. Please, explain opportunities encountered and problems faced during the implementation of the regulation.
10. What do you think should be done to improve the situation?
11. Please explain any opinion you think is important for municipal solid waste management.

Thank you for your time and for responding.

SIGNED DECLARATION SHEET

This thesis is my original work. It has not been worked for any other thesis to the best of my knowledge and that all sources of materials used for the thesis have been duly acknowledged.

Name: Mulu Solomon

Signature _____ Date _____

I conform that this thesis has been submitted with my approval as the supervisor of the same.

Name: *Belay Simane*

Signature *[Signature]* Date _____