Addis Ababa University

School of Commerce

Department of Logistics and Supply Chain Management

Assessment of Reverse Logistics on Used Water and Soft Drink Plastic Bottles in Addis Ababa city

A Research Submitted to the Department of Logistics and Supply Chain Management in Partial Fulfillment of the Requirements for the Degree of Masters of Logistics and Supply Chain Management

(MA LSCM)

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C E R T I F I C A T E

This is to certify that this project work, **–Assessment of Reverse Logistics on used Water and Soft drink Plastic Bottles in Addis Ababa city**", undertaken by Hagos Gebre for the partial fulfillment of Master's of Art in logistics and supply chain management (MA) at Addis Ababa University, is an original work and not submitted Earlier for any degree either at this University or any other University.

_____

Research Advisor

Declaration

I, Hagos Gebre declare that this work entitled **"Assessment of Reverse Logistics process on used Water and Soft drink Plastic Bottles in Addis Ababa city"**, is the outcome of my own effort and study and that all sources of materials used for the study have been duly acknowledged. I have produced it independently except for the guidance and suggestion of the research advisor.

This study has not been submitted for any degree in this University or any other University. It is offered for the partial fulfillment of the degree of Master's Art in Logistics and Supply Chain Management (MA) at Addis Ababa University.

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Addis Ababa University

School of Graduate Studies

MA Program

Assessment of Reverse Logistics Process on Used Water and Soft Drink Plastic Bottles

By Hagos Gebre

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ABSTRACT

This study deals with the assessment of reverse logistics on used water and soft drink plastic bottles in Addis Ababa. The purpose of this thesis is to investigate the organization, effectiveness and efficiency of the process and the actors involved in the reverse logistics system. Further, the thesis attempts to analyze the role of all stakeholders starting from the producers of water and soft drinks, government offices, consumers and other formal and informal organizations involved in collection and recycling of used plastic bottles. Primary and secondary sources of data were used to gather data from different stake holders through self administered questionnaires to micro and small scale enterprises and informal solid waste collectors or qorale's and interviews with COBA IMPACT plc, bottler companies, Addis Ababa solid waste management and cleansing agency selected by using purposive sampling method briefly shown in the third chapter. The detailed analysis and interpretation of the data collected using graphs, tables and pie charts as well as grouping of responses given for the open ended questions and interview questions done in the fourth chapter. Finally the findings of the research and the recommendations given by the researcher are included in the fifth chapter. the reverse logistics process of used water and soft drink plastic bottles is not effective due to lack of awareness on source separation, risky and inconsistent collection processes due to the fall on the selling price of collected plastic bottles, high cost of transporting plastic bottles, lack of safe and enough storage space, low community participation and low contribution of bottling companies to environmental protection. To solve these problems the researcher suggested consumer education, collector education and training, polluter pays, flattening of plastic bottles, preparing separate plastic bottle specific standards and policies and finally integration among all stake holders in order to protect the environment and create additional source of income in this area.

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Abbreviations

ARSCP	African Roundtable on Sustainable Consumption and Production
CP	Cleaner Production
EPA	Environmental Protection Authority
ISWM	Integrated Solid Waste Management
UNIDO	United Nations Industrial Development Organization
UNEP	United Nations Environment Program
RLS	Reverse logistics system
EFBW	European federation of bottled waters
SME‘s	small scale and micro enterprises

CHAPTER ONE

INTRODUCTION

Environmental protection is the common agenda of business leaders and policy makers in developed and developing countries of the world. Ethiopia is participating on different international environmental conferences by representing African countries by debating developed countries whether to reduce the level of pollution or to pay compensation for those less industrialized and less polluting economies. Different environmental policies have been designed and implemented to ensure wise utilization of natural resources and protect the environment. Ethiopia is also one of the countries taking different actions to build green economy. One of the factors which can negatively affect the environment is poor solid waste management which is the common problem of most developing countries. Even though there are policies and standards for environmental protection and natural resource utilization its implementation is not proportional with the rapid urbanization and the need for sustainable solid waste management practice caused by the growth of different solid wastes. Addis Ababa city is facing challenges on solid waste management causing sanitation problems. Of the solid wastes causing environmental problems plastics are the most challenging ones because of their nature and the ability to stay for hundreds of years.

1.1 Background of the Study

Currently the usage of plastics is increasing due to their convenience and reliability for packaging materials. Significant numbers of consumers of bottled water in Addis Ababa prefer to use bottled water for drinking at home, work places or hotels as compared to other forms of tap water (Matiwos Ensermu, 2014). Using plastic bottles for water and soft drinks increases the marketability and quality of the products through ease of access to simply pick and drink everywhere when needed. But the main problem is that, the users of the products throw here and there after drinking and this causes environmental pollution and blocking of sewerage systems.

The disposal of empty bottles by bottled water users anywhere on the streets of the city is environmentally unfriendly as all of the packaging of the bottled water is plastic. In the absence of green packaging of water products for commercial use in Ethiopia, it demands for reverse

logistics for recycling of plastic packages for use (Matiwos Ensermu, 2014). Reverse logistics here is the back ward collection of used plastic bottles from the consumers to the recycling centers or the company for recycling or reusing purpose. There are some practices to collect and recycle plastic bottles in Addis Ababa city but it is accompanied with problems on separation, collection, transportation, storage and recycling of empty plastic bottles. So this study assessed the effectiveness and efficiency of the existing reverse logistics system of recollecting and recycling of plastic bottles and finally recommends ideas to solve the negative impacts of plastic bottles thrown on the environment and save virgin resources.

1.2 Statement of the Problem

The purpose of this study is to identify the problems facing reverse logistics practice and to search for different international experiences and solutions to promote efficient and effective separation, collection, transportation handling and recycling of used plastic bottles in Addis Ababa city in order to protect the environment from the pollutions and solve sanitation problems. Since Addis Ababa is the capital of Ethiopia, diplomatic seat of African and other international organizations as well as a tourist destination for many citizens and foreigners it needs to be more clean, green and beautiful enough. Even though there are changes from time to time on the sanitation and development of the city it is not at the required level.

Solid waste in general is the main problem affecting the environment and good looking of the city but this study focuses on used plastic bottles which needs separate system of reverse logistics in collaboration with all stakeholders. One of the challenges for sanitation problems and environmental impacts in the city is used plastic bottle which is not properly handled after use and increasingly used from time to time. Since logistics in general and reverse logistics is young discipline in Ethiopia there is a research gap in assessing the reverse logistics performance in the country and this made preferable to conduct thesis on reverse logistics specifically on plastic bottles. So in order to identify the shortcomings of the recovery and recycling system data was collected from the plastic bottled soft drink and water producing companies about their role in recollecting the used plastic bottles; the small and micro enterprises about the collection process and the challenges facing them in relation to the collection, marketing, transportation of the products; from wholesalers at _minalesh tera' collecting these materials from informal collectors

which are called as **Qorale"s** and finally *Coba impact plc* the plastic bottles recycling company was interviewed using structured interview questions to get details of the problems.

Finally, after identifying the causes of the reverse logistics problems for those used plastic bottles the researcher suggested better ways to improve the existing system by taking other countries best experiences in the area and supporting scientific principles to assure sustainable solutions for the problems.

1.3 Basic Research Questions

This study answered the following basic research questions

- How is reverse logistics and recycling service of used water and soft drink bottles managed in Addis Ababa?
- What are the legal frame works and environmental policies in relation to the collection and recycling of used plastic bottles in Addis Ababa?
- What is the community participation in the effective segregation and collection of plastic bottle wastes in Addis Ababa?
- What is the role and social responsibility of plastic packed water and soft drink producing companies in protecting the environment from plastic wastage negative impacts?

1.4 Objective of the Study

1.4.1 General Objectives

- The main objective of the study is to assess the reverse logistics process of used water and soft drink plastic bottles in Addis Ababa city which, in turn, may provide a useful framework in determining effective reverse logistics strategies to protect the environment from the adverse effects of used plastic bottles to the environment and make the waste as a source of income.

1.4.2 Specific Objectives

- To assess how the collection and recycling of used plastic bottles is managed in Addis Ababa.
- To assess the legal frame works and environmental policies in line with the collection and recycle of used plastic bottles in the city.
- To analyze the participation of the community in effective segregation and collection of used plastic bottle wastes.
- To identify the role of plastic bottled water and soft drinks producing companies in collection and recycling of used plastic bottles.

1.5 Significance of the Study

This study is important in several aspects for several stakeholders. Firstly, the findings of this thesis will serve as inputs to used plastic bottle recycling companies; city administration solid waste management and cleansing agency; bottled water and soft drink producing companies and the government in general on how to formulate and implement environment friendly reverse logistics strategies. Second, it is a piece of contribution to the existing knowledge of reverse logistics practices on used plastic bottles and can be referred by other researchers for further research on the area.

1.6 The Scope of the Study

This paper was delimited to the assessment of reverse logistics on used water and soft drink plastic bottles in Addis Ababa city. The data for the analysis was obtained from micro and small scale enterprises organized in collecting solid waste and plastic bottles; COBA IMPACT PLC plastic bottle recycling company; plastic packaged water and soft drink producing companies in Addis Ababa and Addis Ababa City Administration solid waste management and cleansing agency. Finally, this study does not include varieties of solid wastes including plastic products other than water and soft drink packaging plastic bottles.

1.7 Organization of the Study

The paper is organized on five chapters. Chapter one deals with background of the study, statement of the problem, basic research questions, objective of the study, scope and significance of the study. Chapter two is review of related literatures with the research topic. Chapter three deals with methodology of the study, chapter four shows the detail analysis and interpretation of data collected and the fifth chapter deals with the conclusion and recommendation part.

1.8 Limitation of the study

There were external (Uncontrollable) variables that deter the smooth implementation of the study For instance, finding and Locating respondents, the lack of cooperation of the respondents and their commitment to complete the questionnaires, lack of sufficient time by the researcher to collect sufficient data from the stakeholders located far apart in the city and lack of other studies or books on this area in Ethiopia. Moreover, the time pressure faced by the researcher is also the other constraint to undertake wide survey in Ethiopia with respect reverse logistics on used water and soft drink plastic bottles in Addis Ababa city administration. The lack of relevant and up to date literature, lack of localized previous research papers in the area of the study were also major constraints in this study.

CHAPTER TWO
LITERATURE REVIEW

2.1 Overview of Reverse Logistics

Today an increase in world population and living status has magnified resource consumption and the disposal rate. In other side climate changes, local and regional impacts to the weather and water pollution from human activities have significantly expanded the need for green supply chain and green logistics through the implementation of reverse logistics system or environment friendly environmental logistics. So, in this chapter the researcher will review the definitions given by different books and researchers to reverse logistics, the environmental benefits of reverse logistics, reverse logistics activities, environmental policies related with reverse logistics and corporate social responsibility of manufacturing companies in Addis Ababa by focusing on water and soft drink manufacturing companies.

Reverse Logistics is the process of planning, implementing, and controlling the efficient, effective inbound flow and storage of secondary goods and related information opposite to the traditional supply chain direction for the purpose of recovering value or proper disposal (R. Dekker et al. 2004).

Reverse logistics is defined as the processes of receiving returned components or products for the purpose of recapturing value or proper disposal. Reverse logistics processes and plans rely heavily on reversing the supply chain so that companies can correctly identify and categorize returned products for disposition, an area that offers many opportunities for additional revenue. It is much more than simply counting defective items returned by customers. Also, it is much more complex than outbound shipping in that customers and/ or consumers initiate a return, making it an inbound shipment process that is less predictable. The science of reverse logistics includes return policy administration, product recall protocols, repairs processing, product repackaging, parts management, recycling, product disposition management, maximizing liquidation values and much more (Curtis Greve and Jerry Davis Feb 2013).

According to Reverse logistics association defined reverse logistics as all activity associated with product/service after the point of sale, the ultimate goal to optimize or make more efficient after market activity, thus saving money and environmental resources. Other terms synonymous to

reverse logistics are aftermarket logistics, retrogistics, or after market supply chain (Reverse logistics association, 2002).

2.1.1 Reverse Logistics Activities

Type of activity common with reverse logistics includes; logistics, warehousing, repair, refurbishment, recycling, e-waste, after market call center support, reverse fulfillment field service and many others (Reverse logistics association, 2002).

Typical reverse logistics activities would be the processes a company uses to collect used, damaged, unwanted (stock balancing returns) or outdated products, in addition to the packaging and shipping materials from the end-user or the reseller. Once a product has been returned to a company, the firm has many disposal options from which to choose. If the product can be returned to the supplier for a full refund, the firm may choose this option first. If the product has not been used, it may be resold to a different customer or it may be sold through an outlet store. If it is not of sufficient quality to be sold through either of these options, it may be sold to a salvage company that will export the product to a foreign market. If the product cannot be sold ~~"as~~ is" or if the firm can significantly increase the selling price by reconditioning, refurbishing or remanufacturing the product, the firm may perform these activities before selling the product. If the firm does not perform these activities in-house, a third party firm may be contracted or the product can be sold outright to a reconditioning/remanufacturing/refurbishing firm. After performing these activities, the product may be sold as a reconditioned or remanufactured product, but not as new(Reverse logistics association, 2002).

The key players in the waste management sector in Addis Ababa are formal and informal operators in the processes of collection, separation, recycling, reuse and transportation of waste for final disposal at the city dumping site of Koshe. Formal operators are those registered and licensed to work subject to tax and space regulations. These operators include municipal cleaners and private operators authorized by government, whereas informal operators are not registered and have no legal base for the operation of their business. The latter category includes scavengers, unregistered recyclers and re-usable article sellers (Elias Mazhindu, Trynos Gumbo and Tendayi Gondo, 2012).

2.2 Solid Waste Management

Clean and healthy living conditions in cities and towns cannot be achieved without reliable and regular waste collection and adequate disposal systems. The major solid waste management processes start at solid waste production, storage and followed by solid waste collection, transportation and transferring. Then after street cleaning, recovery of recyclable materials, solid waste treatment, and solid waste final disposal, and finally collects feedback to monitor and evaluate the solid waste management processes (Addis Ababa City Administration Urban planning, sanitation and beautification bureau solid waste manual plan 2012).

The key players in the waste management sector in Addis Ababa are formal and informal operators in the processes of collection, separation, recycling, reuse and transportation of waste for final disposal at the city dumping site of Koshe. Formal operators are those registered and licensed to work subject to tax and space regulations. These operators include municipal cleaners and private operators authorized by government, whereas informal operators are not registered and have no legal base for the operation of their business. The latter category includes scavengers, unregistered recyclers and re-usable article sellers (Mazhindu et al. 2012).

2.2.1 Segregation of Solid Wastes

According to the studies compiled by ENDA_ Ethiopia (2014) separation of waste at home differs between well-to-do and poor households. Strict separation of household waste is practised in poor households, since they make a varied use of their waste. Cow dung is used to plaster the floor and walls of the houses, or processed into dung cakes and used as fuel. Pieces of paper, thread and plastic bags are used burned to initiate three stone fire burning. Used papers, such as paper from old exercise books of their children, are reused as toilet paper by the family. The only items which poor households have for sale to qorales are their worn-out slippers. The well-to-do families responded that they don‘t separate household waste at source. However, the children at home collect some of the saleable used bottles, glasses, and nail paint containers to sell.

2.2.2 Collection of Solid Wastes

According to the Review of International Comparative Management, March 2013 as the shift from waste to resource management continues, the logistics of collecting, processing and recycling materials has become more complex. The wider range of materials now recycled at the curbside (including low density materials such as plastic bottles and cardboard), often requires a review of collection rounds and practices. Curbside collection, or curbside collection, is a service provided to households, typically in urban and suburban areas, of removing household waste. It is usually accomplished by personnel using purpose built vehicles to pick up household waste in containers acceptable to or prescribed by the municipality.

While materials used by the bottled waters industry are 100% recyclable (glass, plastic, caps and labels) the significant challenge to the sector is recovery (EFBW, 2010).

2.2.3 Storage of Solid Wastes

Ethiopian urban planning, sanitation and beautification bureau solid waste management plan has no separate storage facility for used plastic bottles but the general solid waste management storage facilities have been explained as primary storage of solid wastes and secondary solid waste storage facilities as follows

A variety of facilities are used for primary storage of solid wastes. Temporary containers, such as cardboard boxes and plastic carrier bags, are used in subserviced or poorly serviced areas. Standardized use of purpose-made plastic refuse bags is often inappropriate for developing countries as they require careful organization to distribute and their attractiveness for alternative uses and susceptibility for tearing. Collections of materials at source are termed ‗curbside collection systems'. This method involves the householder putting out recyclable materials for collection separate from the normal refuse. In the separation at source scheme, the householder is either required to place recyclable materials into one container for sorting by the collectors (including informal sectors), or the recyclable materials are placed in separate containers.

Secondary waste storage facilities may be either stationary or portable units. The stationary units are commonly uncovered, and the waste is often scattered around the facility where insects, rodents and animals are attracted to it. Wastes from stationary units have to be removed by

raking out on to the ground and collecting in baskets before being carried to the vehicle (Addis Ababa university urban planning, sanitation and beautification bureau solid waste manual plan 2012).

2.2.4 Transportation

Many sources of waste might only be reached by roads or alleys which may be inaccessible to certain methods of transport because of their width, slope, congestion or surface. This is especially critical in unplanned settlements such as slums or low income areas and thus largely affects the selection of equipment. Road conditions, traffic density, and overall haul distance will have a determining influence on vehicle choice. Besides to motorized vehicles, non-motorized vehicles should be considered which are mainly used to transfer wastes to communal containers or to disposal sites (in small towns) that are found near the towns. The non-motorized vehicles are also recommendable in narrow and filthy roads, dense settlement areas and in inaccessible parts of large towns. In large towns or cities, the non-motorized vehicles should be used only to transfer wastes to communal containers (Addis Ababa university urban planning, sanitation and beautification bureau solid waste manual plan 2012).

Transporting of solid waste in Addis Ababa includes transporting of wastes from where the waste is generated to communal collecting sites and from communal collection sites to the disposal landfill. The municipality and the private sector of small scale enterprises are involved in transporting solid waste from where the waste is generated to the communal collection sites. The municipality uses lift trucks, side loaders, and compactors for collection as well as transportation purposes, while most of the private enterprises use push carts and wheel barrows (Selamawit, 2006).

2.2.5 Recycling

Once material enters the waste stream, recycling is the process of using recovered material to manufacture a new product. For organic materials like plastics, the concept of recovery can also be expanded to include energy recovery, where the calorific value of the material is utilized by controlled combustion as a fuel, although this results in a lesser overall environmental performance than material recovery as it does not reduce the demand for new (virgin) material. This thinking is the basis of the 4Rs strategy in waste management parlance—in the order of decreasing environmental desirability—reduce, reuse, recycle (materials) and recover (energy),

with landfill as the least desirable management strategy(Jefferson Hopewell, Robert Dvorak, Edward kosior, 2009).

Recycling is a critical step towards environmental protection. Processing used materials into new products reduces resources, Saves primary energy, prevents pollution and lowers green house emissions (EFBW, 2010).

Ife Adewumi under the title _Solid waste management in Nigeria: Efforts towards a paradigm shift of waste to wealth stratagems described the major characteristics of municipal solid waste in Nigeria and highlighted the common features of municipal solid waste management in the region. He indicated that based on the available information about 30% of the waste collected in urban centres in Nigeria could be recycled into useful resources. He outlined the major steps for valorisation of waste which included the sorting/segregation, collection and transportation methods for recyclable waste. He then particularly focused on plastic recycling process which has become a thriving business in Nigeria. He also presented the different products produced from metal scraps. He concluded his presentation by saying that: Recycling of significant proportion of the municipal solid waste is viable for most African urban centers; There is growing local knowledge base in the region in terms of developing the required equipment and infrastructure; Valorization of municipal waste can create wealth for both workers and entrepreneurs thereby contributing to the econ0mic development agenda of the country; The Nigerian experience has shown that there is a good potential for public-private partnership in promoting the waste to wealth paradigm in the region (ARSCP-4 and UNCC, 29 May 2006, Addis Ababa Ethiopia).

Some of the reusing and recycling mechanisms are described below.

1. Resource recovery- is a broad term that is used for the retrieval of valuable materials or energy from a waste stream.
2. Reclamation- is the separating out of materials such as rubber, glass, paper and scrap metal from refuse and the act of reprocessing them for reuse.
3. Composting- is an age-old process, wherein the organic fraction of wastes is heaped into piles and allowed to decompose in that after about six months humus like substance remains and makes an excellent soil conditioner.

Hydro pulping- is a method that is used to recycle paper products (Addis Ababa university urban planning, sanitation and beautification bureau solid waste manual plan 2012).

4. According to European federation of bottled waters sustainability report recycling rate is growing steadily across Europe. In parallel, continuous efforts are being made by the industry to reduce the amount of plastic in water bottles and to minimize packaging as a whole. Though recycling rates vary across Europe, there has been a steady increase in the capture of PET bottles, from 35% in 2005 to 48% in 2009. In fact PET bottles largely contribute to meeting EU recycling targets for plastic packaging. Companies are working closely with local authorities to raise awareness and encourage national recycling schemes. Simultaneously, water bottlers are investing in new recycling technologies to use greater amounts of recycled materials in packaging (EFBW, 2010).

2.3 Reverse Logistics on Used Plastic Bottles

The number of polyethylene bottles (bottles for beverages made from plastic) produced is on the rise in all countries. Even with recycling, there are still a number of environmental impacts that are generated from the production of bottles, the transportation of beverages, refrigeration and sales, recycling, and the lifecycle of the product from production to disposal. In many countries that have water service infrastructure in place and can provide safe and high-quality tap water, there are measures and campaigns being implemented to reduce the use of PET bottles, and review and promote the use of tap water (Friends of Earth Japan Annual report, 2013).

2.3.1 Types of Plastics

Plastic products are typically labeled with a number surrounded by the recycling symbol. These numbers and labels identify both the type of resin used to make the plastic and the products recyclability. Associated with the different types of resin are potential health risks. The following table summarizes seven different types of commonly used plastics, product examples, recyclability, and potential health risks.

1. PLASTIC #1 - POLYETHYLENE TEREPHTHALATE (PET); used for soft drink, water, and other beverage bottles detergent and cleaning containers, peanut butter and other food containers and bottles. PET is recycled into: new bottles, polyester for fabrics

and carpet, fill for bumper cars and fiberfill for sleeping bags and jackets. It is one of the most easily recycled plastic types. No known health issues are identified regarding the use of this plastic type.

2. PLASTIC #2 - HIGH DENSITY POLYETHYLENE (HDPE); milk and water jugs, laundry detergents, shampoo and motor oil Containers, shampoo bottles some plastic bags are the basic ones. Clear HDPE containers are easily recycled back into new Containers. Colored HDPE are converted into plastic lumber, lawn and garden edging, pipes, rope, and toys. No known health issues are identified still for the usage of this plastic type.
3. PLASTIC #3 - POLYVINYL CHLORIDE (PVC OR V); clear food packaging, cling wrap detergents and window cleaner bottles, some plastic squeeze bottles, cooking oil and peanut butter jars, vinyl pipes shower curtains looring, home siding, and window and door frames. PVC is one of the least recyclable plastic due to additives. Potentially harmful substances are also created by its disposal. Many harmful chemicals are produced in the manufacturing, disposal, or destruction of PVC including Lead DEHA (di(2ethylhexyl)adipate) . Dioxins Ethylene dichloride Vinyl chloride Effects of exposure to these chemicals may include: decreased birth weight, learning and behavioral problems in children, suppressed immune function and disruption of hormones in the body, cancer and birth defects, genetic changes. Harmful chemicals created as a byproduct of PVC can also settle on grassland, where they can be consumed by livestock, and accumulate in meat and dairy products that are directly ingested by us.
4. PLASTIC #4 - LOW DENSITY POLYETHELENE (LDPE) bread, frozen food, and grocery bags most plastic wraps. some bottle LDPE is not usually recycled. No known health issues. While no known health effects associated with the use of this plastic are known, organic pollutants are formed during manufacturing.
5. PLASTIC #5 - POLYPROPYLENE (PP) deli soups, syrup, yogurt and Margarine containers disposable diapers outdoor carpet house wrap clouded plastic containers, e.g. baby bottles, straws PP is not easily recycled. Differences in the varieties of type and grade mean achieving consistent quality during recycling is difficult. No known health issues.

6. *PLASTIC #6 - POLYSTYRENE (PS);* Rigid Polystyrene CD cases, disposable cutlery Formed Polystyrene (Styrofoam), food containers packaging, insulation egg cartons, building insulation Recycling. PS is possible, but not normally economically viable. Styrene can leach from polystyrene. Over the long term, this can act as a neurotoxin. Studies on animals report harmful effects of styrene on red-blood cells, the liver, kidney, Styrene can be absorbed by food, and once ingested can be stored in body fat. It is thought that repeated exposure could lead to bioaccumulation. WHO International Programme On Chemical Safety. ―Styrene". Environmental Health Criteria 26. Retrieved Try reusing Styrofoam packing peanuts, and polystyrene cutlery where practical.
7. PLASTIC #7 - MIXED (OTHER) lids medical storage containers electronics most plastic baby bottle 5-gallon water bottles ―sport" water bottles metal food can liners clear plastic ―sippy" cups some clear plastic cutlery Mixed resin plastics like #7 are difficult, if not impossible, to recycle. Health effects vary depending on the resin and plasticizers in this plastic that often includes polycarbonates. Polycarbonate plastic leaches bisphenol A (BPA) a known endocrine disruptor. By mimicking the action of the hormone, estrogen, bisphenol A has been found to: effect the Development of young animals; play a role in certain types of cancer; create genetic damage and behavioral changes in a variety of species (Compiled by Sea Studios Foundation Feb. 2013).

2.3.2 Advantages and Challenges of Using Plastic Packaged Bottles

2.3.2.1 Advantages of Using Plastic Bottles

Bottled water demand at this time is at its increasing rate in relation to the income level of the consumers. As the income of consumers increases the tendency to shift from tap water to bottled water also rises due to the changes in life styles at individual and household levels.

According to the study conducted in Ghana by Owusu-Sekyere Ebenezer et.al. (2013) the high degree of labor intensity of the waste picking and sorting processes enables numerous people to earn some kind of income and thus reaping the economic benefit of the system.

The demand for water in the country is rapidly increasing, corresponding to the annual urban growth. Water supply is met through local production and imports. The production of purified

water has increased from 376,755hl in 1997, to 448,983hl in 2010, Addis fortune (2012) citation from the Central Statistical Agency's (CSA) annual report published in 2011. The demand is projected to reach 997,551hl by 2020, mainly due to increased urban settlement in the coming years (Addis fortune July 08, 2012).

As indicated in different studies the demand for bottled water is increasing and plastic bottles are more preferable due to their cost, convenience to buy and drink everywhere, lightness in weight irrespective of their environmental impacts. Even though, the cost of bottled water is higher when compared with tap water due to the high threats on quality of tap water so many consumers freely drink if it is bottled and this leads to further increase of the demand of bottled water. Soft drinks in Ethiopia are bottled using glass bottles which are returnable to the company after drinking or can be rarely purchased at a higher price for a single bottle if you don't have empty exchange bottle and plastic bottles low cost when cost and use and throw when compared with those of glass bottles and becomes more preferable to increase sales of products. So that banning of using plastic bottles will be challenging and the best option is to control its side effects to the environment and human health.

Foods and beverages are normally packaged in plastic, including milk bottles made from high-density polyethylene. Between 1997 and 2005, annual sales of small bottles of water — those holding less than one liter — increased from 4 billion to nearly 30 billion bottles (John Wargo Nov 12, 2009).

To meet the rising domestic and foreign demand of plastic bottled water and soft drinks a number of investors are attracted to invest their asset on the manufacturing of bottled water and soft drinks creating job opportunities and becoming source of income for skilled as well as unskilled manpower, wholesalers, retailers, and for the government through taxation and foreign currency from export sales and finally plays an important role in minimizing unemployment.

2.3.2.2 Challenges of Using Plastic Bottles

Even though, using plastic bottles for food and beverages packaging have the advantage of making safe and simplified utilization of the products for the consumers it has its own adverse

effects in relation to the chemical contents of plastics, the cost of using plastics, and health and environmental issues related with the disposal of used plastic bottles.



Figure 2-1: Drainage System Close by Plastic Bottles [Photo: Researcher around 70 Dereja]

We can simply observe in our surrounding how plastic bottles are becoming wastes and polluting our environment by closing the sewerage systems which in turn can cause floods on asphalts and residential areas repetitively challenging different households.

The chemical contents of plastics have always been a mystery to consumers. Under federal law, ingredients need not be labeled, and most manufacturers are unwilling or unable to disclose these contents or their sources. Indeed, often the only clue consumers have to the chemical identity of the plastics they use is the voluntary resin code designed to identify products that should and should not be recycled — but it offers little usable information. The true costs of plastics — including the energy required manufacturing them, the environmental contamination caused by their disposal, their health impacts, and the recycling and eventual disposal costs — are not reflected in product prices. The American Plastics Council now estimates that only about 5 percent of all plastics manufactured are recycled; 95 billion pounds are discarded on average yearly. Adding to the environmental toll, most plastic is produced from natural gas and petroleum products, exacerbating global warming (John Wargo Nov 12, 2009).

According to the Climate Action Network, incineration of plastic bottles causes toxic chlorine (and potentially *dioxin*) to be released into the air while heavy metals are often deposited in the residual ash. Moreover, if plastics are buried in landfills instead of burned, these containers take up valuable landfill space. During the process of plastic degradation, which can take thousands of years, they can release potentially toxic additives, such as phthalates, that subsequently leak into nearby groundwater.

The barriers to an increase in plastic bottle recycling are; many consumers continue to be unaware of the significant usefulness, demand, and value of recycled plastic HDPE and PET and lack of sufficient access to recycling collection opportunities for products used away from home. Consumers continue to want additional opportunities to be able to recycle at public venues, offices, recreational sites, schools, and retail establishments (Association of Postconsumer Plastic Recyclers, 2013).

2.3.3 Reduce, Reuse and Recycling of Plastic Wastes

2.3.3.1 Source Reduction

Source reduction is the process of reducing the amount of waste that is generated. The plastics industry has successfully been able to reduce the amount of material needed to make packaging for consumer products. Plastic packaging is generally more lightweight than its alternatives, such as glass, paper, or metal. Lighter weight materials require less fuel to transport and result in less material in the waste stream (http://www.epa.gov/osw/conserve/materials/plastics.htm#content American chemistry council last updated on 6/17/2015).

2.3.3.2 Reusing plastic bottles

Markets for some recycled plastic resins, such as PET and HDPE, are stable and even expanding in the United States. Currently, the US has the capacity to be recycling plastics at a greater rate. The capacity to process post-consumer plastics and the market demand for recovered plastic resin exceeds the amount of post-consumer plastics recovered from the waste stream. The primary market for recycled PET bottles continues to be fiber for carpet and textiles, while the primary market for recycled HDPE is bottles, according to the American Chemistry Council. PET is also recycled into clothing, such as fleece jackets. Recovered HDPE can be manufactured into recycled-content landscape and garden products, such as lawn chairs and garden edging.

Recovered LDPE bags and films are used to manufacture polymer lumber for decks and fencing (http://www.epa.gov/osw/conserve/materials/plastics.htm Last updated on 6/17/2015).

The major market for plastic bottles is near Tana Shopping Mall, Mercato. Like other parts of Mercato, the backside of Tana is filled with hustle and bustle. Trucks, donkeys, and people rush to line up and exchange the bottles for cash. The shouts of drivers of trucks and taxies are heard as they call out to sellers of bottles. Merchants buy the bottles at a price of 30 to 35 cents in winter and 50 to 55 cents in summer, leaving sellers with a 15-cent profit from each bottle. The price of bottles depends on market demand and weather conditions. Merchants in Mercato take the plastic bottles to regional towns and rural areas where locals use them to carry kerosene, store traditional brews, and carry holy water for Christians and feet cleaning water for Muslims. Some purchase the bottles to refill them with tap water and sell for one Birr in the market, mostly to khat chewers. ―Khat shops and chewers are our major market target," said a used bottle merchant, who requested anonymity, as he loaded his lorry with sacks full of empty bottles of different brands (Addis fortune, July 08, 2012).

2.3.3.3 Recycling Plastic Bottles

As noted for 2005 through 2012, too many consumers continue to be unaware of the significant usefulness, demand, and value of recycled plastic HDPE and PET. Data and experience show that plastic bottle recycling can be increased through sustained local education campaigns. Municipalities also need to understand that they too can benefit from the prices being paid for bales of bottles, including revenue sharing to fund educational programs and other costs of collection. Another barrier to increased recycling is lack of sufficient convenient access to recycling collection opportunities for products used away from home. Consumers continue to want additional opportunities to be able to recycle at public venues, offices, recreational sites, Schools and retail establishments (Association of Postconsumer Plastic Recyclers, 2014).

.Advantages of Plastic Bottles Recycling

Assefa presented a study that was undertaken by the Swedish University that was focused on looking at the wider picture of an integrated solid waste management system (ISWMS) through Life Cycle Assessment (LCA) and Life Cycle Costing (LCC) practice. The presentation noted

the debate that has been going on whether recycling or incineration of old plastics is a better alternative and he indicated that as per the peer-reviewed results from different studies, recycling option should be favored since it avoids high energy consumption of producing virgin plastic and the emission of greenhouse gases during the virgin plastic production (AU &UNEP report may 2006).

2.4 Bottled Water and Soft Drink Manufacturing Companies

Mayra Sanchez Osuna presentation for the ARSCP which is about UNIDO‘s Experience on Solid Waste Management, noted that UNIDO is introducing two integrated solid waste management approaches, namely: Cleaner Municipal solid waste management, and Cleaner Industrial solid waste management. She further noted that UNIDO has been promoting the application of an Integrated Solid Waste Management on both of the above areas and focused on the highlights of the experiences from integrated solid waste management projects carried out in China, Cuba and Tanzania. The China Municipal Solid Waste Management project, despite having had the most difficult institutional arrangements, showed that; A strategy can be developed, accepted and adopted nationally, A training manual is an important tool for capacity building and ensures continuity after project phase out, Implementation of such projects can be done in a pilot city, A monitoring system and waste management control laboratories are essential components, and that, The implementation strategy should include alternative ways for ensuring that producers of waste pay for collection and processing of their waste.

According to Osana the Cuban Experience involved designing a project for a city community of 10000 houses. This project was implemented with technical assistance from Switzerland. The major achievements of this project included; Reduction in the quantity of waste for final disposal and increased the life-span of the disposal site, Promoted separation or waste segregated collection, Promoted the establishment of a composting plant that produces high quality compost and of a digestion plant, etc. Several materials have been developed for raising awareness in the local community. The project has also been used to highlight the immense cost and sustainable development benefits of ISWM and CP to the present and future generations. Similar experiences have resulted from the Tanzanian Sisal Industry Project, which is applying the –closing the loop and zero-waste concepts or approaches” whilst incorporating poverty reduction

aspects in the revival of the industry. The waste from the sisal industry has found many economically viable uses as animal feeds and in energy production (ARSCP-4 and UNCC May 2006)

Abyssinia Springs started bottling water in 2004. Supplying its products to all regions of the country, the factory has a production capacity of 15 million liters a year. The factory produces its own plastic bottles, importing polyethylene terephthalate (PET), a strong and lightweight raw material commonly used to make food beverage, and other liquid containers. Great Abyssinia Plc imports 100tn of PET granules every month from Korea, China, and Thailand at a price of between 1,300 and 1,700 dollars a ton. The PET is then heated and injected into a mould, where it takes the shape of a thin tube, sort of like a vial. The tube is then inserted into a bottle-shaped mould and filled with pressurized hot air. The heat and pressure stretch it into the shape of a bottle. Ethiopia also imported 199,067kg of plastic bottle performs, worth 504,945 dollars in, according to the Ethiopian Revenues & Customs Authority (ERCA, 2011).

The percentage of recyclable plastics is minimal due to the different types of chemical used to produce them. Recycled plastics can be contaminated by mixing different types of materials and chemicals. Another hindrance to recycling is that the separation of plastic from non-plastic materials consumes a lot of time and labor. Policies to manage waste have not been successful in many countries, according the UNEP. Waste management is set to improve by not only recycling but also reducing production and reusing. However, developing countries do not regulate production, a UNEP report shows. The federal government is, however, working towards ensuring environmental friendly conditions, by setting up strategies and policies to regulate industries and factories on plastic production. The Environmental Protection Authority (EPA) of Ethiopia assesses and requires plastic to have a thickness of at least 0.003mm. When it comes to recycling, only a handful of companies deal with plastic.

Thirteen plastic recycling investment projects have been registered at the Ethiopian Investment Agency (EIA) since 1993. To date, only two are operating. An expert from the EIA defends that, since chemicals used for recycling are expensive, the country could not recycle plastic bottles until now. Most companies collect plastic bottles, crush them, and export them to China, India, or South Korea, according to Abiot Ashagre, an expert in chemical and metal projects working

with the EIA. ―Investors are also unwilling to invest in a recycling company, as the income generated from the project is low," Abiot said. ―The government also has the responsibility to encourage investors in recycling projects and not only encourage huge investors in the country." Recycling of packaging waste minimizes the demand for resources needed for its disposal and also minimizes pollution after the product is used.

Lack of waste management strategies by companies is the main hindrance of companies linked to the production of the plastics, the UNEP report concluded. An official from Classy Water Springs, who requested anonymity, admitted that the company did not have any follow-up management of used bottles after distribution of water from the factory. However, the factory, like its counterpart Great Abyssinia, has a plan to begin recycling plastic bottles. Abyssinia plans to establish a bottle recycling firm in July 2013. The company expects to buy empty bottles from distributors, who collect the plastic bottles from end users. The distributors will be drawn from all regions, and the company will buy the bottles back in cash, according to Tewodros Zerihun, Deputy General Manager of Abyssinia's factory. To help encourage recycling, the US Embassy launched a recycling project in 2009. The embassy collects plastic bottles from other embassies and diplomatic residences as a way of helping to keep the environment clean by reducing, reusing, and recycling plastic materials. After collecting the plastics, the Embassy later supplies them to plastic recycling companies. One of the beneficiaries, Aqua pure General Trading Company, a distributer of different plastic materials, packs the bottles in large manila sacks at the company's compound in Saris. To minimize space, the plastics are then chopped into small pieces and stored in a collecting bucket. Recycling of waste products is economical and also reduces carbon emissions, which developing countries are trying to do, according to Calvin Atuwamba, an environmental expert working at the UN Economic Commission for Africa (ECA).

Currently, the debate on climate change and environmental conservation is dominating world forums, with countries striving to implement a green economic strategy. Such a strategy sets up standards to reduce carbon emissions. During the recent World Environment Day, commemorated on June 5, 2012, it was revealed that 23pc of deaths in Africa are linked to environment and climate impacts. Plastic bottles play a huge role in environmental pollution,

since most products sold are made of plastics or packaged in them, both ending up not recycled but dumped in landfills or burnt. Recycling saves on landfill space, since a plastic bottle takes an average of 500 years to biodegrade. ―The recycling of plastics helps in the reduction of greenhouse gases created during the production of new products and also keeps the environment friendly," (Addis fortune, July 08, 2012).

According to the American Chemistry Council, about 1,800 US businesses handle or reclaim post-consumer plastics. Plastics from MSW are usually collected from curbside recycling bins or drop-off sites. Then, they go to a material recovery facility, where the materials are sorted by plastic type, baled, and sent to a reclaiming facility. At the facility, any trash or dirt is sorted out, then the plastic is washed and ground into small flakes. A flotation tank may be used to further separate contaminants, based on their different densities. Flakes are then dried, melted, filtered, and formed into pellets. The pellets are shipped to product manufacturing plants, where they are made into new plastic products.

2.4.1 Coca-Cola Company

There is indeed a story in every one of our bottles—and in our can and other packages, too. It is the story of increasing efficiency, Innovation, A passion to promote recycling and renewable materials and a global vision over the long-term of zero waste. We are advancing that vision by: Designing consumer-preferred, resource-efficient packaging; eliminating landfill waste; Using recycled and/or renewable materials. As we strive to improve our packaging, we balance environmental concerns with our need to protect product quality and manufacturing as well as our need to transport products economically. Our approach is increasingly informed by an understanding of particular packaging needs in different locations around the world and by the impacts of various packages over their entire lifecycle (http://www.coca-colacompany.com/sustainabilityreport/world/sustainable-packaging.html#section-looking-ahead-industrywide-metrics).

2.5 Environmental Policies and Legal Frame Works

Solid waste collection policy; the solid waste collection policy in Addis Ababa has been decided by the city administration. According to the existing policy, solid wastes are collected by the

government employees, private companies based on contractual agreements and micro and small enterprises. However the principal stating that the waste procedures are subject to put their wastes in to different containers based on specific type of wastes is not practiced in the city (Asian network for scientific information, 2014).

The overall policy goal is to improve and enhance the health and quality of life of all Ethiopians and to promote sustainable social and economic development through the sound management and use of natural, human-made and cultural resources and the environment as a whole so as to meet the needs of the present generation without compromising the ability of future generations to meet their own needs (environmental policy of Ethiopia).

2.5.1 Ethiopian Environmental Policies and Solid Waste Management Standards

–Solid waste" means anything that is neither liquid not gas and is discarded as unwanted. –Solid waste management" means the collection, transportation, storage, recycling or disposal of solid waste, or the subsequent use of a disposal site that is no longer operational (EFDRE proclamation No. 13, Feb 2007).

Urban administrations may transfer the following responsibilities to their lowest administrative units; The formulation and implementation of action plans on solid waste management ;ensuring the installation of marked waste bins by streets and in other public places; ensuring the collection of solid wastes from waste bins with sufficient frequency to prevent overflow; planning and carrying out public awareness raising activities; ensuring that measures are taken to prevent pollution arising from the mishandling of solid wastes (EFDRE proclamation No. 13, Feb 2007 article 5/4).

Control of Hazardous Materials and Pollution from Industrial Waste

The Policies are: (EFDRE proclamation No. 13, Feb 2007 article 5/4).

a) To adhere to the precautionary principle of minimizing and where possible preventing discharges of substances, biological materials or their fragments from industrial plants and personal or communal appliances or any other external sources that could be harmful, and to disallow the discharge when they are likely to be hazardous;

b) To adopt the "polluter pays" principle while endorsing the precautionary principle since pollution is likely to occur, and ensure that polluting enterprises and municipalities and wereda councils provide their own appropriate pollution control facilities;
c) 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;
d) To provide adequate regulation of agricultural (crop and livestock) chemicals and micro-organisms;
e) To ensure that pollution control is commensurate with the potency, longevity and potential to increase or reproduce of the pollutant;
f) To establish safe limits for the location of sanitary landfill sites in the vicinity of wells, bore holes and dams, and issue regulations to enforce them;
g) To review and develop guidelines for waste disposal, public and industrial hygiene and techniques to enable the cost-effective implementation of defined standards of control, and to issue regulations to enforce them;
h) To formulate and implement a country-wide strategy and guidelines on the management of wastes from the medical, agriculture and other sectors that may use potentially hazardous biological organisms, their fragments or chemicals, and to issue the necessary regulations to enforce them;
i) To establish a system for monitoring compliance with land, air and water pollution control standards and regulations, the handling and storage of hazardous and dangerous materials, mining operations, public and industrial hygiene, waste disposal, and water quality.
j) To maintain an up-to-date register of toxic, hazardous and radioactive substances, and to make the information available on request;
k) To maintain regular environmental audits to ensure the adoption of environmentally sound practices in all public and private development activities including industrial and mining operations;

l) To enforce the exhaustive labeling and detailing of the contents usage and expiry date of foods, drugs, cosmetics, other chemicals, and when any of the contents are poisonous or dangerous in any other way, the fixing of strikingly visible labels to that effect;

m) To promote waste minimization processes, including the efficient recycling of materials wherever possible;

n) To create by law an effective system of control, distribution, utilization and disposal after use or expiry of chemicals, biological organisms or fragments of organisms that could be hazardous but are required for use;

o) To prohibit from importation to and from transit through Ethiopia hazardous materials, organisms or fragments of organisms as agreed by African states in Bamako;

p) To hold as legally liable an employer who deploys employees in using or handling hazardous materials without adequately training them on how to deal with the hazard and without adequate equipment to protect each one of them for physical harm or disease that is caused by working conditions whether the harm or disease starts in the place of work or away from it;

q) To foster better understanding of the dangerous effects of chemicals and organisms and their fragments through the provision of information in a form understandable to users, and provide or enforce the provision of information on the appropriate methods and technologies for the treatment and disposal of wastes(EFDRE proclamation No. 13, Feb 2007 article 5/4).

2.6 Participants in Plastic Waste Recovery

2.6.1 Role of Qorale‟s

Urban administration shall create enabling conditions to promote investment on the provision of solid waste services. Any person shall obtain a permit from the concerned body of an urban administration prior to his engagement in the collection, transportation, use or disposal of solid waste (EFDRE proclamation No. 13, Feb 2007 article 4/1&2).

2.6.2 Roles of micro and Small Scale Enterprises

Ethiopian government has given priority to micro and small-scale industries which have a significant contribution to the development of the country. In the Ethiopian context, MSE is defined as:-

- Micro – Enterprises are those enterprises with a paid up capital of not exceeding birr 20,000 and excluding high - tech consultancy firms and other high establishments.
- Small Enterprises are those enterprises with a paid up capital of above birr 20,000 and not exceeding birr 500,000 and excluding high-tech Consultancy firms and other high – tech establishments (Addis Ababa city Administration urban development indicators finance & economic development bureau august, 2002).

2.6.3 Importance of Community Participation in Solid Waste Management

Coordination and integration of all stakeholders plays pivotal role for the successful implementation of a plan. In managing urban solid wastes the source as well as the solution for the problem is the community. For the effective segregation, collection, transportation, reuse, recycling and final disposal of used plastic bottles and other solid wastes it is better to begin from creating mutual understanding on the negative effects of poor solid waste management on the environment and human health. Then after, the community will have a sense of ownership to solve the problem and become the mechanism to reduce, recover, reuse and recycling of solid wastes. That is why the government of Ethiopia clearly specified the importance of community participation for effective solid waste management as follows.

Urban administrators shall ensure the participation of the lowest administrative levels and their local communities in designing and implementing their respective solid waste management plans (EFDRE proclamation No. 13, Feb 2007, art 5/1).

The head of each house hold shall ensure that recyclable solid wastes are segregated from those that are destined for final disposal and are taken to the collection site designed for such wastes (EFDRE proclamation No. 13, Feb 2007, art 11/1). According to this article sub article 3 it is prohibited to dispose of litter on streets, waterways, parks, bus stops, train stations, sport fields, water bodies in urban areas or in other public places while litter bins are available.

But the reality on the ground is in reverse to the proclamation because solid wastes thrown here and there on these mentioned areas especially plastics are observed. The proclamation says as far as the waste bins are available the main problem is the absence of these dust bins and lack of awareness to use for disposal of wastes and in addition to this the bins are not marked as to put recyclables and other types in different places and all wastes are thrown together and there is contamination problems of recyclable wastes.

So far the researcher has described the formal solid waste management system in Addis Ababa, and it has become clear that the municipality‘s role in plastic recycling is absent and that they mainly focus on collection, storage, transportation, and disposal of solid waste. As a consequence, most of the collection of plastic for reuse and recovery in the city is performed by the informal sector in the absence of the government provision (Bjerkli, july 2005).

Community Participation and the Environment

The Policies are:

a) To ensure that all phases of environmental and resource development and management, from project conception to planning and implementation to monitoring and evaluation are undertaken based on the decisions of the resource users and managers;
b) To reorient management professionals employed in natural resource and environmental extension programs to embrace participatory development, and to strengthen their communication skills so as to more effectively disseminate both the results of scientific research and the practical experience of local farmers;
c) To develop effective methods of popular participation in the planning and implementation of environmental and resource use and management projects and programs;
d) To develop the necessary legislation, training and financial support to empower local communities so that they may acquire the ability to prevent the manipulated imposition of external decisions in the name of participation, and to ensure genuine grassroots decisions in resources and environmental management;
e) To authorize all levels of organization to raise funds locally from the use of natural resources to fund the development, management and sustainable use of those resources;

f) To greatly increase the number of women extension agents in the field of natural resource and environmental management; and

g) To ensure information flow among all levels of organization including the Federal and Regional States and the people at the grassroots level by developing a two way mechanism for data collection and dissemination (Ethiopian environmental policy).

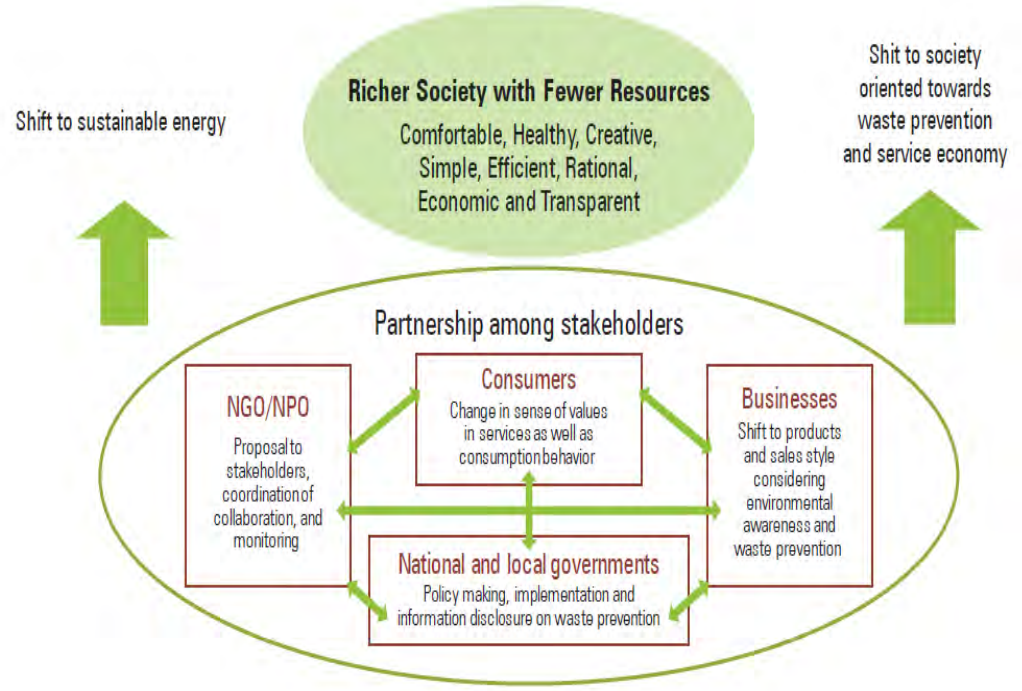


Figure 2-2: Adopted from Friends of Earth Japan 2013

According to the report of fiends of earth (FOE) the aim of environmental protection is to create richer society with wise utilization of fewer resources by making resources comfortable, healthy, creative, efficient, rational, economic and transparent. To realize this, collaboration among national and local governments, consumers, NGOs, and businesses should be given more emphasis. Local and national governments must play their role through policy making, implementation and information discloser on waste prevention and management; Businesses should consider the environmental awareness and waste prevention by shifting to products and sales styles; nongovernmental organizations prepare proposals to stakeholders on the coordination of collaboration and monitoring the waste prevention and management process and

consumers create awareness‘s and change in sense of values in services as well as consumption behavior. The sum of all efforts and attitudinal changes of the stakeholders in collaboration can achieve the environmental objectives.

Reverse logistics on used plastic bottles also need similar collaboration among the stake holders which are the government, plastic bottled water and soft drink manufacturing companies, the consumers, used plastic bottle collectors and recycling companies. Based on this the expected outcome of this study is just to assess the current performance of stakeholders forwarding recommendations to save the environment from the negative impacts of plastic bottles thrown everywhere after usage.

2.7 Corporate Social Responsibility and Environmental Protection

In today‘s business world environmental conservation from any type of pollution is becoming a serious issue by governments and the society giving more emphasis on the factors which can affect them in short or longer time period. Due to this reason manufacturing industries should take in to consideration their social responsibility in protecting the climate and the health of themselves and their society to build good image for their company which may lead for raising sales in the long run. Currently this principle can ideally be supported by many but rarely implemented and companies are focusing on their short term increase in profits and marketability of their products irrespective of the adverse effects of their liquid, solid and gaseous wastes of their production.

While promoting economic development, logistics activities also increase the quantity and frequency of related activities, increase energy consumption, aggravate air pollution and waste pollution, and bring many side-effects on economic sustainable development of the whole society (International Conference on Industrial Engineering and Operations Management Bali, Indonesia, January, 2014).

It‘s easy to make hollow promises lauding ―corporate social responsibility,‖ but more and more companies and businesses are seeing that actions do indeed speak louder than words. The age of the conscious consumer and conscious public is upon us, and firms will naturally be increasing their self-generated waste recycling efforts, as well as being more vocal about sustainability in general. Green washing is getting increasingly difficult to manage, as people are more vigilant

and ready to pounce on illegitimate sustainability efforts. Besides, there are upsides to businesses becoming more sustainable, like increased supply line efficiency and reductions in industrial waste. We can expect to see more of this as well-informed consumers continue to demand that the companies they buy their products from be more socially responsible and environmentally-conscious(http://www.treehugger.com/corporate-responsibility/10-recycling-and-waste-management-trends-watch-out-near-future.html June, 2014).

CHAPTER THREE
RESEARCH METHODOLOGY

Methodology describes ―the theory of how inquiry should precede" that ―involves analysis of the principles and procedures in a particular field of inquiry." It involves the researchers' assumptions about the nature of reality and the nature of knowing and knowledge. In other words, methodology represents ―a theory and analysis of how research does or should proceed." Methodology encompasses our entire approach to research. The assumptions about what we believe knowledge is are embedded in methodological discussions and therefore have consequences for how we design and implement research studies (Abiy Zegeye, Alemayehu Worku, Daniel Tefera, Melese Getu and Yilma Sileshi, 2009).

3.1 Research Design

Exploratory research method was used to meet research objectives. Exploratory research is less formal, sometimes even unstructured and focuses on gaining background information and helps to better understand and clarify a problem. It can be used to develop hypotheses and to develop questions to be answered (Abiy Zegeye.et.al, Sep 2009). Particularly a survey research method is appropriate for this thesis in order to obtain the required data in relation to the assessment of reverse logistics on used water and soft drink plastic bottles in Addis Ababa city from different stake holders through different data collection materials. Because survey research is surveys gather data at a particular point in time with the intention of describing the nature of existing conditions, or identifying standards against which existing conditions can be compared, or determining the relationships that exist between specific events. They may vary in their levels of complexity and in terms of their scope. Typically survey method is used to scan a wide field of issues, populations, programs etc. in order to measure or describe any generalized features (Abiy Zegeye.et.al, Sep 2009).

3.2 Sample Size and Sampling Methods

As the aim of this research is to describe and investigate reverse logistics activities on used water and soft drink plastic bottles in Addis Ababa, the target populations for this study are; micro and

small enterprises working on collecting solid wastes; plastic packaged water and soft drink manufacturing companies for Addis Ababa market; Qorales(informal collectors of used plastic bottles), plastic bottle recycling companies and Addis Ababa City Administration Solid Waste Management and Cleansing Agency. In order to collect accurate data in relation to the research topic from the participants at a reasonable cost and manageable time to the researcher purposive sampling technique is used. This sampling technique is preferred for the study by the assumption which is the responses of participants in the same target population group but located in different locations was assumed to be similar and cost and time difficulties to reach the 10 sub cities and 99 kebeles of the city. Finally using this sampling technique 70 micro and small enterprise members colleting solid waste in Arada Sub City; Gulele Sub City and Yeka Sub City; 50 Qorales selling their collected plastic bottles in "Merkato Minalesh tera" ; COBA IMPACT PLC plastic recycling company; plastic packaged water and soft drink producers and Addis Ababa City Administration Solid Waste Management and Cleansing Agency were taken as a sample for the study.

3.3 Methods of Data Collection

To conduct this research both primary and secondary sources of data were used. Primary source of data gives first hand information from the stakeholders or the selected participants of the study through observation, self-administered questionnaires and structured interview questions. Data was also obtained from different books, previous research works, government legislations, directives and manuals in relation to the research title. Both qualitative and quantitative approaches of research were followed and self-administered questionnaires were prepared and distributed to the participants selected from the micro and small scale enterprises and 'Qorales' collecting and selling plastic bottles. Structured and unstructured interview questions were also prepared to gather data about reverse logistics on used plastic bottles of water and soft drinks in the city from COBA IMPACT PLC, plastic packaged water and soft drink producing companies in Addis Ababa and Addis Ababa City Administration Solid Waste Management and Cleansing Agency.

3.4 Data Quality Assurance

Reliability in a research work is affected by the possible error emanating from the employed instruments. The similarity of results from employing the same tools in different operations is one of the methods for assuring reliability of research. To ensure the quality and validity of the data, data collecting tools were carefully developed and adopted from previous research conducted by Camilla Louise Bjerkli on the title plastic wastes and informality as a solution on 2005 and evaluated by logistics professionals currently working on the area to check whether the tools can help the researcher to gather the required data or not and based on the comments given the tools were revised and also translated to local language Amharic to make easily understandable by the respondents. Then after reliability was measured using the cronbache's alpha from the pilot study and registered 0.794 which is acceptable and shows the reliability of the instruments. During the data collection time due to the inconvenience and illiteracy of the respondents the researcher was enforced to read the questions and write the responses which was very time consuming and tiring but helpful for the collection of valid data. So the above situations can be taken as supporting factors for the collection of valid and reliable data.

3.5 Plan of Data Analysis

After collecting the required data through the data collection tools, data was processed following the next stages; the raw facts/ data/ was made ready for data analysis. The collected data first was edited through field and office editing; the edited data was coded. Data gathered from participants was analyzed by classifying as quantitative and qualitative approaches. Data collected in the quantitative approach was analyzed using percentages (%), frequencies and SPSS (statistical package program for social sciences) to process the data and look at the effectiveness and factors affecting the success of plastic bottle reverse logistics. Qualitative data gathered through open ended questions and interviews was coded, classified as per their similarity on their characteristics, and conclusion drawing, verification of the qualitative data and possible comparison was done.

CHAPTER FOUR
DATA ANALYSIS AND DISCUSSION

4.1 Introduction

As mentioned in the third chapter the next step after data collection is the analysis and interpretation of data in order to come up with meaning full explanations about the research problem and recommendations to solve the problems. The objective of this thesis is to assess the reverse logistics process in relation to the collection, separation, transportation, storage and recycling on used water and soft drink plastic bottles or PET plastic bottles in Addis Ababa city administration and to identify the problems and forward possible solutions for the problems in order to improve the process and minimize the environmental impacts related with using PET plastics as packaging material for food and beverage products and creating environment friendly green logistics which can in parallel create balanced economical and environmental strategies to achieve both organizational and environmental goals simultaneously.

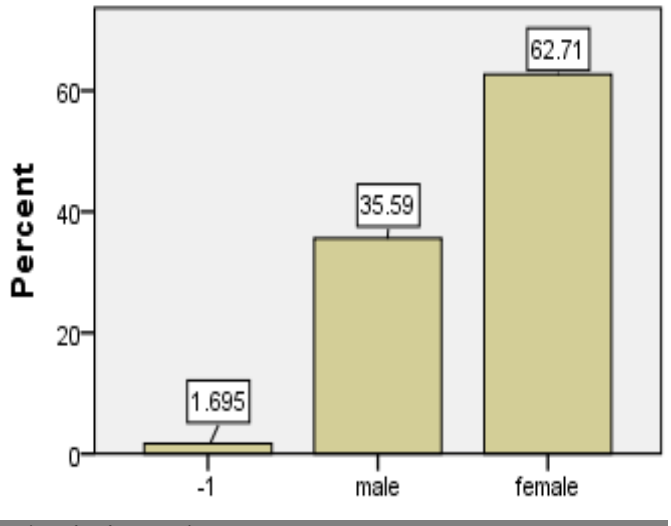
Data is the main resource which enables researchers to investigate the problems and reach in conclusions and recommendations. In this research primary and secondary source of data were used. Self-administered questions, structured and unstructured interviews and observation was done to obtain data from primary sources. Different proclamations, standards, regulations, researches, journals and related literatures were the secondary sources as revised on the literature review part.

This chapter shows the detail analysis of the data coded, defined on the SPSS software, entered and processed using categorizations, graphs, tables, frequencies and percentages to summarize data. The analysis begins with the data collected by self administered questions from the micro and small scale enterprises and Qorale‘s using the outputs from SPSS and the information obtained from interviews and observation was analyzed and interpreted by attaching to similar variables to strengthen the quantitative data and separately by giving their own title.

4.2 Demographic Profile of Respondents

4.2.1 Gender Distribution of the Members of Small Scale and Micro Enterprises

Figure4-1: Gender Distribution of Micro and Small Scale Enterprises

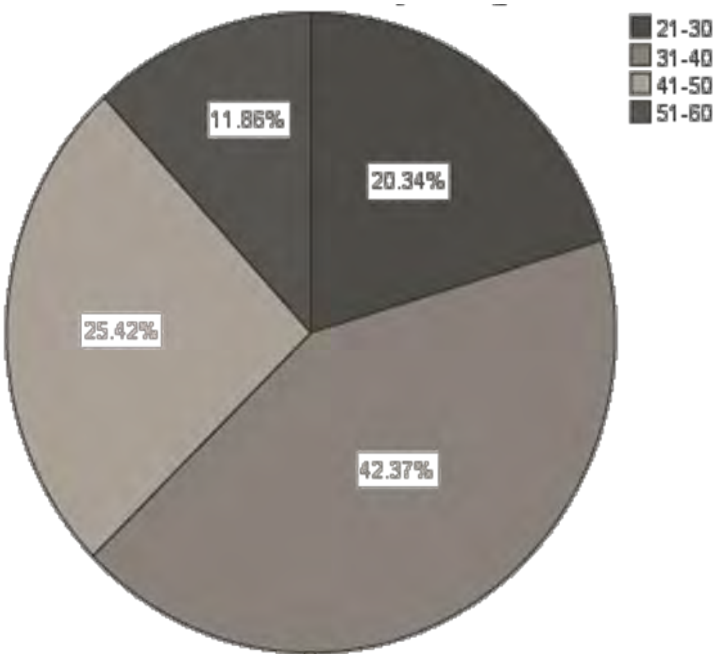


-1* missing value. Source: Own survey, 2015

As we observe from the above bar graph 4.1 the sex distribution of the 59 respondents from micro and small scale enterprises 37 (62.7%) are females and 21(35.6%) are males. This indicates that majority of the members of the enterprises are females. Having large number of females on such activities can be seen positively as an indicator of high involvement of women on the created job opportunities and poverty reduction in the economy. Solid waste collection and disposal in the city uses human power to handle the push carts and hold a sack of solid wastes on their back to the point where the push cart is located. So in this case the support of men is very important in order to successfully perform their day to day activities of waste collection in order to earn better income which is dependent on the amount of solid waste collected by the enterprises.

4.2.2 Age Distribution of Respondents

Figure 4-2 Age Distribution of the Respondents

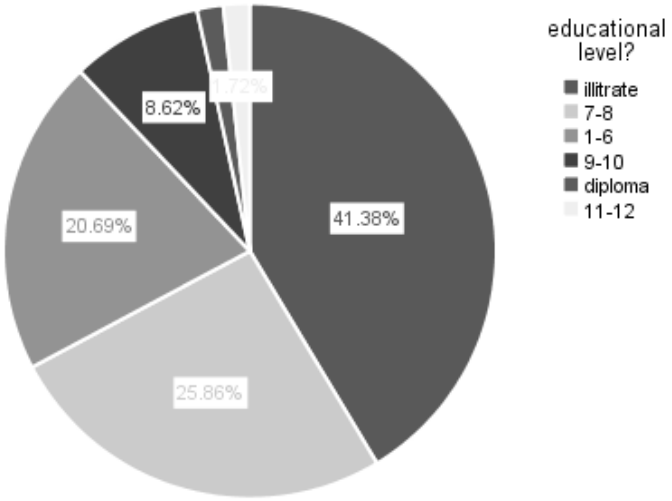


Source: Own survey, 2015

The above pie chart 4-2 shows the age distribution of the MSE's participated in the study. Majority of the respondents are in the age group from 31 to 40 years which is (42.37%) followed by the age categories from 41 to 50 years (25.42%), from 21 to 30 years (20.34%) and the least number is from 51 to 60 (11.86%) age category. In this result the number of age group from 21 to 30 years is not enough because this age group is the most productive and energetic force when relatively compared with other age groups and an increase in the number of youngsters can solve youth unemployment and bring sustainable environmental solution by giving continuous training to enhance entrepreneurial quality, encouraging creativity and innovation.

4.2.3 Educational Background of SME Members

Figure 4-3: Educational Level of the Respondents



Source: Own survey, 2015

The data in Pie chart 4-3 shows the educational level of the MSE members working on the collection of solid waste and used plastic bottles for recycling purpose. Of the total 59 respondents 58 respondents give response for the question asked about their educational level and 1(1.72%) of the respondents have diploma, grade 11-grade 12 1(1.72%), 5(8.62%) are from grade 9 to grade 10, 15(25.86%)grade7-grade 8, 12(20.62%)from grade1-grade 6 and the rest 24(40.7%) are illiterate .

From this data it can be concluded the majority of the members of the MSE‘s in Addis Ababa city are less educated and this can negatively affect operation and profitability of the business due to the in ability to easily manage material, financial, human and technological resources of the enterprises. Because education is one of the business success factors enabling to cope up with the customer‘s needs, technological advancements and environmental changes in the dynamic world.

4.3 Length of Time in this Activity

Table4-1: Length of time SME's stayed in this business

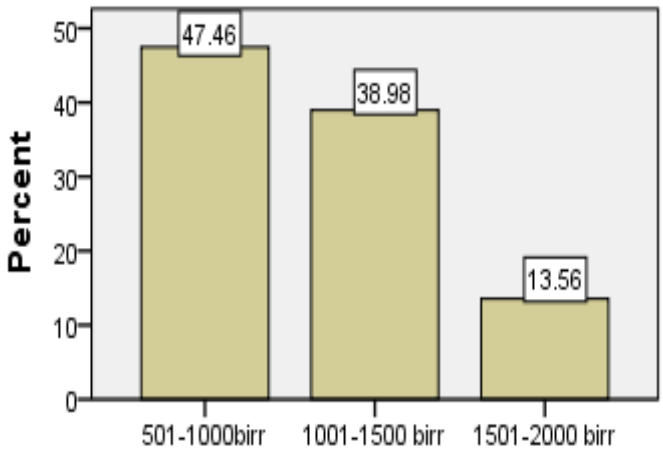
		Frequency	Percent	Valid Percent
How long have you been in this business?	1-4 years	6	10	10
	5-8 years	11	18.33	18.33
	9-12 ears	27	45	45
	Above 12 years	16	26.67	26.67
	Total	60	100	100

Source: Own survey, 2015

The above question was given to the SME members to know for how long they have been in this activity and the response from the participants of the study as shown in table 4.1; 43(71.67%) of the respondents stayed in this business for more than 8 years and 17(28.33%) claimed less than 8 years. From this we can conclude that waste collectors are more experienced but their growth progress is not satisfactory. According to the small scale and micro enterprises strategy they are expected to be transferred to middle industry within five years of operation but they are still working as SME's.

4.3.1 Amount of Income Earned from the Business

Figure 4-4: Monthly income level from solid waste collection



Source: Own survey, 2015

As shown on the above bar graph 4.4 the response given about the income level earned from collecting solid wastes is; from birr 500- birr 1000 earned by(47.46%) of the respondents, birr 1001- birr 1500(38.98%) and 13.56% of the respondents said that the monthly income is from birr 1501-birr 2000. The above figure shows majority of the members of MSE's organized in solid waste collection are earning monthly income less than birr 1500 which does not seem attractive for other unemployed people and even not satisfactory for the members of MSE's themselves in relation to the health risks, low social acceptance of the sector and the high cost of living in the city. While collecting the data the researcher asked some unstructured questions for more information and the response of the majority of the members was ~~it~~ is better than nothing", they were comparing the income and task not with other similar activities but saying it is better than unemployment and sitting home without any source of income.

Collecting plastic bottles separately from other solid wastes is not the primary task of SME's rather they are collecting to supply for the recycling company according to the memorandum of understanding signed between COBA IMPACT PLC and Addis Ababa solid waste management and cleansing agency to sell the products at a price of birr three for 1kg of collected bottles. To get understanding on how much they are earning from this activity one open ended question was raised. The question was how much do you earn in a month from collecting used plastic bottles in birr? The participants of the study said that the average amount collected by one enterprise per month is about 3quintals of PET bottles multiplied by selling price birr 300 the total earning for the enterprise is about 900 birr. And the personal earning depends on the number of members so the average individual income from PET bottle collection is birr 85-90 which is not proportional with the amount collected and the efforts and risks taken to separate and collect the materials. Lower earning is one challenge of collection and recycling of plastic bottles because decrease in the income earned from this activity discourages SME's from collecting more amounts and creates an opportunity to increase the number of plastic bottles freely thrown any where polluting the environment.

4.3.2 Attitude of the Respondents towards the Income Level

Table 4-2: Attitudes of respondents towards the income level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-1	4	6.8	6.8	6.8
	lower	38	64.4	64.4	71.2
	moderate	14	23.7	23.7	94.9
	good	3	5.1	5.1	100.0
	Total	59	100.0	100.0	

-1*missing value Source: Own survey, 2015

Table 4.2 shows the attitudes of MSE's members on the monthly income earned from the collection and sale of solid wastes and related activities. As we can see from the above table 4.2 the members of MSE's answer to the level of income is; 4(6.8%); 38(64.4%) said the income is lower, 14(23.7%) respondents said moderate and 3(5.1%) answered the income is good. We can conclude from this that, more than 60% of the MSE's members believe the income they earn is lower. In addition to the weak culture of choosing activities which affects the sanitation of our clothes and hands, the low income from solid waste collection can discourages other people not to join this sector.

4.3.3 Reasons for Starting the Business

Table 4-3: Reasons of MSE's members to start this business

		Responses		Percent of Cases
		N	Percent	
Why did you start this business?	time and place freedom	9	8.5%	15.5%
	lack of other alternative source of income	46	43.4%	79.3%
	low skill/low education	26	24.5%	44.8%
	peer/group influence	6	5.7%	10.3%
	higher income from the task	4	3.8%	6.9%
	to make clean the environment	15	14.2%	25.9%
Total		106	100.0%	182.8%

-1*missing value Source: Own survey, 2015

As table 4-3 demonstrates lack of another option of income ranked first by the respondents which is 46(43.4%) and low skill/ low education is also another factor 26 respondents or 25.4% answered as their reason, to make the environment clean 15(14.2%), time and place freedom 9(8.5%), high income from the tasks and peer/group influence are least chosen reasons. So the main reasons the members organized in collecting solid waste management as micro and small enterprises are lack of another better alternative source of income and low educational level. So we can be sure that these members can leave this business one day when they get another option of income. If this happened the currently unsuccessful solid waste management sector in our city will be aggravated due to its less attractive income and socially unacceptable working environment. Failure in this will lead to the decrease in the collection of the used plastic bottles as one of the solid waste materials and this will damage the city‘s good looking as well as breathing of clean air by the residents as well as the tourists and others visiting the countries capital.

4.3.4 Sources of Used Plastic Bottles

Table 4-4: Sources of used plastic bottles

		Responses		Percent of Cases
		N	Percent	
From where did you collect plastic bottles?	house holds	41	22.2%	69.5%
	Shops	27	14.6%	45.8%
	hotels and restaurants	41	22.2%	69.5%
	Universities	38	20.5%	64.4%
	hospitals and clinics	26	14.1%	44.1%
	others specify	12	6.5%	20.3%
Total		185	100.0%	313.6%

-1*missing value Source: Own survey, 2015

This question was raised to identify the main sources for the used plastic bottles and the results are depicted on table 4-4 and main sources are described as; 41(22.2%) respondents said households, again the same number 41(22.2%) hotels and restaurants, 38(20.5%) from universities and other educational institutions, 27(14.6%) from shops, and 26(14.1%) said

hospitals and clinics and 12(6.5%) from other sources like streets, stadiums, bus stations, government offices, small and large scale industries etc. as indicated on the table 4-4 households, hotels and restaurants and universities and other educational institutions are the major sources for used plastic bottled followed by shops, hospitals, and clinics. Identifying the major sources enables collectors and recyclers to give more emphasis and create awareness about the separation, collection and marketing of the empty plastic bottles.

4.3.5 Handling of Plastic Bottle by Customers

Table 4-5: plastic bottle handling by customers

		Responses		Percent of Cases
		N	Percent	
How did customers handle plastic bottles?	put together in a sack with other house hold solid wastes	52	42.3%	91.2%
	put on separate recycling bin and sell it	24	19.5%	42.1%
	throw any where	42	34.1%	73.7%
	other specify	5	4.1%	8.8%
Total		123	100.0%	215.8%

-1*missing value Source: Own survey, 2015

Table 4-5 shows what customers do with used plastic bottles after drinking the water or the soft drink. As depicted in the table majority of the respondents which are 52(42.3%) said that users put empty plastic bottles together with other solid wastes and give to solid waste collectors,42(34.1%) said they throw anywhere and 24(19.5%) answered that users put used bottles on a separate recycle bin and sell it to collectors while 5(4.1%) respondents choose other specifying as reusing for storing holly water, water refilling and drinking material, oil and other cultural drinks; uses as a decoration using the combination of different colored bottles on trees and flower and other plants. This data shows the problem of used plastic bottles from the users or at a consumer‘s level. Because we can approve this through observing the drainages in our residential areas closed by these bottles thrown by consumers and we can also observe people adding plastic and other wastes and at the same time closing their noses to protect the bad smell created as a mixture of solid and liquid wastes. Many residents in the city are carelessly throwing

plastic wastes and others to the everywhere without giving due care for their environmental and health problems which directly and indirectly affecting quality of life.

4.3.6 Solid Waste Related Additional Activities

Table 4-6: solid waste related additional activities performed by MSE's collectors

		Responses		Percent of Cases
		N	Percent	
What solid waste related tasks do you have?	waste collection	49	54.4%	90.7%
	Recycling	4	4.4%	7.4%
	Composting	5	5.6%	9.3%
	waste disposal	28	31.1%	51.9%
	other specify	4	4.4%	7.4%
Total		90	100.0%	166.7%

-1*missing value Source: Own survey, 2015

As depicted in table 4-6 the respondents were asked to respond for their choices of solid waste related activities they perform and their responses shows that the main task is solid waste collection 49(54.4%) and waste disposal by 28(31.1%), recycling and composting are least chosen by 5% of the total respondents. 4(4.4%) of the respondents selected the option which says others specify but any one of them didn't specify solid waste related activities. We can conclude from this the members are not performing tasks like recycling and composting of the collected wastes which is the reason for lowering the income. Adding another additional activity creates other additional source of income and makes them to have long range goals and further invest and change their economy in this sector sustainably solve the problem through changing trash in to cash.

4.3.7 Plastic Bottle Buyers

Table 4-7: Buyers of collected used plastic bottles

		Responses		Percent of Cases
		N	Percent	
Who are the buyers of used plastic bottles?	Recyclers	48	53.3%	82.8%
	used plastic bottle retailers	18	20.0%	31.0%
	used plastic bottle wholesalers	17	18.9%	29.3%
	Individuals	4	4.4%	6.9%
	others specify	3	3.3%	5.2%
Total		90	100.0%	155.2%

-1*missing value Source: Own survey, 2015

As shown in the above table 4-7 MSE‘s members responded for the question which is asked to get clear understanding on the availability of buyers for plastic bottles they collected. 48(53.3%) said we sell to recycling company, 18(20%) sells to retailers of used plastic bottles and 17(18.9%) are wholesalers. 3(3.3%) of the respondents specified that churches, mosques and chat houses as other additional buyers of used plastic bottles from collectors. So this indicates that the major buyers of the used plastic bottles are recycling companies. The data obtained from COBA IMPACT PLC through interview shows that, memorandum of understanding was signed between Addis Ababa city solid waste management and cleansing agency and the COBA IMPACT plc to receive the used plastic bottles collected by about 608 micro and small scale enterprises organized in this type of business. Currently in relation to this the recycling company said we have the capacity to recycle the used plastic bottles even from other cities of the different regional states in the country by giving the compressing machine in order to minimize transportation costs. So the availability of a recycling company with huge capacity is one green light for the green logistics of plastic bottled products, But cannot give a full guarantee in alleviating plastic bottle related environmental problems since the awareness and the commitment of the society in handling, separation, collection and transportation of used plastic bottles back to the recyclers are the main contributing factors to the successful recycling of these packaging materials.

Technology Used by the firm to Collect, Store and Transport Plastic Bottles

Technology is one production factor which can make difference on the quantity and quality of the products and the SME's were asked to describe the technologies they use during separation, collection, storage, and transportation of used plastic bottles and their response to this question was similar. Almost all of the SME collectors use push carts and large sacks only. Using technologies like pressing machines can help collectors to reduce the volume of plastic bottles and make them cost effective through minimizing storage space and space during transportation.

4.3.8 Availability of Enough and Safe Storage System

Table 4-8: availability of safe and enough storage places for plastic bottles

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-1	6	10.2	10.2	10.2
	yes	13	22.0	22.0	32.2
	no	40	67.8	67.8	100.0
	Total	59	100.0	100.0	

-1*missing value Source: Own survey, 2015

Plastic bottle reverse logistics needs safe storage space and the members of SME's were asked about the availability of the storage space and 40(67.8%) said we don't have safe and enough storage space for the collected used plastic bottles and 13(22%) said we have enough storage space for the collected items. The information obtained from interviews and physical observation of the storage space shows that they are storing collected materials simply around the streets exposed to different safety threats. Even the enterprises don't have offices to put their materials and working clothes. So this shows that the focus given for the sector is not proportional to the importance of the service they are providing for the environment.

4.3.9 Usage of Safety Materials

Table 4-9: safety materials utilization level by the SME members

	Never	Rarely	sometimes	Always	total
Hand gloves	6	13	17	22	58
Safety shoes	29	20	8	2	59
Nose and mouth mask	26	19	10	3	58
Hats	8	12	15	24	59
Reflective cloths	38	14	4	2	58
Total	107	78	54	53	

Source: Own survey, 2015

As shown on the above table 4-9 the researcher asked SME members to rank usage of personal protective safety materials during the collection time of solid wastes and separating of the recyclables. 22(37.2%) respondents claim to use hand gloves in a regular way and some others not totally using or rarely. About 29(49%) never use safety shoes rather they handle their tasks using their normal shoes including slippers with socks.SME members use their scarps and other clothes to protect their mouth and noses from bad smell and small solid waste particles, but 26(44%) said they didn‘t use standardized masks. The other personal protective which used by the majority 24(40.6%) of the waste collectors was hats in addition with other personal clothes covering their heads as well as their faces for safety purpose and to hide themselves from the vision of the community in order not to lose their social acceptance. Use of reflective clothes is also another personal protective material indicating vehicles the existence of sanitation workers in front of them and take the necessary precautions during the night time because the cleaning and sanitation workers begin cleaning streets starting from the night time 10 o‘clock in Ethiopian calendar. In general the usage of personal protective clothes by the small and micro enterprises in Addis Ababa city is poor in relative to the risks attached with the solid waste collecting activities.

4.3.10 Future Expansion Plan

Table 4-10: SME's expansion plan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-1	6	10.2	10.2	10.2
	yes	13	22.0	22.0	32.2
	no	40	67.8	67.8	100.0
	Total	59	100.0	100.0	

-1*missing value Source: Own survey, 2015

As table 4-10 demonstrates 40(67.8%) of the SME's respondents claim they don't have further expansion plan in this sector, But 13(22%) said we have a plan to expand this business. This shows that the currently organized SME members are working in this area until they get other source of income as explained on the reason to engage to this work due to lack of other source of income they will leave this business and engage in other better activity.

Major problems in relation with the transportation of used plastic bottles and solid waste

The problems related with transportation of used plastic bottles and solid waste in general as explained by the respondents are; first, they don't have any motorized or animal powered vehicles and the option for transportation is using push carts and carrying the solid waste on their backs. Pushing the carts filled with solid wastes needs more human power and carrying wastes on their back is also dangerous for health since the wastes are containing different hazardous materials. The other problem is relatively high cost of transporting used plastic bottles. The loading capacity and cost of transportation can be determined based on volume, weight and distance travelled. Plastic bottles are light in weight but can hold large volume of space which becomes beyond the vehicle's loading volume capacity while the weight very small. So those enterprises at longer distances from the premises of the recycling company are suffering with delaying and or totally stop buying from that area by taking in to consideration the value of the items and the transportation cost for transporting a long distance. Due to this reason enterprises

are becoming discouraged to collect more due to the transportation problems but which can be solved using pressing machines.

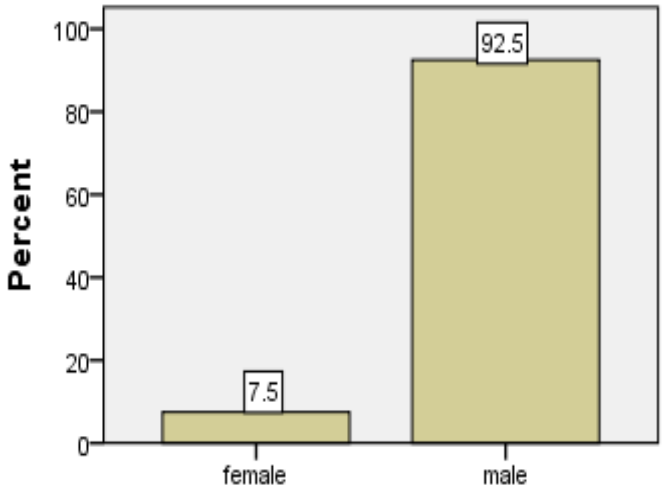
What suggestions do you have for different stake holders in order to effectively collect used plastic bottles and get advantages of environmental protection and making source of income?

The collectors of used plastic bottles were advised on the open ended question to give some comments in order to solve the problems in the area and some of the comments forwarded by them are awareness creation for the society as a whole, government support for all the collectors and recycling companies, supply of safety materials and equipments from the government, collaboration among all stakeholders to create clean environment.

4.4 Analysis of Data Collected from „Qorale‟s‟

4.4.1 Gender Distribution of Informal Solid Waste Collectors or „Qorale‟s‟

Figure 4-5: Gender distribution of solid waste collectors „Qorale‘s‘



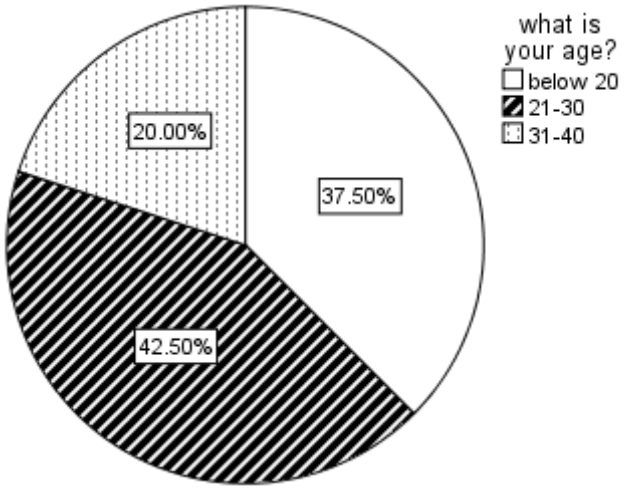
Source: Own survey, 2015

As we observed from the above bar graph 4-5 the sex distribution of the 40 respondents from informal solid waste collectors locally named as Qorale‘s 37 (92.5%) are males and 3(7.5%) are females. Since this is not formally and legally authorized job opportunity it is difficult to identify and contact the collectors. The researcher collected the data through collaboration with the

buyers of collected plastic bottles in _Minalesh tera' asking when they come to sell their collected plastic bottles.

4.4.2 Age Distribution of Qorale"s

Figure 4-6: Age distribution of Qorale's

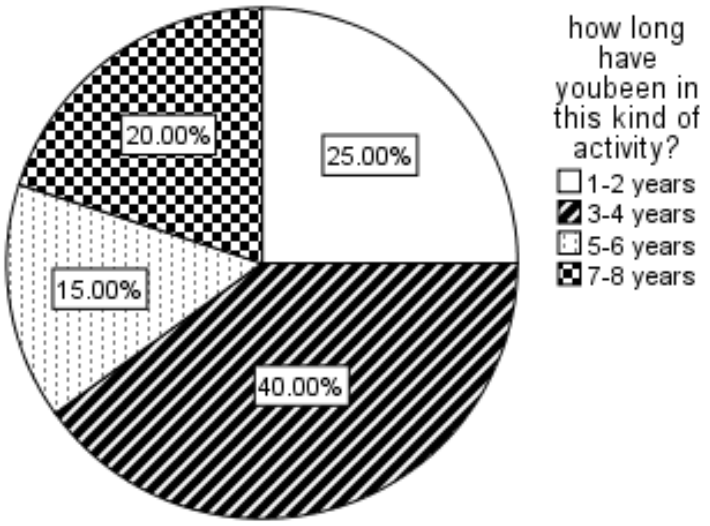


Source: Own survey, 2015

As shown on the above pie chart 4.6 majority 17(42.5%) of the respondents are in the age group between 21-30 years, 15(37.5%) are below the age 20 and 8(20%) are in the age group between 31-40 years. In comparison with the small scale and micro enterprises assigned in solid waste collection Qorale's are younger and they have a capacity to solve the environmental problems if they can be organized in to formal way and get trainings on the separation, collection, transportation, recycling, entrepreneurship, and savings in order to help them lead their lives on a formal way through their own efforts than begging than leading life in a danger way and being one of the bad image creators to the city.

4.4.3 Length of Time in this Activity

Figure 4-7: The Length of time Qorale's doing this activity

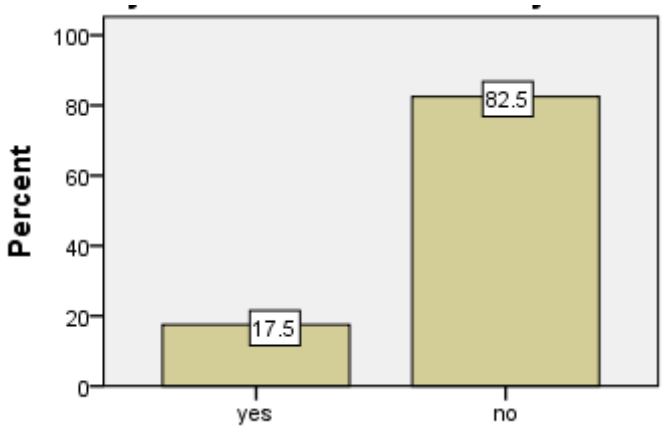


Source: Own survey, 2015

As shown in pie chart 4-7 16(40%) of the respondents have been in this activity for three to four years and 10(25%) for one to two years, 8(20%) from 7-8 years and 6(15%) for 5-6 years. The majority of the respondents stay for less than four years. Everyone can stay in a business activity whether formal or informal only if the amount of income earned is attractive or working environment is convenient. When we compare this with SME's collectors relatively they stay for longer time since they are formally organized and they have additional alternative source of income. So informality on the collection of waste materials for sale or personal use cannot guarantee the sustainable collection of wastes for recycling or reuse purpose and the sanitation of the city.

4.4.4 Availability of Additional Work Activity

Figure 4-8: Qorale‘s additional work activity



Source: Own survey, 2015

As demonstrated on the bar graph 4-8 Qorale respondents were asked if they have another additional activity and the results show that 33(82.5%) of them said we don‘t have other additional work activity and 7(17.5%) respondents said that they have other work activities in addition to solid waste collection. Interview was conducted with some of the Qorale‘s around _Minalesh tera‘ which were found selling plastic bottles and other Qorales collecting different solid waste materials from the city to acquire clear information if there is a difference between plastic bottle collectors and other materials collectors because some of the Qorales around piazza told me they did not collect plastic bottles but those who collect were different from them. The results from the interview also show that, most of the collectors of plastic bottles are street boys which are not actively and continuously performing this activity as a permanent source of income but they lead their life through begging leftover food from hotels and restaurants and collecting and selling plastic bottles in an irregular way. But most of those Qorale‘s collecting Metals, glasses, old shoes and other materials are permanent workers and use as a source of income and say it is profitable.

4.4.5 Reasons for Starting this Work

Table 4-11: Reasons of Qorales to start this work

		Responses		Percent of Cases
		N	Percent	
Why did you start this activity?	time and place freedom	12	14.8%	30.8%
	lack of other income opportunity	36	44.4%	92.3%
	lack of skills/low education	16	19.8%	41.0%
	high earnings from this activity	6	7.4%	15.4%
	to keep the environment clean	11	13.6%	28.2%
Total		81	100.0%	207.7%

Source: Own survey, 2015

As table 4-11 demonstrates lack of another option of income ranked first by the respondents which is 36(44.4%) and low skill/ low education is also the secondly ranked factor in which 16 (25.4%) answered as their reason to do this activity, time and place freedom 12(14.8%), to make the environment clean 11(13.6%), high income from the tasks and peer/group influence are least chosen reasons. So the main reasons the respondents collecting solid waste management as Qorale‘s are lack of another better alternative source of income and low educational level. So everyone make sure that these members can leave this business one day when they get another alternative source of income. If this happened the currently unsuccessful solid waste management sector in our city will be aggravated due to its less attractive income and socially unacceptable working environment. Failure in this will lead to the decrease in the collection of the used plastic bottles as one of the solid waste materials and this will damage the city‘s good looking, breathing of clean air by the residents, tourists and others visiting the countries capital.

4.4.6 Types of Materials Collected by Qorales

Table 4-12: types of materials collected by Qorales

		Responses		Percent of Cases
		N	Percent	
What kind of materials do you collect?	Glasses	6	6.5%	15.0%
	food related wastes	12	12.9%	30.0%
	plastic bottles	23	24.7%	57.5%
	metals	21	22.6%	52.5%
	papers	15	16.1%	37.5%
	others	16	17.2%	40.0%
Total		93	100.0%	232.5%

Source: Own survey, 2015

Qorales collect different types of waste materials and one question was raised in order to identify the materials which are most frequently collected by them. As clearly depicted on table 4-12 23(24.7%) respondents collect plastic, 21(22.6%) collect metals, 16(17.2%) said others specifying as old shoes, old clothes, electronics and other household old materials. Qorales collect different materials either for sale or personal use. Plastic bottles and metals are the main items repeatedly collected and sold at the market Minalesh tera.

4.4.7 Profitable Types of Materials

Table 4-13: profitability level of collected materials

		Responses		Percent of Cases
		N	Percent	
Which of them are more profitable?	Glasses	4	5.3%	10.8%
	food related wastes	10	13.2%	27.0%
	plastic bottles	13	17.1%	35.1%
	Metals	29	38.2%	78.4%
	Papers	11	14.5%	29.7%
	Others	9	11.8%	24.3%
Total		76	100.0%	205.4%

Source: Own survey, 2015

As shown on the above table 4-13 Metals were ranked the first profitable chosen by 29 (38.2%) respondents followed by plastic bottles (17.1%) and papers 11(14.5%). 9(11.8%) of the respondents said that other materials like old electronics materials, shoes and clothes are the most profitable ones. Since the most profitable one is metal as chosen by many of the respondents the interest of informal collectors for those least valuable materials including plastic bottles can decline and this will cause amount collected lead to sever environmental damages.

4.4.8 Sources of Used Plastic Bottles Collected by Qorale‟s

Table 4-14: sources of plastic bottles collected by Qorale‘s

		Responses		Percent of Cases
		N	Percent	
From where do you collect used plastic bottles?	households	15	17.0%	37.5%
	waste bins	22	25.0%	55.0%
	Streets	25	28.4%	62.5%
	Landfills	10	11.4%	25.0%
	Others	16	18.2%	40.0%
Total		88	100.0%	220.0%

Source: Own survey, 2015

This question was raised to identify the main sources for the used plastic bottles and the results are depicted on table 4-14 as; 25(28.4%) from streets and 22(22.7%) respondents said waste bins, followed by households, landfills and other sources 16(18.2%) like hotels, restaurants, hospitals, clinics, schools, government offices etc. Unlike SME‘s the main source for used plastic bottles for Qorales are streets and waste bins. The other source as specified by the respondents‘ hotels and restaurants, stadiums, schools, clinics and hospitals are their additional sources. We can understand that, the contact with households is lower when compared with SME‘s since the major source of used plastic bottles for used plastic bottles is from households.

How many hours do you work during a day?

This question was raised by the researcher in order to get information for how long the collectors are working within a day to collect more materials. The participants of the study answers shows

that 24(60%) of the respondents work for less than four hours a day, 11(27.5) spent from 3-6 hours a day and 5(12.5%) are working for 6 hours and above. This shows that the collectors perform their collection activity only for shorter hours.

4.4.9 Utilization of Earned Income /Saving Habit of Qorale‟s

Table 4-15: the saving habit of the respondents

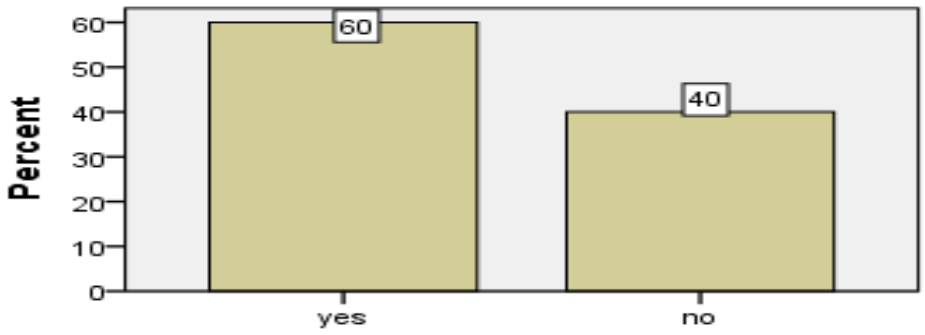
	Frequency	Percent	Valid Percent	Cumulative Percent
fully spend on daily expenses	23	57.5	57.5	57.5
I have bank account to save the amount remained from daily expenses	9	22.5	22.5	80.0
saving the whole amount earned	8	20.0	20.0	100.0
Total	40	100.0	100.0	

Source: Own survey, 2015

The researcher asked this question to get clear understanding on the usage of the money earned from the sale of plastic bottles and the results shown that 23(57.5%) of the respondents fully spend the whole income on their daily expenditures, 9(22.5%) save the amount remained from their daily consumption expense while 8(20%) of the respondents save the whole amount earned. This happened due to the absence of another source of income and earnings are less which is even not enough for survival and the low culture of saving on the respondents. So both reasons will negatively affect the collection used plastic bottles and other thrown materials which in turn can lead an increase to the existing environmental problems. In relation to this question Qorale‟s were requested about the income they earn on good time and bad time. The response from the collectors shows that the minimum earnings can reach even below 10 birr if they cannot collect more amounts and the maximum earning of a good day reaches up to 35 birr but this is not always achievable.

4.4.10 Buyers for Collected Plastic Bottles by Qorale"s

Figure 4-9: The availability of buyers for collected plastic bottles



Source: Own survey, 2015

Qorale‘s collect solid wastes from the streets, households, hotels and restaurants, universities, schools, stadiums etc and sell to the buyers at Merkato _Mnalesh Tera‘ a market for waste materials having value for reusing or recycling. The buyers in the market are wholesalers to buying from the individual collectors selling to distributers to different regional small towns for different purposes. In relation to availability of market for the collected used plastic bottles collectors were asked if they have permanent buyers to their products especially plastic bottles. The summery of the response given to this question as indicated on the above bar graph 4-10 24(60%) of replied yes and the remaining 16(40%) said we don‘t have permanent buyers to our products. This shows that majority of collectors have customers receiving these products and even those who don‘t have permanent buyers didn‘t face a problem with loss of buyers because everything in the market area have enough buyers as per the observation and oral questions interviewed in merkato _Minaleshtera‘. So, this is good opportunity for the collection of used PET recyclable plastic bottles by the informal collectors irrespective of the selling price.

The selling price is also by far higher when compared with the small scale and micro enterprise collectors selling their prices to recyclers. The price for a single half liter plastic bottle is varies from 35-45 cents in Merkato, while the price of 1kg of plastic bottle is sold for maximum price of three birr only and 1kg is averagely 58 half liter bottles which is 35 cents multiplied by 58 half liter plastic bottles 20.3 birr which is higher than selling to recyclers. The major challenge here is

the bottles collected in Merkato are sold to different regional towns to be reused by the rural people for storage of different cultural drinks, wholly sprit water, water for _khat‘ chewers etc which for a short time and will be easily thrown on the rural areas and which can severely affect our agricultural productivity, while the recycling companies are transforming in to other products creating different economic as well as environmental benefits.

4.3.11 Actions of Qorales with Increase on the Price of PET bottles

Table 4-16: the effect of price increase for used plastic bottles

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	collect more	29	72.5	76.3	76.3
	collect the same amount as usual	6	15.0	15.8	92.1
	collect less	3	7.5	7.9	100.0
	Total	38	95.0	100.0	
Missing	System	2	5.0		
Total		40	100.0		

Source: Own survey, 2015

An increase or decrease on the price of materials can affect the supply and respondents were asked what they will do if price of collected PET bottles increase in the market and the response from 29(72.5%) shows they will collect more in order to increase their earnings which is rational thinking .so one of the factors which can increase the collection of used plastic bottles is an increase in the selling price. But the reality especially at this time when the price of fuel is getting down the selling price of the PET plastic bottles is being affected.

4.4.11 Actions of Qorales with Decrease Price of PET bottles

Table 4-17: the effect of price decrease for used plastic bottles

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	collect more	5	12.5	13.2	13.2
	collect the same amount as usual	5	12.5	13.2	26.3
	collect less	28	70.0	73.7	100.0
	Total	38	95.0	100.0	
Missing	System	2	5.0		
Total		40	100.0		

Source: Own survey, 2015

As shown on the above table 4.17 The collectors become will be discouraged to collect more amount of used plastic bottles price in the market fails ranked first by 28(70%) and the remaining 5(13.2%) said we will collect same amount and the same number said they will collect more. from this data we can understand that, the main problem for the plastic bottle recycling business is collection costs of PET bottles in relation to their values in the market. The researcher asked the collectors about the price and demand of these materials and their response was it is not attractive and even there are enterprises beginning to collect PET bottles together with other solid wastes in order to increase the amount of solid waste collected in cubic meter (M^3) since the payment is according the volume collected in cubic meter and plastic bottles can increase the volume.

At the end of the questionnaire two open ended questions were prepared and distributed to Qorale respondents aimed to identify the problems facing them while performing their tasks and their future plan in relation to this business. The summarized responses of the sample participants of the study showed that the problems facing Qorales are decrease on selling price of the collected used plastic bottles, transportation problems, and lower income from the sale of large number of bottles, loss of clean plastic bottles etc.32 (80%) respondents said we don‘t have any future plan in relation to this activity and the remaining 8(20%) show their interest to continue with solid waste and plastic bottle collection in particular.

4.5 COBA IMPACT plc Plastic Bottle Recycling Company

Used plastic bottles in the city are not returning back to their manufacturers rather the flow is to two different directions. As the information obtained from the traders in _Minalesh tera' the destinations for the used plastic bottles are distributers selling to different regional towns for reusing purpose and recycling companies, for crashing and exporting purpose. COBA impact is a huge company buying recycling used plastic bottles from small scale and micro enterprises, Qorale's, individuals, plastic packed water and soft drink manufacturers etc from all parts of the city. In order to assess the reverse logistics process interview questions was prepared and asked to the general manager and procurement head of the company. The information gathered through interview is going to be interpreted in following way.

4.5.1 Name of the company and time of establishment?

The Name of the company is COBA IMPACT MANUFACTURING PLC and it was established before 4 years. The company currently created employment opportunity for 100 permanent and 100 contractual workers.

4.5.2 Main activities of the company, and suppliers of plastic bottles?

The main activities of the company as explained by the managers of the company are Plastic Manufacturing and Plastic Recycling. In the plastic recycling, there are two major activities performed by two departments namely the collection and Production Departments. The collection department mainly works with 10 sub-cities associations which are organized under Addis Ababa Regional Administration Solid Waste Management at the zonal and woreda level. These numbers reach to 608 and COBA has signed MOU with the Agency, individuals and bottlers which is to be implemented accordingly. Some of them are reorganized through the Zonal Head of Solid Waste bureau into unions. This is very encouraged for work because this simplifies the collection and transportation of used plastic bottles from very small number rather than travelling the whole Addis Ababa. Hopefully, the other sub-cities heads will learn from Lideta sub-city which is a pioneer for this good work. Furthermore, water and soft drink bottlers and individuals are other good suppliers of PET bottles.

The company has one collection center. The number of employees at the center reaches to 28. These are organized into three groups. The two groups are working in sorting of labels, cups and before it is pressed by the machine. Sorting of performs is done by its color. One of the groups unloads from the trucks the used bottles coming from associations, bottling companies and individuals. At the end loading the pre-form and bales on the truck to the factory will be accomplished. In the near future, we have a plan to collect PET bottles from other regions by giving pressing machine and this will increase our source of supply. The function of production department is managing the technical process of the production in order to achieve the required productivity level in quality and quantity.

4.5.3 Availability of safe and enough storage space

The company needs 250,000Kg or 250 quintal or 25 tone of used plastic bottles within a month. From this figure, we can see a huge amount of PET bottles has to be collected in order to have full-fledged resource because a large storage space can be occupied fewer amounts of plastic bottles. The production area is very small that can accommodate only performs and bales which is impossible to get storage for the collected used plastic bottles from different areas. This implies the company is in acute problem to get the collection center nearby the factory. Recycling companies has to be encouraged by getting a land which is appropriate to their work because they are contributing a lot to the environmental protection.

4.5.4 Quality parameters for the collected plastic bottles

No quality discrimination. But as much as possible the collected plastic bottles must be clean enough. All plastic bottles available for collection are collected. All the collected plastic bottles have the same quality regarding PET bottles. If you are observing quality in terms of neatness then the bottling companies have rejected or defect bottles during the process which is neat. Next to bottlers individual suppliers collecting from big hotels are good. But some of the unions or associations usually collecting from garages and landfills as well as waste bins are not clean.

Foreign contamination (oil, soil, soap, other contaminants irrelevant to the original contents of the bottle are some of the quality challenges. The quality in terms of cleanness is different during rainy time and summer time. Mostly the bottles are becoming full or partially full with water, tea, urine and sometimes milk inside it in order to scale up the weight. While during summer

time, the company tries to minimize it by the strict follow up not to add up such unwanted additional things.

4.5.5 Costs related to Recycling of used plastic bottles

Purchase of scrap bottles (raw material), transportation/logistics, machinery, chemicals, labor, packaging, and other regular corporate operational costs. The cost of PET bottles mainly depends on the cost of world fuel price. The higher the price and the cost will become reasonable. However, at present due to the decrease of the cost of fuel our company will suffer a lot comparing to the previous time since the virgin materials for plastic production are made up of natural gas.

4.5.6 Advantages of investing in plastic bottle recycling

Investing on plastic bottle recycling has Social, economical and Environmental advantages. The main advantages of investing in a plastic bottle recycling are stated as follows. The first thing is it has a good value in keeping our environment clean and friendly so that people can live in a very comfortable condition because today‘s world great issue is keeping our environment clean. The second one is recycling using a new technology is helpful for the countries development in minimizing unemployment problem and technology transfer. The third one is, the product will be exported so that our country could gain a foreign currency which is vital for the country growth & development.

4.5.7 Major problems effective operation of the company

Labor issues, shortage of foreign currency, electricity interruptions, lack of land space for collection, bureaucracy issues, are the general challenges to our sustainable operation. There are two major problems that will hinder COBA IMPACT plc‘s effective operation. The question of land for the collection of used plastic bottles has a paramount importance and this has to be solved to advance our work. The second one is the world market of fuel is failed down now and then and this has an impact in our cost of buying used plastic bottles and selling it as an export.

4.5.8 Cooperation level of company with the government and other stake holders

The company replied as much as possible we are performing our tasks in collaboration with the government especially with Addis Ababa solid waste management and cleansing agency.

Government is supporting and assisting the project. They are working with City Administration of Addis Ababa Solid Waste Management Recycling Agency in order to collect the used plastic bottles which are making dirty the beautiful town Addis Ababa. On the other hand, we have a good contact with bottling companies and Regional Administration in the near future in order to keep secure of the town/s.

4.5.9 Suggestions of recycling company to other stakeholders

The company forwarded the following comments to improve the collection process of used plastic bottles; Segregation at consumer level, segregation at collection level, increase waste collections bins, improve education and awareness raising for the community, government intervention/assistance on the area even through subsidization of the collectors in order to create clean environment. Cleaning of the city is not limited to a certain office because it is an issue of every individual. In this case the media people have to give good time to give awareness creation.

4.6 Bottled Water and Soft Drink Manufacturing Companies

Manufacturers of bottled water and soft drink are number major contributors of PET plastic bottles to the environment. Manufacturers have understood the negative environmental impacts of their packaging materials. Ethiopian Federal environmental policy says to adopt the "polluter pays" principle while endorsing the precautionary principle since pollution is likely to occur, and ensure that polluting enterprises and municipalities and wereda councils provide their own appropriate pollution control facilities. But the environmental policies were observed with poor implementation especially on the industrial pollutants harming the environment by their solid as well as liquid wastages.

Bottler companies were asked about their response to the environmental damages caused by their packaging PET bottle materials their response was almost the same. Their role as they explain is awareness creation for the society about the recyclability of PET bottles using the recycling symbol and a word which says 100% recyclable which is written on the labeling of their bottles. But they don‘t have any evidence about the level of awareness created and the goal achieved in this way. This cannot be the only contribution of the bottlers due to; the first question is to what extent and how many have the habit of reading labeling and the ability of

reading the information written in English and even the symbols message may not also be understandable for all consumers. Second, they have a big social responsibility to benefit the society but if impossible not to affect the convenience of living of the people. In general the level of environmental impact and contribution of the water and soft drink bottling companies is not proportionate. The principle of corporate social responsibility and the rights of citizens to live in a healthy and clean environment is also violated.

The reasons forwarded by bottling companies for these question PET bottles were 100% recyclable so the environmental impacts can be reduced through recycling; the cost of collecting and recycling plastic bottles for example to collect 1 kilo gram of half liter plastic bottle you have to collect about 58 half liter bottles in number which can be sold for three birr to recycling companies; some of them agree as this is the responsibility of environmental protection authority, etc which seems to far way themselves from accountability for the environment.

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Key Results

The objective of this thesis is to assess the reverse logistics process on used water and soft drink plastic bottles and Addis Ababa city administration as clearly explained in part one of this chapter. The basic research questions have been initially identified and based on these research questions different data collecting methods and instruments have been incorporated. The methods of collecting data for the study was self administered questionnaires, structured interview, unstructured interview and observation of the environment and processes. Self administered questions were prepared separately micro and small scale enterprise in Addis Ababa city activating on solid waste collection and disposal and the informal collectors of solid waste materials locally recognized as Qorale's since they have their own different characteristics.

Nineteen (19) mixed open ended and closed ended questions were prepared for SME's and analysis is also done based on the order, similarity and complementarities of the open ended with the closed ones. Similar to this questionnaire containing twenty (20) open ended and closed ended questions were distributed and the data obtained was analyzed separately but by comparing between the two groups for some similar variables. Total of 130 questionnaires were distributed and 60 from SME's and 40 from Qorale's was correctly filled and returned. In order to minimize the accuracy problems data collection was conducted under close supervision, checked, coded, and analyzed in relation to the studies conducted on similar areas by other researchers, the experiences, rules and regulations related with.

SPSS version 20 was used to process the data in to meaning full information which can help the researcher to reach some conclusions on the plastic bottle reverse logistics related. Different comparisons were made among the responses obtained from different target groups for cross checking purposes of the results obtained from the responses. In general the researcher has identified the following summery points regarding the reverse logistics process.

- From the analysis 37 (62.7%) are females and Traditionally, sanitation is assumed as a default task of females, so that females are also more effective than males until this back ward culture is not being changed. But, on the other side females‘ physical strength decreases due to birth and other traditional overburdens and decrease on the number of males can negatively affect the effective operation since the loading to and pushing carts needs more physical power. While the data collected from Qrales shows the sex distribution of the 40 respondents from informal solid waste collectors locally named as Qorale‘s 37 (92.5%) are males and 3(7.5%) are females. In this case whether they are males or females continuing this way raises questions of legality and sustainability.
- The age distribution of micro and small scale enterprises shows that, majority of the members (42.37%) are between age group 31-40 years and the lowest relative number is age group 21- 30 years the youngest and energetic group. High involvement of young workers in such activities reduces unemployment rates and can also sustainably solve solid waste problems through providing continuous training and development programs enhance entrepreneurial quality, encouraging creativity and innovation. In comparison with the small scale and micro enterprises assigned in solid waste collection Qorale‘s are younger and they have a capacity to solve the environmental problems if they can be organized in to formal way and get trainings on the separation, collection, transportation, recycling, entrepreneurship, and savings

- From this data we can understand that majority of the members of the MSE‘s in Addis Ababa city are less educated and this can negatively affect operation and profitability of the business due to the in ability to easily manage material, financial, human and technological resources of the enterprises.
- According to the summery of the responses 43(71.67%) of the respondents have been working for more than 8 years in this work, According to the small scale and micro enterprises strategy they were expected to be transferred to middle industry within five years of operation but they are still working as SME‘s so that this discourages other new entrants. The majority of the respondents stay for less than four years. Everyone can stay in a business activity whether formal or informal only if the amount of income earned is attractive or working environment is convenient. So informality on the collection of waste

materials for sale or personal use cannot guarantee the sustainable collection of wastes for recycling or reuse purpose and the sanitation of the city.

- The above figure shows majority of the members of MSE's organized in solid waste collection are earning monthly income less than birr 1500 which does not seem attractive for other unemployed people and even not satisfactory for the members of MSE's themselves in relation to the health risks, low social acceptance of the sector and the high cost of living in the city.
- The results show that 33(82.5%) of them said we don't have other additional work activity and 7(17.5%) respondents said that they have other work activities in addition to solid waste collection. Interview was conducted with some of the Qorale's around _Minalesh tera' which were found selling plastic bottles and other Qorales collecting different solid waste materials from the city to acquire clear information if there is a difference between plastic bottle collectors and other materials collectors because some of the Qorales around piazza told me they did not collect plastic bottles but those who collect were different from them
- More than 60% of the MSE's members believe the income they earn is lower. In addition to the weak culture of choosing activities which affects the neatness of our clothes and hands dirty, the low income from solid waste collection can discourages collectors and other people not to join this sector .
- The main reasons the members organized in collecting solid waste management as micro and small enterprises as well as Qorale's are lack of another better alternative source of income and low educational level. This is can be taken as one of the reasons for the failure on the effective collection of used plastic bottles and environmental protection.
- Households, hotels and restaurants and universities and other educational institutions are the major sources for used plastic bottled followed by shops, hospitals, and clinics.
- The descriptive table showed majority of the respondents which are 52(42.3%) said that users put empty plastic bottles together with other solid wastes and give to solid waste collectors,42(34.1%) said they throw anywhere and 24(19.5%) answered that users put used bottles on a separate recycle bin and sell it to collectors. Users either put together with other wastes or throw any where plastic bottles after drinking the water or soft drink. Source separation and proper disposal of used plastic bottles by consumers was one of the major problems of plastic bottle reverse logistics.

- The collected data shows micro and small scale collectors are performing only a single activity of collecting solid wastes.
- 48(53.3%) said we sell collected plastic bottles to recycling company, specifically to COBA IMPACT plc plastic manufacturing and recycling company.
- Almost all micro and small scale enterprises are using the same technologies for the collection, storage and transportation of solid wastes which are sacks and push carts both accompanied with risks, time consuming asking more physical power.
- 40(67.8%) said we don‘t have safe and enough storage space for the collected. So their materials can be freely exposed to theft and collectors are challenged with storage space problem not to collect more amount.
- The usage of personal protective clothes by the small and micro enterprises in Addis Ababa city is poor in relative to the risks attached with the solid waste collecting activities.
- 40(67.8%) of the SME‘s respondents claim they don‘t have further expansion plan in this sector, which is a great threat for the future collection reverse logistics and environmental protection.
- Plastic bottles and metals are the main items repeatedly collected and sold at the market Minalesh tera. Metals were ranked as the profitable ones when compared with other material that is why, most Qorale‘s focus on metals.
- Unlike SME‘s the main source for used plastic bottles for Qorales are streets and waste bins. The contact with households is lower when compared with SME‘s since the major source of used plastic bottles for used plastic bottles is from households.
- The participants of the study answers shows that 24(60%) of the respondents work for less than four hours a day, 11(27.5) spent from 3-6 hours a day and 5(12.5%) are working for 6 hours and above. This shows that the collectors perform their collection activity shorter hours when compared with micro and small enterprises collectors.
- The results shown that 23(57.5%) of the respondents fully spend the whole income on their daily expenditures, This happened due to the absence of another source of income and earnings are less which is even not enough for survival and the low culture of saving on the respondents.

- Qorale's collect solid wastes from the streets, households, hotels and restaurants, universities, schools, stadiums etc and sell to the buyers at Merkato _Mnalesh Tera' a market for waste materials having value for reusing or recycling.
- The major challenge here is the bottles collected in Merkato are sold to different regional towns to be reused by the rural people for storage of different cultural drinks, wholly sprit water, water for _khat' chewers etc which for a short time and will be easily thrown on the rural areas and which can severely affect our agricultural productivity, while the recycling companies are transforming in to other products creating different economic as well as environmental benefits.
- The selling price is also by far higher when compared with the small scale and micro enterprise collectors selling their prices to recyclers. The price for a single half liter plastic bottle is varies from 35-45 cents in Merkato, while the price of 1kg of plastic bottle is sold for maximum price of three birr only and 1kg is averagely 58 half liter bottles which is 35 cents multiplied by 58 half liter plastic bottles 20.3 birr which is higher than selling to recyclers.
- The main problem for the plastic bottle recycling business is collection costs of PET bottles in relation to their values in the market.
- Manufacturing of bottled water are not playing their role to protect the environment from plastic packaging caused problems. The awareness creation on the labeling is not accessible by all residents of the city except for few with the ability and habit of understanding and reading product and packaging information on the labeling.
- Lack of storage space for the collected PET bottles; foreign contamination of bottles by oil, soil, soap, and others; high transportation cost due to high volume and low weight of plastic bottles; machinery, chemicals, labor issues, shortage of foreign currency,, bureaucracy issues, packaging's, and other regular corporate costs are factors which are affecting the effective operation of the recycling company.
- Decline on fuel price negatively affects the price recycling as a result the purchase price for the collected plastic bottle falls down just like what is currently happening this year.
- Addis Ababa solid waste management and cleansing agency striving to solve the problems through providing policies, standards, and procedures for solid waste collection in general but these standards were less implemented. On its written policies the participation was

given high value to become major part of the solution but still the reality is creating problems due to lack of awareness on how to handle solid wastes.

- While materials used by the bottled waters industry are 100% recyclable (glass, plastic, caps and labels) the significant challenge to the sector is recovery (EFBW, sustainability report). Major problem in the plastic bottle industry is the recovery problem the same with the report of the EFBW report.

5.2 Conclusions

- The reverse logistics process of used plastic bottle in Addis Ababa was not seen effective in the research due to the following factors; the results of the study shows low habit of source separation of used plastic bottles and other wastes; Consumers either, throw everywhere in the city or put it on a single waste bin so, mixing with other wastes creates contamination and other risks and time consuming for the collectors of solid wastes. inefficient collection due the high effort requirement and lower price for the collected bottles and the quality of the thrown plastics; the price at merkato was better than selling to recyclers; high transportation costs due to their high volume less weight nature of plastic bottles in transportation and storage; shortage of safe and enough storage system from both the recycling and collectors side; recovery of the required amount was hindering the company.

- The legal frame works of Addis Ababa solid waste management shows solid waste management standards, policy and manuals but there were no separate policies and standards, which is simply overlooked.

- Community role and participation lacks the collection and separation of used plastic bottles in particular and solid waste in general. The environmental policy and manuals raise this issue for Addis Ababa solid waste management and cleansing program but less implemented. Because most people in the city are polluting and making dirty their city instead cooperatively cleaning.

- We can say they have no any social responsibility and role in protecting the environment from the pollution and sanitation problems caused by their packaging materials. Their

responsibility in this case was limited to awareness creation using the labeling and the symbol of recycling with a message please .but even this was limited because there is a large number of people using plastic bottles may not have the ability to understand the message written in English, and majority may also have the culture of reading labeling and instructions.

5.3 Recommendations

The purpose of the thesis is to identify problems related with reverse logistics on used water and soft drink plastic bottles and to forward suggestions and recommendations which can help to solve the process problems and ensure effective recovery of used plastic bottles and then protect the environment from the adverse effects caused by plastic bottles thrown here and there in the city. So, the researcher identified the problems and forwarded possible solutions to the problems as follows;

- In order to maximize the recovery and value of PET plastic containers in your community‘s recycling collection program, two best practices should be followed when designing your program. The first is to establish an effective and ongoing consumer education program (the elements of which are described in the *Consumer Education Best Practice*), regardless of collection system design. Studies by the American Plastics Council indicate that participation in local recycling programs can increase 10% to 20% immediately following educational and promotional campaigns. However, it has also been shown that participation will decline unless the educational and promotional efforts are maintained.
- Using compacting and or pressing machine to flatten the plastic bottle, transportation costs can be by far reduced through reducing the volume space and increasing the weight of the collected vehicles. For this reason simple technologies can be created through research and development which can affordable by micro and small enterprise.

- This sector needs special emphasis in developing separate manuals, standards, policies and procedures, to establish plastic associations in offices, and plastic club on schools in order to manage used plastic bottle and to save our environment.

- To collect the used plastic bottles effectively and efficiently the separation, collection, transportation and recycling processes must be given emphasis by the different stakeholders. Integrative solid waste management system should be developed among all stake holders.

- Collector‘s training and education focusing on the collection and segregation process, safety training, entrepreneurial and creativity training, problem solving skill, and this training should be given not only to implement by them but also to train the customers.

- Polluter pay should be incorporated with industrial as a prerequisite for issuance of licenses to enter in to this kind of industrial investment. Ethiopia and all other developing countries contributing less to the climate change together are debating with those industrialized countries to pay according to their emissions and pollutions to the environment.

- Distribution of sacks to all households labeled with information about their products with dual purpose of waste segregation and promoting their products on the other way.

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Appendices

5.4 Appendix 1

ADDIS ABABA UNIVERSITY

School of commerce

Department of Logistics and supply chain management

Self administered questionnaire prepared to be by members of small scale and micro enterprises involved on solid waste collection

First of all I would like to thank you for giving me viable information sacrificing your golden time to fill my questionnaires. This questionnaire was prepared to assess the reverse logistics process of used plastic bottles in Addis Ababa city administration and filling this questionnaire properly plays vital role for the successfulness of the study. So, politely requesting for your accurate data and the collected will only be used for this paper keeping its confidentiality.

Instructions:

- Don't write your name
- Put this(√) sign inside the box given
- Answer all questions

Part one: - general information

1. sex: ☐ male ☐ female
2. age : ☐ below 20 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐ above 60
3. education ☐ illiterate ☐ 1-6 ☐ 7-8 ☐ 9-10
   ☐ 11-12 ☐ diploma ☐ degree ☐ masters and above
4. How long have you been in this activity?
   ☐ 1- 4 years ☐ 5- 8 years ☐ 9-12 years ☐ above 12 years

Part two; questions to gather detail information

5. How much do you earn in a month from collecting and disposal of solid wastes in birr?

☐ Below 500 birr ☐ 501-1000 ☐ 1001-1500 ☐ 1501-000

☐ 2001-2500 ☐ above 2500 birr

6. How much do you earn in a month from collecting used plastic bottles in birr?

_____

7. What do you think about the income of this sort of activity?

☐ Low ☐ Average ☐ Good

8. Why did you start this business?

☐ Freedom in determining working hours and working place

☐ Lack of other income opportunities

☐ Lack of skills/low education

☐ Peer group influence

☐ High earnings from this activity

☐ To keep the environment clean

9. What kind of solid waste activities do you carry out?

☐ Waste collection

☐ Recycling

☐ Composting

☐ Waste disposal

☐ Other

Potential sources for used plastic bottle waste materials

☐ House holds ☐ Shops ☐ Hotels and restaurants

☐ Universities and colleges ☐ Hospitals and clinics ☐ other sources

10. What do households and other sources of solid wastes do with used plastic bottles?

☐ Put it together in a sack with other house hold solid wastes

☐ Put on separate recycling bin and sell it

☐ Throw it any where

☐ Others specify_____

11. Who are the direct buyers of your products?

☐ Plastic recycling companies

☐ Wholesalers

☐ Retailers

☐ Individuals

☐ Specify if Other_____

12. What kind of technology does your firm use to collect, store and transport plastic bottles?

_____

_____

13. Do you have enough and safe storage system for the collected plastic bottles until amount reaches full load

☐ Yes ☐ no

14. To what extent do you use safety materials while collecting solid wastes?

R.no	Safety materials	Utilization level			
		I don't have/never	Rarely	Moderate/ sometimes	Always
1	Hand gloves				
2	Safety shoes				
3	Noise masks				
4	Hats				
5	Reflective clothes				

15. Would you like to expand your activities in solid waste management?

☐ Yes ☐ no

16. If yes, to include other activities or to expand the activity you are performing today?

_____

_____

17. What do you think are the major problems concerning the transportation of used plastic bottles and solid waste in general?

_____

_____

18. What suggestions do you have for different stake holders in order to effectively collect used plastic bottles and get advantages of environmental protection and making source of income?

_____

_____

አዲስ አበባ ዩኒቨርሲቲ

የንግድ ሥራ ትምህርት ቤት

የሎጂስቲክስና ሳፕላይ ቸይን ማኔጅሜንት ዲፓርትሜንት(logistics and supply chain management)

በደረቅ ቆሻሻ መሰብሰብ ለተሰማሩ የጥቃቅንና አነስተኛ ኢንተርፕራዞች የተዘጋጀ የፅሁፍ መጠይቅ

በቅድሚያ ይህንን መጠይቅ ለመሙላት ጊዜዎን መስዋዕት በማድረግ ለሚያደርጉልኝ ትብብር ከልብ የመነጨ አድናቆቴና ምስጋናዬን ላቀርብልዎት እወዳለሁ፡፡ይህ መጠይቅ የተዘጋጀው በአዲስ አበባ ከተማ ውስጥ ያለው የውሃና የለስላሳ ማሸጊያ የፕላስቲክ ጠርሙሶችን ሪቨርስ ሎጂስቲክስ(riverse logistics) ፕሮሰስ ላይ የሚተኩር ጥናት ለማካሄድ ሲሆን ይህንን መጠይቅ በአግባቡ መመለስ ለጥናቱ ስኬታማነት ወሳኝ ሚና አለው፡፡ስለሆነም ጠቃሚ መረጃ እንዲሰጡኝ ስል በትህትና እየጠየቅኩ አርስዎ የሚሰጡትን መረጃ ሚስጢራዊነቱ የተጠበቀ ሆኖ ችግሮችን ለመለየትና የመፍትሔ ሃሳብ ለማመንጨት ብቻ የሚውል ይሆናል፡፡

መመርያ፤

- ስም መጻፍ አስፈላጊ አይደለም
- ይህንን ምልክት(√) በተሰጠው ሣጥን ላይ ያስቀምጡ

- ሁሉንም ጥያቄዎች ለመመለስ ይሞክሩ

ክ ፍ ል 1፡ - ጠቅ ላ ላ መረ ጃ

19. ፆታ: ☐ ወንድ ☐ ሴት

20. እድሜ፡ ☐ ከ20 በታች ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐ ከ60 በላይ

21. የትምህርት ደረጃ፡ ☐ ያልተማረ ☐ 1-6 ☐ 7-8 ☐ 9-10

☐ 11-12 ☐ ዲፕሎማ ☐ ዲግሪ ☐ ማስተርስ እና በላይ

22. በዚህ ስራ ለምን ያህል ግዜ ቆይተዋል?

☐ከ1-4 አመት ☐ ከ5-8 አመት ☐ ከ9-12አመት ☐ከ12በላይ

ክፍል ሁለት፡- ዝርዝር መረጃ ለማግኘት የሚረዱ ጥያቄዎች

23. የደረቅ ቆሻሻ በመሰብሰብና በሽያጭ በማስወገድ የሚያገኙት ወርሃዊ ገቢ በብር: ☐ ከ500 በታች ☐ 501-1000

☐ 1001-1500 ☐ 1501-2000 ☐ 2001-2500 ☐ ከ 2500 በላይ

24. የውሃና የለስላሳ የፕላስቲክ ጠርሙሶችን ሰብስበው ከመሸጥ በቀን በብር ምን ያህል ገቢ ያገኛሉ?

_____

25. ከስራው በሚገኘው ገቢ ላይ ያለዎት አስተያት ምን ይመስላል?

☐ ዝቅተኛ ☐ መካከለኛ ☐ ከፍተኛ

26. ወደዚህ ስራ እንዲገቡ ያደረጉዋቸው ምክንያቶች ምንድን ናቸው?

☐ የስራ ሰዓትና የስራ ቦታ የመወሰን ነጻነት

☐ ሌላ አማራጭ የገቢ ምንጭ ማጣት

☐ ያለኝ ክህሎትና የትምህርት ደረጃ ዝቅተኛ መሆን

☐ የጓደኛ ግፊት ወይም ጫና

☐ ከስራው የሚገኘው ገቢ በጣም ማራኪ በመሆኑ

☐ አከባቢዬን ፅዱ ለማድረግ ካለኝ ፍላጎት በመነሳት

27. ከደረቅ ቆሻሻ ጋር ተያያዥነት ያላቸው እርስዎ ምን ምን ስራዎች ይሰራሉ?

☐ ደረቅ ቆሻሻ መሰብሰብ

☐ ደረቅ ቆሻሻን ሪሳይክል ማድረግ ወይም በድጋሚ ወደ ምርት መስገባት

☐ ደረቅ ቆሻሻን ወደ ማዳበሪያነት መቀየር

☐ ደረቅ ቆሻሻን ማስወገድ

☐ ሌላ ካለ ይግለፁ_____

28. የውሃና የለስላሳ የፕላስቲክ ጠርሙሶች በብዛት ከየት ከየት ያገኛሉ?

☐ ከመኖርያ ቤቶች ☐ ከሱቆች ☐ ከሆቴሎችና ሬስቶራንቶች

☐ ከዩኒቨርሲቲዎችና ከሌሎች የትምህርት ተቋማት ☐ ከሆስፒታሎችና ክሊኒኮች

☐ ሌላ ካለ ይግለፁ_____

29. የፕላስቲክ ጠርሙሶች ተጠቃሚዎች ምርቱን ከተጠቀሙ በኋላ የባዶ ጠርሙሶቹ አያያዝ ምን ይመስላል?

☐ ከሌላ ደረቅ ቆሻሻ ጋር በአንድ ላይ በአንድ ማዳበርያ ያስቀምጣሉ

☐ በተለየ የደረቅ ቆሸሻ ማጠራቀሚያ በማስቀመጥ ይሸጡታል

☐ ባጋጠማቸው ቦታ ይጥሉታል ☐ ሌላ ካለ ይግለፁ_____

30. የሰበሰባቹዋቸውን የፕላስቲክ ጠርሙሶች ቀጥተኛ ገዥዎች እነማን ናቸው?

☐ የፕላስቲክ ጠርሙሶች ሪሳይክል የሚያደርጉ ወይም መልሰው በግብአትነት የሚጠቀሙ ድርጅቶች

☐ ያገለገሉ የፕላስቲኮችን የሚያከፋፍሉ ድርጅቶች

☐ ያገለገሉ የፕላስቲኮችን ቸርቻሪዎች

☐ ግለሰቦች ☐ ሌላ ካለ ይግለፁ_____

31. ያገለገሉ የፕላስቲክ ጠርሙሶች ለመሰብሰብ፣ለማከማቸት እና ለማጓጓዝ ምን ምን አይነት ቴክኖሎጂዎች ይጠቀማሉ?

_____

_____

32. የምትሰበስቧቸው የፕላስቲክ ጠርሙሶች ሙሉ ጭነት እስኪሞሉ ድረስ ደህንነቱ የተጠበቀ እና በቂ የሆነ የማከማቻ መጋዘን አላችሁ?

☐ አዎ ☐ የለንም

33. የደረቅ ቆሻሻ በሚሰበስቡበት ግዜ የደህንነት መጠበቂያ መሳሪያዎችን ምን ያህል ይጠቀማሉ?

ተ.ቁ	የደህንነት መጠበቂያ መሳሪያዎች	የአጠቃቀም ደረጃ			
		ጭራሽ አልጠቀምም	አልፎ አልፎ	በመካከለኛ ደረጃ	ሁልግዜ እጠቀማለሁ
1	የእጅ ጓንት				
2	የደህንነት ጫማ				
3	የአፍና አፍንጫ ማስክ				
4	ባርኔጣ				
5	አንጸባራቂ ልብሶች				

34. በዚህ የደረቅ ቆሻሻ ዙርያ ወደፊት የማስፋት እቅድ አላችሁ?

☐ አዎ ☐ አይደለም

35. ለተራ ቁጥር 17 መልስዎ አይደለም ከሆነ ምክንያቶትን ቢያብራሩ?

_____

_____

36. ያገለገሉ የፕላስቲክ ጠርሙሶችና ሌሎች የደረቅ ቆሻሻዎችን ከማጓጓዝ ጋር ተያያዥነት ያላቸው ችግሮች ምንድናቸው?

_____

_____

37. ያገለገሉ የፕላስቲክ ጠርሙሶችን በአግባቡ ተሰብስበው ጥቅም ላይ እንዲውሉ ለተለያዩ ባለድርሻ አካላት ያለዎት አስተያየት በዝርዝር ቢገልጹልን?

_____

_____

5.5 Appendix 2

Addis Ababa University

School of Commerce

Department of Logistics and Supply Chain Management

Questionnaire prepared to be filled by Collectors in the informal sector of solid waste management or Qorale's in Addis Ababa

These questionnaires were developed as part of my master's degree on reverse logistic process of used water and soft drink plastic bottles in Addis Ababa city administration. The purpose of these questionnaires is to gain information on the current practice concerning the separation, collection, storage, transportation and recycling process of PET plastic bottles. The answers to these questions are central to my master's project, where the aim is to identify the current reverse logistics system and the strength and weakness concerning the current reverse logistics process and recycling system in Addis Ababa.

Instruction:

- Don't write your name
- Put this (√) sign in the box
- Answer all questions

Part one; general information

1. Sex: ☐ Female ☐ Male
2. Age : ☐ below 20 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐ above 60
3. Education background
   - ☐ Illiterate
   - ☐ Literate
   - ☐ Elementary
   - ☐ Secondary and above
4. How long have you been in this kind of activity?
   - ☐ 1-2 years
   - ☐ 2-4 years
   - ☐ 4-6 years
   - ☐ 6-8 years

   Other_____

Part two:- questions to gather detail information

5. Do you have other work activity?

   ☐ Yes ☐ no

6. Why did you start this business?

   ☐ Freedom in determining working hours and working place

   ☐ Lack of other income opportunities

   ☐ Lack of skills/low education

   ☐ Peer group influence

   ☐ High earnings from this activity

   ☐ To keep the environment clean

7. What kind of materials are you collecting?

   ☐ Glass

   ☐ Plastic

   ☐ Leftover food

   ☐ Metals

   ☐ Paper

   Other_____

8. Which of the materials you are collecting do you think is more profitable?

   ☐ Glass

   ☐ Plastic

   ☐ Leftover food

   ☐ Metals

   ☐ Paper

   Other_____

9. Where do you collect the materials?

- ☐ Household
- ☐ Streets
- ☐ Waste bins
- ☐ Landfill
- ☐ Other

10. How many hours do you work during a day?

_____

11. How much do you earn during a day?

On a god day _____

On a bad day _____

12. What do you do with the money you earn?

- ☐ I spent the whole amount for daily consumption
- ☐ Save the remaining amount from daily expenses
- ☐ Totally saved

13. Are there seasonal variations in the quantity of waste collected?

☐ Yes ☐ Some ☐ No

14. To whom and where do you sell the collected materials?

_____

_____

_____

15. If selling them to wholesale buyers, do you have specific buyers you sell the Materials to?

☐ Yes ☐ No

16. If yes, how many and why?

_____

17. How do you relate to an increase in the price of the materials?

- ☐ Collect more
- ☐ Collect the same amount as usual
- ☐ Collect less

18. How do you relate to a decrease in the price of the materials?

- ☐ Collect more
- ☐ Collect the same amount as usual
- ☐ Collect less

19. Do you face any problems doing this activity? If yes, what kind of problems?

_____

_____

_____

20. What is your plan for the future in relation to this task**?**

_____

አዲስ አበባ ዩኒቨርሲቲ

የንግድ ሥራ ትምህርት ቤት

የሎጂስቲክስና ሳፕላይ ቸይን ማኔጅሜንት ዲፓርትሜንት(logistics and supply chain management)

የፕላስቲክ ጠርሙስ በመሰብሰብ ላይ ለተሰማሩ በተለምዶ (**ቁራሌው**) የተዘጋጀ የፅሁፍ መጠይቅ

በቅድሚያ ይህንን መጠይቅ ለመሙላት ጊዜዎን መስዋዕት በማድረግ ለሚያደርጉልኝ ትብብር ከልብ የመነጨ አድናቆቴና ምስጋናዬን ላቀርብልዎት እወዳለሁ፡፡ይህ መጠይቅ የተዘጋጀው በአዲስ አበባ ከተማ ውስጥ ያለው የውሃና የለስላሳ ማሸጊያ የፕላስቲክ ጠርሙሶችን ሪቨርስ ሎጂስቲክስ (reverse logistics) ፕሮሰስ ላይ የሚተኩር ጥናት ለማካሄድ ሲሆን ይህንን መጠይቅ በአግባቡ መመለስ ለጥናቱ ስኬታማነት ወሳኝ ሚና አለው፡፡ስለሆነም ጠቃሚ መረጃ እንዲሰጡኝ ስል በትህትና እየጠየቅኩ አርስዎ የሚሰጡትን መረጃ ሚስጢራዊነቱ የተጠበቀ ሆኖ ችግሮችን ለመለየትና የመፍትሔ ሃሳብ ለማመንጨት ብቻ የሚውል ይሆናል፡፡

መመርያ፤

- ስም መጻፍ አስፈላጊ አይደለም
- ይህንን ምልክት(√) በተሰጠው ሣጥን ላይ ያስቀምጡ

- ሁሉንም ጥያቄዎች ለመመለስ ይሞክሩ

ክፍል 1፡ - ጠቅላላ መረጃ

21. ጾታ: ☐ ሴት ☐ ወንድ

22. እድሜ፡ ☐ ከ20 በታች ☐21-30 ☐31-40 ☐41-50 ☐ 51-60 ☐ ከ60 በላይ

23. የትምህርት ደረጃ ☐ ያልተማረ ☐ ሁለተኛ ደረጃ ☐ የተማረ ☐ ዲፕሎማና ከዛ በላይ

24. በዚህ የስራ ዘርፍ ለምን ያህል ጊዜ ቆይተዋል? ☐ 1-2 አመት ☐ 4-6 አመት ☐ 2-4 አመት

☐ 6-8 አመት ☐ ከ8 አመት በላይ

ክፍል ሁለት፡- ዝርዝር መረጃ ለማግኘት የሚረዱ ጥያቄዎች

25. ከዚህ ስራ ሌላ የተሰማሩበት የስራ ዘርፍ አለ? ☐ አዎ ☐ አይደለም

26. በዚህ የስራ ዘርፍ ለመሰማራት የመረጡበት ምክንያት?

☐ የስራ ሰዓትና የስራ ቦታ የመወሰን ነጻነት ☐ ከስራው የሚገኘው ገቢ በጣም ማራኪ በመሆኑ

☐ ሌላ አማራጭ የገቢ ምንጭ ማጣት ☐ አከባቢዬን ፅዱ ለማድረግ ካለኝ ፍላጎት በመነሳት

☐ ያለኝ ክህሎትና የትምህርት ደረጃ ዝቅተኛ መሆን ☐ የጓደኛ ግፊት ወይም ጫና

27. በስራ እንቅስቃሴዎ ምን ምን ማቴርያሎችን የሰበስባሉ? ☐ ብርጭቆ ☐ የምግብ ትራፊዎች

☐ ፕላስቲክ ጠርሙሶች ☐ ብረታብረት ☐ ወረቀት ☐ ሌላ ካለ ይግለፁ_____

28. ከምትሰበስባቸው የወዳደቁ ማቴርያሎች የትኛው ነው በከፍተኛ ደረጃ ትርፋማ የሆነው? ☐ ብርጭቆ

☐ የምግብ ትራፊዎች ☐ ፕላስቲክ ጠርሙሶች ☐ ብረታብረት ☐ ወረቀት ☐ ሌላ ካለ ይግለፁ_____

29. እነዚህን ማቴርያሎች የሚያገኙባቸው ምንጮች ምን ምንድናቸው? ☐ ከመኖሪያ ቤቶች ☐ ከቆሻሻ ማጠራቀሚያ ገንዳዎች

☐ ከመንገዶች ☐ ቆሻሻ ተሰብስቦ የሚጣልበት ቦታ ☐ሌላ ካለ ይግለፁ_____

30. ይህንን ስራ በቀን ለምን ያህል ሰዓት ይሰራሉ? _____

31. ከዚህ ስራ በቀን ምን ያህል ገቢ ያገኛሉ?

ጥሩ በተሰራበት ቀን ብር_____

ብዙ ባልተሰራበት ቀን ብር_____

32. ከስራው የሚያገኙትን ገቢ ምን ያደርጉታል?

☐ ለቀን ፍጆታ አውለዋለሁ ☐ ከፍጆታ የተረፈውን ባንክ እቆጥበዋለሁ

☐ ሁሉንም እቆጥበዋለሁ

33. የሚሰበስቧቸው ማቴርያሎች ብዛት ከወቅት ጋር በተገናኘ ልዩነት ያሳያል?

☐ አዎ ☐በተወሰነ መልኩ ☐አይደለም

34. የተሰበሰቡትን ማቴርያሎች ለማንና የት ይሸጧቸዋል?

_____

_____

_____

35. ለአከፋፋዮች የሚሸጡት ከሆነ በቋሚነትና የተሰበሰበውን ብዛት የሚረከቡ ደንበኞች አሉ?

☐ አዎ ☐ አይደለም

36. ለተራ ቁጥር 17 መልስዎ አዎ ከሆነ ምን ያህል እና የቋሚ ደንበኛ መኖር ጥቅሙ ቢያብራሩልን ?

_____

37. በሚሰበሰቡት ማቴርያሎች ገበያ ላይ የዋጋ ጭማሪ ቢያሳዩ ምን ያደርጋሉ ?

☐ ተጨማሪ ብዙ እሰበስባለሁ

☐ ምንም ጭማሪ ሳላደርግ እንደወትሮው እጨምራለሁ

☐ የምሰበስበውን መጠን እቀንሳለሁ

38. በሚሰበሰቡት ማቴርያሎች ገበያ ላይ የዋጋ ቅናሽ ቢያሳዩ ምን ያደርጋሉ?

☐ ተጨማሪ ብዙ እሰበስባለሁ ☐ የምሰበስበውን መጠን እቀንሳለሁ

☐ ምንም ጭማሪ ሳላደርግ እንደወትሮው እጨምራለሁ

39. በዚህ ስራ በተሰማሩበት ወቅት የሚያጋጥሟቸው ችግሮች ካሉ ቢዘረዝሩልን?

_____

_____

_____

40. ከዚህ ስራ በተያያዘ የወደፊት እቅድዎ ምንድን ነው?

_____

5.6 APPENDEXES 3

Interview questions for Addis Ababa city administration solid waste management and cleansing agency

1. What are the environmental policies concerning the production and recovery of plastic bottles?
2. What roles does the solid waste management and cleansing agency have in protecting the environment and making plastic bottles as a source of income to unemployed people?
3. What are the major problems in relation to the management of plastic bottle recycling in the city?
4. How is the city administration future plan to solve solid waste management and sanitation problems?

5. How the current participation level of the community in managing solid waste in general and plastic bottles in particular?
6. What is the city government plan to increase community involvement?