



**ADDIS ABABA UNIVERSITY
FACULTY OF BUSINESS AND ECONOMICS
SCHOOL OF COMMERCE
DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT**

**MEASURING PERFORMANCE OF REVERSE LOGISTICS SYSTEM
IN PET BOTTLES RECOVERY IN EABSCO.**

In Partial Fulfillment of the Requirements for the Award of
Master of Arts Degree in
Logistics and Supply Chain Management

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Declaration

I, hereby, declare that this thesis, MEASURING PERFORMANCE OF REVERSE LOGISTICS SYSTEM IN PET BOTTLES RECOVERY IN EABSCO., is my original work and has never been presented for a degree in any other university and that all sources of materials used for this thesis have been duly acknowledged.

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Abstract

The East Africa Bottling Share Company(EABSCo) , Coca-Cola's leading local independent franchise bottling partners, has commissioned a \$50 million (ETB 800 million) to manufacture 750 ,000 recyclable bottles per day to meet increasing demand for Coca-Cola beverages in Ethiopia (Press release , Sept 2012). This research is aimed to measure the performance of reverse logistics in recovering PET bottles of EABSCo. Quantitative and qualitative research is employed. Both primary and secondary data gathered and analyzed.

The study finding revealed although there is understanding and application of reverse logistics to recover asset such as Returnable Glass Bottles (RGB), this case does not indicated in terms of recovering post-consumer PET bottles. There supporting evidence unavailability legal enforcement in the country significantly affected EABSCo to engage in recovery of PET bottles through well established. There is evidence showing absence of legal framework is reflected on company's policy failure to embrace as must to do activities. This further implied for lack of recognizing recovering PET bottles as a key competitive of the company. In Conclusion, according to Alvarez-Gil et al. (2007), supply chain players are suggested to be the motivators of reverse logistics implementation. In contrary , there is no effort being done linked to recovering of PET bottles either through its well own recovery chain or through creating integration with inform waste recovery chain.

The research is limited by unavailability of information due to thematic areas new areas for the industry.

In terms of future areas of research measuring the performance which includes the full supply chain actors is an areas which requires further investigations. Secondly, additional research can be conducted to understand the product life cycle analysis of PET bottles in Ethiopia. Further research could also be done to better understand the social and economic impact of improper waste disposal that might arise from plastic wastes such as PET bottles.

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Acronyms

HDPE: High Density polypropylene

CLSC: Closed Loop Supply Chain

CSR: Corporate Social Responsibility

EABSCo: East African Bottling Company

ELDP: Low-density polyethylene

ETB: Ethiopia Birr

KII: Key Informant Interview

MSEs: Micro and Small Enterprises

RGB: Returnable Glass Bottles

PET: Polyethylene terephthalate

PLC: Product Life Cycle

RL: Reverse Logistics

SPSS: Statistical Package for the Social Sciences

UNEP: United Nation Environmental Program

MSW: Municipal Solid Waste

1. CHAPTER I: Background of the study

1.1. Introduction

As environmental issues are rapidly becoming one of the most important topics in supply chain management, managers consider improvements in environmental or 'green' performance a basic competitive priority besides lower cost, short lead time, and high quality. Green supply chain success indicators are quantifiers which are used in assessing the efficiency and effectiveness of green supply chain management practices. These indicators tend to vary between companies and industries, depending on their priorities and the focus of the performance criteria¹.

Reverse logistics is the process of retrieving the product materials or parts from the end user (consumer) in order to recapture value or dispose the materials in an environmentally friendly manner. Reverse Logistics include activities such as waste collection, parts collection, inspection, selection, sorting, direct recovery, reprocessing, redistribution, and disposal. Recovering products, refurbishing goods, and salvaging parts such as precious metals that can be recycled or reused can bring a huge benefit to the environment and to the manufacturer. Reverse logistics enables the realization of the idea of a circular economy, which is a departure from the linear model of raw material flow, to a model of closed material-energy cycles, which significantly reduces the high entropy of the modern economy while enhancing the overall utility rate (Magdalene and Krzysztof, 2011). Actually, implementing reverse logistics programs to reduce, reuse, and recycle wastes from distribution and other processes generates tangible and intangible value and can lead to better corporate image (Azzone et al, 1998). Recent research findings in the sector revealing that there is a number of drivers to design and operate reverse logistics. The main drivers are enforcement to legislations and directives, increased consumer awareness and pressure from consumer activist groups, social responsibilities of companies towards ensuring their activities are environmentally friendly.

Evidences showing that the poor state of solid waste management in cities of developing countries is fast and becoming a social and environmental problem. In this regard, there has been continuous promotion of recycling-oriented practices to ensure sustainable growth by reducing the consumption of natural resources and lessening environmental burdens. Waste is typically disposed of without consideration for environmental and human health impacts, leading to its accumulation in cities, towns and uncontrolled dumpsites. Industrialization, urbanization and modernization of agriculture are needed for poverty reduction and development of Africa but generally require increase in the consumption of industrially-manufactured goods which commonly generate more waste. These trends are predicted to continue into the future. The legal, institutional and administrative framework for the

environmentally sound management of waste remains either lacking or inadequate across the industry despite considerable progress in formulation and adoption of waste management policies.

Rapid population growth and high rural-urban migration pose many socio-economic and environmental challenges in Addis Ababa, including the accumulation of waste on open lands, in drains and in residential areas. Apart from being a nuisance, it also produces foul-smelling pools, pollution, flooding due to clogged drains and contributes towards the health associated risks such as epidemics (UNEP, 2009). In a mega city like Addis Ababa major sources of solid wastes were households, streets and public areas, and public and private institutions. Evidences also revealed that the rate of waste generation is increasing from time to time, as a result the dump site is getting full and beyond the capacity to sink the waste generated. As a direct result of the design and production processes, packaging is seen as one of the biggest problems in developing and industrialized societies, being understood as a great villain for the environment, due to the fact that packaging represents the greater volume of the urban waste.

1.2. Statements of the problem

The East Africa Bottling Share Company, Coca-Cola's leading local independent franchise bottling partners, has commissioned a \$50 million (ETB 800 million) to manufacture recyclable bottles to meet increasing demand for Coca-Cola beverages in Ethiopia (EABSCO , Press release , Sept 2012). The new plastic container line is touted as Africa's first hi-tech, with a capacity of producing 750,000 plastic bottles. Looking at the projected growth of the soft drink industry EABSCo diversified its packaging into recyclable plastic bottles. According to this press release, previously Coca-Cola has been packaging all their beverages that are sold in Ethiopia in returnable glass containers. With the launch recyclable plastic bottles, EABC simultaneously announced their commitment to invest in a recycling program to protect environment.

According to Total Logistic Management, the problems of waste management are increasingly falling into the field of logistics – this is reflected in the growth of reverse logistics (Total Logistic Management, 2011). Waste recovery includes ranges of product recovery options which includes direct reuse/resale, repair, refurbishing, remanufacturing, cannibalization, recycling, incineration, and landfilling. Each of the product recovery options should involves the collection of used products and components, reprocessing and redistribution.

Ethiopia is a country of remarkable potential and opportunities. Unsurprisingly, the second most populous nation in Africa - with a predominantly young population showing rapid increase in the consumption of beverages. It is customary to watch varieties promotional tools such as TV spot,

billboards, etc. which massively encourage wider consumption of soft drinks such as Coca Cola. This communication campaign targeted to increase the sales volume of coca cola family products, most importantly plastic bottled products. The multiple channel of distribution in Addis Ababa created an opportunity to reach its target customers. Major distribution outlets EABSCOs family products includes (but not limited) to Coca Cola kiosks, hotels, cafeterias, supermarkets, hotels, public recreational centers, street venders , social events such as wedding , birthday's , etc. .

In this regards, observation revealed that there are large number of plastic bottles being distributed for wholesaling and retailing agents serving as an outlets for Coca Cola family products with different varieties and sizes. However, relatively there is less visibility of EABSCO's effort in terms of recovering an emptied – post consumer plastic packages. Existing plastic recovery effort seems informal, less organized with lesser scale and incomparable with the amount of packed bottled products injected to the market through multiple distribution channels. However, Coca Cola claimed that they have designed and implemented globally a closed loop supply chain strategy in their in all over the world (International Coca-Cola Sustainability Report, 2013). According to Coca-Cola EABSCO Sustainability report , the company disclosed that “We will constantly work on reducing the impact of our packaging on the environment though the light weighting of our packaging material, having no heavy metal content in our material, supporting recycling efforts and increasing the recycled content of our packaging” .(Coca Cola-EABSCO Sustainability Review , 2012). The same report revealed that Coca-Cola EABSCO designed a zero waste vision through recovering their plastic waste for recycling. However, EABSCO has not disclosed any information regarding their strategies to reach a zero waste vision.

In terms of availability knowledge in the fields of reverse logistics, there are many published and unpolished research and articles on International Journals. The relationship between Reverse Logistics and Waste Management has already been an agenda in recent years at Global and East Africa level. However, in Ethiopia there seems Reverse Logistic for Proper Plastic Waste Recovery as a discipline has been given limited focus, attentions and resources when we compare the magnitude of the problem as a researchable thematic areas. With regards to urban waste management issues it has been areas of research in the public health profession in our country, but with limited or linkage with the reverse logistics discipline. This research expected to generate knowledge products which also triggers dialogue and discussion in the fields. The research will also expected to shed light how the under developed reverse logistics sector could get benefited from Urban Waste Management.

In conclusion, Revers Logistics for plastic waste recovery is identified as an area of research to generate an evidence based knowledge with a particular attention to the soft drink industry.

This research is aimed to answer whether there is relationship of reverse logistics performance in proper plastic waste management in the soft drink industry.

The basic research question crafted to answer:

- i. Is there a proper understanding of reverse logistics in the Soft Drink Industry?
- ii. What are the key drivers/factors of the industry actors for engaging in the reverse logistics for recovering PET bottles?
- iii. What key roles do key actors play in reverse logistics for recovering plastic waste in the soft drink industry?
- iv. What is the key road lockers for effective functionality of reverse logistics for managing plastic wastes in the soft drink industry?

1.3. Objectives of the study

The general and specific objectives of this study is discussed below.

1.3.1. General Objective

The main objectives this study is to measure the level of performance of reverse logistics in recovery of PET bottles the soft drink industry.

1.3.2. Specific Objectives

The specific objectives of the study is presented below:

- 1.2.1. To assess the level of understanding and application of reverse logistics concept in the soft drink industry in Addis Ababa,
- 1.2.2. To examine the effect of key drivers on performances of reverses logistics in recovering PET bottles the soft drink industry,
- 1.2.3. Examine the role of key actors engaged in reverse logistics in the recovering plastic wastes in the industry,
- 1.2.4. To explore key barriers inhibiting proper functionality of plastic waste reverse logistic chain,
- 1.2.5. To recommend reverse logistics framework for proper recovery of PET bottles overcome for the soft drink industry,

1.4. Scope of the study

The research is aimed at to analyze the relationship between the reverse logistics system in recovery plastic waste in the East African Bottling Company (EABSCo). Reverse logistics is a wider and rapidly growing disciplines. The discipline has been applied from wide perspective such as product returns, source reduction, recycling, materials substitution, reuse of materials, waste disposal and refurbishing, repair, and remanufacturing. The research would love to analyze reverse logistic in terms of waste management with special attention on PET bottles recovery. Coca Cola is the leading soft drink in the industry with a major share of in the soft drink industry. In this research the subject under study will only be on the plastic package of Coca Cola family products but not the forward logistics of product.

Recently launched small and big sized plastic bottled for a ranges of products for Ethiopian market. Observations revealed that there is significant level of uptake or consumption of this branded product in Addis Ababa Market. Given the larger market size in plastic packed soft drink industry this has provided some level confidence to conduct this research with special attention to EABSCO in Addis Ababa City. However, the finding from this research does not give the full picture of the industry especially when it comes to company specific findings that might draw from the assessment. But there is still aspect of the research intended to explore the overall picture of the Soft Drink Industry in Ethiopia.

1.5. Significance of the study

The significance of this research mainly lies the chosen theme; understanding the relationship between reverse logistics in recovering plastic waste in the soft drink industry. The author could not find any secondary data of reverse logistics in plastic waste recovery in the soft drink industry in Ethiopia. In terms of availability knowledge in the fields of revise logistics, there are many published and unpolished research and articles on international journals with limited focus to our context. Globally, the relationship between Reverse Logistics and Waste Management has already been an agenda in recent years. However, in Ethiopia it seems the research theme has been given limited focus, attentions and resources when we compare the magnitude of the problem. With regards to plastic waste management , the issues has been areas focus for researchers especially attention has been given from public health profession in our country, but overlooked the benefits of linking with reverse logistics perspectives. Therefore, this research expected to generate knowledge products which also initiate dialogue and discussion on the agenda of reverse logistics and proper waste recovery such as post-consumer PET bottles. The research will also expected to shed light how the infant reverse logistics

industry could get benefited from Waste Management Sector. The lack of existing information on the topic highlights a critical need to further knowledge in measuring performance of reverse logistics in proper post-consumer PET bottle recovery in the soft drink industry. These facts explains somehow the originality of the research theme.

1.6. Limitation of the study

The research mainly focus on understanding the reverse logistics and recovering plastic waste through building cases with EABSCo. In this regard some the finding from this research might not be applicable for the soft drink industry due to driver pertaining to reverse logistics dependent on internal factors. The researcher also challenged from less clarity of existing reverse chain in clearly determining research participants. Unavailability of limited research in our local context made the research less benefited in terms of designing the research framework, measuring performance of reverse logistics, and appropriate research methods. This research only focused towards understanding of reverse flow of physical product than flow of information and finance across the reverse chain.

In an attempt to fill this gap researcher conducted a multi-stage research which helped to gain a better understanding of the reverse logistics and waste management operational structure in the soft drink industry in Addis Ababa.

2. CHAPTER II: Research Design and Methodology

2.1. Research Methods

Two stage research were conducted. In the initial stages preliminary information in relation to the research theme will be gathered to inform the second phase of the research.

Initial rapid assessment conducted to get better understanding increase researcher understanding on the EABSCo operational modalities in terms of the reverse logistics management with a particular attention to recovering plastic wastes. In addition, assessment is generated pertinent information on how the plastic waste is managed in the city. The information explored through this rapid survey is utilized to determine appropriate research methods which other would not have happened. Most importantly this stage is significant contributed redesigning sampling frame and identify unit of analysis of the research methods.

The actual research mainly relied on primary and secondary sources of data. In term of primary data needs this cross-sectional study involves both quantitative and qualitative research approaches. The quantitative approach (the survey) will focus on ‘what’ and ‘how’ questions set to explore key drivers for adoption and practice of reverse logistics in the soft drink industry in Addis Ababa.

On the other hand, since the adoption and practice is also influenced by institutional and contextual factors, a complementary qualitative approach (key-Informant Interviews and Observations) will be employed to capture the more subtle and subjective issues that will enrich the research findings.

Therefore, the researcher used a mix of qualitative and quantitative methods. The reason for choosing to utilize a combined methods is to overcome some of the limitations with the use of only one of the approaches, and to increase the validity of the results. Due to limited information availability on the thematic areas the researcher believe using both type of research could generate adequate data.

With regards to secondary data the researcher will intensively review and analyze existing relevant knowledge such researches, articles, publications, industry analysis report, policies, proclamation, strategies, etc. from relevant local to global sources.

2.1.1. Study populations

According to Donald et al, population consists of all the subjects you want to study. It comprises of all the possible cases (persons, objects, events) that constitute a known whole. Therefore, from this we can conclude that population consists of all the subjects the research envisaged to study. The population for this particular study has got multiple actors operating in the Soft Drink Industry in Addis Ababa

The study employed a purposive sampling design. Due to the research peculiar nature the researcher defined the target population from EABSCo only senior and mid-level managers from relevant department. The total population of study was 20 from these department. Based on the discussion Addis Ababa City Administration Waste Recovery and Recycling Project Offices, Arada sub-city is selected for a better performance of PET waste recovery practices through Micro and Small Enterprises. In Arada Sub city there are 60 MSEs recently operating, these were taken as a target population of the study.

A. Forward Logistics Actors

The major actors are those actors engaged in the process of returning to a party in the original forward logistics on the one hand, such as the original equipment manufacturer. The fundamental units of in this chain for this specific research is East Africa Bottling Share Company (**EABSCO**).

B. PET Bottle recovery chain Actos

The second crucial actors are those operating in the secondary market chain. In the latter case a further distinction can be made between specialized parties relying exclusively on secondary resources and parties using them as additional input alternatively. This part of target population mainly engaged in the recovery process of the plastic packages. In this reverse logistics functions actor are dynamics, informal, less organized. There seems to be higher exit and entry of actors with very dynamic changes of functions. The student research has conducted a rapid preliminary assessment to better understand target population and key actors in the soft drink industry and secondary market of the PET package recovery industry engaged in recovery plastic wastes in Addis Ababa City.

The main chain actors play different functions along the reverse logistic chain/ waste management chain includes. These research participants are lists of unit of analysis for quantitative survey.

The initial assessment has provided an insight about the possible actors those actor operating in PET secondary market the drink industry with specialized functions are categorized as clearly indicated below.

Table 1: Summary of sample size with respective survey participants

Estimated population size by Functions	Total Population Size	Sample Size for Respective Functions
Soft Drink Industry in Addis Ababa City Administration		
Senior and Mid-level Managers East African Bottling Share Co.	20	19
PET Bottle Recovery Chain Actors		
Micro and Small Enterprises	60	52
Expected none responses		7
Total number of responses		78
Total actual response		69
Response rate		92%

C. Sampling Designs and Sampling procedures

The student research proposed to use purpose sampling techniques. In general the survey will utilize non – probabilistic sampling techniques. Due to the nature the problem to be researched the researcher categorized different key actors into different functions in reverse logistics and plastic waste recovery functions. In order to select respondents from each of these function the research chosen to utilize stratified sampling techniques as shown on the above table.

East Africa Bottling Company and Addis Ababa City is selected as a primary unit of analysis purposive sampling techniques as this methods of sampling is in line with the research objectives and scopes. As a secondary unit of analysis the student researcher used employ a multistage sampling design. While selecting sub-cities in order to get adequate representation from each stratum. The study mainly considers on one sub city of the ten sub cities.

D. Sample Size Determination

Dr Getie. A (2003) in his instruction manual “Research methods in business studies, a practical guide” the model greatly simplified sample size decisions by providing the table that ensures a good decision model proposed (See Annex).

Dr. Robin Hill (1998) in his study what sample size is "enough" in internet survey research? He was cited as Krejcie & Morgan (1970) have produced a table for determining sample size. They are

produced the table based on a formula. No calculations are required to use standardized tables to determine adequate sample size. Alreck and Settle (1995) provide similar evidences to justification the need to simplify sample size determination.

Thus, based on the above developed based on the findings on the initial stage research target population is estimated is around 78. These participants of the research are operating both at forward and reverse logistics and secondary market operators. From EABSCo from senior and mid-level manager 19 were purposively selected. From Informal PET recovery chain 52 were selected for the survey. The response rate for the survey was found 92%.

2.2.Data Collection Methods

2.2.1. Quantitative Survey

Primary and secondary sources of data collected. To gather quantitative data collection standardized surveys tools utilized. The questionnaire were translated, piloted, and finalized before conducting the actual surveys.

2.2.2. Qualitative data

The qualitative data collection methods used for key-informant interviewees (KIIs) and Observations. The qualitative data helped to understand and explain the underpinning reasons for what is observed in the survey. It was also used to triangulate the quantitative survey. Therefore, the research also conducted Key Informant Interview from informal waste management sector especially from the public service providing services to better understand the existing waste recovery structure. Informant also provided their professional thought in terms of understanding existing policy level gaps, opportunities and recommendation to address gaps pertaining to PET bottle recovery in Addis Ababa City Admirations.

2.3. Ethical Considerations

2.3.1. Informed consent

The researcher applied oral an informed consent to solicit the willingness of the individual to participate on this research. The participants were given information on the purpose of the study, the time it takes, the procedures to be followed, and benefits before starting the research. It is only after getting an informed consent that the participants will be required to move to the next steps. The potential participant will also be informed that he/she can refuse to answer any question and that he/she can quit the interview at any point. If the participant has any questions, the researcher will be required to respond adequately.

2.3.2. Confidentiality

The researcher assured information that participants provides during the study will be kept confidential. The raw data set and recorded interviews shall not be used for any other purpose than the intended purposes.

2.4. Data Analysis and Interpretation

2.4.1. Data Gathering and Analysis

As indicated earlier, this study employ a combination of quantitative and qualitative data collection methods.

The quantitative data checked for completeness then the data entry will begin with writing the data entry format (including coding and data edit checks). Then, the data exported into Statistical Package for the Social Sciences (SPSS) for analysis. SPSS is used to produce preliminary frequency tables, and tabulations that will help select statistical methods to do further analysis of the data as per the objectives of the study.

The Key Informant developed, piloted and finalized before conducting the interviews. The interviews is recorded; and notes were taken. The transcripts of the taped interviews transcribed. Then, the data organized and analyzed thematically, in preparation for report writing.

2.5. Organization of the Research/ Chapterization

The research report be organized into five chapters. The first chapter focused on the general introduction, highlighting the issues of reverse logistics, plastic waste management at local, regional and regional level. A problem formulation and research questions also form part of this chapter followed by the methodology and scope of the research work. The second chapter presents the recently emerged knowledge products presented through extensive review of relevant literatures from

different sources. The third chapter presented the research methodology used to gather and analyze the data. In the fourth chapter is make an in-depth presentation and discuss of results of generated from this research. The last section of report presents a conclusion and recommendations.

Chapter III: Literature Review

3.1. Theoretical Frameworks: Reverse Logistics and Plastic Waste Recovery

3.1.1. Reverse Logistics

Reverse logistics encompasses the logistics activities all the way from used products no longer required by the user to products again usable in a market. First of all — and probably most intuitively related with the notion 'reverse' — this involves the physical transportation of used products from the end user back to a producer, thus distribution planning aspects (M. FLEISCHMANN et al, 1997). Reverse logistics can be divided into the post-sale reverse logistics and post-consumption reverse logistics. Leite (2009) understands that this differentiation is necessary, despite the areas interdependence he classifies after-sales reverse logistics as the area that manages the information and physical goods flow after the sale and that goes back into the productive cycle with little or no use due to defects, errors in processing, among others. The reverse logistics of post-consumer, according to Leite (2009), is concerned with solving the flows of products discarded when their usefulness ends, and these can be transported to final destinations such as incineration or landfill, or have your useful prolonged once they return to the production cycles. There are several possibilities for marketing and treatment of post-consumer goods extinguished after its original use. According to the author, remanufacturing and recycling add economic, ecological and logistics value to post-consumer materials, enabling them returning to productive cycle

In all cases the reuse opportunities give rise to a new material flow from the user back to the sphere of producers. The management of this material flow opposite to the conventional supply chain flow is the concern of the recently emerged field of 'reverse logistics' (Stock, 1992). Reverse distribution is the collection and transportation of used products and packages. Reverse distribution can take place through the original forward channel, through a separate reverse channel, or through combinations of the forward and the reverse channel.

During the early nineties, the Council of Logistics Management started publishing studies where reverse logistics was recognized as being relevant both for business and society (Stock, 1992). The idea of reverse logistics (RL) businesses has been around at least since the early industrial age when merchants recognized that old clothing and rags, linens, and so forth, could be reproduced and used to produce new textile products (Donald F. , 2005). The reverse logistics business gained significant momentum, gaining visibility in the 1980s when environmental issues became emotionally charged sensitive topics. This immensely accelerated for an emergence of waste (general and hazardous)

processing and recycling business. Evidences revealed that Using RL as a business strategy to explore new markets or improve a company's bottom line emerged only after the early 1990's. Since then there is a common understanding in the industry that the basic underpinnings of RL process as a business is key to understand the concept of Product Life Cycle (PLC) management and support in view of product or technology over its entire life cycle of use.

A number of forces are driving the increased interest in business providing RL and Closed Loop Supply Chain (CLSC) services activities and markets. Among these drivers heightened, increasing awareness of consumer due to the legislation imposed by government and environmental activists to environmentally friendly products by competitors in every industry. Among others triggered consumers increased use of reusable containers for convenience and fast moving consumer good among main drivers.

Reverse logistics in terms of forward logistics based on different parameters and theories summarized below in the table. In summary, as compared to forward logistics, reverse logistics is less visible, predictable and structured in terms managing product, information and financial flows along the chain.

Table 2 : Forward Logistics Vs Reverse Logistic

Forward Logistics	Reverse Logistics
<ul style="list-style-type: none"> • Product quality uniform • Disposition not clear • Routing of product unambiguous • Costs more easily understandable • Pricing of product uniform • Inventory management consistent • Product life cycle manageable • Financial management issues clearer • Negotiation between parties more straightforward • Type of customer easy to identify and market • Visibility of process more transparent 	<ul style="list-style-type: none"> • Product quality not uniform • Disposition options clear • Routing of product ambiguous • Reverse costs less understandable • Pricing of product not uniform • Inventory management not consistent • Product lifecycle less manageable • Financial management issues unclear • Negotiation less straightforward • Type of customer difficult to identify and market • Visibility of process less transparent

As can be clearly observed on below (Fig 1) direct supply chain involved the movement of materials from suppliers of suppliers' to consumers of consumers'. Once the products reaches the consumers of consumers' the product starts moving back through the reverse supply chain known as reverse logistics. The backward movement can be caused for variety of reasons. According to European Journal of Operational Research reverse Logistics is a process of moving or transporting goods from their final destination for the purpose of capturing value or for proper disposal (Kannan Govindan, et al, 2014).

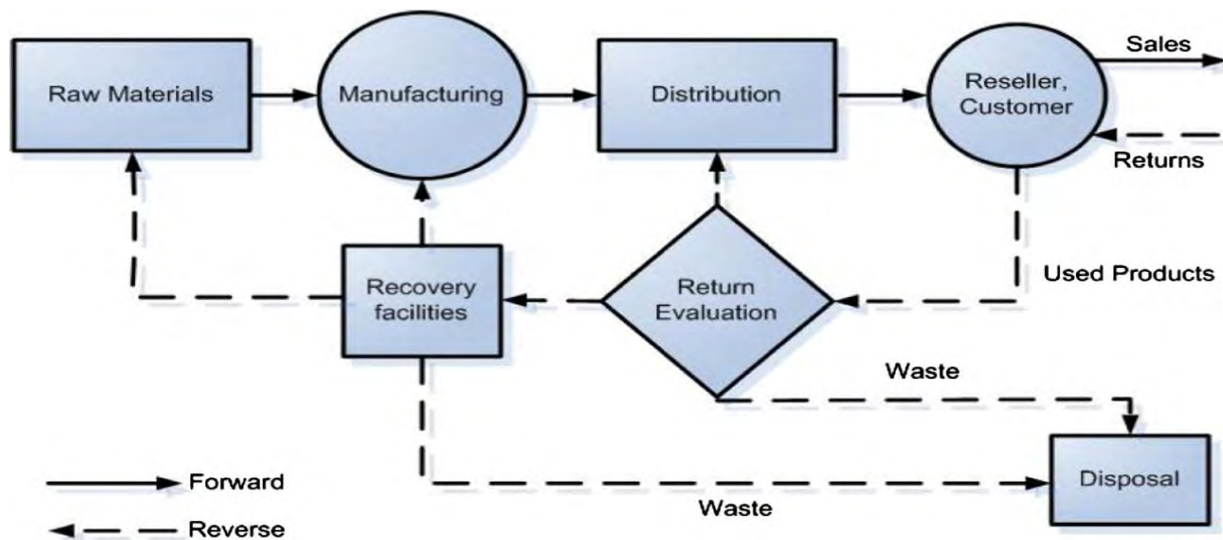


Figure 1 : Generic form of forward/reverse logistics (Tonanont et al , 2008)

This research intends to build on the reverse logistics concepts from the perspectives of recovering products after serving their very purpose for consumers. Most importantly, the research builds around the theoretical frameworks on Reverse Logistics System from the products/ materials recovery.

Any Used or end-of-life products are returned into the forward supply chain for three main purposes (Wells and Seitz, 2005) summarized below as:

- *Reuse*: Which is the process of collecting used products from the field, and distributing or selling them used. Thus, although the ultimate value of the product is reduced from its original value, no additional processing is required.
- *Remanufacturing*: which is the process of collecting a used product or component from the field, assessing its condition, and replacing worn, broken, or obsolete parts with new or refurbished parts? In this case, the identity and functionality of the original product is retained.

- *Recycling*, which is the process of collecting used products, disassembling them (when necessary), separating them into categories of like materials (e.g., specific plastic types, steel, glass, paper, etc.), and processing them into recycled products, components, or materials. In this case, the identity and functionality of the original materials is lost.

Rogers and Tibben-Lembke (1999) and Daher et al. (2006) argued that the main reasons that cause firms to make efforts to adopt reverse logistics are Environmental legislation, Economic benefits of using returned products in the production process and Growing public environmental awareness.

To summarize, we can group the overall business of Reverse Logistics into five major segments.

- i. Industrial, technical, and commercial products :
- ii. Consumer goods reclamation, return, and disposal
- iii. Green product legislative-based returns
- iv. Packing and pallet recycling
- v. Waste collection return and processing

There is a significant differences in the general reverse logistics (RL) process between industrial and commercial products on the one hand, and consumer goods products on the other, is the position of the distribution/retailer in the overall supply chain, and the ease or difficulty of applying closed loop supply chain (CLSC) processes and technology. In essence, in the consumer goods area, the customer usually deals directly with the retailers, or in some cases the distributor, if internet or ecommerce processes are utilized. In general, the direct supply chain flows from the manufacturer to the dealer/distributor, the retailer, or both. Both returns and service and support to the customer are coordinated through the retail chain; thus, the closed loop structure found in industrial and commercial products is either not applicable, or is much more difficult to manage and control, since the entire process is not the responsibility of one organization.

Literature review has also shown that products, goods, and materials can be returned for a variety of reasons, including:

- Parts or subassembly failures in the field
- Products or materials damaged in shipping or transit
- Products or materials returned to clear shelves
- Products or materials returned due to obsolescence, age, manufacturing issues/recalls
- Products or goods returned for other reasons, such as customer remorse

In the CLSC operation, a significant portion of these returns are repaired, refurbished, and sent back to the end user. Some materials and products are simply disposed of as waste or trash leading to material recycling, destruction by fire or chemical means and burial in land or sea deposits.

In addition, another return channel involves reselling to secondary markets. Secondary market deals with the creation and use of secondary markets and mechanisms for disposal of returned products and materials, which continue to have value as is, or with refurbishment, repair, or remanufacture. In general, these secondary market businesses operated nationally or regionally, and were primarily involved in the purchase of unwanted returned goods at significant discounts, for purpose of resale. Primary disposal channels usually involve purchase and sale of products and goods in the same geographic region. Alternatively, disposal of these products can be managed offshore through international transfers. Particularly in the case of consumer goods to be returned from mass merchandisers, often restrictions are placed on the disposition channels to avoid direct competition for the same products at discounted rates, which could compete with the mass merchandiser stores.

3.1.2. Plastic Waste Recovery

Plastics are a crucial part of 21st century life. Not only do they provide us with useful, lightweight and durable products, but they play a key role in the sustainable development of our world. Every activity in modern life is influenced by plastics and many depend entirely on plastics products. It would be hard to produce cars without synthetic bumper, dashboards, steering wheels and switches. It would almost impossible to exist medicine without plastic hypodermic syringes and artificial hip joints. The same is in telecommunications, dependent on plastic telephones, circuit boards and cable insulation. Our entertainment and leisure relies on the unique combination of characteristics offered by plastics in sports equipment and clothing, CDs, video and audio tape, television and cinema.

Plastic is the general common term for a wide range of synthetic or semisynthetic materials used in a huge, and growing, range of applications from packaging to buildings; from cars to medical devices, toys, clothes etc. The term "plastic" is derived from the Greek word "plastikos" meaning fit for molding, an d"plastic" meaning molded. It refers to the material's malleability, or plasticity during manufacture that allows it to be cast, pressed, or extruded into a variety of shapes – such as films, fibers, plates, tubes, bottles, boxes, and much more.

Reverse logistics (RL) is a multi-billion dollar business in the United States (Stock, Speh, & Shear, 2002).All plastics can be recycled, however the extent to which they are recycled depends upon both

economic and logistic factors. As a valuable and finite resource, the optimum use for most plastic after its first use is to be recycled, preferably into a product that can be recycled again.

Used plastics can be recycled up to six times. If it doesn't make economic or environmental sense to recycle, then the energy can be recovered through Energy from Waste (EfW) incineration. Used plastics have a higher calorific value than coal and at a time of high energy prices unrecyclable materials can, through EfW provide a much needed local energy supply.

Plastics products which have undergone a full service life and have then been reclaimed for further use are termed, post-use material, and can arise from industrial, commercial and domestic sources. Recent years have seen a growth in post-consumer plastics recycling.

Most of the plastics recycled are from the commercial and industrial sectors, with bottles being recovered from domestic sources. This pattern is because the main requirements for effective recycling of post-use plastics are:

- i. Resource efficient reclamation of the post-use products;
- ii. Facilities to sort and compact the reclaimed products;
- iii. End use applications for the recycled plastics materials and these conditions are more easily met from commercial post-use waste.

In addition, heavily contaminated plastic waste requires special washing and drying facilities from converter demand to finally recovery and disposal.

Reuse of products and materials is not a new phenomenon. Metal scrap brokers, waste paper recycling, and deposit systems for soft drink bottles are among examples that have been around for a long time. In these cases recovery of the used products economically more attractive than disposal. In the recent growth of environmental concerns has given *reuse* increased attentions. Waste reduction efforts have promoted the idea of material cycles instead of a 'one way' economy. Dealing with the environmental costs in rapidly growing economic development, urbanization and improving living standards in cities have led to an increase in the quantity and complexity of generated waste, representing a phenomenal challenge (UNDP, 2004). In urban centers throughout African regions, less than half of the solid waste produced is collected, and 95 percent of that amount is either indiscriminately disposed away at various dumping sites on the periphery of urban centers, or at a number of so-called temporary sites, typically empty lots scattered throughout the city (Mohammed 2003). Economic growth and changing consumption and production configurations are ensuing into hurried increase in cohort of plastic wastes. In 2009, UNEP reported that the world's annual consumption of plastic materials has increased from around 5 million tons in the 1950s to nearly 100 million tons; thus, 20 times more

plastic is produced today than 50 years ago. This implies that on one hand, more resources are being used to meet the increased demand for plastic, and on the other hand, more plastic waste is being generated. Over the last few decades, there has been a steady increase in the use of plastic products resulting in a proportionate rise in plastic waste in the municipal solid waste streams in large cities in sub-Saharan Africa (World Bank, 1996; Yankson, 1998).

Most products are now packaged in polyethylene films, which form about 70% of the plastic waste in the municipal waste stream. According to Fobil, plastic materials in commerce across the sub-region include low-density polyethylene (LDPE) commonly called polyethylene films, high-density polyethylene (HDPE) and other plastics such as polypropylene, polystyrene, polyvinyl chloride (PVC) and polyethylene terephthalate (PET). The majority of plastic waste comes from the post-user market which is found mainly in Municipal Solid Waste (MSW), as well as in the following economic sectors: packaging, agriculture, construction and demolition, automotive, electronics and electric (Eng. Magdy G. Faraget al, January 2008). The Plastic Waste component of the Municipal Solid Waste has been described as quite problematic because it is non-biodegradable and can stay in the environment for a considerable length of time causing all sorts of environmental problems (Oteng-Ababio, 2011). In contrast, according to *PlasticEurope*, plastic play a significant role in the environmental, societal and economical dimensions of sustainable development (*PlasticEurope*, 2009). Plastics are light, durable, clean and versatile and therefore have been increasingly used to make packaging, automotive, building, electronic and electrical products. Recognizing the importance of plastics and the fact that plastics are made of scarce resources, there have been a lot of efforts in research and development to make plastics reusable and recyclable (Chee Wong, 2010). According to Cheng Wong Plastics can be recycled at the end of use, typically for a maximum of six times. Most plastic waste can be re-processed to form plastic products. His research also shed lights that plastics soft drink bottles are reused in many countries. The recovery of waste requires designing an effective systems which functions properly and environmentally friendly.

In recent days, there is an increasing emerging evidences revealing that waste recovery mostly motivated through economical, legislative and corporate citizenships drivers. Reverse logistics, plays a major role in addressing reducing waste and protecting the environment not only in Kenya but also globally (Paul and Esther, 2014). Reverse logistics (RL) market, business models, processes, systems and technology, and functional areas have provided the framework and structure for examining

management issues. This relatively new and emerging business opportunity is of growing importance with respect to two areas:

- Environmental concerns focusing on reducing waste, trash, hazardous, and other residue of consumer and industrial and commercial enterprise
- Economic value in terms of extending the Product life cycle (PLC), as well as the usability and uptime of goods and products manufactured

While considerable focus has been placed on the environmental issues and impacts, the economic side of the equation has received less attention. However, as discussed and described above both objectives (environmental and economic) can be achieved with the same business models, practices, and infrastructure. Identified market for RL and repair on either a stand-alone basis or as part of a CLSC represents a significant and growing business opportunity and market. It has also been shown that by managing this process efficiently and with modern technology, both objectives can be met. According to Paul and Esther, this concept, which marries both environmental and economic concerns through RL as one integrated approach, is being to some extent driven by recent developments.

Economic, Legislation, Corporate Citizenship and Environmental and Green issues are considered as the four main drivers of reverse logistics. Based on the importance of these drivers to an organization and their goals and objectives company must adopt core business strategies to be successful in reverse logistics. The most commonly echoed strategies on published literatures is summarized into six set of core areas:

Customer Satisfaction (CS): The voice of the customer is the most important aspect of reverse logistics management. Customers do respond to companies' behaviors, and the goodwill developed through reverse logistics and proper disposal of products can create substantial customer loyalty. Efficient reverse supply chains can mean happier customers and higher profits.

New Technology (NT) : Implementation and technology support has been recognized as a competitive weapon capable of enhancing firm performance new applications and tools may be required for compliance reporting, track and monitor customer returns and manage returns data. The technology development to handle reverse logistics should be flexible enough to handle inevitable future expansion and exceptions involved in reverse logistics.

Eco-Compatibility (EC) and environmental performance continues to be a focus item for many companies. Regulations, laws, corporate and consumer awareness, as well as competitiveness, have

companies initiating actions to reduce hazardous material, to take back their products, and to minimize product energy usage.

Strategic Alliances (SA) are often used to rationalize business operations and improve the overall competitive position of a company. A strategic alliance allows a company to take advantage of what it does well and enables it to seek partners who have strengths in other areas. The strategic alliance formation benefits every member of the supply chain to focus on their core competencies.

Knowledge Management (KM) is a multi-disciplined approach to achieve organizational objectives by making best use of knowledge. It involves the design, review and implementation of both social and technological processes to improve the application of knowledge, in the collective interest of stakeholders. Constant innovation and learning processes are necessary for the successful conduct of reverse logistics operations.

Value Recovery (VR) from returns is a key to successful reverse logistics in any organization. Reverse supply chains were designed to be cost efficient. For items that can be resold, the goal is to get them back in the sales channel at the highest selling price as soon as possible. The goal of an organization in terms of value recovery is to get returned product available for resale at the highest possible price. In essence, the increased focus on RL as an extension of the basic direction of supply chain concept which is becoming progressively more significant, driven by the recognition of both the environmental impact of incorrectly handling, managing, and processing returns, as well as the economic value of returns, which is increasingly lost.

Multiple actors might be engaged in comprehending strategies could be members of forward distribution channel members such as traditional manufacturers, retailers, and logistics service providers. Alternatively, specialized parties such as secondary material dealers and material recovery facilities.

Possible functions in the reverse distribution channel are: collection, testing, sorting, transportation, and processing (*Pohlen and Farris, 1992*). A distribution network is to be designed, determining suitable locations for these functions. One important issue is the location of sorting and testing within the network. Early *testing* might save transportation of useless products. On the other hand, sophisticated testing might involve expensive equipment which can only be affordable to establish at only few locations. Decentralized testing is therefore typically restricted to a rather rough, preliminary check. *Sorting* of a return stream into different reusable fractions might be less expensive at an early stage close to collection.

Recycling can often be described as an *open-loop system*, i.e. the products do not return to the original producer, but will be used in other industries. Possibilities for integration of forward and reverse distribution are scant as the actors differ in both channels. Remanufacturing and reuse often lead to *closed-loop systems*: the product or packaging returns to the original producer. Reverse distribution may either take place through the original network directly, using traditional middlemen or through specialized logistical providers. Even if the same actors are involved, integration of forward and reverse distribution may be difficult at the routing level since collection and delivery may require different handling. At present, there are very few models treating forward and reverse distribution simultaneously.

There are many broad areas of reverse logistics. While surveying the literature it noticed reverse logistics spreads over the areas like environment, customer's satisfaction, organizational role in reverse logistics, support systems, forecasting and return policies etc.

Thus, research mainly built around the above conceptual frameworks of Reverse Logistics and Plastic Waste Management Concepts. The initial rapid assessment expected to provide an insight on the how reverse logistics system operates and organized in the Soft Drink Industry as well as how the reverse logistics is linked with urban waste management system in Addis Ababa City. This framework will benefited a lot from this preliminary finding in designing one step closer to the actual scenarios the industry.

3.1.3. Literature review of the Soft Drink Industry

Africa offers significant growth potential in beverages, underpinned by rising personal disposable income, a fast-growing population and increasing per capita consumption. With more than 30 bottling plants and over 14,000 employees, Coca-Cola Beverages Africa will be the largest Coca-Cola bottler on the continent, with the scale, complementary capabilities and resources to capture and accelerate top-line growth. This will also allow the new African bottler to develop best operating practices and invest in production, sales and distribution, and marketing to benefit from growing demand and drive profitability.

Ethiopia is a country of remarkable potential and opportunities. Obviously, the second most populous nation in Africa - with a predominantly young population is seeing a rapid increase in the consumption of beverages¹. Recently published report revealed that an annual growth of 25% forecast, the soft

¹ Sources : sidel.com/global-references

drinks market in Ethiopia is expected to reach 100 million crates per year within the next few years. Coupled with this potential for growth has intensive evaluation market trends provided a confidence to mobilize their resource and invest in the soft drink industry with special focus on marketing soft drinks in PET bottles.

In an attempt to exploit this opportunity for instances, Moha Soft Drinks SC, the major market share leader in Ethiopia, turned to an international company, Sidel, initiated a new venture to exploit to unlock the opportunity. Moha particularly impressed by the company's leadership in PET and Combi bottling solutions. The management team confirmed its choice after being impressed by Sidel's great image of innovation and solidity at a world fair for beverage and liquid food technology in Munich (Moha press release, 2013). The PET manufacturing plant was installed and started to manufacture PET bottles in Addis Ababa.

In similar notions , the second market share holder , East Africa Bottling Share Company, Coca-Cola's leading local independent franchise bottling partners, has commissioned \$50 million (ETB 800 million) to manufacture recyclable bottles to meet increasing demand for Coca-Cola beverages in Ethiopia (EABSCO Press release , Sept 2012). The new plastic container line is touted as Africa's first hi-tech, with a capacity of producing 750,000 plastic bottles. Looking at the projected growth of the soft drink industry EABSC diversified its packaging into recyclable plastic bottles. According to the press release, previously Coca-Cola has been packaging all their beverages that are sold in Ethiopia in returnable glass containers. With the launch recyclable plastic bottles, EABC simultaneously announced their commitment to invest in a recycling program to protect environment.

Recently published report (Coca-Cola Sustainability Report, 2014/2015) sustainable packaging and recycling is one of the areas of the company's engagement in which the company restate its commitment to support the development of the circular economy, through use recycled and renewable materials and recycle more packaging than the company used. The following table summarizes, revisited companies corporate social responsibilities and sustainable strategies.

Figure 2: Summary of Coca-Cola Sustainable Packaging and Recycling²

	Target	By
Light Weighting	Reduce by 25 percent the amount of material we use across all packaging formats	2020
Recycled Materials	Include recycled aluminum, glass and steel in respective packaging formats	Ongoing
PET Bottles	Ensure that 40 percent of the PET we use is recycled PET and/or PET from renewable materials	2020
Recyclability	Continue to ensure that 100 percent of cans and bottles are fully recyclable	Annual
	Support the development of infrastructure and technology to enable recycling of all other packaging materials	2025
Manufacturing	Send zero waste to landfill from our own manufacturing operations	Annual
Recycling	Recycle more packaging than we use, by championing improvements to collection schemes and supporting the recycling industry	2020
Inspiring consumers	Increase packaging recovery rates by using our brands to educate and inspire consumers to recycle more often	Ongoing
Packaging innovation	Support the wider packaging industry to explore next-generation packaging.	Ongoing

However, like the previous sustainability report of Coca-Cola enterprise's this version of statement of commitment also lacks how these set of target could be realized.

3.1.4. Review of relevant policy and strategies

A rapid urbanization rate means that the challenges relating to the collection and disposal of solid waste will increase in years to come, and therefore there is an urgent need to resolve the current problem (UN-Habitat, 2010a). In order to achieve improved SWM, international donors place a strong emphasis on the adoption of the principles of good governance (Bjerkli, 2013).

In 2009, the city Addis Ababa city administration introduced a new policy called Business Process Re-engineering (BPR). This policy was part of a national capacity-building program to improve public services further and was also supported by international donors. The aim of the policy was to increase

² Corporate Responsibility & Sustainability Report 2014/2015 , Fact Sheet 03/30

efficiency within the city's administration, develop its capacity, cut operational costs and improve public services (Camilla Louise Bjerkli International Journal, 2013).

Preliminary discussion held with relevant stakeholders revealed that The SBPDA was now reorganized into three agencies: the Solid Waste Management Agency, the Landfill Project Office and the Beautification, Park and Cemetery Agency. Thereafter, even more power was to be given to the *kebeles*, which were to take responsibility for waste collection, whereas the sub-city administration would only play a monitoring role and be responsible for the transportation of waste by truck. The city administration had the main responsibility for the overall management of solid waste and the landfill site. The new SWM policy was aimed at reorganizing the former MSSEs into government-supported cooperatives. According to the city administration, these changes were introduced because the previous service had not worked well. The city administration accused the MSSEs of being 'rent collectors' or 'rent seekers', of handling the waste in an illegal manner, of favoring collection from high-income households, and of only engaging in the sector to earn money, not caring about the cleanliness of the city. Conversely, members of the MSSEs blamed the city administration for lack of containers and for not arranging for the containers to be collected. Regardless, these changes and decisions related to SWM in the city had once again been made without consulting the various actors involved, such as the MSSEs and households. As a result of the policy, all managers of the former MSSEs had to reorganize their enterprises and either become members of the cooperatives or cease working altogether. The change in policy resulted in most of the former managers of the MSSEs opting to cease looking for other contracts, and their employees had no other choice than to join the new *kebele*-controlled cooperatives. One of the previous managers stated.

Promotion of good governance policies such as decentralization and partnership with non-state actors has been adopted and implemented by the city administration in Addis Ababa with the official aim to improve solid waste services. The analysis of solid waste management from 2004 to mid-2011.

At this initial stage of the research relevant national Urban Solid Waste Management policies, strategies and plans has been reviewed. The initial finding revealed that there are a number of public institutions which can be associated with Urban Sanitation Waste Management (USWM) at national and local level. This posed challenges in terms of playing role their roles. The challenges seems overlapping of duties, and responsibilities among owners of the business from various sector ministries. Similar analysis has also shown there is an overlapping and clarity of roles among different ministries. Box

below the gaps summarizes existing policy and their relevant gaps in terms of mandated authority and related implementation challenges (Dr. Abera K. et al, 2014).

Box 1: Summary of gaps in Urban Solid Waste Management (USWM) national policies and strategies

Health Policy 1993: Federal Ministry of Health

- The policy does not emphasize USWM or waste from commercial areas or institutions.

Food, Medicine and Health Care Administration and Control Proclamation Number 661/2009

- Proclamation does not clearly indicate urban management of human, solid, or liquid waste.

Food, Medicine and Health Care Administration and Control Regulation Number 299/2013

- The regulation does not clearly indicate the management of urban sanitation, and penalty is not indicated for those who failed to comply with Article 39 waste handling or Article 42 toilets in public facilities.

National Sanitation and Hygiene Strategic Action Plan (2011 – 2015): Federal Ministry of Health

- The strategy focuses exclusively on hygiene and sanitation that is implemented only in peri urban and small towns. It does not treat large and medium towns or solid and liquid wastes handling in these towns.

Environmental Policy: 1997 (Ministry of Environment and Forestry)

- There was no overall comprehensive policy formulation to address the cross-sectoral issues concerning urban sanitation.

Proclamation 300/2002, Environmental Pollution Control: (Ministry of Environment and Forestry)

- The proclamation does not clearly confer on waste management and urban sanitation at large.

Solid Waste Management Proclamation No. 513/2013: (Ministry of Environment and Forestry)

- The proclamation does not clearly confer on waste management or urban sanitation at large.

Water Supply and Sanitation Policy 2001: (Ministry of Water Irrigation and Energy)

- The health and water and sanitation policy was issued a long time ago (1993 and 2001).
- Expected progress in sanitation was not made, and sanitation policies are not properly treated or implemented.

Urban Waste Management and Green and Beautification Draft Strategy: (Ministry of Urban Development and Construction)

- Important stakeholders do not participate in the strategy development process and there is no collective ownership.

(Adapted from Situational Analysis Report USWM: Addis CIPH, Aug, 20 4)

Existing practices in terms of solid waste characterization as shown the table below (Dr. Abera K. et al, 2014) plastic waste is the second most generated in most low and medium income county. In contrary to this characterization, EFDRE's, Solid Waste Management Proclamations 513/2007, article no. 7, the proclamation ignored to mention plastic bottles as one.

Waste Material	Average Loose Density (kg/m ³)	Example Composition
Organic (food etc)	288	32%
Plastic (bottles and film etc)	40	13%
Paper & cardboard	60	5%
Glass	188	5%
Metal (cans etc)	100	4%
Other (ashes, dust & Misc.)	380	41%
Total	270 kg/m³	100%

Table 3: Standard Characteristics of Solid Wastes in Urban

The proclamation also limited in overemphasizing for solid wastes with lesser rate of generation and scale of perceived economic, social and environmental impacts.

3.1.5. Literature review Performance Measurement

3.1.5.1. Measuring performance of reverse logistics

In the last few decades, due to the advancement of technology, business processes have been reengineered, marketing channels have become more diverse, and product life cycles have been shortened. The volume and monetary value of products flowing in the reverse direction within a supply chain has been and continues to be increasing, particularly as environmental, legal and customer service requirements increase throughout the marketplace (Guide et al., 2006). The reverse logistics operations can be referred to as the many needed activities to retrieve a product from a customer and either dispose or recover the value from it (Prahinski and Kocabasoglu, 2006). The advantages of reverse logistics are not limited to environmental aspects only. Reverse logistics has played an increasingly critical role in overall corporate business (Daugherty et al., 2002) and has been examined strategically within the broader supply chain strategy. An enterprise that can develop and properly monitor reverse logistics processes for product returns will create a mutually beneficial situation for both the organization and customers through reverse logistics (Stock and Mulki, 2009). Therefore, maintaining an effective and efficient reverse logistics process has moved to the forefront as a key capability for logistics and manufacturing organizations.

Further, Skjott-Larsen et al. (2007) presented that within the reverse logistics there are various challenges such as:

- i. Large variations in timing, quality and quantity of product returns;
- ii. Lack of formal product returns procedures;

- iii. Delayed product returns reducing their market value;
- iv. Lack of local competence in inspection, evaluation and disposition of returns;
- v. Risk of cannibalizing new product markets; and
- vi. Lack of performance measurement for the return process efficiency.

One of the most important challenges for the reverse logistics enterprises will be to develop the performance measurement for reverse logistics for its efficiency and effectiveness. Efficiency of reverse logistics is achieved by reducing the waste, recapturing recovered value, reducing inventory investments, and optimizing the collection networks. These contributions may help enterprises reduce the costs of reverse logistics decrease investments, and therefore improve the profitability.

Reverse logistics effectiveness allows enterprises an opportunity to improve their competitiveness by building consumer confidence in enterprise brand and image through quick handling of returned products, liberalized returns policies, operations of take-back networks, and green aspects of performance.

3.1.5.2. Empirical review on Urban Sanitation and Waste Management

An in-depth focus group discussion with relevant agencies of city of Addis Ababa administration findings organized into different function of waste management including waste generation, local screening, collection, disposition and recovery. However, there is no strong evidences generated from all functions except in some of the functions such as local screening, collection and disposition functions to provide enough evidences to construct conceptual frameworks of the research. The initially empirical evidences summarized as follows.

A. Waste Generations

In the city of Addis Ababa solid waste generates a solid waste of 0.4kg/c/day. More than 200,000tonessolid waste are collected each year. About 550t/day which is about 80% of the total waste collected. The municipality largely engaged in the collection.

B. Waste Collection

It is reported that currently the capacity of municipality in terms of collection has reached 80%. Sources of waste generated 76% households, 18% institutions, commercial and factories hotels and only 6% of waste generated is from the street sweeping. Primary collection is done by micro and small enterprises. The number of enterprises organized to work on solid waste collection is 520 with a total number of 5815 operators. With regards of collection the Municipality Spends large proportion of its

budget on collection, transport, and disposal of solid waste, solid waste collection services divided in to two sub-systems primary and secondary collection.

C. Sorting

In terms of physical decompositions, organic 60%, **recyclables 15 %** and others 25%. Vegetable 4.2 %, paper 2.5%, rubber/plastics 2.9%. The municipality categorizes plastic waste under the recyclable.

D. Disposal

Disposal of solid waste, there is currently one open dumpsite where all collected waste is disposed of. It has been established 47 years ago. The site is known as "Rappi" or "Koshe" which is South West part of the city. Located 13 km away from the city center. It has a surface area of 25 hectares. The present method of disposal is crude open dumping: hauling the wastes by truck, spreading and leveling by bulldozer and compacting by compactor or bulldozer.

3.1.5.3. Empirical evidences of measuring performances reverse logistics

About 26% of companies confer a high importance to the objective: “to reduce the production costs”. The next most ranked objective (18% of the requested companies grant it a great importance) is: “to reduce the negative environmental impact”. (Michael Feitó Cespón et al³ , 2012). According to Michael, 48% of requested companies recognize to have a link between reverse logistic strategies and manufacturing strategies. Only 21% establish a relation between reverse logistic strategies and environmental strategies, and 5% have a special strategy for the recovering of returns and residuals. It is remarkable that almost 26% of manufacturing companies in the studied area do not have any strategy for the residual and the return management. It shows how deficient the industrial sector is in the strategic aspects of the reverse logistic management. 57% of those companies whose reverse logistic strategy is implemented, have it properly-written, only 36% of them have it partially-written and only 7% do not have any records of their strategy.

Stakeholder perspective (0.291) is perceived to be the most important criterion followed by the process (0.265) and by financial (0.145) and environmental (0.145) perspectives (Muhammed and Walid). The same researched revealed that the financial perspective, RL costs are found to be the most preferred (0.478) followed by the revenue recovered (0.256). At process level, RL cycle time (0.395) is the

³ Cespón, M. F., Castro, R. C., Lundquist, J.: *Empiric Study on Reverse Logistic Strategies in the Manufacturing Sector*.

Journal of Operations and Supply Chain Management 2 (2), pp 72 - 82, C International Conference of the Production and Operations Management Society.

preferred desirable measure compared with others. At this point, one of the important tasks is synchronization and cooperation among the several means of RL including its partners that help the RL to deliver in the best possible manner and followed by the efficiency of product recovery (0.293). At the stakeholder perspective, the measure customer satisfaction (0.427) followed by governmental satisfaction (0.285) is among the front-runners. This is the key player that really transforms the objectives through the strategic considerations. In terms of innovative and growth perspective, the management and employee measure (0.395) is followed by process innovation capability (0.293). This reveals that innovative and growth plays an important role in directing and handling RL process and gaining knowledge for any improvements which is critical one. The environmental perspective shows that overall environmental compliance (0.373) is seconded by materials utilization (0.277). The overall environmental compliance of RL is critical to continuous monitoring and regulatory compliance of environment-related issues. The social perspective, corporate image (0.499) is followed by relationships (0.249). This leads to an increase in market value and building the relationships with RL network partners (Mohammed and Walid, 2012).

An empirical investigation of reverse logistics conducted in Flanders, revealed that results of a cross-sector survey of 250 Flemish LSPs and shippers with a response rate of 22.5%. Practically all the respondents have to deal either with short-life cycle or low-value products, or both, stressing the importance of efficient reverse logistics handling. However, current reverse logistics processes are not considered to be a priority by the respondents as far as returned product flows are concerned, but especially the management of packaging and support materials appears to be an information blind spot. The limited value recovery of products and packaging materials and the slow cycle time of packaging materials and returnable transport items represent an important 'invisible value loss' in the supply chain and may offer a substantial untapped source of efficiency gains. The investigation also revealed, 71 % of the studied are engaged in manufacturing companies intended to check and reformulate their strategies annually, the 4 % review them from 3 to 5 years, and the other 14 % never check them out. There is also an evidence supporting the reverse logistic strategy will depend in great measure of the residuals generated in each company and its ability to reuse them. Significant percentages (43%) of the residuals generated by these industries are organic, which is a challenge for their recovering due to the fast decomposition and the difficult conservation. Another residual that could have some difficulty with its reusability is plastic because of their difficult classification due to the immense amount of plastic types that have similar characteristics. The metallic residuals are also

generated in great quantities, 38 % of the residuals generated by the manufacturing companies. These kinds of residuals are easier to be classified and recovered because their recovering does not need relevant changes in the production structure.

In terms of the drivers to deal with packaging returns, then cost reduction became the first driver when compared with customer satisfaction. As customer involvement is lower for packing and support materials, cost reduction is the primary focus. There are evidences that less than 25% of respondents focus on value recovery, although the value of durable packaging and returnable transport items such as the 'europallets' should not be underestimated. There are several recovery options for products and materials being returned. Here we consider the following (Brito and Dekker, 2004):

- i. Direct recovery (re-selling and re-distribution)
- ii. Product recovery (repair, refurbishing, remanufacturing)
- iii. Recycling (materials recovery)
- iv. Proper disposal and write-off

Furthermore, evidences revealing that there is distinguishable differences between products that are being recovered for the original versus for secondary markets.

Across industries, the value and nature of goods sold is different. Empirical research have shown that segmentation percentages based on the product lifecycle (PLC) and value for the respondents' most important products. Almost two thirds (63%) are dealing with products of relatively low value and more than three quarters are dealing with products with short lifecycle. Fast moving consumer goods and agricultural products tend to have a relatively low value and short product life cycle. ICT, telecom and consumer electronics are typically sectors where products have a relatively high value and shorter product life cycle. Construction and DIY products have a relatively low value and long PLC, and products in the automotive industry have a relatively high value and long PLC. Only 4% of the companies belong to this category while the remaining 96% have to deal either with short-life cycle or low-value products, or both. Any delays or inefficiencies in the processing of return flows can be expected to have a significant negative impact on value recovery. This stresses the importance of paying attention to the return processes. Participants in the research 30% listed legislation as a driver. This reflects the sectorial composition of the respondents, as pro-environmental legislation is affecting paramount the reverse logistics. Ethics & ecology appears as a driver referred by just below 20% of the organizations, showing that a considerable group is as well values-driven.

When asked on the drivers to deal with packaging returns, then cost reduction became the first driver when compared with customer satisfaction. As customer involvement is lower for packing and support materials, cost reduction is the primary focus. Less than 25% of respondents focus on value recovery, although the value of durable packaging and returnable transport items such as the 'europallets' should not be underestimated.

On average, almost 30% of the products are (directly) resold on the original market, and more than 25% are properly disposed and written off. Linked to this 71 % of reverse logistics and repair services are currently done in-house. Over 55 % of the firm would prefer to outsource this function (Blumberg 1999). Processes for physical and administrative handling of products and packaging returns on a three point scale. Processes are *poorly under control* and are performing in an irregular way, processes are *partially under control* but could be performing in a better way and processes are *well under control* and are performed efficiently.

The survey indicates that only 37% of the respondents consider the physical handling of packaging & support materials to be *well under control* and performing efficiently. The administrative handling of packaging and support materials receives positive grading from 54% of the respondents. For returns of products, the figures are better, 71% of the respondents consider the physical management of product returns to be well under control, while 25% of the respondents express concerns about the administrative handling of product returns (partially or poorly under control). Regarding information management, there is a lack of integration of data with ICT especially the management of packaging and support materials appears to be an information blind spot. This is a serious gap as monitoring is one of the necessary steps for a successful reverse logistics program (Ellis, 2006). Furthermore, 40% of the respondents indicate that there has been little or no management attention towards reverse logistics in the recent past. Within the respondents, 24% had no policy on product returns and 44% had no return policy for packaging and support materials (Flanders, 20). In terms of ownership, the reverse logistics process is often entrusted to managers in charge of other main processes such as sales and customer service. The responsibility for reverse logistics is also often shared with these colleagues. In 46% of the cases, the logistics manager is not the single owner of the reverse logistics process. Overall, the job title of "reverse logistics manager" exists in only 13% of the companies in the sample. In 11% of the cases, no clear owner of the physical reverse logistics process can be identified, a figure that is even slightly higher for the administrative aspects of the reverse logistics process (13%). Thus, the outcome is little management commitment, lack of return policies and unclear assignment of

human resources to reverse logistics resulting in dispersed ownership of reverse logistics issues. However, it is known that without a clear focus and commitment from the organization's top management, it is impossible to give reverse logistics the necessary attention, to obtain the budget for the necessary investments and to overcome the resistance to reengineer reverse logistics processes and create awareness for reverse logistics with suppliers and customers. The lack of commitment from top management is an important barrier to successful reverse logistics management. Other main barriers to reverse logistics are caused by the variable quality of returned products, the lack of appropriate performance metrics, financial constraints and lack of staff training and education (Ravi and Shankar, 2005). Nonetheless, almost all respondents (94%) expect to see an increase in management attention towards reverse logistics. More than quarter of the respondents state that their organization will start a reverse logistics project.

3.1.5.4. Empirical Review on Plastic Waste Recovery⁴

The aim of **repairing** is to return the used products to working order. Quality of the repaired products is more likely less than the original. It requires limited disassembly and remanufacturing. This operation can be performed anywhere. Durable product manufacturer. The aim of **refurbishing** is to bring used product to a specified quality level. Quality is less rigorous compared to the new products. It consists of fixing the improper modules and replacing them with working or technological ones. Military aircraft are examples of refurbished products. The aim of **remanufacturing** is to bring the products to the quality level of new products, that is, to make them "as new". Used products are completely disassembled to the parts level. All parts are extensively tested. Worn-out or outdated parts are replaced with the new ones. Repairable parts are extensively tested. Approved parts are sub assembled to the module level, and approved modules are sub assembled to product. As opposed to the previous activities, in **recycling** neither product nor part identity is preserved. The aim is to reuse the materials from used products.

3.1.5.5. Empirical review trends in packaging⁵

Quality required depends on the process in which the recycled material will be used. Results from Plastics Europe's report from (Denkstatt , 2010) conducted to understand the impact of plastics on life-cycle energy consumption and greenhouse gas emissions in Europe, confirmed that without plastic packaging it is estimated that the tonnage of alternative packaging would increase by a factor of almost

⁴(Magdalena GRACZYK and Krzysztof WITKOWSKI 2011)

⁵ Oakdene Hollins , An Analysis of the Viability of Reverse Haul within the UK Hospitality Sector, 2010

four. Greenhouse gas emissions would rise by 61% and energy consumption by 57%. Globally, the plastics industry has grown rigorously and continuously over the last 60 years. Production increased from 1.5 million tones in 1950 to 230 million tunes in 2009. Growth is estimated at around 9% a year on average.

The trend in packaging within the on-trade shows a gradual decline in returnable bottles and an increase in one-trip containers. Packaging of beer has moved towards these non-returnable bottles and cans. For instances in 1975, only 7.5% of the overall (on-trade and off-trade) UK beer market used one-trip containers, yet in 2000 this had increased to 36.5%.

When plastics have completed their use phase, whether as a car bumper or a bottle, they can either be recycled or if this is not economic or environmentally beneficial the calorific value of the plastic can be recovered through energy from waste incineration to provide a much source of home-grown power. As a consequence plastics can be viewed as ‘borrowing’ the oil.

2.6. Summary of gap identified in empirical and theoretical reviews

In conclusion, the study of RL and performance measurement of reverse logistics has only lately started to fascinate researchers’ courtesy, and so far only a few issued works which can easily be accessed. The focus of performance measurement in reverse logistics has, for the most part, been on performance factors. Therefore, an integrated and comprehensive performance measurement system of reverse logistics has academic and practical implication. Henceforth, there seems a researchers started to identify research need can be recognized not only to amass performances based on existing and widely utilized performance measurement framework but also developing customized performance measurement tools which can easily be applied to their industry as well as firms.

The literature review in this chapter exhibited the prominence of the performance measurement and performance evaluation of reverse logistics. Although approaches are presented, shortcomings of both a theoretical and practical nature still exist seeking attentions from academic sector. The following are the major gaps observed from the previous studies:

- Available published researches on reverse logistics has just examined one or several performance factors that contribute to performance. However, there is not fused framework that precisely measures reverse logistics performance.
- While many studies focus on performance evaluation in reverse logistics, some questions left unaddressed. What would an effective performance measurement system for reverse

logistics? How can organizations design an inclusive and implement a comprehensive performance measurement system successfully?

- The specific measurement issues of performance in reverse logistics, such as stakeholder focus, strategy, processes, innovation and learning, partnership, and knowledge management are emerging in research. However, further investigation is required for a relevant choice of measures and the selection of appropriate measures.
- The design of measures/factors has been covered in many publications. The cascading and aggregation of measures vertically has not been adequately researched.
- The strategic management in the reverse logistics industry provides many opportunities for research, particularly the measurement of strategy deployment. When developing or applying any performance measurement framework, the issue of strategic performance measurement should be taken into account.
- Existing RL related research in different industry but fail to show clear linkage between the primary market such soft drink industry with secondary market which in this is plastic waste recovery.
- In a developing nation like Ethiopia, although a large numbers of researches has been conducted in Urban Solid Waste Management Industry, there still need to research which has a linkage into a single industry such as a soft drink industry.
- Globally , there are a couple of research conducted in terms of understanding the concept of reverse logistics and measuring it , only a single research has been conducted in terms of understanding the linkage between bottled water and consumption behaviors of Addis Ababa consumers’.
- The theoretical aspect of RL is at the infancy stages compared with forward logistics, this constrained to get a clarity of theories, concepts, principles, etc. to the level expected. Instead, the research highly relied on premature theories which are evolving through research insights.

2.7. Conceptual Frameworks

This research is conceptualized on three key concepts. These includes reverse logistics, plastic waste recovery and measuring performance of organizations.

This research is mainly focus on plastic packages recovery after consuming a soft drinks. Companies recover their plastic packages for different reasons. Researcher have shown there are various reasons.

The primary reason is to gain a direct economic benefit from the recovery of the plastic packages. Secondly, intended comply with environment related policies and pressures from activist, consumer associations and pro-environment groups. Thirdly, corporate citizenship which emerges to adhere to the companies social responsibility.

Reverse logistics , recently emerged , a concept which can be applied in a broader areas including managing product and raw materials return from consumer to the manufacturer for poor performance, quality, defects, due to longer duration delivery time, obsolescence of fashion products. Companies also recovery packages after end of life of their products. The recovery options can take a different shape in different industries. However, in reverse logistics there are two well recognized mechanisms to recover post-consumer products such the soft drink PET package. Direct recovery of the post-consumer products this include re-sale, re-use and re-distributions. Process recovery is a broader option than the direct recovery. Process recovery includes repair, refurbish, remanufacturing, retrieval, recycling and incinerations. Both options requires a set process with a different function and value adding roles. The most commonly known process are collection, inspections, selection, sorting and recovery. The functions managed by different types of the actor along the reverse logistics players. These actors can be categorized into four. There are forward logistics actors, reverse logistics players, government institutions and opportunistic players. The types and level of engagement are vary depending their types of organizations. Post-consumer product can be recovered within primary market through creating integration with forward logistics so that they can get recovered through this established system.

The four key steps involved in a returns process are local screening, collection, sorting and disposition.

A. Local Screening

Local screening is done at the point of collection of the returned products. Often products enter the supply chain that should not enter in the first place and cause unnecessary transportation, administration and handling costs. In an ideal reverse supply chain, products are screened at the point of collection according to specifications of the manufacturer. Disposition, however, changes based on the product (or its version), the vendor and the retailer. Therefore, complex decision mechanisms need to be maintained to allow disposition of product based on customer agreement on a product-by-product basis. With the ubiquitous presence of the Internet plenty of opportunities exist to do this in a cost efficient and effective way. This will be discussed in more detail in the Technology section.

B. Collection

There are many different ways to collect the products that are destined to enter the reverse supply chain. Retailers often have to send their return products back to their suppliers' different warehouses throughout the country. Different processes need to be set up to facilitate timely processing of these returns. This can often be very complicated and confusing for both retailers and manufacturers as they are dealing with multiple parties, many of whom are concentrating on getting products out to the customer, rather than back to the source.

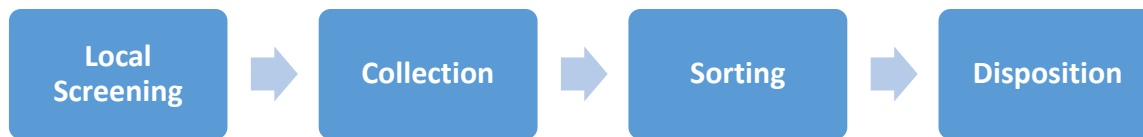


Figure 3: Plastic Waste Recovery Functions

Figure 4 : Plastic Waste Recovery Functions

C. Sorting

Some large retailers have been using centralized return centers (CRCs) for many years. They have selected centralized return centers dedicated to handle their entire reverse logistics operations. The advantages of using centralized return centers are numerous. When a company dedicates an entire facility, organization and system to optimize the handling of returns, benefits arise from a whole range of areas. Some of the key benefits are: efficiency can increase as employees occupy positions full-time and can focus on handling returns only, experience in the sorting process will help employees make better and quicker disposition decisions, and cycle times will improve, resulting in better asset recovery and higher customer satisfaction.

D. Disposition

Three ways to dispose of product can be distinguished: sell as-is, repair or reuse (part of it) and ultimately dispose of the product. Some key activities within each of these categories are:

Sell as-is: Resale (as new), sell via outlet or discount store, e-auction, and sell to secondary market.

Repair or reuse: Repair, refurbish or remanufacture, modify and recycle.

Dispose: Scrap, donate (to charity), and dispose in secure manner (for example, certain drugs). Disposition should be done to maximize the value of reclaimed goods or dispose of the goods in the most cost-effective way.

The soft drink industry widely known for setting up effecting reverse logistics especially in managing emptied soft drink bottles. However, the soft drink industry also known for being inefficient and ineffective in recovering PET plastic bottles. The researcher observation and rapid assessment findings shows that most plastic packages is recovered through secondary market without direct linkages of manufacturers of plastic bottles. Those recovered through secondary market is recycled and remanufactured into different product such as plastic household wares, plastic shoes, plastic chairs and tables, dust bins, etc.

The second areas is concept is waste management system. The solid waste management is a broad disciplines, therefore the research will consider only few waste management concepts. The waste management chain has seven stages different functions will be undertaken with different key actors. The first stage of the waste management chain is a storage of wastes. The method used where waste is produced to temporarily store waste until it is collected or transported to the next stage in the waste management chain.

Second stage at along the chain is primary collection. The collation, loading and subsequent movement of materials considered by the generator as waste, from the point of generation to a point of intermediate transfer either to secondary collection or transfer. In the secondary collection stages collation, loading and movement of waste from the end point of a primary collection service, to a point of recycling, treatment or disposal. Then transferring is the next function in the chain. The physical activity of moving waste from one sub-system to another with the aim of improving transport efficiency. In the treatment biological, chemical, or mechanical methods employed to remove pollutants from industrial or municipal wastes, change the character and composition or reduce or eliminate its potential for harm to living beings and the environment. The final function along the chain is disposal. Sites where waste is deposited and its subsequent *in situ* degradation is either, preferably, managed under a controlled physical, biological and chemical process until it is rendered safe or , preferably not, discarded in the natural environment with uncontrolled consequences, with various degrees of control between these extremes.

Therefore, research builds and focuses on solid waste management chain where reverse logistics and recovery of PET plastic packages with soft drink industry. Recycling has experienced rapid growth as a technique to reduce the solid waste stream volume. Despite the public appeal and acceptance of recycling, the reverse logistics channels used in recycling have received minimal attention. However,

the reverse channels' membership and capabilities have a significant impact on the efficiency of processing recyclable material for remanufacture into recycled products. Differing product characteristics, extensive handling, and low density shipments pose considerable obstacles to establishing an efficient reverse channel for recyclable commodities. Current literatures, describes the reverse logistics channel structure, membership and functions, and provides a foundation for identifying the issues affecting efficiency and marketability, and possible future directions for improving efficiency within the reverse channel structure.

Most reverse supply chains are designed along five key activities (Blackburn et al., 2004). Used products first have to be obtained from the user through product acquisition. The acquired products are transported through the reverse logistics channel to a facility where the next processes take place. Inspection, sorting and disposition activities allow for assessing the returned products' condition and value recovery options. Products then may be restored to their original specifications by means of remanufacturing activities. Finally, secondary markets are to be created for the recovered products, in order to recover their residual value. However, the longer these activities take, the more value is lost along the chain. Supply chain design has to take this into account, as economics are an important driver for reverse logistics. Once a product enters the reverse logistics flow, the logistics manager has to decide where the product has to be sent: either return to vendor, to the landfill, or to the secondary market. The reverse logistics has an interface with several secondary market. This secondary market is usually known as the waste management chain as shown on the above figure.

Therefore, this research conceptually framed on the reverse logistic flows and waste management chains.

2.8. Constructs of Variables for Measurement Performance

There are various external and internal factors that influence the implementation and development of reverse logistics in an. Some of the common factors addressed in many previous studies are divided into two groups of external and internal factors.

The **internal factors** include:

- (i) Company policy - more strategic focus on reverse logistics and specific policies of returns management makes reverse logistics operations more effective and efficient (Alvarezgil et al., 2007, Janse et al., 2010);
- (ii) Top management support - increased awareness of the strategic importance of reverse logistics, support for strategic decisions of resource allocations for reverse logistics operations (Alvarezgil et al., 2007, Janse et al., 2010);
- (iii) Cross-functional integration - create value, competitive differentiation, and efficiency in returns management (Mollenkopf et al., 2007); and
- (iv) Utilization of current resources - cost reduction for reverse logistics operations, integration and support between forward and reverse logistics (Rahman and Subramanian, 2012).

The **external factors** are:

- (i) Laws and Regulations - drivers for reverse logistics implementation in the European electronics industry; supports for efficient reverse logistics operations;
- (ii) Customer awareness and demand - drivers and support for environmentally oriented business management, end of life management, and customer returns management;
- (iii) Information technology - support for effective and efficient reverse logistics operations from collection, recovery to redistribution;
- (iv) Collaboration: increased share of information, knowledge, resources and capabilities for effective and efficient reverse logistics operations; and
- (v) Globalization: cost savings due to standardization and centralization of the reverse logistics services.

According to Garengo et al. (2005), these dimensions are applicable to all enterprises engage in reverse logistics industry but needs contextual modifications. Therefore, for this study twice categories of variables were identified and presented as follows:

The first categories are internal factors which determines the level of performance of reverse logistics for proper recovery plastic waste packages in the soft drink industry in Addis Ababa City. These includes:

Internal Variables /Drivers:

A. Management :

- i. Financial Management
- ii. RL Policy
- iii. Knowledge/Learning

B. Process

- i. Network capacity
- ii. Recovery capacity

C. Innovation and Growth

- i. Management Initiatives
- ii. Employee Competency
- iii. Capability

The second set of factors are the external factors which determines the level of performance of reverse logistics for proper recovery plastic waste packages in the soft drink industry in Addis Ababa City.

These are:

External Variable

A. Environmental Legislature

- a) Government Satisfaction
- b) Overall environmental compliance
- c) Disposing Capability

B. Stakeholders

- a) Government Satisfactions
- b) Employee Satisfaction
- c) Investors Satisfactions
- d) Customer Satisfaction

C. Social

- a) Corporate Social Responsibility (CSR)
- b) Safety and Security
- c) Job Creations

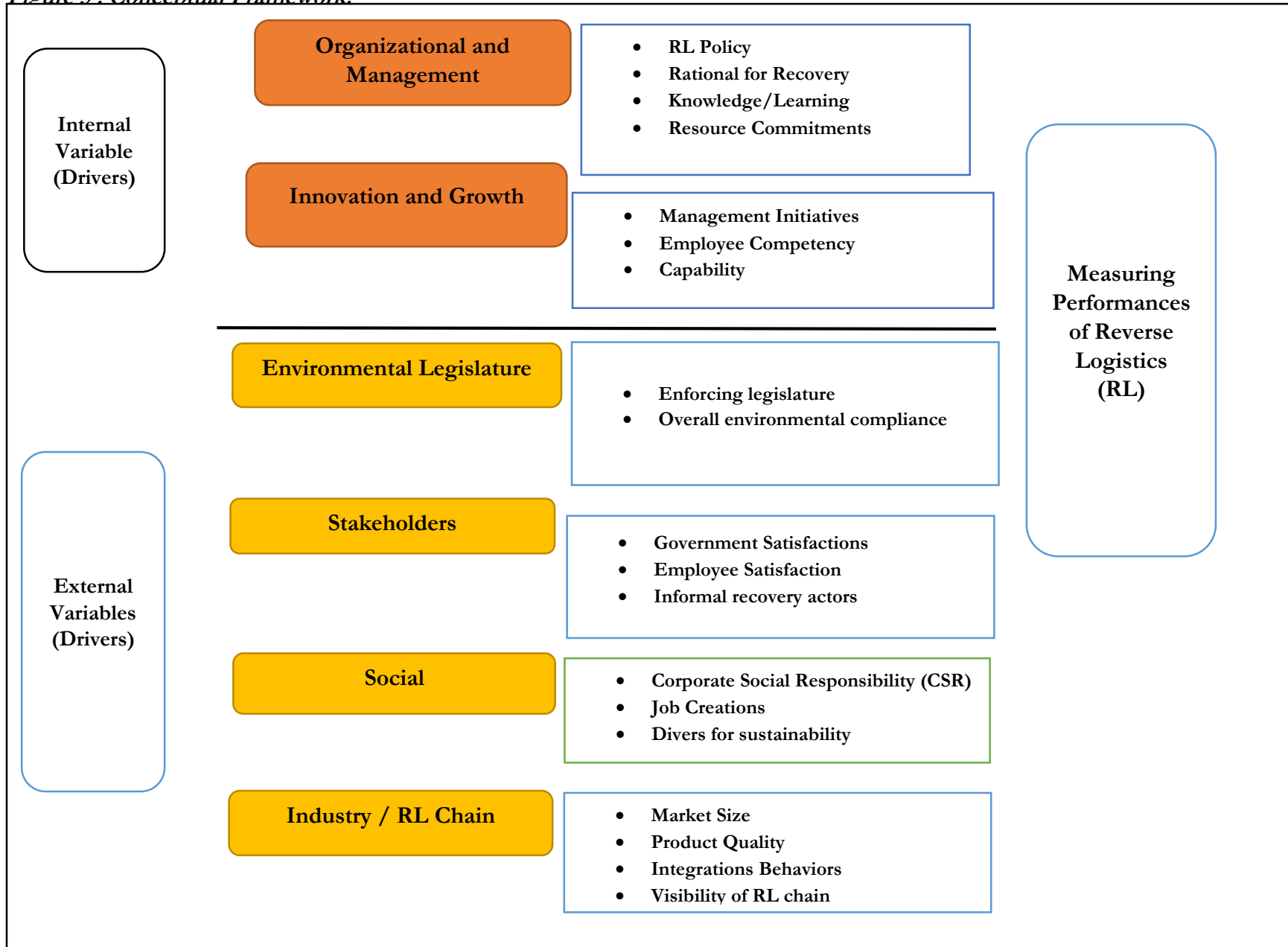
D. Industry/Reverse Logistics Chain

- a) Market Size
- b) Product Quality

- c) Cooperation Behaviors
- d) Visibility of RL Chain

The research will use as a construct variables for measuring performance of key actors operating reverse logistics and waste management chain to understand the level of performance of the soft drink industry in Addis Ababa. The research framework is conceptualized as shown on the fig below.

Figure 5 : Conceptual Framework.



(Sources: Authors compilation based on initial stage research and literatures)

4. Chapter III : Data presentation and Analysis

4.1. Findings and analysis: Soft Drink Industry, East African Share Co.

4.1.1. Reverse Logistics Practices in recovering PET bottles

A. Return Returnable Glass (RBG)

Respondents were asked whether their company is engaged in any reverse logistic (RL) activities. They have engaged respondents have shown that they have EABSCo RL activities to return emptied (Returnable Glass Bottle) RGB. The level of agreement as indicated on the figure more than 75% of the response scaled as strongly agree while the rest of the respondent responses shown their agreement in terms of their company engagement in RL to return RGB.

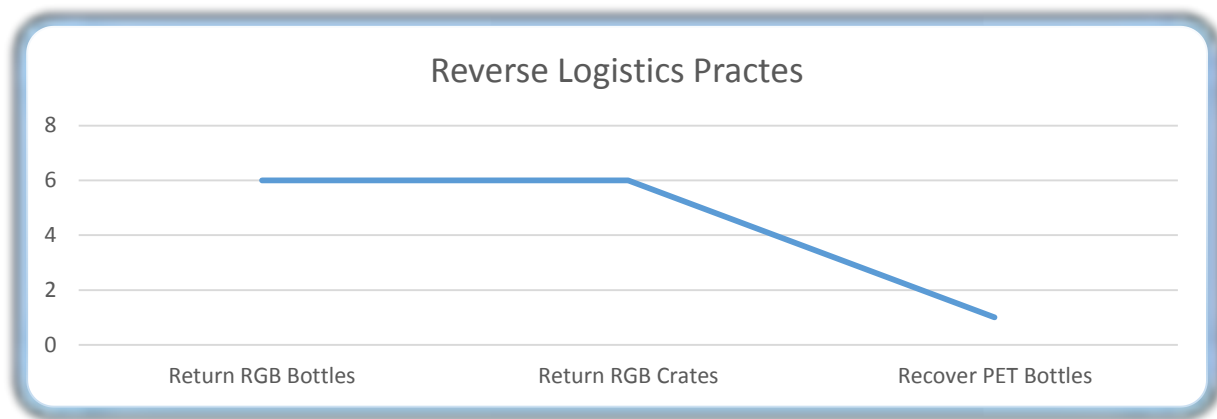


Figure 6: Revere Logistics Practices

B. Return RGB Crates

In line with the level of agreement shown on EEABSCO's reverse logistics exercise to recover RGB, respondents has shown consistent responses which reveals EEABSCO engagement in returning crates. Likewise, close of 60% has shown their level of agreement while the rest of respondents shown their level of agreement as agree.

C. Recover PET Bottles (RPL)

The data collected from the response whether EEABSCO has been practicing the PET bottle recovery activities has revealed, more than 80% of the respondent has shown that there is no such practice in their company. While close to 15% has shown they believe their company has partially engaged in recovery PET bottles. Insignificant number of respondent (5%) of the respondents believe that they

agree EEABSCO engagement in terms of recovering PET bottles. This revealed that the company has no engagement in recovery PET emptied bottles.

4.1.2. Drivers of EEABSCO to practice in recovering PET Bottles

In the literature of reverse logistics, many authors have pointed out driving factors like economics, Environmental laws and the environmental consciousness of consumers (see e.g. RevLog, online). Generally, one can say that companies do get involved with Reverse Logistics either 1) because they can profit from it; or/and 2) because they have to; or/and 3) because they “feel” socially motivated to do it. (Marisa and Dekker, 2003).

Respondent were asked to associate the reason behind their level of agreement with the most driving factors. Respondents were provide lists of possible drivers for recovering. These includes Economic, Corporate Social Responsibility, Company policies and environmental legislatures as a key drivers for recovering PET bottles.

A. Economic/Commercial

As shown on the graph below, the finding revealed that respondents disagree intention of EABSCo to recover PET bottles through its logistic system. Amongst the possible drivers indicated the strongest level of disagreement is associated with economic or commercial benefits.

Economic drivers mean that with reverse logistics, it is possible to recover economic value from products that are being taken back. Recovery can be cheaper than manufacturing or buying new products or raw material. (Partridge, 2011) points out that applying sustainable methodologies in the management of activities enables the reduction of inefficiencies and costs.

B. Corporate Social Responsibility(CSR)

Respondents shown their disagreement when it comes EASBCo’s engagement to recover PET bottles intended to play its social corporate social responsibilities.

The results of the study are a confirmation that corporate citizenship is major factor that the company considers in its logistical activities. The findings are consistent with Ravi & Shanker, (2005), study which established that societal interests and well-being could influence the company to engage in environmentally friendly practices such as reverse logistics. The design and implementation of reverse logistics should therefore consider well- being of the society.

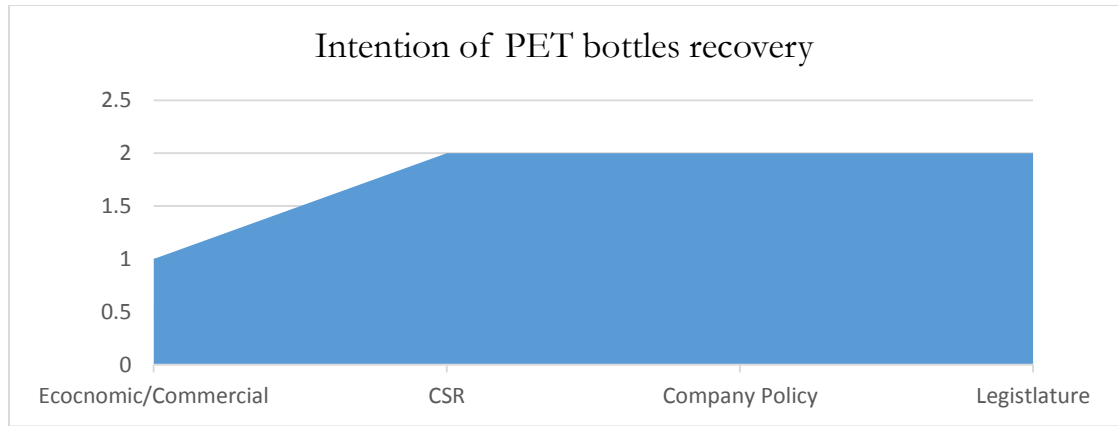


Figure 7 : Intention of PET Bottle recovery

C. Company Policy

In line with measuring respondents level of agreement how they associate their company's engagement in recovering PET bottles with company's internal policy. The finding revealed that they disagree that their companies engagement to comply their organizational policy. Having good reverse logistics policies can be a marketing strategy for organizations and can improve an organization's green profile and marketing position. Legislative motives are one of the most common drivers; there are stricter environmental regulations today that force organizations to focus more on reverse logistics. Asset protection means that organizations may take back products after use in order to prevent sensitive information and components leaking to competitors.

One of the of the key barriers that hampers effective and efficient management of reverse flows detected within a number of empirical surveys and case studies focused on reverse logistics and/ or return management is business (organizational) policy, specifically lack of policy, deficiency in existing policy or inferior policy (Alena Klapalová , 2013).

D. Environmental Legislation

The finding revealed EABSCo there is no association of the PET bottle recovery , respondents disagreed that had there be any PET recovery it is not intended fulfilment of complying environmental legislatures to recover their PET waste.

The finding key informant interview with Addis Ababa City Admiration Solid Waste Recovery Agency, revealed that PET plastic bottles waste growing from time to time , one of the reason behind for this is that there is no clear legislature enforcing to take recover or take back plastic wastes such as PET bottles. From an in-depth analysis of existing relevant policies and legislature show that PET bottle is not categorized as solid waste in our country.

From the study it evident that a combination of internally voluntary and externally forced laws and regulations drives reverse logistic of Coastal Bottlers Company. The results of the study are consistent with findings of the study by Dekker *et al.*, (2003). The precise influence of the four dimensions of the framework presented here (why, how, what and who) is still an open question that requires more investigation.

4.1.3. Resource Commitment for reverse logistics to recover PET bottles

In order to better understand the level of resource commitment of EABCO in terms of recovering PET bottles participants were asked to show their level of agreement whether their company , the finding revealed shown their disagreement to the statement. The following table shows, the median value the response, 1.00, for each of the variable indicates participant’s disagreement in terms of investing on technology and deploying financial resources.

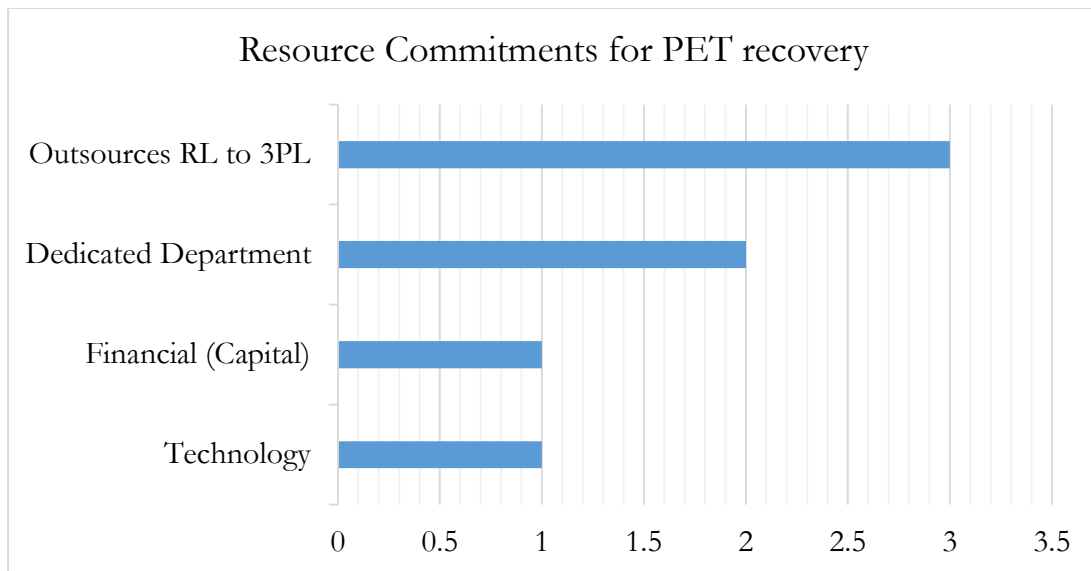


Figure 8: Resource Commitment

The finding revealed participants partially disagreed on ESBCo’s effort in terms using third party logistics (3PL) to manage PET recovery. There is wider consensus among research participants for EABSCo’s effort in terms of setting up a dedicated reverse logistics system to recover PET bottles.

Similar research findings shows , aspects such as the allocation of resources to RL (Daugherty et al., 2001) and the strategic posture of the manager vis à vis RL (Kopicki et al., 1993) are relevant in the decision to implement RL activities. According to conventional thought, the availability of resources (March and Simon, 1958; Ullmann, 1985) is a key organizational factor that determines the pursuit and successful.

The finding from the research also revealed given the EABSCo’s poor performance to recover PET, it is not surprising unless an organization is committing resources for a certain activities could be performing better than poor.

4.1.4. Importance of reverse logistics

A. Reverse Logistics

Question were posed to show how important in terms of variables for their company in terms of achieving an overall objective reverse logistics. The data gathered revealed that that a mean score of above 5.00 and standard deviation of 0.412 indicates that there was an agreement with the statement, that the company used the reverse logistics strategies to recover assets , contain costs , improve profitability as well as reducing inventory. Among these variables improving profitability, a mean of 5.79, is among the most important driver for EABSCO.

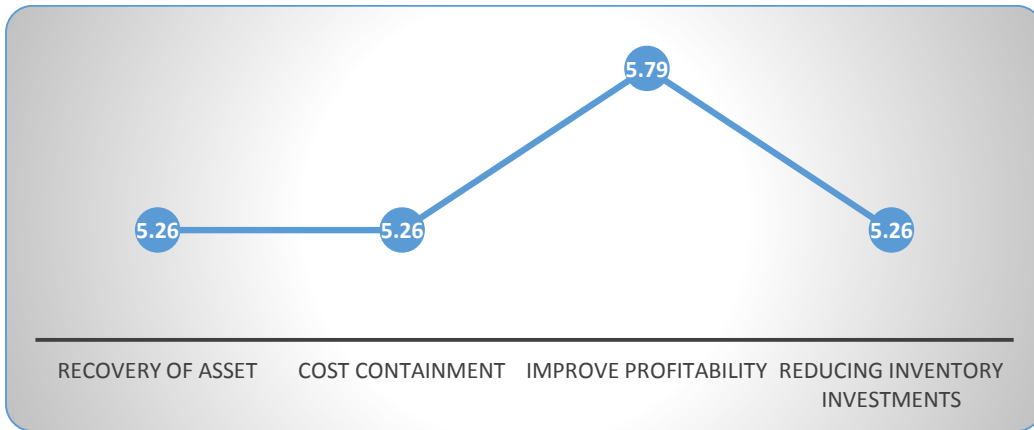


Figure 9: Importance of Reverse Logistics

B. Reverse Logistic to recovery PET bottles

Similarly questions were posed to show their level of agreement specifically EEABSCO’s objectives for engaging in recovery PET bottle through reverse logistics strategies. However, information gathered revealed EEABSCO is reverse logistics strategy, does not recognize any of the variables, with a mean value of 1.95 and standard deviation below (0.7), which shows they are in disagreement.

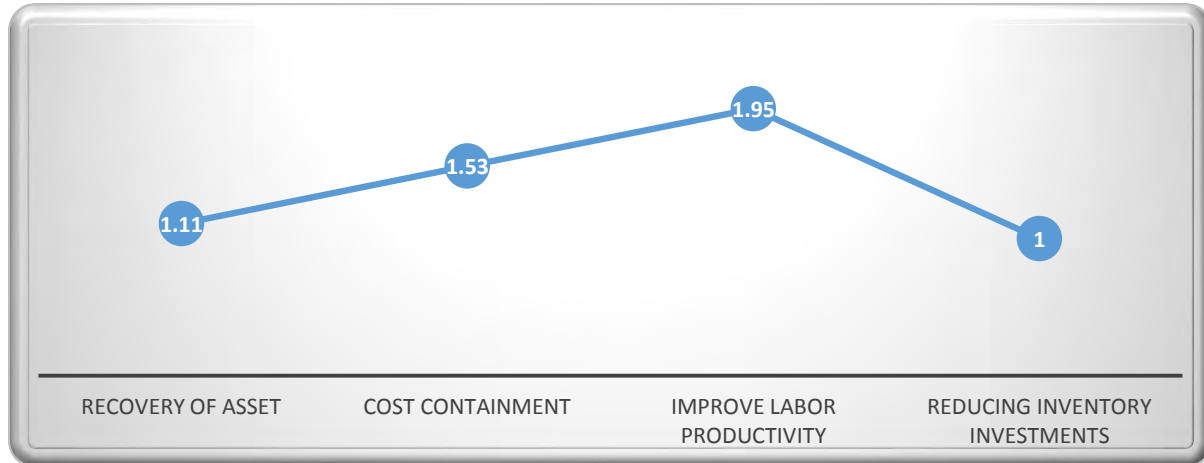
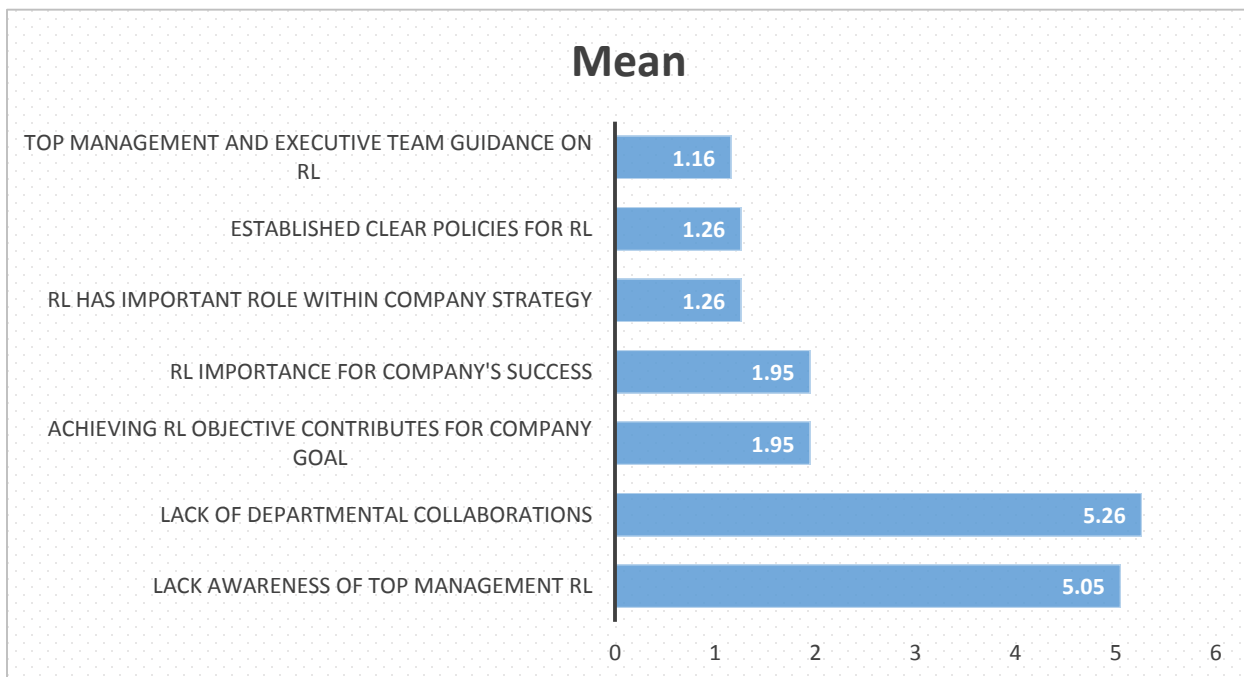


Figure 10 : Importance of reverse logistics to recover PET bottles

4.1.5. Strategic importance

Linked to recovering PET bottles queries were administered to see how they relate EABSCO position from strategic importance point of views. As show on the table below, respondents has shown their agreement there is lack of awareness among top management, the findings shows that this is well beyond the average, 5.05 with standard deviation of .75. Respondent also show their strong level of agreement there is lack of departmental collaboration in line with recovery PET bottles through EABSCO's revers logistics system.



Respondents show their strong disagreement EABSCO's recognition recovering PET bottles through reverse logistics, with a mean of 1.95. Likewise, respondents have shown their disagreement in terms of EABSCO's recognition of recovering PET bottles as a strategically less relevant areas

According to data presented on the above table, recovery PET bottles through reverse logistics systems seems less important, with a mean value of 1.26 and standard deviation of .452, within the company strategy. The findings also revealed that that there is no established policies within reverse logistics stating regarding recovery of PET bottles. Respondents shown their strong disagreement in terms of top management and executives' guidance on proper recovery of PET bottles through reverse logistics.

Similar researches also revealed that, often even the best-performing organizations may have limited or even no executive focus on their reverse logistics (Tompkins, 2010:1). In addition, top management can be a chief barrier to the successful management of reverse logistics, and if there is no commitment, this can hinder the entire process even more (Ravi & Shankar, 2005:1016; Rogers & Tibben-Lemke, 1998:35). Lack of awareness in terms of the importance of reverse logistics can be one of the main barriers to the successful management of the process (Ravi & Shankar, 2005:1017; Rogers & Tibben-Lemke, 1998:33). Reverse logistics processes often suffer from a lack of interdepartmental communication and cooperation (Lang in Hoffman, 2006:1; Rukavina in Walsh, 2007:42). Reverse logistics is a boundary-spanning process between business units in the same organizations, and developing a system that has to work across these boundaries can also exacerbate the problems (Rogers & Tibben-Lembke, 1998:43).

The reverse flows may also involve an entirely different channel which requires new approaches (Norek, 2002:42; Richey, Genchev & Daugherty, 2005a:235). Resistance to change in the organisations can therefore be a problem because reverse logistics requires drastic changes in mindset and practice (Ravi & Shankar, 2005:1015). the perspective of reverse logistics being unimportant is likely to impact negatively on an organization's performance (Autry, Daugherty & Richey, 2001:2) and a lack of accountability for reverse logistics is a major reason why reverse logistics tends to be undermanaged (Monaham et al., 2004:21). In many organizations, reverse logistics is still a "part-time" activity (Stock & Mulki, 2009:50).

Mollenkopf and Closs (2005) also recognized that reverse logistics previously was not viewed as a strategic tool but rather as a necessary cost for the business, a green “have to” or a regulatory agreement. However, additional organizations started to believe that reverse logistics can be a strategic tool. Research by Rogers and Tibben-Lembke (2001) (two years later) showed that two thirds of the respondents in their research considered reverse logistics as a strategic tool. Furthermore they recognize that good reverse logistics practices can lower the customer’s risk when buying products and as a result; make an organization more competitive because the product can be re-turned more easily.

The finding from this research also revealed that, due to the fact that EABSCo’s failure to consider as on the strategic importance areas most likely implied on existing level of performance in terms of recovering PET bottles through its logistics system.

4.1.6. Reverse logistics integrations to recover PET bottles

Respondents were asked to show their agreement how the reverse logistics chain integrated in recovering PET bottles. The following table shows, with a mean of 5.26, revealed lack of collaboration among reverse chain actors. Similarly, evidences with regards of they lack effective communication system. In consistence with lack of effective communication, respondents, show their disagreement in applying integrated information management systems. Respondents, show their disagreement on the availability of standardized procedures. The information gathered revealed that there is no sufficiently determined opportunities for creating partnership which is mainly based on mutual trust and understandings among the RL chain actors. The findings of the study are also consistent with Ravi & Shanker, (2005) study findings which highlighted the various important aspects of collaboration that actually influences reverse logistics. The findings also agree with Ho *et al*, (2012), study which had observed that a firm with good cooperation and relationship with other business partners can implement reverse logistics.

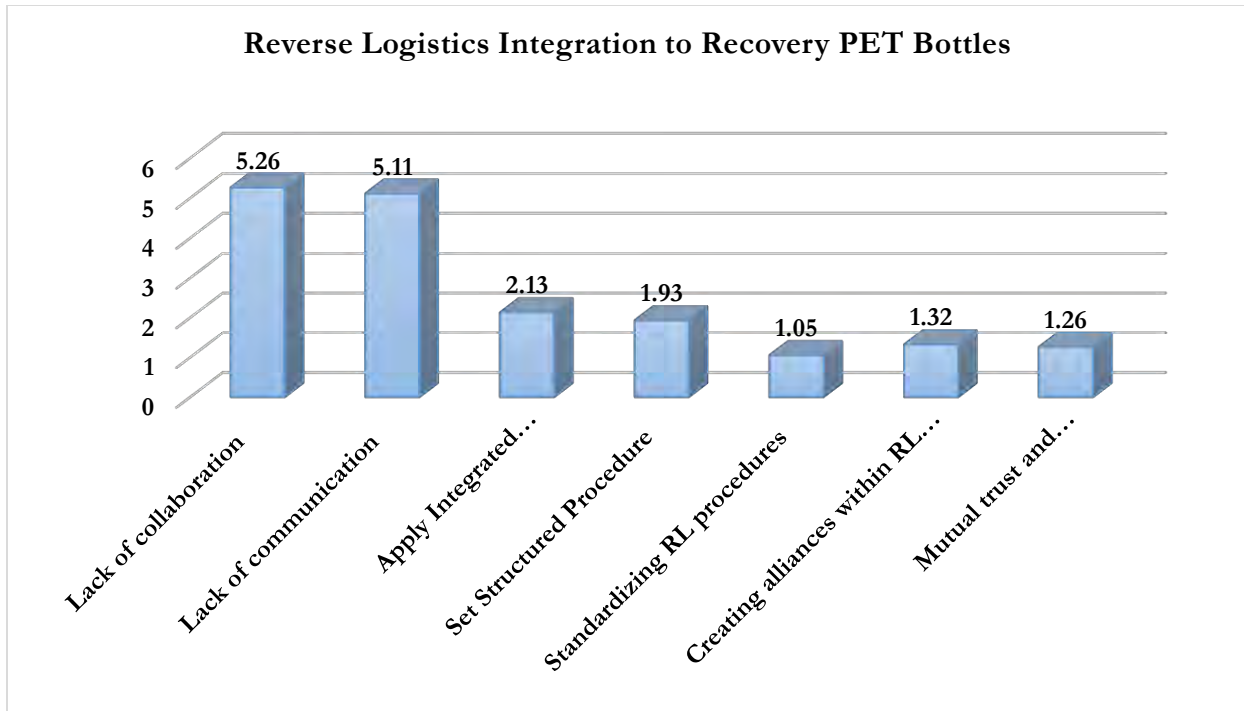


Figure 11 : Reverse logistics integration to recover PET bottles

The application of information technology is the principal link in the reverse logistics system (Zheng et al., 2005:853). The complexity of a reverse logistics program means that information support is absolutely critical. However, Richey, Chen, Genchev and Daugherty (2005b:830) have found that traditional information systems are designed for forward logistics only and not reverse logistics. A lack of information and technological systems can be an extremely serious problem in terms of reverse logistics implementation (Ravi & Shankar, 2005:1013).

4.1.7. Driving factors to engage in recovering PET Bottles

Respondent were requested to rank what would drive owning reverse logistics to recover PET bottles, they were asked to assign 1 for most important factors and 7 for the least important factor. The data gathered revealed that changing environmental legislature , with a mean value of 1.21, is most likely reason that should drive a company to engage in recovering PET bottles followed by increased competitions with a mean value of 2.21 then growing trends stood as the third most likely driving factor for any company engagement. With a mean value of 4.21, the growing pressure standout as a middle ground from the lists. Shortening product life and increasing selling orientations seems the less relevant driving factor for company's engagement.

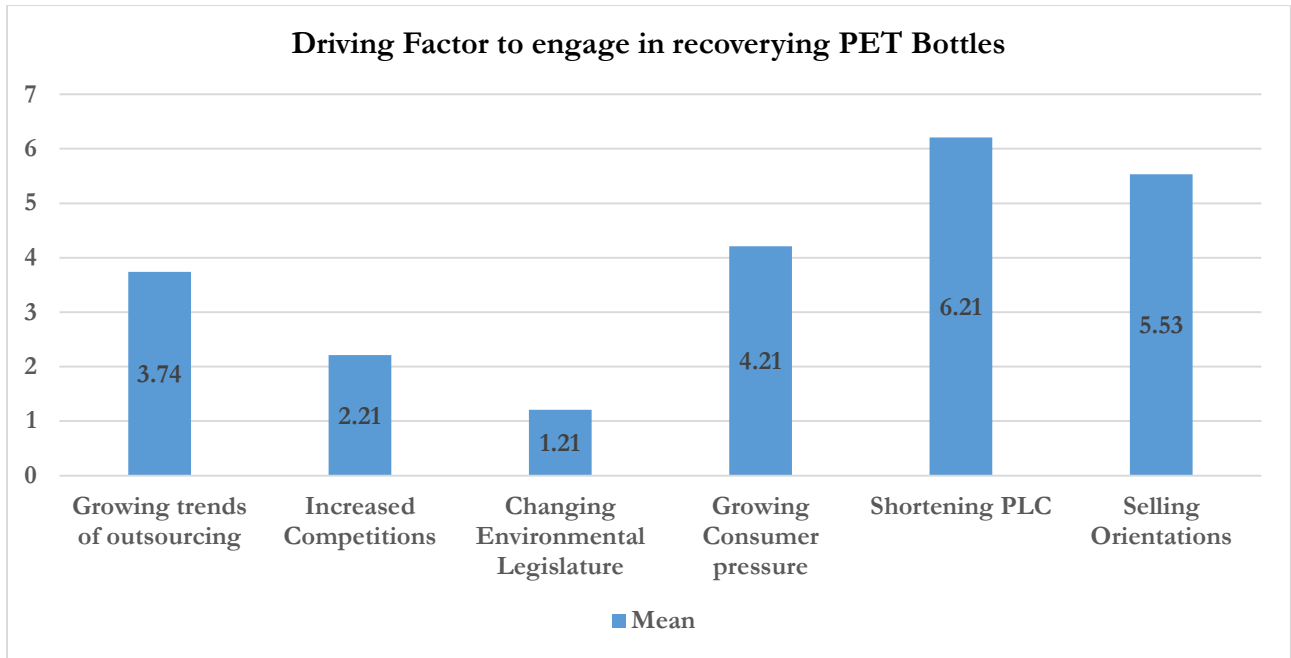


Figure 12: Driving Factor to engage in recovery of PET bottles

4.1.8. Barriers for recovering PET bottles through RL systems

Respondents were also requested to show their level of agreement what would most likely be possible barriers for company's engagement in recovering PET bottles through reverse logistics. Respondents were asked to give a value of one for the highest weight that they might be a barrier for the reverse logistics, and value of seven for a barriers which may thought weighs less. The finding revealed that lower level of understanding about reverse logistics rated as key barriers (28) for in terms of engaging in reverse logistics, then with a sum of second least 43, organizations failure to recognize reverse logistics as a competitive.

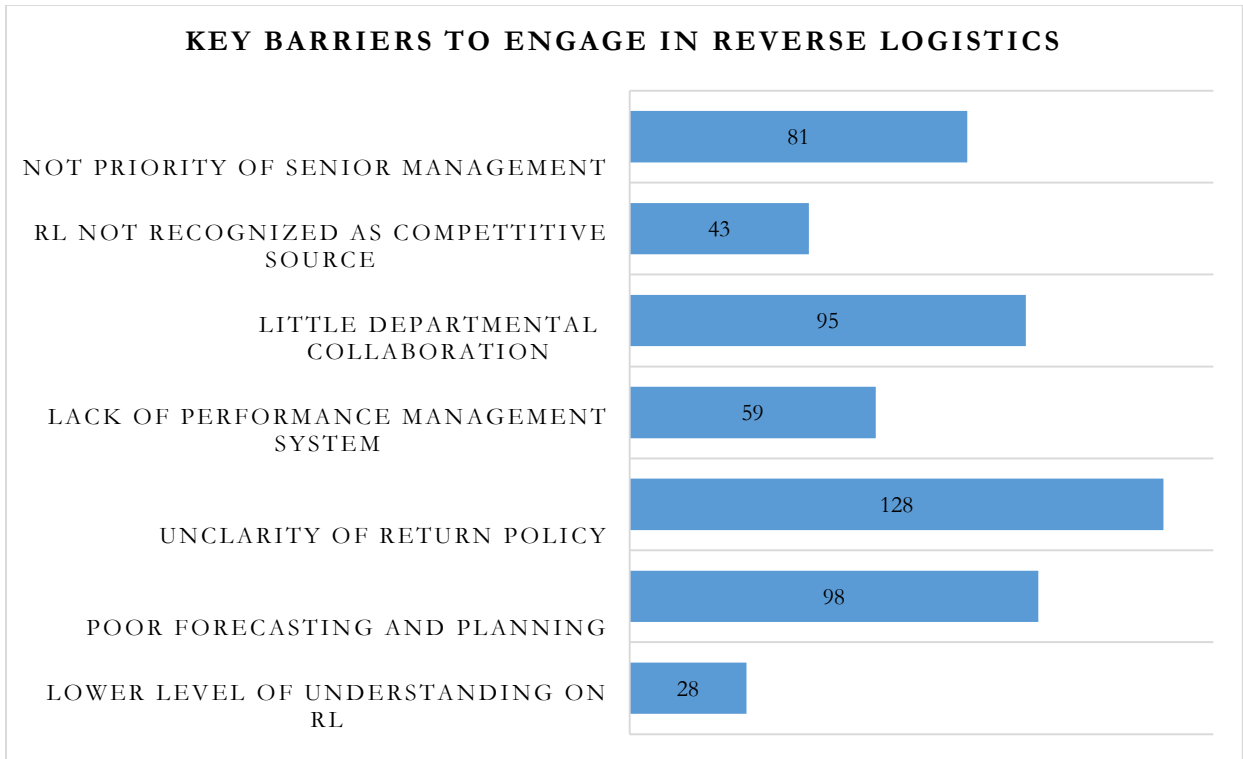


Figure 13: Key barrier to engage in reverse logistics

The definition mentioned earlier by Rogers and Tibben-Lembke (1999) highlights the processes included in reverse logistics, namely; planning, implementing, and controlling the flow of goods. They furthermore recognize that there are numerous factors affecting the practice of reverse logistics; namely external and internal practices.

4.2. Findings and Analysis : Finding from MSEs and Informal PET bottles recovery Chain

4.2.1. Functions MSEs and Informal PET Bottle Recovery Chain

The finding from this research also revealed that, due to the fact that EABSCo's failure to consider as on the strategic importance areas most likely implied on existing level of performance in terms of recovering PET bottles through its logistics system. The collectors can be divided into four groups: street boys (Appendix 12.4, photographs), private sector enterprises, scavengers' operations at the Municipal landfill, and the korales. Micro and small enterprises have started to engage in Addis Ababa City Administrations, filling the gap that the municipality has not able to successfully (Camilla, 2005). The findings from this survey revealed that micro and Small Enterprises operating in waste management sector have been requested to identify their function in the waste recovery chain. The finding revealed that majority of the respondents (60%) indicated that they are engaged in collection and sorting stages. Around 35% engaged in collection wastes. Only 5% are engaged in sorting of collected wastes. There is no enterprises or informal groups engaged in recycling and final disposal functions.

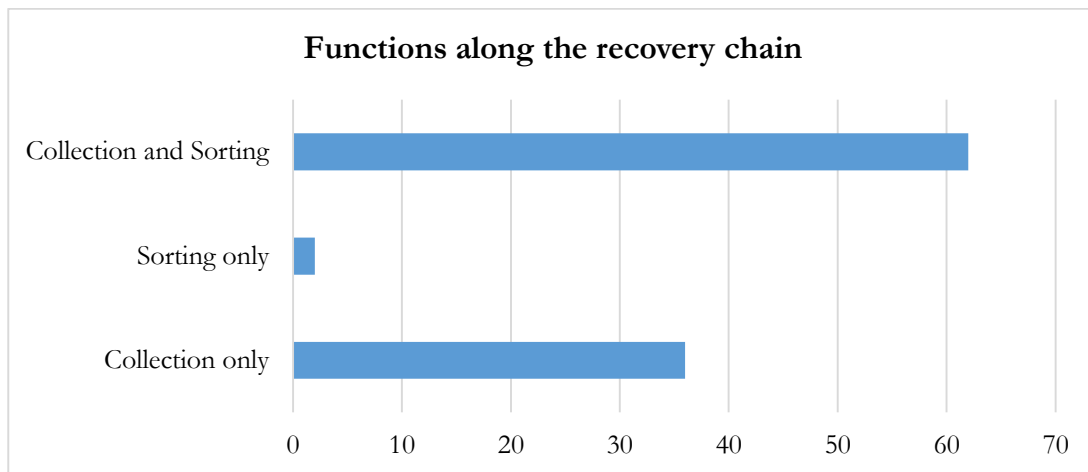


Figure 14: Function of MSEs in recovery chain

According to micro and small enterprises have started to engage in Addis Ababa City Administrations, filling the gap that the municipality has not able to successfully (Camilla, 2005). The findings from the survey also revealed the role of MSE within the formal waster recovery chain.

4.2.2. Plastic Wastes Managed

The first link within the resource recovery chain are the korales (from the Amharic phrase “korkoro yalew”, which means “do you have any scrap?”), who are buyers of valuable materials that go from door to door recovering metal scrap, glass, plastics and textiles. Bjerkli (2005) estimated that around 5,000 korales are active in the informal resource recovery chain.

The finding revealed that majority of plastic waste recovered is PET bottle (42%), followed by plastic bags (40%) then Jerry Cans (18%).

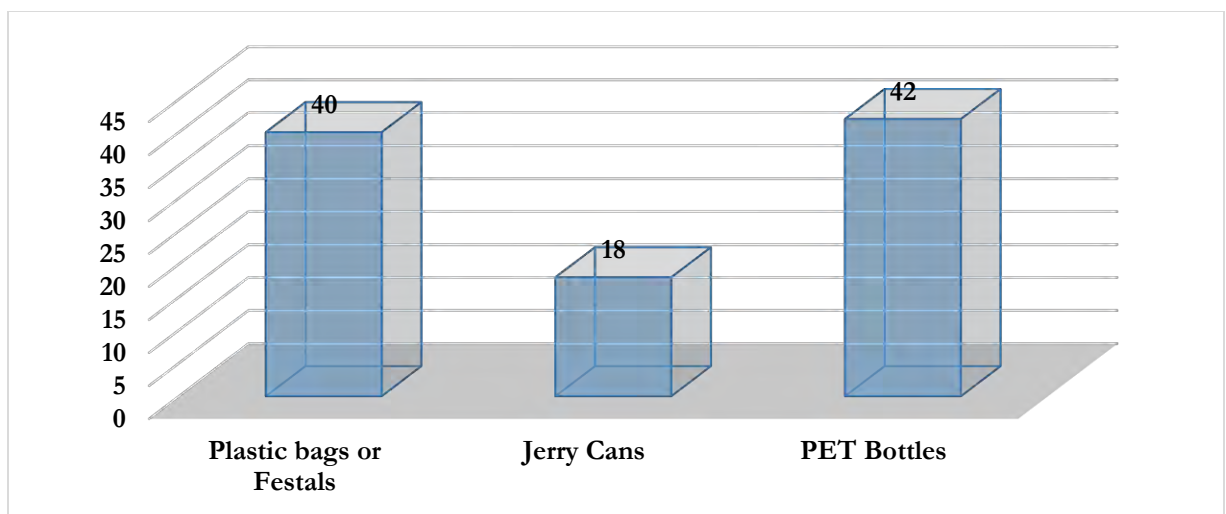


Figure 15: Types of Plastic Wastes Recovered

4.2.3. Ranking PET Bottles by volume recovered

Respondents were asked to rank PET bottles in terms of volume of waste, PET bottles ranked first with significant level of differences (60%). The rest of the participants voted that PET bottle ranked third (20%) and fourth (20%). This confirms the previous findings.

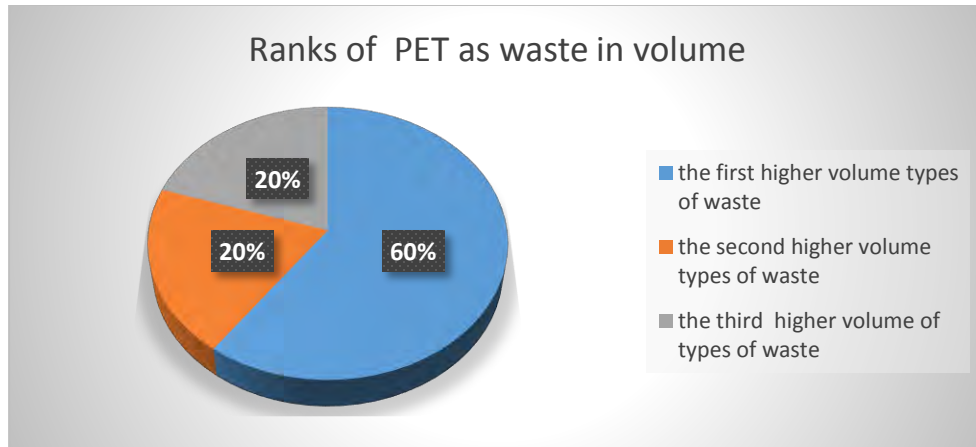


Figure 16 : Ranking Volume of PET bottles Waste

4.2.4. Market value of PET bottles

Majority of respondents (76%) rated the market value of PET bottles as low and the rest of participants rated as medium one. None of the participants rated as high market value.

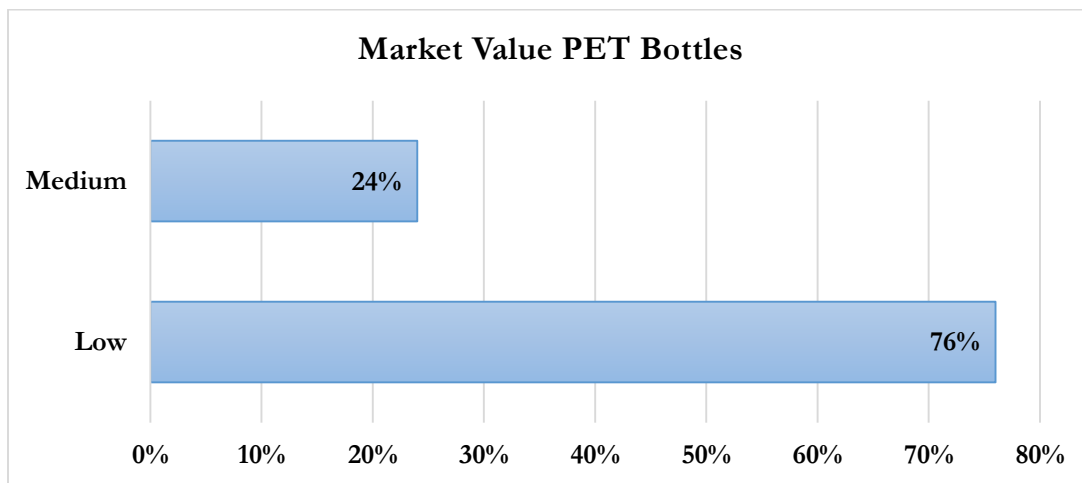


Figure 17: Market Value of PET bottles

4.2.5. Buyers of PET bottles

Majority of enterprises indicated that their major buyer (58%) of PET bottles are recycling companies. The rest of the respondents reported that they supply PET bottles for door to door scavengers. There is evidence revealing any bottling company as a buyer of PET bottles.

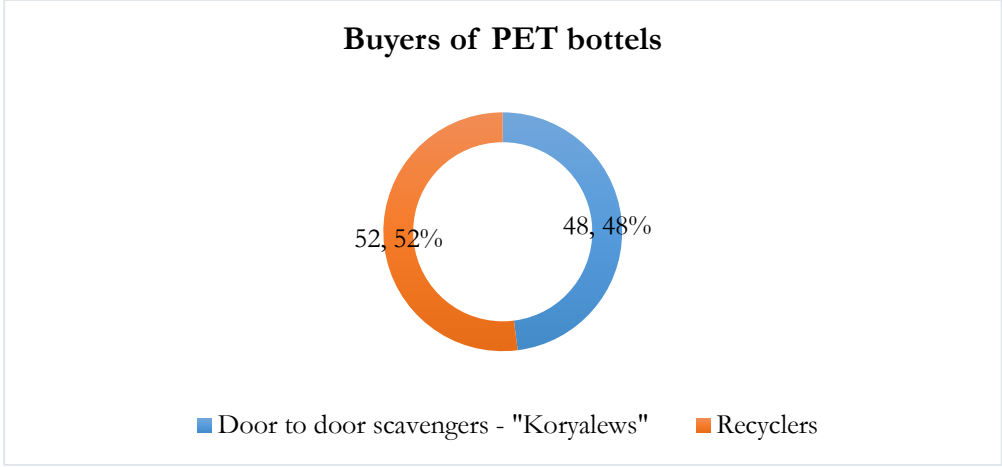


Figure 18: Buyers of PET bottles

4.2.6. Understanding of the PET bottles recovery chain

Respondent were asked to assess the informal PET bottle recovery chain using scaled responses. The finding revealed that majority of the respondents revealed that importance of understand of recovery chain is an important element of their activities.

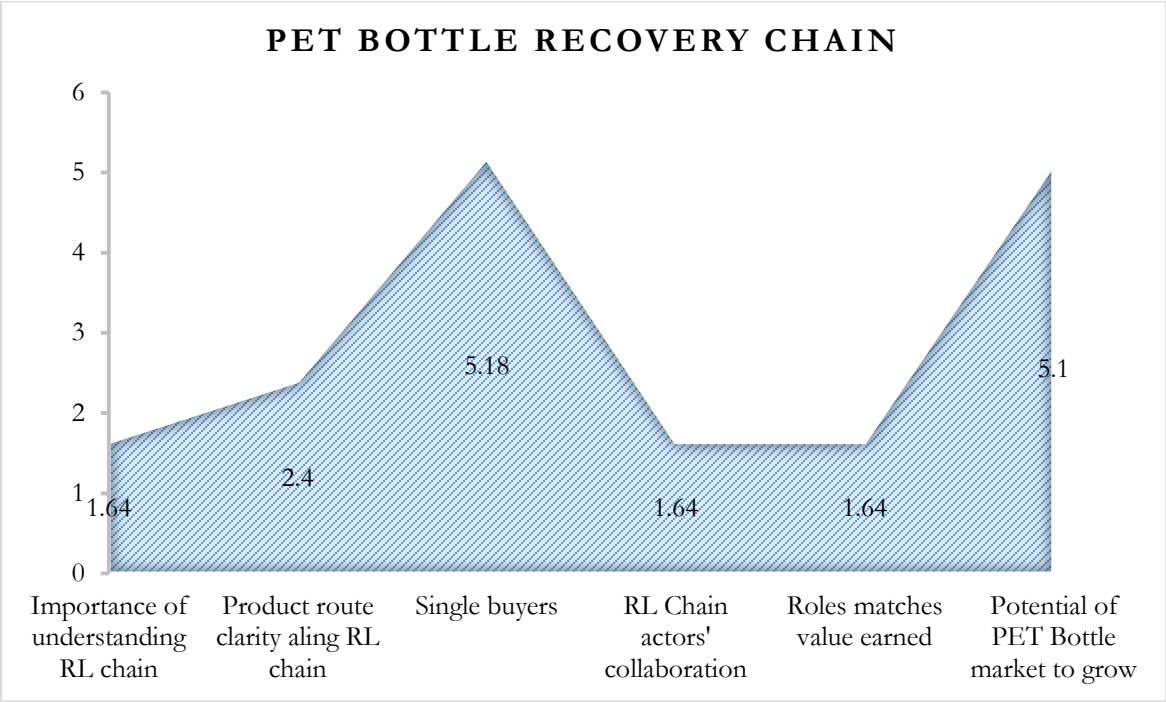


Figure 19: MSEs' perspectives of PET bottle recovery chain

However, they believe that they do not have a clarity of the recovery chain. Most of the MSEs and informal operators revealed that they relying on a single buyers. They believe that there is a weak collaboration practice among chain actor of recovery chain. Majority of the respondent have shown their disagreement that their functions does not match with value they are adding.

4.3. Reliability and Validity

4.3.1. Soft Drink Industry in Addis Ababa City

Reliability measures the internal consistency of items used to measure the latent constructs. The reliability analysis procedure calculates a number of commonly used measures of scale reliability and also provides information about the relationships between individual items in the scale. To be more specifically, Dunn et al. (1994) indicates that the term reliability refers to the **accuracy** or **precision** of the scale. There are several ways to assess reliability, namely *Cronbach's Alpha*, *Split-half*, *Guttman*, *Parallel*, and *Strict parallel*. Among these measuring models, Cronbach's Alpha is the most widely used one (Dunn et al., 1994). The following table shows the Cronbach's Alpha on the four constructs.

Table 4 : Cronbach's Alpha test for EABSCo

Constructs	Cronbach Alpha's	Number of Items
Rational for PET Recovery	0.85	4
Internal Challenges – Barriers	0.934	7
External Challenges - Barriers	0.983	5
Resource Commitments	0.71	2
Overall performances	0.97	2

According to Minahan (1998), the value of the Cronbach's Alpha higher than 0.6 indicates a satisfactory internal consistency of the measurement items. By looking at the above table, all the constructs have a satisfactory Cronbach's Alpha, which indicates the reliability of the constructs.

4.3.2. Informal PET bottle recovery chain

Reliability measures the internal consistency of items used to measure the latent constructs. The reliability analysis procedure calculates a number of commonly used measures of scale reliability and also provides information about the relationships between individual items in the scale. To be more

specifically, Dunn et al. (1994) indicates that the term reliability refers to the accuracy or precision of the scale.

Table 5: Cronbach's Alpha test result for MSEs

Constructs	Cronbach Alpha's	Number of Items
Importance of understanding recovery chain Product route clarity Actor collaborations Roles Matches Earnings	0.789	4

Therefore, Dunn et al., 1994, the above calculated Cronbach's Alpha's, 0.789, there is a very good level of internal consistency, revealing reliability of the construct.

5. CHAPTER 5 : Conclusion and Recommendations

5.1. Conclusions

In terms of the level of understanding of overall reverse logistics the survey finding revealed that there is some level of understanding and application of reverse logistics in EABSCo. Respondents has shown their agreement they have engaged respondents have shown that they have EABSCo reverse logistics activities to return emptied (Returnable Glass Bottle) RGB. The level of agreement as indicated more than 75% of the responses scaled as strongly agree while the rest of the respondent responses shown their agreement in terms of their company engagement in Reverse to return RGB. In addition, the finding revealed that EABSCo is engaged to recover RGB bottle crates. The in-depth interview findings revealed that EABSCo uses its distribution structure to ensure their RGB bottles ad crates is returned. Which reveals the practice reverse logistics in one way or another.

Brito & Dekker, (2003) identified three driving forces of reverse logistics; legislation, economics and corporate citizenship. The three drivers are also interlinked and boundaries are sometimes blurred, and reverse logistics is often carried out for a mix of motives. Although respondents' responses revealed that there a general understanding about reverse logistics, there is no practices associated with recovery of PET through reverse logistics driven with any of the factors mentioned above. According to Addis Ababa City Administration Solid Waste Recovery Project Office, PET bottles were among the most growing solid waste in Addis Ababa City Admiration. Coca-Cola family PET bottles are also among the types.

The survey shed light that recovering PET bottle through their functional reverse logistics systems is not a strategic focused area of senior's management. This in turn made the company with no resources and no internal policy. Similar researches also revealed that, often even the best-performing organizations may have limited or even no executive focus on their reverse logistics (Tompkins, 2010:1). In addition, top management can be a chief barrier to the successful management of reverse logistics, and if there is no commitment, this can hinder the entire process even more (Ravi & Shankar, 2005:1016; Rogers & Tibben-Lemke, 1998:35). The finding from this research is also others, in terms of lack of with lack of awareness in terms of the importance of reverse logistics can be one of the main barriers to the successful management of the process (Ravi & Shankar, 2005:1017; Rogers & Tibben-Lemke, 1998:33). Reverse logistics processes often suffer from a lack of interdepartmental communication and cooperation (Lang in Hoffman, 2006:1; Rukavina in Walsh, 2007:42). Reverse logistics is a boundary-spanning process between business units in the same organizations, and

developing a system that has to work across these boundaries can also exacerbate the problems (Rogers & Tibben-Lembke, 1998:43). Ravi & Shankar (2005) indicate that a lack of awareness about reverse logistics is one of the barriers to its implementation. The results of the study also prove that there is a strong relation between awareness and practice of reverse logistics (Zhang, 2007). Moreover, Cain (2008) finds that there is a considerable effect of reverse logistics on a company; thus, higher awareness should be generated on the importance of reverse logistics. Sharma *et al.* (2011) also suggest that the awareness of reverse logistics could bring economic benefits by recovery of the returned product for use.

In terms of key drivers for adopting reverse logistics which support recovery of PET in the soft drink industry, the finding revealed that lower level of understanding about reverse logistics as a mechanism to recover PET bottles seems a key barriers. Followed by failure to recognize reverse logistics to recover PET bottles as key a competitive. Thirdly, respondents voted for lack of performance management systems as source of barriers for company. Un-clarity of return policy, poor forecasting, less priority for top management and little departmental of collaboration are rated as less relevant barriers EABSCo to engage in reverse logistics.

In terms of understanding, the possible driving factor for EABSCo to engage in recovering PET bottles, the data gathered revealed that changing environmental legislature could be a motivating factors. Lack of enforceable environmental legislations established by the government may lower the motivation for the organization to consider implementing reverse logistics (Lau & Wang, 2009). Generally, one can say that companies do get involved with Reverse Logistics either 1) because they can profit from it; or/and 2) because they have to; or/and 3) because they “feel” socially motivated to do it. (Marisa and Dekker, 2003). Increased competition is the second most important factor which could drive EABSCo. Then growing pressure for corporate social responsibility stood as the third most likely driving factor for any company engagement. Shortening product life and increasing selling orientations seems the less relevant possible driving factor for company’s engagement.

According findings informal waste recovery chain, PET bottle is stood first in terms of volume generated among the plastic type they are managing. However, the PET bottle value recovered from reselling is not satisfactory level. The survey result shows soft drink industry actors such as EABSCo is not in the list of buyers of the micro and small enterprise operators, rather the major buyers are few recyclers and door to door scavengers from the informal sector.

According to the city waste recovery agency, there is some starts regarding recovering PET bottles for the recycling purposes through informal waste recovery systems. The informality of the sector waste recovery sector coupled with limited number of recycling companies made the uptake of the PET bottles insignificant when compared with the an increasing rate of injection of PET bottles in the environment.

In sum, recently published report (Coca-Cola Sustainability Report, 2014/2015) sustainable packaging and recycling is one of the areas of the company's engagement in which the company restate its commitment to support the development of the circular economy, through use recycled and renewable materials and recycle more packaging than the company used. However, the survey has not identified any identifiable acts of EABSCo in line with complying its commitments. According to Alvarez-Gil *et al.* (2007), supply chain players are suggested to be the motivators of reverse logistics implementation. In contrary to this, again there is no effort being done linked to recovering of PET bottles either through its well own recovery chain or through creating integration with inform waste recovery chain.

5.2. Recommendations

Lack of enforceable environmental legislations established by the government may lower the motivation for the organization to consider implementing reverse logistics (Lau & Wang, 2009). Kulshreshtha & Sarangi (2001) suggest that the government may introduce some policies or subsidies in support of reverse logistics. The survey findings provided insight that there is no enforcing rules and policies for companies operating in any industry to recovery post-consumer packages such as PET bottles. Therefore, government should seek a mechanism to introduce some policies to support the reverse logistics either through the company revers logistics system or through supporting the formalization and build capacity of informal actor such as micro and small enterprises.

According to Alvarez-Gil *et al.* (2007), supply chain players are suggested to be the motivators of reverse logistics implementation. Regarding actors in reverse logistic systems, they divided them in three groups: forward supply chain actors (manufacturers, wholesalers, retailers); specialized reverse chain players (jobbers, remanufacturers,); and opportunistic players (such as charities). With respect to their roles, the actors are actually responsible for operations in the reverse logistics chain. Therefore, the research would like to recommend EABSCo should recognize and engaged in the recovery of PET bottles through creating partnership with these actor as a main supply chain players. EABSCo should realize to start there is no better moment to realize its recently restated goals not only as corporate social responsibility act rather also as an accountable global company for its act.

5.3. Future research areas

In terms of future areas of research measuring the performance which includes the full supply chain actors is an areas which requires further investigations. Secondly, additional research can be conducted to understand the product life cycle analysis of PET bottles in Ethiopia. Further research could also be done to better understand the social and economic impact of improper waste disposal that might arise from plastic wastes such as PET bottles.

i. Survey Instruments

Dear Sir/Madam,

Addis Ababa

This research is conducted as a partial fulfilment of Master of Arts (MA) graduate studies of Logistics and Supply Chain Management at School of Commerce of College of Business and Economics of The Addis Ababa University. This research is designed to gather primary data to measure the performance of reverse logistics in plastic waste recovery in the soft drink industry with particular focus of East African Bottling Share Company (SABCO) in Addis Ababa.

In the questionnaire we ask you about measuring performances of reverse logistic in recovery plastic wastes in the soft drink industry. The questionnaire is categorized into three main sections. The first section of the questionnaire designed to gather few demographic data of your organization. The section mainly designed to gather data on reverse logistics and /or waste recovery performances. While the second section mainly designed to gather data on level of performances of companies engaged in packaging and bottling companies involved in forward logistics.

We would be grateful if you would be so kind as to take 45 minutes to fill in this short questionnaire. We would like to ask you to be realistic and objective in assessing your organization. We assure **complete anonymity** of the gathered data. These will be represented on aggregate level alone. Please provide answers on all questions even though you feel that they repeat themselves occasionally. This is the only way we can assure statistical validity of the questionnaire. We would like to assure you that information provided will be kept and treated with strict confidential.

If you need further information please contact Ato Sirak Wondimu Tele : +251911145030.

Sincerely

Sirak Wondimu Tilahun

General Information

1. General Information

Respondent information	
Respondent function:	
Company name:	
Core activity:	
Respondent name:	
Position	
E-mail:	

2. Education background

- Illiterate
- Literate
- Secondary school
- Above

3. How long have you been in this kind of activity?

- > 3 years
- 3-5 year
- 5-8 years
- < 8 years

4. In what sector or function are you operating (Please put a tic mark)?

- Beverage Bottler
- Packaging
- Solid Waste Management
- Solid Waste Recovery
- Public services

Other:

5. Please indicate the number of employees in your company

< 10

11-30

31-50

> 50

6. Please indicate your annual revenue

< ETB 100, 000.00

ETB 100, 001.00 – 500,000.00

ETB 1 ,000, 001.00 – 10,000,000.00

> ETB 10, 000, 000.00

7. Why do you choose to involve in this business activity?

8. How do you choose to involve in this business activity?

9. How does your company position itself?

A. Forward supply chain actor

B. Specialized reverse chain actor

10. If you chose you chose A, skip section go to section II.

11. If you chose B, please proceed to section I.

Section I: PET Bottles recovery chain

12. If you chose B, please indicate which describes your function best?

- A. Collections
- B. Sorting
- C. Recovery
- D. Disposal
- E. Recycle
- F. Any other?

13. If you are engaged in waste collection describe the waste generation sources?

- A. Households
- B. Institutions
- C. Street
- D. Another sources

14. Can you please give a rank types of waste generated from households?

Types of Wastes	Please rank top 3 (1 st , 2 nd , and 3 rd)
A. Organic	
B. Plastic	
C. Paper and Cardboard	
D. Clothes	
E. Glass	
F. Metal scrap	
G. Other (ash, dust, etc.)	

15. Can you please give a rank types of waste generated from institutions?

Types of Wastes	Please rank top 3 (1 st , 2 nd , and 3 rd)
A. Organic	
B. Plastic	
C. Paper and Cardboard	
D. Clothes	
E. Glass	
F. Metal scrap	

G. Other (ash, dust, etc.)	
----------------------------	--

16. Can you please give a rank types of waste generated from street?

Types of Wastes	Please rank top 3 (1 st , 2 nd , and 3 rd)
A. Organic	
B. Plastic	
C. Paper and Cardboard	
D. Clothes	
E. Glass	
F. Metal scrap	
G. Other (ash, dust, etc.)	

17. Please rank of waste in order market value?

Types of Wastes	Please rank only top 3 (1 st , 2 nd , and 3 rd)
A. Organic	
B. Plastic	
C. Paper and Cardboard	
D. Clothes	
E. Glass	
F. Metal scrap	
G. Other (ash, dust, etc.)	

18. Can you please rank types of plastic wastes?

Types of Wastes	Please rank only top 3 (1 st , 2 nd , and 3 rd)
A. Plastic bags –“ festal”	
B. Non-returnable food packages – jerry cans and others	
C. Non-returnable plastic beverage bottles	
D. Any other?	

19. Can you please rank types of non-returnable beverage plastic packages/bottles in terms of volume?

Types of non-returnable beverage packages	Please rank only top 3 (1 st , 2 nd , and 3 rd)
A. Emptied bottled water (of any types)	

B. Emptied Coca-Cola family products	
C. Emptied Pepsi-Coal family products	
D. Any other	

20. Please rank of in order of market value?

Types of non-returnable beverage packages	Please rank only top 3 (1 st , 2 nd , and 3 rd)
A. Emptied bottled water (of any types)	
B. Emptied Coca-Cola family products	
C. Emptied Pepsi-Coal family products	
D. Any other	

21. Please rank in order of profit margin?

Types of non-returnable beverage packages	Please rank only top 3 (1 st , 2 nd , and 3 rd)
A. Emptied bottled water (of any types)	
B. Emptied Coca-Cola family products	
C. Emptied Pepsi-Coal family products	
D. Any other	

22. What do you do with the materials you separate?

- A. Reuse them
- B. Sell them
- C. Exchange them with other materials
- D. Give them away

Other _____

23. Who are buyers of the product?

- A. Original manufacturers
- B. Re-users
- C. Recyclers
- D. Municipality
- E. Others

24. Are there seasonal variations in the quantity of PET bottle demand?

Yes

No

25. If yes, why do you think the reasons for the variation?

26. Are there seasonal variations in the quantity of PET bottle supply?

Yes

No

27. Are there seasonal variations in the quantity of PET bottle demand?

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

- A. Collect more
- B. Collect the same amount as usual
- C. Collect less

29. How do you relate decrease in the price of the materials?

- A. Collect more
- B. Collect the same amount as usual
- C. Collect less

30. Can you please indicate your level of performances reverse logistics chain in plastic waste recovery?

Importance of understanding operators' role	1	2	3	4	5
Importance to know the route of products along the chain	1	2	3	4	5
Clarity flow of product	1	2	3	4	5
Visibility of Information flow	1	2	3	4	5
Efficient financial flow	1	2	3	4	5
Partners trust each other	1	2	3	4	5
Supply for a single buyer	1	2	3	4	5
Supply multiple (more than one buyers)	1	2	3	4	5

Chain actor collaborate to explore market opportunities	1	2	3	4	5
Opportunities for vertical integration	1	2	3	4	5
There is a competition along RL chain	1	2	3	4	5
Function matches value earned	1	2	3	4	5
Market size has potential to growth	1	2	3	4	5

31. Do you know where the Coca-Cola plastic packages end up?

Yes

No

32. In the last three years how often Coca-Cola Company contacted you?

Never

Small extent, on irregular basis

Often and on a regular basis

33. Have you received any support from Coca-Cola?

Yes

No

34. If yes, how do you categorize the support?

Capacity /Skill Building

Capital Equipment/Facility

Financial Assistances

Another

35. If no, do you expect from Coca-Cola such supports?

Yes

No

Do not know

36. If yes, why do Coca-Cola should provide such support?

Economic

Environmental/Legal

Corporate Social Responsibility

Any other

37. Have you heard or received any information on how to contribute towards a cleaner and healthier environment?

Yes

No

38. Do you think the waste situation in the city has improved in the last year?

Yes

No

Section II: Soft Drink Industry

39. To what extent your organization engaged in reverse logistics

(1 = Never 2 = To some extent (Irregularly) 3 = Often on regular basis but not core strategy 4 = Often on regular basis as a core strategy 5 = Do not know)

Return Emptied bottles	1	2	3	4	5
Return Crates	1	2	3	4	5
Recovering plastic packages	1	2	3	4	5
Recovering Corks	1	2	3	4	5
Recovering plastic lead	1	2	3	4	5
Other _____	1	2	3	4	5

40. Can you please indicate which most describes your reason for in practicing reverse activities?

(1 = Economic, 2 = Legislature 3 = Corporate Social Responsibilities, 4 = Organizational Policy 5 = Do not know)

Return Emptied bottles	1	2	3	4	5
Return Crates	1	2	3	4	5
Recovering plastic packages	1	2	3	4	5
Recovering Corks	1	2	3	4	5
Recovering plastic lead	1	2	3	4	5
Other _____	1	2	3	4	5

Organizational learning

41. Please indicate your level of agreement with the following statements related to learning culture/practice of company. (1= strongly disagree; 5 = strongly agree)

Managers in our organization basically agree that learning is the key to our competitive advantage	1	2	3	4	5
The basic values of our organization include learning as key to improvement	1	2	3	4	5
The sense within our company is that employee learning is an investment, not an expense	1	2	3	4	5
Learning in our organization is seen as a key necessary to guarantee organizational success	1	2	3	4	5
	1	2	3	4	5
Other _____	1	2	3	4	5

Resource commitment

42. Please indicate the levels of commitment of following resources to reverse logistics within your company: (1: little; 5: substantial)

Technological resources (technological support for reverse logistics, e.g. specific software; hardware)	1	2	3	4	5
Managerial resources (assignment of personnel to reverse logistics)	1	2	3	4	5
Financial resources (capital)	1	2	3	4	5
Set-up a dedicated department for reverse logistics functions	1	2	3	4	5
Outsource reverse logistics to third party logistics (3PL) providers	1	2	3	4	5
Other _____	1	2	3	4	5

Economic performance

43. Please indicate how important following reverse logistics objectives are within your company: (1: not at all important; 5: extremely important)

Recovery of assets	1	2	3	4	5
Cost containment	1	2	3	4	5
Improving profitability	1	2	3	4	5
Improving labour productivity	1	2	3	4	5
Reducing inventory investment	1	2	3	4	5
Other _____	1	2	3	4	5

44. Please indicate how effective your company has been in achieving the following objectives related to reverse logistics recovery plastic bottles. (1: not at all effective; 5: extremely effective).

Recovery of assets	1	2	3	4	5
Cost containment	1	2	3	4	5
Improving profitability	1	2	3	4	5
Improving labour productivity	1	2	3	4	5
Reducing inventory investment	1	2	3	4	5
Other _____	1	2	3	4	5

Strategic Importance

45. Please indicate your level of accordance with the following statements related to your company: (1: Lesser extent 5: greater extent).

The lack of top management awareness of the importance of RL	1	2	3	4	5
The lack of top management commitment to reverse logistics	1	2	3	4	5
The lack of departmental collaboration/communication/cooperation in reverse logistics	1	2	3	4	5
The resistance to change in order to include reverse logistics	1	2	3	4	5
Achieving objectives within RL contributes to achieving organizational goals	1	2	3	4	5
Reverse logistics is important for your company's success	1	2	3	4	5
Reverse logistics is important for the functioning for my organization	1	2	3	4	5
Reverse logistics plays an important role with in my company's strategy	1	2	3	4	5
Establish clear policies for RL	1	2	3	4	5
Guidance of top management and an executive team on RL	1	2	3	4	5

RL partners integrations

46. In your opinion, to what extent do organisations experience the following problems with reverse logistics? Please provide more information in the comments block if you wish to expand on or clarify specific issues. (1: Lesser extent 5: greater extent).

Lack of collaboration with partners in reverse logistics	1	2	3	4	5
Lack of communication with partners in reverse logistics	1	2	3	4	5
Apply an integrated information management approach	1	2	3	4	5
Streamline the reverse logistics process	1	2	3	4	5
Set structured procedures	1	2	3	4	5
Standardise the reverse logistics procedures	1	2	3	4	5
Create alliances with supply partners for reverse logistics	1	2	3	4	5
Build and develop long-term partnerships with RL partners based on mutual trust and commitment	1	2	3	4	5
Share information with supply chain partners	1	2	3	4	5

ii. **Key Informant Interviews Guide**

I. **Overview of the Agencies and SWM sector**

- 3.1. Can you briefly describe the main function your institutions at City administration, Sub city, Woreda or Kebele Level?
- 3.2. Can you describe your organizational structures?
- 3.3. Can you tell us the types and size of waste managed annually?
- 3.4. Can you please rank types of solid waste in terms of resource commitment?

II. **Solid Waste Management Function in the City**

- 3.5. Can you please describe the solid waste management in terms of function? Can you say how the waste is disposed and recovered?
- 3.6. Who are key players of solid waste management?
- 3.7. How many MSE are engaged in solid waste management?

III. **Soft Drink Industry and recovery**

- 3.8. How do you see the attractiveness of it in terms of recovering emptied bottles through secondary market?
- 3.9. How do you see PET empty bottle recovery rate? Why do you think is the reason behind?
- 3.10. How do you see PET bottles in terms of secondary market?
- 3.11. Who are key players' secondary market?
- 3.12. How many PET bottle recycling companies are available in Addis Ababa City?
- 3.13. Do you think they are playing their role?
- 3.14. Have you had specific projects in terms of recovering PET bottles with Coca-Cola?
- 3.15. Can you describe challenges in terms of recovering PET bottles?

IV. **Policy Frameworks**

- 3.16. Whom responsibilities do you think is recovering PET bottles?
- 3.17. Do you see existing policies supportiveness in terms of creating accountability along recovery functions?
- 3.18. Is there any specific policy or regulation to ensure plastic waste recovery?
- 3.19. What do you think required for improving City of Addis Ababa (Specifically with regards to recovering PET bottles?)
- 3.20. If you have to change a single thing in managing solid waste management operational modalities, what would most likely be?

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