ST. MARY'S UNIVERSITY COLLEGE

BUSINESS FACULTY

DEPARTMENT OF MANAGEMENT

A RESEARCH ON SOLID WASTE MANAGEMENT
THE CASE OF DYNAMIC SANITARY SERVICE

BY

BIRTUKAN SIRAW

JUNE 2010

SMUC

ADDIS ABABA

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DYNAMIC SANITARY SERVICE

A SENIOR ESSAY SUBMITTED TO THE

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APPROVED BY THE COMMITTEE OF EXAMINERS

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TABLE OF CONTENT

Table	List of tables	page

ABBREVIATION

DSS- Dynamic sanitary service

SWM-Solid waste management

SW - Solid waste

SBPDA- Sanitation beatification and park development agency

CHAPTER I

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

To make a business successful there are different factors that should be taken into consideration. Among these effective strategies, good information system and excellent implementation are important. Solid waste management and practice in our country specifically in dynamic sanitary service focused on the collection, transportation and disposal to Repi disposal site.

Solid wastes are potential sources of environmental pollution. Environmental pollution is becoming a core issue with regards to its effects on human health. One of the environmental problems affecting the human being is solid waste.

Solid waste management is a complex process because it involves many technologies associated with the generation (including source reduction) on-site handling, storage collection, transfer, transportation, processing and disposal of solid waste

According to my observation in DSS solid waste are not effectively and efficiently collected and transported to an appropriate disposal sites. Indiscriminant dumping of solid waste and failure of the collection system in populated community for two of three weeks would soon cause many problems odors, lies, rats, roaches, crickets, wandering doges and cats and fires would dispel any remaining doubts of the importance of proper solid waste management.

Inefficiencies of SWMs are a serious problem observed in DSS. In order to try to reduced cost, increase profit, efficiency and effectiveness using solid waste management should be used recycling, reusing composting is mandatory .For this reason the researcher wanted to assess the practice in DSS.

1.2 BACKGROUND OF THE ORGANIZATION

Dynamic sanitary service has been engaged in solid waste material management service in Addis Ababa .the enterprise is the first private enterprise and started the service with small-scale collection system through push cart and rented vehicles. The enterprise established in 1991 E.C. through the motivation of Eden Melke and has archived tremendous effort in contributing proper solid waste management system

and employment generating schemes .currently the enterprise is enabled to render the service through three compacter and three container lifter trucks.

Dynamic sanitary service now gathered organizational waste material like factories, Hotels, schools, Hospitals, and related potential business institution in general having more than 50 (fifty)customers.

The current solid waste material management practice of Dynamic sanitary service focus of the collection transportation and disposal to Rapi disposal site.

1.3 STATEMENT OF THE PROBLEMS

In our country due to various reasons such as limited skill or poor knowledge about solid waste management and less attention is given for many aspect of solid waste management practice in many society as well as organization. But everyone should give attention about solid waste management practice for the overall environmental beautification and high income generating. (selamawit, 2009) . DSS is the first private enterprise and which practice SWM in Addis Abeba, but the way of DSS practice of SWM in Addis Abeba focuses on the collection transportation and disposal to Repi disposal site ,that means don't use efficient solid waste management option.

Efficient solid waste management option are source reduction, recycling, reusing and composting (selamawit B. 2009) . In DSS this efficient solid waste management system are not practiced at all, for this instance DSS is one of the creature of problems that disposal area of Repi disposal site. And disposal creates a range of environmental problem. In Repi disposal site have caused different health related problem with the society , and pests (filers, Mosquitoes rodents) in addition to this in the rainy seasons DSS two or three days in a week stop their work because the cars are difficult to inter in the disposal site because of rain and bad infrastructure. Thus the need for improved solid waste management, to minimize and fin ally solve the problems currently prevailing in the management of solid waste in DSS need to assessed and analyzed to solve the problem.

1.4 RESEARCH QUESTIONS

1. What are the current practices solid waste management in dynamic sanitary service?
2. What are the major problems DSS is facing related to solid waste management?
3. What option are there to improve current SWM practice?

1.5 OBJECTIVE OF THE STUDY

1.5.1 General objective

The main objective of this study is to identify the reason why DSS is not practicing efficient solid waste management.

1.5.2 Specific objective

The specific objectives of the study were as follows:

1. To assesses the existing practice of SWM service, in DSS
2. To identify the major problems DSS is facing related to solid waste management.
3. To recommend ways to improve the current SWM practice.

1.6 SIGNIFICANT OF THE STUDY

The finding of this study will contribute to different level of the society and DSS to make a sound decision on solid waste management system. It also gives understanding about the problems of solid waste management in DSS.

1.7 SCOPE (DELIMITATION OF THE STUDY)

Even if it is possible to the research at private (organization) enterprise level which is located in Addis Abeba, because of time and financial problems the study restricted to examine only the existing inefficient solid waste management practice DSS and assess the policy ; rule and regulation of sold waste management practice related to government policy. To make the research complete, it is good to have the necessary information from all the society but due to some constraint the study is restricted to Dynamic sanitary service.

1.7 LIMITATION OF THE STUDY

The student researcher gets different challenges such as shortage of time, lack of adequate primary and secondary data; In addition to that the management bodies are willing to respond the interview and made long day appointment was bottle necked the completion of the study but a great effort were exerted for the successful completion of the study.

1.8 DEFINITIONS OF TERMS

- **Solid waste material management**: - is literally the process of managing waste material .it involves the collection, transport processing and /or disposal of waste materials.
- **Recycling**: - sorting, collecting, and processing materials to manufacture and sell them as new products.
- **Composting**: - is organic material that can be used as a soil amendment or as a medium to grow plants.

1.9 RESEARCH DESIGN AND METHODOLOGY

1.9.1 Research design

This research employed descriptive type of study .descriptive survey research as "process of collecting data in order to answer questions concerning the current status of the subjects in the study",(MuGENDA AND Mugenda, 1999,cited by sibelo 2006).Descriptive research is concerned with relationship that exist, practices that are prevailing ,processes that are going on effect that are being felt or tends that have developed. These attributes of a descriptive research make harmony with the purpose of study since it will assess the existing practices and process used in solid waste management in DSS.

1.9.2 Population and sampling technique

The sampling unit will be taken at different level in the company .there are 5 employees from managerial areas and 18 employees from sanitary workers total 23 workers in the enterprise will be taken as population of the study . For institutions the purposive sampling techniques based on accessibility of information 3 (three) respondents from this category were selected from relevant institutions because they have technical know how about rules**.**

1.9.3 Determinant the sample size

The total sampling size ,which was taken for the study 23 sample respondent from the enterprise ,From health one ,sanitation beatification and park development agency two officers and the total sample size 26 respondents.

Respondent	population	Data instrument	Sample size
DSS sanitary worker	18	Questioners	censes
DSS managerial area	5	interview	censes
Health	1	interview	purposive
SBPDA	2	interview	purposive
Total	26		

Table 1.1 sample size and sample techniques of respondent

1.9.4 Types of data collected and used

This paper will use both primary and secondary source of data .primary data would be collected through questioners, it was data collection instrument was incorporated in the study to avoid conscious bias of the researcher using properly designed, interview; it was the main source of data for the purpose of this study. To prepare interview questions considering the availability of information regarding SWM. The main reason for select this method was, it permits face-to-face contact with respondents, provides opportunity to explore topics in depth and allow interviewer to explain or help clarify questions, personal observation, it is provides direct information and to enter in to DSS and understand the situation while secondary data would be collected from internet published and unpublished document from DSS.

1.9.5 Method of data analysis

The method that the research uses to analyze the data was descriptive data analysis method .this help to describe the respondent result in a manner that it can be meaningfully understand and easily communicate .more over, both primary and

secondary data are analyzed and presented using statistical too like tables, percentage and others were used to interpret the result of the data analyzed

1.10 ORGANIZATION OF THE STUDY

This paper has four major chapters and the following is the highlight of each. The first chapter tells more about introduction parts and the way this research paper is prepared, like background of the study, statement of the problem, objective of the study and methodology.

Chapter two refers to literature review of solid waste management from different sources. Chapter thee consists of analysis of data that purely comes from dynamic sanitary service. The fourth and the last chapter, deals with conclusion and recommendation part of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Definition & conceptual frame work

2.1.1 Waste

Waste is an unwanted or undesired material or substance. It is also referred to as rubbish, trash, garbage, or junk depending upon the type of material and the regional terminology. In living organisms, waste relates to unwanted substances or toxins that are expelled from them. The UK s environmental protection Act. 1990, defines waste as any substance which constitutes a scrap material, an effluent or other an wanted surplus arising from the application of any process or any substance or article which requires to be disposed of which has been broken, worn out, contaminated or other wise spoiled. This is supplemented with anything which is discarded other wise dealt with as if it were waste shall be presumed to be waste unless the contrary is proved. (Waste- Wikipedia the free encyclopedia).

2.1. 2 Solid waste (SW)

Solid waste is defined as any garbage, refuses, or sludge from waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material including solid, liquid, semisolid, or contained gaseous material resulting from industrial commercial, mining and agricultural operations, and from community activities, (Hick man, 1999). It comprises organic as well as inorganic material that is generated from house holds in the first place, which is usually called “municipal waste” and it includes street sweeping waste. Commercial, institutional, and industrial establishment and activities generates solid wastes (EPA 2006).

2.1.3 Solid waste management

Solid waste management may be defined as the discipline associated with the control of generation, storage, collection, transfer and transport processing, and disposal of solid wastes in a manner that is in according with the best principles of public health, economics, engineering, conservation, aesthetics, and other environmental consideration, and that is also responsive to public attitudes. In its scope, solid waste management include all administrative financial legal, planning, and engineering functions involved in solutions to all problems of solid wastes. The solutions may

involve complex inter disciplinary relationships among such fields as political science, city and regional planning, geography, communications and conservation, as well as engineering and materials science. (Zerbock,2003).

2.2. Sources, types and categories of solid waste

Knowledge of the source and types of solid wastes, along with data on the composition and rate of generation, is basic to the design and operation of the functional elements associated with the management of solid waste (Techobanglous, 1993)

Sources of solid waste in community are, in general, related to land use, and zoning. Although any number of source classifications can be developed the following are useful; Residential, commercial, institutional, construction and demolition, municipal service, treatment plan site, industrial, and agricultural. Solid wastes are classified on the basis of sources of generation and type.

2.2.1 Source based classification

Historically, the sources of solid waste have been consistent, dependent on sectors and activities (Techobanglous, 1993), and these includes the following.

I. Residential: this refers to wastes from dwelling, apartments, and consists of left over food, vegetable peels, plastic, clothes, and ashes.
II. Commercial: this refers to wastes consisting of leftover food, glasses, metals, and ashes, generated from stores, restaurants, markets, hotels, motels, author repair shops, and medical facilities.
III. Institutional: this mainly consists of paper, plastic, and glasses, generated from educational, administrative, and public buildings such as schools, colleges, offices, and prisons.
IV. Municipal: this includes dust, leafy matter, building debris, and treatment plant residual sludge generated from various municipal activities like construction and demolition, street cleaning, and landscaping.
V. Industrial: this mainly consists of process wastes, ashes, demolition and construction wastes, and hazardous wastes due to industrial activities.
VI. Agricultural: this mainly consists of spoiled food, grains, vegetables, agricultural remains, and litter, generated from fields, vine yards, and farms.

A type of solid waste varies according to its sources. Solid wastes mostly generated from residential areas are food waste, paper, cardboard, plastics, textiles, leather, yard waste, wood, glass, tin cans, aluminum, other metals, ashes, street leaves, and special waste (including bulky items, consumer electronics, white goods, yard wastes collected separately, batteries, oil, and tires), household hazardous waste.

According to (wikipedia, free encyclopedia) there are five categories of municipal solid waste

- Biodegradable wastes: food and kitchen waste, green waste, paper(can also be Recycled)
- Recyclable material: paper, glass, bottles, cans, metals, certain plastics.
- Inert waste: construction and demolition waste, dirt, rocks, debris.
- Composite waste: waste clothing, tetra packs,
- Domestic hazardous waste (also called house hold hazardous waste) and toxic waste: medication, e-waste, paints, chemicals, light bulbs, florescent tubes, spray cans, fertilizer and pesticide containers, batteries, shoe polish.

2.3 Functional Elements of Solid Waste Management (SWM)

2.3.1 Collection of Solid Waste

Collection simply refers to how waste is collected for transportation to the final disposal site. Any collection system should be carefully planned to insure that storage facilities do not become overloaded. Collection intervals and volumes of collected waste must be estimated carefully.

This is the removal of refuse from collection points to the final site, it is the most expensive as compared with other operations and management procedures because it demands special vehicles, experienced people to manage, more manpower, hand tools and more funds for fuel, salary, maintenance, gathering or picking up of solid waste from the various sources, taking the collected wastes to the collection where it is emptied and unloading of the collection vehicle.

Private solid waste collectors usually charge a fee in each individual home owner or government on contract base and will pay the fees. The government contact enables solid waste collection in a uniform, sanitary manner without such a contract, some

individuals may be relevant to pay the collector for the service and the refuse may go uncollected.

2.3.2 Solid Waste Transportation

This is the stage when solid waste is transported to the final disposal site. There are different modes of transport which may be adopted and the chosen method depends upon local availability and the volume of waste to be transported. In most cities and towns solid wastes are transported by certain government institutions, wheel barrows, horses- drawn carts, and various types of trucks including containers-hoist vehicles are employed to dispose to the final site.

2.3.3 Disposal of Solid Waste

Most of the SW in developing countries is dumped on land in a more or less uncontrolled manner. Whenever solid waste management system based on user fees are introduced, the fees often barely cover collection and transport costs, leaving practically no financial resources for the safe disposal of waste. Most people are willing to pay for the removal of the refuse from their environment, but are generally not concerned with its ultimately disposed and act according to the motto “out of sight, out of mind”!” (Christian Zurbbrug in 1999,)

A well known possible method of waste treatment, reducing the amount of materials which finally will have to be disposed of is incineration. But for most developing countries and especially for countries with a tropical climate waste incinerators are in appropriate because of the composition of waste (high humidity and low calorific value), the high costs and technical difficulties of operation …(Oeltzschner& Mutz ,2001)

2.4 Key SWM approaches /efficient SWM/ and Methods

Large number of issues and specific problems in various solid waste management systems that is to keep collection and disposal services operating continuously as efficiently as possible, it is necessary to introduce possible and applicable approaches, methods and efficient SWM set of solutions will be necessary in order to adequately address SW systems in the future.

2.4.1 Source Reduction

Source reduction focuses on reducing the volume and/toxicity of generated waste. Source reduction includes the switch to reusable products and packaging, the most familiar example being returnable bottles. However, legislated bottle bills only result in source reduction if bottles are reused ones they are returned. Another good example of source reduction are grass clippings that are left on the lawn and never picked up and modified yard plantings that do not result in leaf and yard waste. The time to consider source reduction is at the product /process design phase.

Source reduction is best encouraged by making sure that the cost of waste management is fully internalized. Cost internalization means pricing the service so that all of the cost are reflected. For waste management, the costs are reflected. For waste management, the costs that need to be internalized include pickup and transport, site and construction.

Administrative and salary, and environment controls and monitoring . It is important to note that these costs must be considered, whether the product is ultimately managed in a land fill, combustion, recycling facility, or composting facility. Regulation can aid cost internalization by requiring product manufacturers to provide public disclosure and the costs associated with these aspects of product use and development. (Tchobanoglous, et al.2002)

2.4.2 Recycling

Recycling is a serious of activities that involves collecting, sorting or processing or converting of used or abandoned materials in to useful products. Materials discarded after use are recovered from the municipal waste steam and used as row material to manufacture products other than for obtaining energy. (SEA- UEMA Project, 2004) Recycling is an effective method for sustainable waste management it follows the principles of reduction in waste disposal by recovery of resources that would other wise and up in land fills. The composition and characterization of municipal waste indicates the presence of materials that can be reduced, reuse or recycled (Ibid).

2.4.2.1 Benefits of recycling

According to (SEA- UEMA Project, 2004) some of the primary benefits of recycling waste which saves land fill space as it reduces the volume of disposal waste, saves the

cost of waste disposal (transportation and tipping fees) at the land fills, recycling saves energy as often recycled products are easier to refurbish than new ones (e.g. metal) while recycling plastic could be energy intensive conservation of depleting natural resources can be achieved as recycling papers saves trees and reduces water consumption in the process; and it reduces pollution with lesser emission of land fill gas and decreased generation which contaminates and acquires while fresh manufacture uses more energy and discharges more waste.

2.4.3 Composting

In developing countries, the average city's municipal waste stream is over 50% organic material (Hoornweg, et al 1999). Studies in Bandung, Indonesia and Colombo, Sri Lanka have found residential waste composed of 78% and 81% compostable material, and market waste 89% and 90% compostable, respectively (Cointreau 1982). Still, composting has not been overwhelmingly successful and widespread in practice throughout the developing world. Although well documented in China and other areas of eastern Asia, composting projects have had a spotty record throughout Africa, Latin America and elsewhere, and have had the largest number of failed facilities worldwide (UNEP 1996). There are several reasons for this, and past history should provide a guide for its implementation in the future.

There are many advantages to composting. First and foremost, it would reduce, in some cases significantly, the amount of waste requiring ultimate disposal, extending the life of landfills. When done correctly, the end result becomes a useful product, capable of being used at the household or farm level to augment soil nutrient levels and increase organic matter in the soil, increasing soil stability. If the product is of high enough quality and markets exist, the product can be sold. Environmentally, the process by which composting decomposes organic waste is preferable to landfill processes. In a landfill, bacteria break down organics an aerobically in the absence of oxygen, resulting in the aforementioned releases of methane gas. When properly composted, however, the organic matter is decomposed using an aerobic process, which produces no methane by-product. (Zerbock, 2003)

2.4.4 Combustion

The fourth of the IWM options is combustion (waste-energy). Combustion facilities are attractive because they do one thing very well; they reduce the volume of waste

dramatically up to nine fold. Combustion facilities can also recover useful energy either in the form of steam or in the form of electricity. Depending on the economics of energy in the region, this can be anywhere from profitable to unjustified. Volume reduction alone can make the high capital cost of incinerators attractive when landfill space is at a premium or when the landfill is distant from the point of generation. For many major metropolitan areas, new landfills must be located increasingly far away from the center of the population. Moreover, incinerator bottom ash has a promise for reuse as a building material. Those who make products from cement or concrete may be able to utilize incinerator ash.

The major constraints of incinerators are their cost, the relatively high degree of sophistication needed to operate them safely and economically, and the fact that the public is very skeptical concerning their safety. The public is concerned about both stack emissions from incinerators and the toxicity of ash produced by incinerators. The EPA has addressed both of these concerns though the development of new regulations for solid waste combustion (waste-to-energy) plant and improved landfill requirements for ash. These regulations will ensure that well-designed, well-built, and well-operated facilities will be fully protective from the health and environmental standpoints. (Tchobanoglous, et al.2002)

2.4.5 Landfills

The placement of solid waste in landfills is the probably the oldest and definitely the most prevalent form of ultimate garbage disposal. From the outset, it must be recognized that many “landfills” are nothing more than open, sometimes controlled, dumps. The difference between landfills and dumps is the level of engineering, planning, and administration involved. Open dumps are characterized by the lack of engineering measures, no leachate management, no consideration of landfill gas management, and few, if any, operational measures such as registration of users, control of the number of “tipping fronts” or compaction of waste.

‘Sanitary’ landfills, on the other hand, are sites where waste is allowed to decompose into biologically and chemically inert materials in a setting isolated from the environment. Cointreau (1982) outlined four features that must be present in order for a landfill to be considered sanitary:

- ♣ Full or partial hydro geological isolation through the use of liners to prevent leachate infiltration into the soil and groundwater; collection and treatment infrastructure should be used where leachate is expected to be generated
- ♣ Formal engineering preparations with an examination of geological and hydrological features and related environmental impact analysis, waste tipping plan and final site restoration plan
- ♣ Permanent control, with trained and equipped staff to supervise construction and use
- ♣ Planned waste emplacement and covering, with waste and soil placed in compacted layers as well as daily and final soil cover to reduce water infiltration and reduce odors and pests

2.5 Factors influencing efficient solid waste management system in Ethiopia

According to (Zeleke, 2002), factors influencing efficient solid waste management system in Ethiopia are as follows.

2. 5.1 Difficult collection and disposal system

The topographic condition of the towns, their precarious road system, inappropriate landfill site and the increase in waste generated from year to year do have great influence on the amount of waste collected (ibid).

2.5.2 Lack of awareness

The disposal of waste on skip and trucks requires some sense of responsibility on the side of the community/ residents. As a result of poor cooperation residents' poor collection and disposal of waste results and wastes end up being disposed on open spaces, ditches, and rivers/ streams. This indiscriminate waste disposal could cause environmental pollution that increases occurrence of diseases, blockage of traffic, odor nuisances and aesthetic disruption, surface and ground water pollution (ibid).

2.5.3 Poor management system

The poor management system results in weak work coordination, inefficient controlling, monitoring and evaluation hence inability to curb the existing obstacles. The motivation system for the waste management workers has been very low and hence a barrier to providing good quality service (ibid).

2.5.4 Lack of regulatory legal system

The constitution of Federal Democratic Republic of Ethiopia states emphatically that every citizen is entitled to living in clean and health environment even though there is no waste policy at federal level. The only policy has in regional level, the environmental protection agency, states overall environmental and pollution problems of the region. The ministry of health also has only operational community regulations and laws (ibid).

2.6 Implication of inefficient solid waste management environment and human health

According to (P.A. Koli, 2005) inefficiently managed solid wastes have several implications on environment and human health. Among these the following are the major ones.

2.6.1 Production of Odor

Odor is typical type of smell which arises after the decay of the solid waste at where it disposed. The Odor can develop when the solid wastes are stored for long period of time on site between collections in transfer stations, and landfills. The generation of Odor is on the site of storage and it is more significant warm climate (ibid).

2.6.2 Breeding of flies

The storage of solid waste in municipal bins or disposed improperly elsewhere in city/ town result in breeding of flies. In the summer time and during the all season in warm climates, fly breeding is an important consideration on site of wastes. Maggots can also crawl from uncovered cans or elsewhere to surrounding environment (ibid).

2.6.3 Air Pollution

Municipal solid waste landfills generate several gases that pose risks to the environment and public health. The primary gases are methane and carbon dioxide. There are two causes of air pollution at solid waste landfills (waste burning and waste decomposition) . Waste fires are common at open landfills in developing countries. Many fires are set intentionally to reduce the volume of waste at the site. Other fires occur when organic wastes that are exposed to the sunlight spontaneously combust.

The second cause of air pollution, waste decomposition causes pollution when methane and other gases are released in to the atmosphere as organic wastes an aerobically decompose in the landfill. These gases may explode under certain conditions if not managed correctly (ibid).

2.6.4 Ground water contamination

Ground water contamination is the most common means of environmental degradations associated with solid waste landfill. Ground water contamination occurs when liquids from rainfall, moisture in the waste itself, or decomposition, percolate through the landfill and carry chemicals through the landfill and soil to the ground water. This liquid, or leachate, is generally toxic with hazardous waste such as household cleaners or industrial solvents (ibid).

2.6.5 Surface water contamination

Surface water such as rive/ stream and lake may also be come polluted from landfill operations. Rain water flows across the landfill and into surrounding surface water (i.e. lakes, rivers). This rain water picks up and carries with it, depending upon the level of rainfall, a portion of the landfill cover material, solid waste, and percolating leachate .Improper disposal of municipal solid waste (MSW) has serious results for the environment and human health problems can spread over a wide area. For example, disposal of wastes in to canals and rivers can pollute the water supply along the whole length of the water course. Infections and diseases can spread from dump sites in to the general population (ibid).

2.6.7 Health problems

Serious health hazards directly associated with improper solid waste management includes skin and eye infections are common; dust in the air at dump sites can cause breathing problems in children and adults; flies breed on uncovered piles of rotting garbage and spread diseases like diarrhea, dysentery, typhoid, hepatitis, and cholera. Mosquitoes transmit many types of diseases like malaria and yellow fever, similarly, dogs, cats, and rats living around refuse carry a variety of diseases including plague and flea born fever.

2.7 Solid Waste Management in Addis Ababa

A study by selamawit, (2006), disclosed that solid waste management service is one of the basic urban services that have been neglected most. Further, the information obtained from the inspected SBPDA reports indicates that even after the city was restructured, solid waste management has continued to encounter problems associated with improper organization, lack of innovative approaches and insufficient resources. Until recently, the city government has been the sole provider of solid waste management services. Through the private sectors (mostly small micro scale enterprises) are currently involved, the service instill limited to the primary level. Like and developing countries Addis Ababa, is undergoing a transition in solid waste management both in terms of dealing with the increasing quintiles and changing nature of waste. Large quantity of the solid waste of the city is generated from residential (households 76%) followed by municipal service (street cleaning 6%), commercial (9%), and hotels (3%) and institutional (hospitals1%).(AASBPDA, 2006) The solid waste generation rate in the city is estimated at 0.252 kg/ capital/ day and the total generated amount is about 2297 m3/ day. Accordingly, waste generated in the city of Addis Ababa is of high density (on average 336kg/m3), in general 60% of waste by weight is considered organic. The physical composition is compos table, in compostable and recyclable. (ASBPDA, 2006) Appropriate solid waste disposal sites are scarce and the one available deliver inadequate services. Addis Ababa is estimated to generate 765 tons of solid waste each day. Of this volume, 65% is collected and transported to the disposal site at Ripe. The remaining 35% is left unattended in the various corridors of the city. Solid wastes are not segregated at the point of generation before their transportation to the disposal site. (WWW. Unhabitat.org) In Addis Ababa city there is one official waste dumping site operated by the SBPDA. The dump site is at Ripe, in the south-west of Addis Ababa, 13 Km from the cite centre. The site covers an area of about 25 hectares. It has been in operation since 1968. However, the operational performance at the dump site is very poor. Thus, unpleasant odors, waste carried away from the site by wind, and leach ate runoff during rains are the main features of the Ripe waste damping site, which become major health problem to the people residing in close proximity to the site, living nearby the site. The Ripe waste dump site which was once in periphery of the city is now enveloped within the city residents, due to the expansion of the Addis Ababa city. (Ethiopian Environmental outlook, 2008)

2.8 Best Practices on Solid Waste Collection and Recycling in Bharatput Municipality (Nepal)

Waste is collected form unofficial collecting points in almost 70 percent of the areas in the urban wards. The contractor is responsible for collecting waste from various stations to dispose in the disposal site. Previously metal contrariness were used for waste storage, but the residents objected to them because of the bad adores it produced. In order to encourage waste reduction at source, HH composts and the segregation of plastic waste using guiro hooks for storage have been promoted in some of the wards. In Shallibzar-10 area the local community has initiated segregation of waste at source for compositing and Vermin composting and the recovery of plastic. Similarly, in order to collect waste from surroundings residents of Shantinagar-7area have installed small waste bins; especially for in organic waste, in peripheral areas with the partial support from Lumenti, practical action Nepal and local NGOs, a 40 m3 biogas plants is under construction in ward no.5 of Bharatput. There are 180 low-income residents in this area. The input for the plant will include waste water form water form 18 lows income HHs. It is estimated that 15 percent of municipal solid waste is recycled and that almost 50 percent of the domestic waste and 25 percent of institutional waste is collected at source each day. In order to encourage HH segregation and waste minimization, practical action Nepal has been distributing compost bins and Suiro hooks to the residents of various wards ward of Bharatpur. (BPSWM of Nepalese cities)

2.9. Best Practices on Solid Waste Disposal in Tribhuuannagar Municipality (NEPAL)

The landfill site used by Tribhuuannagar municipality is owned by the municipal government. The total area of the landfill site is 20 hectare and the estimated life span of the landfill is 50 year. Ten tones of wastes are deposited at this site each day. This means that 72 percent of the generated waste was being disposed safely at the landfill. The main features of the size that ensure safe disposal include a leach ate collection truck, a vertical barrier; gas vents, a waste storing area, trenches for composting and a site office. In order to maintain an attractive environment around the landfill site, 3,000 trees (fruit trees and other varieties) have been planted and 150 beehives

installed. These improvements not only improve the environments but also provide a source of income for the municipality. (BPSWM of Nepalese cities)

2.10 Transportation Modernization Programs in Ahmedabad Municipality (India)

Municipality of Ahmedabad is carrying out modernization of its solid waste infrastructure with aid form the World Bank. It is in the process of making changes in its equipment and in work containers: closed metallic containers are in use for the secondary transportation of waste instead of earlier practices of using open truck, which causes great nuisance. Other additions to the flute are compactors, which carry more waste (7 tones) than the traditional trucks (3 to 5 tons) the front-end loader and the flat bed trucks with net cloth covering to prevent dropping of garbage. Methodology (Solid waste best practices, in India). The steps taken as follows: changing the design of handcarts: instead of traditional handcart, a newly designed handcart with six small containers of 40- liter capacity each with three wheals and sealed ball bearings has been introduced. This handcraft facilitates direct transfer of waste in to the community bins. This way, disposition of waste on the ground causing nuisance and health hazard, is stopped. Transportation of waste in closed metallic containers: closed metallic containers are in use for the secondary transportation of waste instead of earlier practices of using open truck, which causes great nuisance. Other additions to the flute are compactors, which carry more waste (7 tones) than the traditional trucks (3 to 5 tons) the front-end loader and the flat bed trucks with net cloth covering to prevent dropping of garbage.

2.11 Policy and regulation frame work on solid waste in Ethiopia

Under Article number 44 of the 1994 Ethiopian constitution, it is enshrined that every person have the right to a clean and healthy environment and government and citizens shall have the duty to protect the environment. In relation to the constitutional provision relevant policy issues were addressed. The environment policy of the country and the hygiene and environmental health regulations of the city government are the policy and regulation available related to sanitation in general on SWM in particular.

The environmental policy objectives stated that among other things

- To ensure that improved environmental sanitation be placed highest on the federal and regional agendas for achieving sustainable urban development ;
- To recognize the importance of and help bring about behavioral change through educational and public awareness of environment sanitation problems in trying to achieve the demand driving community led programs of improved urban environments as well as the sustainable use and maintenance of sanitation facilities;
- To bring about a sound partnership between the government and communities in development of an integrated sanitation delivery system, and to foster the supplementary role of NGOs;
- To give priority to waste collection services and to its safe disposal; and
- To undertake studies that identify suitable sanitary land fill sites in the major cities and towns of the country.

At city level, the city of Addis Ababa has issued proclamation No.2/2003 regarding the establishment of the organs of executive and municipal services, in which Article 47 mentions powers and duties of Sanitation, beatification and parks Development agency including its authorities on SWM. Currently, the comprehensive solid waste management regulation No.13/2004 has been endorsed. The regulations consists of the following main issues: policy goals and objectives, principles, type and resource of solid waste, solid waste transportation, solid waste disposal, reduction and recycling of waste, NGOs and Civic Society's participation, Community participation, and the role of research institutions.

CHAPTER 3

3. DATA PRESENTATION ANALYSIS AND INTRPRETATION

This chapter deals with the analysis and interpretation of data gathered through questioner and interview .The first part of this chapter examines the general characteristics of the population where as the second part is about the analysis of responses. At the end the interviews conducted with the management body will be summarized.

For the purpose of this research a total number of 26 respondents were contacted to fill questioner and to be interviewed. Questionnaires were distributed to 18 respondents to the enterprise sanitary workers and 5 managerial staff of the enterprise and one official from health office and two officials from sanitary beatification and development office interview was conducted and analyzed.

3.1 Characteristics of Respondents

The study captured for sanitary workers characteristics such as age, sex and educational status. It is important to analyze the efficient SWM practiced respondent.

Table 3. 1 Sex, Age and Educational status of DSS workers

	Sex, Age and Educational status	Frequency	percent
Sex	Male	16	69
	Female	5	21
	Total	23	100
Age	20-27	14	61
	28-34	6	26
	35-42	3	13
	above 42	-	
	Total	23	100
Educational status	Illiterate	5	19
	Primary education	10	38
	Certificate	2	8
	Secondary education	3	12
	Diploma	2	8
	Degree and above	4	15
	Total	26	100

Source: primary data

Among the respondent of DSS workers 5(21%) of them were females and 16(69%) of them were males. This implies that the majority of the respondents are males. So the result of the above study is showing that solid waste management practice was more connected with males than women. It shows that the work challenges for female than males.

AS shown in the table above, about 14 (61 %) of the respondents were in the age group between 20-27 years, and 6 (26%) are between 28-34 age group. The remaining 3(13%) are in the age group between 35-42, respectively. As the study result shows most of the respondents are young adults below 42 years. From this it could be said that the majority of enterprise workers are youngsters and could be tapped as potential for in SWM because they are more energetic.

According to the above table 3.1 result, educational status of the respondents, about 5(19%) of surveyed DSS workers can not read and write 10(38%) attained primary education 2(8%) secondary education, 4(15%) certificate holders, 2(8%) had diploma and 1(4%) were degree holders. But about 5 (19%) are illiterate and 10 (38%) are only primary education; this implies that the enterprise workers to have a problems to accept any awareness program and implementation of efficient solid waste management practice.

3.2 Analysis of response

In this analysis the student researcher tried to find out the problems that make the enterprise not to practice efficient solid waste.

Table 3.2 recycling /reusing and composting of SW in DSS

Item	Respondent	
	Frequency	percentage
How do you rate recycling, reusing and composting of SW in DSS?		
A good	2	11
B Medium	-	-
C weak	16	89
Total	18	100

Source: primary data

According to table 3.2 from the total sample respondents 2(11 %) respondents rate the recycling reusing and composting practice in DSS as good and 89 % of the

respondents rate the recycling ,reusing and composting practice of DSS as weak. From the information it can be infered that recycling reusing and composting solid waste in DSS is very poor. But as it can be seen from data very small experience is found in the area.

Table 3.3 solid waste dumping of DSS

Item	Response	Respondent	
		Frequency	percentage
Where do you dump your solid waste?	A,/ burning	-	-
	B/ In River	-	-
	C/"korea"/Rep"	18	100

Source: primary data

According the table 3.3 we can understand that all SW collected by DSS is dumped at "Repi" where all the Addis Abeba city wastes are dumped. This implies that the only disposal site the enterprise as well as the city are one or single.

Table 3.4 Reason for the lack of efficient SWM practice in DSS

Item	Response	Respondent	
		Frequency	percentage
Why DSS don't practice efficient SWM?	A/ lack of willingness	2	11
	B/ lack of enough place (land)	13	72
	C/ lack of awareness	3	17
	Total	18	100

Source: primary data

Table 3.4 shows that among the total respondents 2 (11 %)of the respondents mention lack of willingness as a reason for the absence 0f efficient SWM in DSS. 13(72 %) of

the respondents indicate lack of enough place (land)as , and 3(17%) said that lack of awareness.

From this it can be intended that the main cause for inefficient SWM in DSS is lack of enough land fill site.

Table 3.5 Area of problems on SWM practiced

Item	Response	Respondent	
		Frequency	Percentage
Which area of SW practicing the most problematic area?	A / collection	-	-
	B / Transportation	2	11
	C / Recycling	7	39
	D / Composting	9	50
	Total	18	100

Source: primary data

From table 3.5 out of the total respondents 2(11%) of the respondents said that transportation is the problematic area in SWM practice of DSS, 7(39%) said that recycling is the most problematic area in the processes and 9(50%) of them mention composting as the more problematic area. This indicates that the most problematic areas through the enterprise having more problems in the recycling and composting practice or the enterprise with in problems to do that efficient SWM practiced. This is because; lack of enough land fill space (land) .So the enterprise should have enough land fill space to more practiced on solid waste management.

Table 3.6 Type of solid waste more collected

Item	Response	Respondent	
		Frequency	Percent
Which type of Solid waste more collected?	A/ food ,vegetable,		
	B/ paper,plastic,metal, and glass	12	67
	C / Ash ,Bone and wood	4	22
	D / other	2	11
		18	100

Source: primary data

From the table 3.6 above the majority of the respondent 12(67 %) replied that the more collected waste is food, vegetable, paper, plastic, metal and Glass, 4(22 %) of the respondents collected ash, bone and wood the remaining 2(11%) respondents said others.

Table 3.7 problems on disposal place

Item	Response	Respondent	
		frequency	Percentage
What are the major problems of the disposal place?	A / bad odor	15	83
	B / insects ,fliers	3	17
	C / infrastructure	-	-
	Total	18	100

Source: primary data

From the above data on Table 3.7 the majority of the respondent 15 (83 %) of them said the problem of disposal place is bad odor and 3 (17 %) said that insects and fliers.

This response indicates that the disposal area having a great problem that solid wastes disposed there that is inadequate management and handling of waste can carriers of

disease and creates favorable condition for the spread of different diseases. Odor can develop when the solid wastes are stored for long period of time and affects the health of society lives surrounding the disposal area.

3.3 Interview response

3.3.1 Analysis of interview with DSS manager

According the respondents the current SWM practice of the enterprise are focuses on the collection and transportation and disposal to "Repi" disposal site. As the respondent state that DSS, waste collection is handled in one way: **Block collections**, this means the enterprise provides 8m3 refuse containers to clients upon their request. Clients using this type of service are: large hotels, enterprises, institutions. These clients dump their waste in the containers and call the enterprise office for collection and disposal when the containers are full, using two types of collection vehicles: closed compacting type trucks, and container lift trucks.

This implies that the enterprise using only one way collection method is indication of inefficient SWM practice.

As the respondent state that the enterprise has more than 50 customers who are from different sectors to give the service, Because of this the type of solid waste are heterogeneous in order to that the type of wastes divides as follows

Commercial Solid Waste all types of solid waste generated by stores, offices, restaurants, hostels, warehouses, and other non-manufacturing activities, excluding residential and industrial wastes. A typical classification of commercial solid waste consists of food, paper /plastics, textiles, glass bottles, Plastics bottles, and miscellaneous.

Construction /Demolition Solid Waste: Which are building materials, packaging, and rubble resulting from construction, remodeling, repair, and demolition operations on pavements, houses, commercial buildings, and other structures some examples are soil stones, concrete, bricks, plaster, timber and the likes.

Industrial (Residual) Solid Waste: Solid waste generated by industrial processes and manufacturing such as refuse fabrications, from light and heavy

manufacturing activities, refineries, chemical plants, mining and power generation are some examples.

This implies that the collected wastes by the enterprise are huge and different in type.

According to the respondent, the disposal area selected not by the enterprise. The disposal area of all the solid waste in the city is "Repi" disposal site. The enterprise is disposing this disposal site. Reppi or kosher is the only disposal area of waste in Addis Abeba, it is located 13 kilometers away the city center this site has been giving service since 1968 E.C. This implies that the disposal area related to long age and compares to the city enlargement not enough.

According to the manager the major problems of SWM activities are the work by itself is very difficult that is the society related to the health don't accept the work, For fear the disease that related to wastes , the other are as follows:-

- The major problem is lack or enough land fill space (land) in DSS, because of this absence of recycling or reusing and composting
- Disposal of waste another problem." Reppi "or "Koshe", the sanitary landfill. The present method of disposal is crude open dumping; hauling the wastes by truck, spreading and leveling by bulldozer and compacting by compactor bulldozer. The dumpsite is getting full; it is partly surrounded by residents and institutions and has no gas control. The gas generated from landfill causes spontaneous fire and air pollution. Contribute enormous amount of methane (green house gas) to the atmosphere. The site has low area capacity 25 hectares, and poor road connection.
- Infrastructure facilities especially the availability of road-network affects the management of solid waste.

This implies that the enterprise having different problems, human resource, landfill, infrastructure facility and other related to the work but the problems not only the issue of the enterprise.

All problems in the enterprise are difficult to eliminate because most of the problems are related to the development of the country for example the infrastructure problem, absence of land and others, but the enterprise try to minimize the problems to introduce a new method to customers separate the solid wastes its categories before dump their waste in the containers at the

collection stage. But the customer need additional container to separate the solid waste to dump its categories , that is the enterprise need to additional money to purchase the container but the enterprise are difficult to cover the cost of container. This is implies that the problems can not reduce or solve with the enterprise level.

At the begging the enterprise goals were efficient SWM practice and solve the over all problems on SWM but because of the problems that lack of enough land fill space (land) ,poor infrastructure and other problems related to SWM become an obstacle not to achieve the goal. The enterprise will do more strongly to achieve the goal with cooperate government and other parties. This implies that the problems are obstacle to achieve the enterprise goal.

3.3.2 Analysis of interview with SBPDA

The following are the Role of SBPDA to the private center which engaged in SWM activities:-

- Prepare solid waste management policy and laws and upon approval, follow up their implementation.
- Prepare directives and systems for effective implementation of SWM.
- Prepare standards criteria guidelines and manuals on SWM.
- Formulate and implement the necessary educational efforts and activities, promote awareness creation and information campaign strategies.
- Encourage and assist the participation of private sectors and micro enterprises in SW collection, transportation and disposal.
- Develop and administer landfills, transfer stations and materials recovery facilities.
- Prepare city-level SWM framework.
- Review and monitor the implementation of sub-city waste management plans.
- Coordinate the efforts and operation of sub-cities in implementation of SWM plan and program.

- Coordinate the activities of various sect oral agencies and NGOs operating on SWM.
- To maximum extent feasible, utilize existing resources. Provide technical and capacity building assistance. Support and advice to sub-cities.
- Develop and prescribe procedures of appropriate permits and licenses for the private sector.
- Review the incentive scheme for effective SWM.
- Organize and carry out city level national and international events (workshops, seminar, symposium, conference, etc) on SWM.
- In collaboration with concerned bodies propose equitable and reasonable tariffs for SWM service delivery.
- Collect and compile data for research.
- Make join effort with concerned offices or institution of research activities.
- Recommend measures to generate resources, funding and implementation of projects and activates.
- Propose and adopt regulations requiring the source separation and post separation collection, segregated collection, processing, marketing and sale of organic and designated recyclable material generated in each sub-city.
- Establish guidelines for sitting, design, operation and maintenance of SWM facilities (material recovery, composting, recycling, transfer and disposal facilities).
- Ensures that SWM programs conducted by various bodies comply with SWM rules and regulations.
- Establish effective working relationships with international agencies and donors.
- Facilitate training and education on ISWM.
- Promote the development of recycling.
- Promote the implementation of waste minimization and reduction in sub-cities.
- Prepare annual city waste management status report.

- Recommend policies to eliminate barriers to waste reduction, recycling and recovery.

As the SBPDA officers response, the agency don't have specific implementation policies, rules and regulations about the efficient solid waste management up to now. As mentioned by the officer, the future will having a plan to prepare policy, rule and regulation about efficient solid waste management practice.

According to the respondent ,SBPDA officers, private enterprise or any person should be implemented any work done with out affecting the society of life ,so the enterprise should also knowing the rule and regulation of the work of solid waste management practiced and implemented it. Some of rule and regulation of environmental pollution are:-

- To ensure that pollution control is commensurate with the potency, longevity and potential to increase or reproduce of the pollutant.
- To establish clear linkages between the control of pollution and other policy areas including water resources, agriculture, human settlements health and disaster prevention and preparedness
- To review and develop guidelines for waste disposal, public and industrials hygiene and techniques to enable the cost-effective implementation of defined standards of control and to issue regulations to enforce them.
- To maintain an up-to-date register of toxic, hazardous and radioactive substances and to make the information available on request.

As response the SBPDA officer, SBPDA to give the all society the awareness creation program about SWM practiced by fliers, brushers sometimes are giving by seminars. But the program not continuously done and focused private enterprise.

3.3.3 Analysis of interview with health office.

- What is the role of the health office related to solid waste management practice?
  - According health office of sub city response, as an organ, is responsible for public health delivery in the region. Based on the health policies and legislations of the federal and regional governments, the offices prepare health care plans, programs and legislations and implement the same. To this effect

the bureau enacted the public health regulation No 16/2000 that describes how solid waste should be managed and how the rules regarding this are enforced. According to Art 6/1/ of the regulation, no person or institution shall dispose of or cause to be disposed any solid waste and dead animals on the road, public place, in a river, Lake, Pond water well spring or in any other undesignated area. The regulation also further put a possible waste accumulation facility which is not contrary to the human health. These duties shall be enforced and implemented by health organs at different levels as stipulated in part 9 of the regulation.

For the effective implementation of the regulation, the health bureau further issue directive to specifically deal with hygiene and environmental health conditions. This directive, under its Article 6, specifically provides how solid waste is collected and disposed of. The directive further put administrative and criminal penalties against those violators as well as those organs that enforce and implement it under Art 23 and 24 respectively. Thus, both the regulation and the directive are important instruments for the proper implementation of solid waste management proclamation. The actual practice done according to the low implements criminal penalties and other things but the health problem of disposal area is beyond the capacity of health office because the disposal area the only area for the city disposal and the problems not solve by one party. General the SWM practice related to health on the disposal area need to focused the over all socity, government, and other parties cooperation .

- What is the common problems associated solid waste disposal place?
  - The disposal place at" Repi", it is located on the western direction of the city and the dumpsite is getting full; it is partly surrounded by residents and institutions and has no gas control. The gas generation from landfill causes spontaneous fire and air pollution. It contribute enormous amount of methane green house gas) to atmosphere .The site has low area capacity (25 ha.), poor road connection in Addis. If this situation continues it creates air pollution, problem of health on the disposal and its surrounding area.
  - What are the systems used to prevent poor solid waste management related diseases?

- According the respondent state that, the only system is that to create awareness creation program to the society and the private enterprise to do the practiced of source reduction, reusing and composting program.

- What is the relationship between private sector solid waste management and your office?
  - According to the interview conducted with the officer of the health office, there are regulations and directives that provide how to manage solid wastes to relate health. In solid waste management, the health office conducts a regular supervision with to private solid waste management. It controls solid waste management practices of the enterprise with regard to doing the practice good atmosphere of workers health and the practiced don't affect the overall the society life. The health office takes different financial measure if they don't meet the standards according to the types of offences. For example:-

Type of offences	Amount of penalty
One who is found dumping dead animals in an unauthorized place	Birr 20
Not duly handled or dispose especial waste	Birr 50
Failure to timely pick filled container of placed by private sanitary organization.	Birr 100
Failure to cover waste and littering it while driving on vehicles	Birr 50

CHAPTER FOUR

4. SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

The primary purpose of this study is to assess the current solid waste management practice in DSS, the study has been conducted to address certain research questions, Among the questions the current solid waste management practice DSS is the collection, transportation, and dispose final disposal site is "Repi" .The enterprise major solid waste management problems or hindered to practiced to efficient SWM practiced such as reusing ,recycling and composting are lack of enough space(land) and to asses the improvement of current SWM practiced and with the aim of providing alternative recommendation. Data were obtained from the respondents and through questionnaires, interviews and analyzed using tables and percentage comparison.

Major Findings of the Study:

The study identified the following major concerns:

- Lack of accessibility final disposal site the problem of the enterprise to done the work effectively.
- No or no adequately implemented promotion ,training and awareness creation programmed about waste, waste minimization, recycling, reuse, recovery, composting and disposal of solid waste to private sectors by the government or other parties .
- Lack of specific and clear policy, plan and regulation for the private sectors doing reusing, recycling and composting.
- Bad odor respiratory and communicable diseases like common cold and skin diseases are the disposal area of health problems.
- General in private level the practice of SWM having different problems that hindered the practiced can done properly. Some of the problems are having one disposal site in the city, lack of good infrastructure, not having the rule, regulation and clear policy.

4.1 Conclusions

Waste management is a global environmental issue which concerns about very significant problem in today's world. There is a considerable amount of disposal of solid waste with out proper segregation which has lead to both economic and environment suffering. Solid wastes pose significant threats to public health and the environment if they are not collected, reused, recycled, composted and disposed of properly. The most serious effect of inefficient solid waste management includes air pollution, contamination of drinking water supplies, and the spread of human diseases.

Based on the finding of the analysis it can be conclude as:

- Reuse, recycling and composting of waste are modern options that helps decrease the amount of generated waste and to manage their solid waste in suitable and sustainable manner. But these activities don't practice in the enterprise. At the enterprise level there is no organized reusing, recycling and recovering practices, because the enterprise having a big problem that specifically lack of enough space (land)
- Generally in DSS don't practice recycling, reusing and composting, because of this the enterprise don't success on the area.
- According to the study result, the SBPDA participation is extremely low in relation to private enterprise awareness creation and the overall implementation of policy, rule and regulation because of this the enterprises don't have enough knowledge about rule and regulation.
- According to the study result types of solid waste more collected by the enterprise are vegetable, paper, plastic, metals, and glass.

4.2 Recommendations

Based on the findings of this study, the following recommendations are given. As per the discussion on the previous results of this paper, for sound solid waste management DSS, it needs the attention of the government, society and other parties. This is the reason that the enterprise faced different problems specifically that need a solution from the government, society and donors capacity that highly retarded the provision of solid waste service delivery in the enterprise. So that the Government or SBPDA, society and donors have to give more emphasis to the following points:

- ❖ Lack of enough land fill site affect the solid waste management of the enterprise. So improving the quality of the land fill is expected from cooperates with government, society and donors.
- ❖ Clear regulation and policy frameworks on solid waste management should be formulated, including:
  - There should be legal protection and support private services provider.
  - There should be prepare additional disposal area and to develop efficient solid waste management practice.
  - Policy issues that encourage private sector involvement in provision and management of solid waste should be addressed.

- ❖ The proper solid waste management starts from the sources through waste separation reuse and storage. But in the enterprise, there is no practice of waste separation, reuse and storage systems. So as to make easy SWM
  - Should practices waste separation, waste reuse and then store in their premises in a safe condition by using primary storage systems such as, fertilizer sacks, barrels, different locally produced materials and others.
  - The SBPDA should encourages recyclers, re-users in general and facilitating necessary conditions for composers by giving land for composting purposes in Particular, and enhance for selling composted wastes for agricultural purpose to near by farmers, because such activity is the most important means for reduction of organic waste that is generated in the town and to create job opportunities for jobless youth through organizing them.

- The enterprise solid waste transportation service to provide Skip loaders to transport and dispose solid waste in the sanitary land fill site. But first the skip loaders carry only one container at a time to a disposal site except one car, for single container of capacity of $8m^3$. The system is in efficient and not economical considering the cost of fuel, man power and over head costs for transportation per single trip. So the enterprise should revise the solid waste transportation service system.

- Generally ,landfill requires good management so that all the society ,government and other parties should undertake the development of skills and capacity building activities

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ANNEX

Annex 1

Interview questions for sanitation beautification and park development agency

Back ground information:

Name of the institution_____

Position of the person who interviewed_____

Profession_____

Qualification_____

Dear respondent, I would like to inform you that this interview is used for academic purpose only. The major objective is to identify the reason why DSS don't practice efficient solid waste Management. Your response is very important for the success of the study. Hence, you are kindly requested to give your response.

1. What is the role of (SBPDA) sanitation beautification and park development agency with private sector that conduct SWM on technical and awareness creation?
2. What policies, Rules and regulations implemented concerning efficient solid waste management?
3. What are the responsibilities of private enterprise on SWM related to environmental pollution?
4. Have they any awareness creation program organized in relation to efficient SWM?
5. What do you recommended better performance on SWM practice?

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6. Any more comments! _____

Thank you for your cooperation in advance!

Annex 2

Interview questions for health officials

Back ground information:

Position of the person who interviewed_____

Profession_____

Qualification_____

Dear respondent, I would like to inform you that this interview is used for academic purpose only. The major objective is to identify the reason why DSS don't practice efficient solid waste Management. Your response is very important for the success of the study. Hence, you are kindly requested to give your response.

1) What is the role of role of the health office related to solid waste management practice?
2) What is the common problems associated solid waste disposal place?
3) What are the systems used to prevent poor solid waste management related diseases?
4) What is the relationship between private sector solid waste management and your office?
5) What possible solution do you propose to the improvement of SWM service?
6) Any more comments! _____

Thank you for your cooperation in advance!

Annex 3

Interview questions for DSS managerial areas

Back ground information:

Position of the person who interviewed_____

Profession_____

Qualification_____

Dear respondent, I would like to inform you that this interview is used for academic purpose only. The major objective is to identify the reason why DSS don't practice efficient solid waste Management. Your response is very important for the success of the study. Hence, you are kindly requested to give your response. I would like to thank you for your cooperation.

1. In what activities of SWM are you involved?
2. What type of waste do you usually collect?
3. How do you select the disposal place?
4. What are the major problems on SWM activity?
5. What measure do you take to reduce the problem?
6. What strategy does you proposed the future improvement of SWM in DSS?
7. What do you expect from the stockholders to alleviate these problems?
8. Any more comments!

Thank you for your cooperation in advance!!

Annex 4

Questionnaire to be completed by Dynamic Sanitary Service workers

Dear respondent, I would like to inform you that this questioner is used for academic purpose only. The major objective is to identify the reason why DSS don't practice reusing, recycling and composting solid waste, identifying the problems and indicate an idea to solve the problems. Your response is very important for the success of the study. Hence, you are kindly requested to give your response.

General guide line

- No need to write the name
- Please use "√" sign to indicate your answer

1. Background Information

   1.1 Sex of the respondent Male Female

   1.2. Educational level

   Grade 12 and below certificate Diploma Degree and above Degree

2. In your observation what types of SW have huge quantity?

		Degree of Agreement		
No	**Waste Item**	**To Much**	**Not much**	**No Waste**
1	Food wastes			
2	paper and carton			
3	Peelings and leaves			
4	Ash			
5	Dust			
6	Plastics			
7	Bottles and glass			
8	Metals			
9	Others			

3. Which type of solid waste management practice done in the enterprise?

- ☐ Collect and dispose to " Repi"
- ☐ Collect and reuse practiced
- ☐ Collect and composting practiced

4. The practiced of the enterprise recycle; reuse and composting SWM?

   ☐ Good ☐ Medium ☐ weak

5. If your response to the above Question”4” is week, what is the reason?

   ☐ Lack of place ☐ Lack of willingness ☐ lack of awareness ☐ It is useless

6. In what area the major problem of solid waste management in DSS?

   ☐ Collection ☐ Transporting ☐ Recycling, reusing ☐ composting

7. Where is the place dispose solid waste DSS?

   ☐ River side ☐ Burning ☐ Repi disposal site

8. Have you heard any problems that related to solid waste management?

   ☐ Yes ☐ No

9. If your answer for question no”8” yes explain the problems?

   _____

10. Is there any problem in the dumping area "Repi"?

    ☐ Yes ☐ No

11. If your answer for question no”10” yes mention it?

    _____

12. Could you explain any other problem related to solid waste management in the enterprise?

    _____

13. Would you suggest other ideas?

    _____

Thank you for your responses

Annex 4

KÇÃ“ T›¡ ¾îÇƒ ›ÑMÓKAƒ c^ }™‹¾k[u SÖÃp ÃI SÖÃp KÇÃ“ T›¡ ¾îÇƒ ›ÑMÓKAƒ c^ }™‹ ¾k[u SÖÃp c=J” É`Ï~ Ÿ}KÁ¿ }sTƒ ¾T›cueu¨‹” ¾Å[p qhh [â= /qg?/ ¨eÊ ŸSÉóƒ vhÑ` SMf SÖkU”'**የማዳበሪያ/ኮምፖስት/ የመሳሰሉትን ሥራዎች ላያ ያልተሰማራበትን ምክንÁ„‹** SÑUÑU“ u²=I ²‹]Á ÁK‹ƒ” ‹Óa‹ KÃ„ T¨p እ”Ç=G‹U ¾Sõ}H¦ Gdw KSÖqU ’¨‹::

KT›ÁÅ`Ñ‹M” ƒww` upÅT›Á እ“ ScÓ“K” ›ÖnLÃ SS]Á

- eU Síõ ›ÁeðMÓU
- **ለቀረቡት ጥያቄዎች ትክክል ነው በሚሉት ጎን ባለው ሳጥን ውስጥ ይህን** /√ / UM¡ƒ ÁekUÖ‹::
- ***መልስዎ ከአንድ በላይ ከሆነ ደጋግመው ምልክቱን*** /√ / ÁekUÖ‹::

1. ¾SLg‹/h/ ¾ÓM S[Í
   1.1 ***ዎታ ወንድ*** ☐ **ሴት** ☐
   1.2 ¾ƒUI`ƒ Å[Í 12}—“ Ÿ12}— **በታች** ☐ **ሰርተፍኬት** ☐ ¢K?Ï Ç=ýKAT ☐
2. **በእርስዎ ምልክታ የት—**¨‹ ¾Å[p qhh ›Ã’ƒ ’¨‹ uw³ƒ ¾T›cucu¨‹;

}.I	¾qhh ¨‹ ›Ã’ƒ	u×U w²‹	S"ŸK—	U”U ¾K?K¨‹
1	**የምግብ ትርፍራፊዎች**			
2	¨[kƒ“ Ÿ`„”			
3	**የእንጨት ቁርጥ**^ß“ pÖM			
4	›SÉ			
5	›ª^			
6	Le+¡			
7	Ö`S‹e“ w`ßq			
8	**ብረታ ብረት**			
9	}ÚT]"K			

3. ***ድርጅቱ በየትኞቹ የደረቅ ቆሻሻ አገልግሎት ስራዎች ላይ ተሰማርቶአል?***
   Å[p qhh uScwcw q_ SÉóƒ ☐
   ደረቅ ቆሻሻ በመሰብሰብ እንደገና መጠቀም ☐
   Å[p qhh uScwcw ¨Å TÇu]Á’ƒ SK¨Ø ☐

4. uÉ`Ï~ ¨‹eØ Å[p qhh¨‹" SMf SÖkU'¢Uþe}"/TÇu]/›ÑMÓKAƒ

Ø\ ☐ S"ŸK– ☐ Å"T ☐

5. **በጥያቄ ቁጥር 5 ምላሽ እጅግ በጣም ደስማ ነው ከሆነ ምላሽዎ ምክንያቱ**

የበታ እጦት ☐ **ፍላጎት አለመኖር** ☐

ØpU eKK?K¨‹ ☐ **የእውቀት ማነስ** ☐

6. **በድርጀቱ ውስጥ የየትኞቹ የደረቅ ቆሻሻ ስራ ላይ የበለጠ ችግር ይታያል?**

uScwcw ☐ uTÕÕ´ ☐

እ"ÅÑ“ uSÖkU ☐ ¢UþeƒuSe^ƒ ☐

7. É`Ë~ Å[p qhh¨‹" ¾ƒ ÃÅóM;

¨"´ ›""vu= ☐ ÃnÖLM ☐ [â=/qg?/ ☐

8. ŸIw[}cu‹ uÅ[p qhh ›¨ÒÑÉ ²‹]Á ¾T›cS‹ **›ቤቱታዎች ካሉ?**

›K‹ ☐ ¾K‹U ☐

9. **በጥያቄ ቁጥር 9 ምላሽ አለ ከሆነ እባክዎ ያሉትን ችግሮች ቢዘረዝ\M"**----------

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10. uqhh TÖ^kT›Á q_ ›Ÿvu= ÁK‹ ‹Óa‹ ›K‹;

›K‹ ☐ ¾K‹U ☐

11. uØÁo **ቁጥር *11* ምላሽ አሉ ከሆነ እባክዎ ይዘርዝ**\M;

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12. uÉ`Ï~ ¨‹eØ ŸÅ[p qhh ›¨ÒÑÉ Ò` ¾}ÁÁ² K?L ‹Ó` "K u=ÑMèM"

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13. **በአጠቃላይ በድርጀቱ ውስጥ በደረቅ ቆሻሻ አወጋገድ ዙሪያ መበረታታት ወይም** Se}"ŸM ›Kuƒ ¾T›K‹ƒ "K u=ÑMèM;

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14. }ÚT] ¾T›cÖ‹" ›e}Á¾ƒ "K;

እ“ ScÓ“K”

DECLARATION

I, the undersigned, declare that, this senior essay is my original work prepared under the guidance of Netsanet Benberu .

All sources of material used for the manuscript have been properly acknowledgment.

Name of the Birtukan Siraw

Signature----------

Place of submission: St. Mary University College

Business Faculty

Department of Management

Date of submission June 22, 2010

This senior essay has been submitted for examination with my approval as Advisor.

Name Netsanet Beneberu

Signature----------

Date----------