Mekelle University
College of Business and Economics
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Reverse Logistics Practice in Recycling Used Plastic Water-Bottles in Mekelle City
(An Embedded Case Study of SPA and Mercy Natural Spring Water Producing Companies)

A Thesis Submitted to School of Management
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Master's Degree in Business Administration

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Ethical Declaration

I hereby declare that this thesis represents my own work by the guidance and supervision of my advisor, Mr. Hayelom Nega (Assistance Professor) and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma at Mekelle University or any other educational institution.

As researcher, I have reviewed and edited the content as needed and take full responsibility for the content of the thesis.

Researcher's Name: Esayas Mesfin Muruts

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Certification

This is to certify that the thesis entitled “Reverse logistic practice in recycling plastic bottles in Mekelle city”, submitted to Mekelle University for the award of the degree of master of business administration (MBA) is a bona-fide work of and carried out by Esayas Mesfin Muruts under my guidance and supervision.

Therefore, I hereby declared that no part of this thesis has been submitted to any other university or institutions for the award of any degree or diploma.

Place: Mekelle

Date: April, 2025

Signature: _____

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Acknowledgment

I thank the almighty God and lift up his banner for giving me this opportunity to pursue my master's degree and bringing it to a successful completion. I therefore dedicate this thesis to the almighty God.

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Abstract

The purpose of this study is to explore the understanding and practice of reverse logistics in Mekelle city, Ethiopia. To achieve the study's goal, the researcher used a descriptive research design where a combination of primary and secondary data sources was employed. Primary data was collected from 196 respondents, while secondary data was taken from office manuals and yearly reports. The findings of the study show that poor practice of disposing and collecting used plastic bottles are all apparent in the environment, making the city and its environs filthy and unpleasant to live in. This study also discovered that reuse and recycling have become less common and are rarely practiced. Even though plastic waste disposal guidelines have been incorporate in their operational manuals, the study revealed that there is a lack of community understanding regarding solid waste management, and almost all stakeholders actively disregard waste management proclamations. Thus, it is recommended that all stakeholders, including the government, business owners, plastic bottled water makers, and the public, pay close attention to waste disposal, particularly of non-biodegradable used plastic bottles in Mekelle city.

***Keywords**: reverse logistics (RL); supply chain, recycling; reusing; environmental sustainability; social responsibility, waste management, corporate citizenship,*

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List of Acronyms and Abbreviations

CSR	Corporate Social Responsibility
CSCMP	The Council of Supply Chain Management Professionals
EFBW	European Federation of Bottled Waters
EPA	Environmental Protection Agency of United States
EU	European Union
RL	Reverse Logistics
SC	Supply Chain
SCM	Supply Chain management
SPSS	Statistical Package for the Social Science
SR	Social Responsibility
PET	Polyethylene

Chapter One

Introduction

1.1 Background of the Study

Currently, the usage of plastics is increasing due to their convenience and reliability for packaging materials. Significant numbers of consumers prefer to use bottled water for drinking at home, workplaces or hotels as compared to other forms of tap water (Matiwos Ensermu, 2014). In spite of its excessively high price, the change in Ethiopian people life style leads to high consumption of plastic bottled products. Using plastic bottles for water increases the marketability and quality of the products through ease of access to simply pick and drink everywhere when needed. However, this incidence is a serious problem that causes the accumulation of the plastic wastes to the streets of Mekelle City and makes the city very unclean. These plastic bottle products are not friendly and biodegradable. As plastics take hundreds of years to decompose; it has a wider impact to our environment and has already become the great concern for the environment.

In the absence of green packaging of water products for commercial use in Ethiopia, it demands for reverse logistics for recycling of plastic packages for use (Matiwos Ensermu, 2014). Plastic bottle using companies has the responsibility to manage their after-sale products through the process of reverse logistics. Reverse logistics here is the back ward collection of used plastic bottles from the consumers to the recycling centers or the company for recycling or reusing purpose. Tibben-Lembke (2002) defined reverse logistics as the process of moving goods for capturing value. As Reverse logistics is a very mandatory process, more attention and resources should be paid in order to keep the environment clean as well as to extract value from the return of products, recycling and reusing back.

Reverse logistics is the process of retrieving the product materials or parts from the end user (consumer) 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 & Krzysztof, 2011).

Consequently, such kind of research undertaking can simply indicate the reverse logistics practice on water plastic bottles in Mekelle City. The study tried to assess and investigate the possible difficulties or gaps in the process of reverse logistics and the possible solutions to promote efficient and effective practice of reverse logistics on water plastic bottles in Mekelle city in order to protect the environment from the harm by plastic bottles. It also tried to indicate the possible competitive opportunities that certain companies can gather by working on reverse logistics area.

1.2 Statement of the Problem

Rapid population growth, industrialization and urbanization leads to high consumption of disposable and manufactured goods, which commonly generate more waste to the environment. People put burden to the environment by disposing wastes everywhere without realizing its impact. Among the major sources of wastes, used plastic bottles takes the greater volume, which constitutes relatively wider portion of solid wastes from households, industries, hotels and cafeterias. Some examples are animal refuses, food scraps, packaging materials, yard wastes, pieces of metals and glasses, construction scraps, etc.

In Mekelle City, a lot of disposable plastic bottle using companies and consumers are increasing. It becomes very normal to see plastic bottle wastes in everyday of our life and the pollution of plastic bottles in the city become higher. Too many wastes and disposals of plastic bottles are becoming a social and environmental problem of the city. This is because of poor management of plastic bottle wastes after use that in turn emits to the environment and cause harmful and negative impacts to the environments of the city. The truth that makes things even worse is that, there is a lesser or no visibility of those companies' efforts in terms of protecting the natural environment from deterioration.

According to the Ministry of Environment Forest and Climate Change (MEFCC, 2017), in Ethiopia, plastics constitute nine up to fourteen percent of cities' waste. Irresponsible and reckless practices of waste disposal apart from polluting the air, water and soil and causing severe threat to public health, it also distorts the beautification of cities.

As the world is developing very fast and all the processes and phenomena change immediately one by one, in this way, it becomes more and more complicated to control them efficiently. Increase in waste is one of the successful confirmations of this. Today, people have much more choice and products, which have shorter life spans than earlier. There are also many more single-use and disposable products. These lifestyle changes may have improved the quality of human life, but they also mean we are generating more waste than ever before. (:http://ec.europa.eu/environment/waste/index.htm# European Union 2024).

The life cycle of a product does not end when it is discarded. Several factors such as lack of involvement and commitment of the entire supply chain caused by the

mismatch of objectives; the lack of complete studies to ensure the efficiency of reverse logistics processes along with the absence of clear legislation, induce the companies to not worry about the final destination of their products (Pires & antas 2010).

As Rogers and Tibben-Lembke (1998) summarize reverse logistics as the process of moving goods from the destination to another point in the supply chain, to capture unavailable value. Moreover, the barriers to implement reverse logistics in companies are brought up by manufacturers that don't feel responsible by their products (after consumption) and also by the lack of studies by companies of the benefits of reverse logistics for the product life cycle in organizations (Rogers & Tibben-Lembke, 1999).

Cognizant of the above facts and based on by the researcher's preliminary assessment, the organizations to be studied do not recognize the gain from reverse logistics. This may result in lack of efficient practice and management of reverse logistics planning and management, which in turn may critically, escalate the costs that the companies incur in their logistics operation.

Thus, the purpose of this research was to assess the reverse logistics practice and the possible gaps in the operation of the companies under study. The study also tried to address the contribution of the consumers specifically and the government at large hence came up with the possible competitive opportunities that certain companies can reap by working on reverse logistics.

1.3 Research Questions

In order to come up with the solution for the issues at the problem statement, the studies pose different basic questions, this includes.

1) What does awareness of the reverse logistic practice look like in the companies?
2) What is the contribution of the consumers and government in effective implementation of reverse logistic?
3) What is the current trend of reverse logistic practice on water plastic bottles in Mekelle city?
4) What are the challenges to implement reverse logistics in plastic bottle companies?
5) What are the driving forces for implementing reverse logistics successful?
6) What kind of way-outs should be taken to cure the challenge in reverse logistics?

1.4 Objectives of the Study

1.4.1 General Objective

The overall aim of the study was to assess the reverse logistics Practice in recycling used Plastic Bottled Water Producing Companies in Mekelle city.

1.4.2 Specific Objectives

Specific objectives of the study were:

- ✓ To assess the level of awareness of reverse logistics practice in the bottled water producing companies in Mekelle city.
- ✓ To analyze the contribution of the consumers and government in effective implementation of reverse logistic.
- ✓ To examine the current reverse logistics practice of water plastic bottles.
- ✓ To identify benefits for the successful implementation of reverse logistics.
- ✓ To identify barriers for the successful implementation of reverse logistics.
- ✓ To investigate mechanisms that help to improve reverse logistics practice.

1.5 Significance of the Study

Conducting this study will benefit different parties those are directly or indirectly related with research result/report. Thus, it will including

- ✓ To enable plastic bottled companies understand the concept of reverse logistics practice and its importance.
- ✓ To make supply chain managers consider reverse logistics in their basic operational activity and strategic plan.
- ✓ To offer a new insight to users of bottled water products of the Mekelle city direct their contribution towards minimizing the negative environmental impacts caused by the disposal of used plastics bottles,
- ✓ The make the Administration of Mekelle city formulate a regulatory system to the process of reverse logistics management.

1.6 Scope of the Study

Considering time and cost, this study defined its geographical, conceptual and methodological scopes. Geographically this study was limited its coverage to Mekelle city natural spring water companies mainly Spa and Mercy natural spring water. Theoretically, the study limited its conceptual scope on the assessment of reverse logistics that mainly focus on supply chain process of used plastic bottles from end users back through the supply chain to recycle them. Methodologically, this study used cross sectional data from sample participants and predominantly qualitative research design.

1.7 Limitation of the Study

To the best, the scientific approach allowed this study came up with statistically conclusive results; however, it was not free from limitation. Geographically this study did not assess the natural spring water companies other than Spa and Mercy and other companies in the city, region and the country at large. Conceptually the study did not cover other logistics concepts. Finally the study did not use time series analysis and did not show the reverse logistics before and after the study period. With all the limitations, the research has come up with scientifically reasonable conclusive results.

Chapter Two

Review Related Literature

2.1 Definitions of Reverse Logistics

In the early nineties, emerges the first definition of reverse logistics, Stock (1992) emphasis on the recovery aspects of reverse logistics, defining as: "... the term often used to refer the role of logistics in recycling, waste disposal, and management of hazardous materials; a broader perspective that includes all logistics activities as recycling, substitution, reuse of materials and disposal of products".

Rogers and Tibben-Lembke (1999) defined reverse logistics as the process of planning, implementing and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods, and related information from the point of consumption to the point of origin for the purpose of recapturing or creating value or proper disposal.

According to Arrieta (2015), reverse logistics is defined as the process of moving goods from the point of usage or consumption for the purpose of recapturing value, or proper disposal; including activities such as remanufacturing and refurbishing, processing of returned damaged products, seasonal inventory, recalls (return implemented because of safety or quality reasons), recycling programmers, hazardous material programmers, obsolete equipment disposition and asset recovery.

According to Steven (2004) reverse logistics comprises all activities involved in managing, processing, reducing, and disposing of hazardous or nonhazardous waste from the production, packaging and use of products, including the process of redistribution.

The Council of Supply Chain Management Professionals (CSCMP, 2010) defines reverse logistics as a specialized segment of logistics focusing on the movement and management of products and resources after the sale and after delivery to the customer. Reverse logistics is defined as the processes of receiving returned components or products for the purpose of recapturing value or proper disposal. Reverse logistics processes and plans rely heavily on reversing the supply chain so that companies can correctly identify and categorize returned products for

disposition, an area that offers many opportunities for additional revenue. It is much more than simply counting defective items returned by customers. Also, it is much more complex than outbound shipping in that customers and/or consumers initiate a return, making it an inbound shipment process that is less predictable.

"The science *of reverse logistics includes return policy administration, product recall protocols, repairs processing, product repackaging, parts management, recycling, product disposition management, maximizing liquidation values and much more"* (Greve, C., Davis, J., & Huang, C. (n.d.)).

The European Working Group on Reverse Logistics (see De Brito and Dekker, 2004) puts forward the following definition: "The process of planning, implementing and controlling backward flows of raw materials, in-process inventory, packaging and finished goods, from a manufacturing, distribution or use point, to a point of recovery or point of proper disposal"

In his paper "Development and Implementation of Reverse Logistics Programs", 1998, James R. Stock defines reverse logistics as, "The term most often used to refer to the role of logistics in product returns, source reduction, recycling, materials substitution, reuse of materials, waste disposal, and refurbishing, repair and remanufacturing."

There are two types of popular logistics models in practice: Forward logistic, defined "as the part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from point-of-origin to the point-of- consumption in order to meet customers' requirements". Reverse Logistics which focuses on the movement of goods in the opposite direction, is defined: *"as the process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal"* (Ellinger et al., 2012).

2.2 Plastic Bottle Wastes

Consumption of plastic *similar* to production shows an exponential increase with

more plastics being produced in the first decade of the present century than in the entire preceding century (Bowmer and Kershaw 2010; Thompson et al. 2009 a, b; 2011). The increase in numbers of plastic industries and subsequently discarding the wastes by consumers has only resulted in making the environment worse and encircled living organisms in danger. Plastics are extremely diverse in terms of chemical composition, properties, and possible applications, and are widely distributed in the society and the environment.

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 21 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 waste that is plastic 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- Sahara Africa (World Bank, 1996; Yankson, 1998).

Approximately 50% of manufactured plastic products are utilized for single disposable applications (Hopewell et al 2009). As such, there is a rapid increase in the amount of plastic solid wastes (PSWs) produced as most plastic products" life is short.

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 Ethiopia some studies showed that plastic bottles are causing severe environmental pollutions to human and animal health in urban and rural areas of the country (Bjerkli 2005; Ramaswamy & Sharma 2011; Tadesse et al. 2008).

2.3 Reverse Logistics on Used Plastic Bottle

The number of polyethylene bottles (bottles for beverages made from plastic) produced is on the rise in all countries. Even with recycling, there are still several environmental impacts that are generated from the production of bottles, the

transportation of beverages, refrigeration and sales, recycling, and the lifecycle of the product from production to disposal. In many countries that have water service infrastructure in place and can provide safe and high-quality tap water, there are measures and campaigns being implemented to reduce the use of PET bottles, and review and promote the use of tap water (Friends of Earth Japan Annual report, 2013).

Polyethylene Terephthalate (PET) bottles have experienced rapid growth since the 1970s when the technique of blow molding was introduced (Glenz, 2007).Mechanical recycling can only be performed on single-polymer plastic thus the more complex and contaminated the waste, the more difficult it is to recycle it mechanically (Al-Salem etal., 2009). 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.

2.3.1 Reduce, Reuse and Recycling of Plastic Wastes (The 3R's)

2.3.1.1 Reduction

Reduction or minimization involves all actions aimed at decreasing the amount of waste production. Waste reduction, after prevention, is one of the most important strategies to achieve sustainable development. In practice, waste reduction can be carried out by conducting life-cycle analyses or very thorough mass or material balances.

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

2.3.1.2 Reusing Plastic Bottles

WWF Report (2001) suggested that water bottles be washed and reused to lessen their negative impact on the environment. Unfortunately, reusing plastic bags and bottles further compromises the quality of the water due to leaching of more and

more hazardous chemicals into water; such as bisphenol A (BPA), phthalates, antimony and other organic contaminants as the bottle gets older (Andra et al. 2011; Earth Talk 2012; Schmid et al. 2008,Widen et al. 2005; 2012).

2.3.1.3 Recycling of Plastic Wastes

Plastic waste recycling is recommended to sustainable waste management. The primary aim is to lessen environmental damage and achieve environmental sustainability. Recycling can save energy, conserve resources, reduce emissions from incinerators and prolong life spans of the landfills (Tsai, 2008).

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

2.4 Importance of Reverse Logistics

Reverse logistics (RL) is becoming an important aspect of supply chain management. Many companies that previously did not devote much time or energy to the management and understanding of reverse logistics have begun to pay attention.

Firms have begun to benchmark return operations with best in-class operators. Third parties specializing in returns have seen demand for their services greatly increased (Arun & Kwan, 2003).

Reverse logistics has become significant because organizations are under increasing pressure from many stakeholder groups, including shareholders, customers, employees, suppliers, reverse supply chain partners, government agencies, nonprofit organizations and the (public) environment (Vachon Klassen 2006) owing to environmental issues, legislation and consumer expectations.

As with any organization, processes that take away from potential profit or put a drain on limited resources will gain the watchful eye of management to rein in costs and streamline the process. It is this reason that field of reverse logistics has increased in importance within the business community and academia (Carter & Ellram 1998; Blumberg 1999; Dowlatshahi 2000; Rogers & Tibben-Lembke 2001; Mason 2002).

Reverse logistics has numerous impotencies, these are, economic, environmental, marketing image, market share and asset protection can be raised. The main motive behind reverse logistics is economic (minimizing cost and increasing profits), environmental protection and gaining competitive advantage into the industry.

This section focuses on the importance of reverse logistics and how reverse logistics can play an important role in the growth of organizations through the environmental and societal, financial, and competitive advantages.

2.5 Driving Forces of Reverse Logistics

In this section, the focus will be on the driving forces of reverse logistics. Generally, the companies carry on reverse logistics because of the profit, obligatory forces, or social pressure.

According to this classification, the drivers is named as; economic, legislation and corporate citizenship (De Brito & Dekker, 2004).

2.6 Barriers in Reverse Logistics

Companies today acknowledge the importance of the reverse flow, even though there is still a lack of interest and difficulties to implement them (Guarnieri et al., 2006; Quinn, 2001; Rogers & Tibben-Lembke, 1999).

Apart from indisputable advantages of reverse logistics, there is also a range of barriers to implement the process of reverse logistics.

2.7 Synopsis of Empirical Studies

This part of the literature review dwells with the empirical findings of studies on reverse logistics A study by Anna Dunay etal, 2022 on the *'Role of Reverse Logistics Activities in the Recycling of Used Plastic Bottled Water Waste Management'* came up with the main findings; incineration, landfilling, and dumping of used plastic bottles on the side of the road are all apparent in the environment; making the city and its environs filthy and unpleasant to live in. Moreover, the study also discovered that reuse and remanufacturing have become less common and are rarely practiced. Although plastic waste disposal guidelines have been created, the investigation of the researchers revealed that there is a lack of community understanding regarding solid waste management, and some stakeholders actively disregard waste management proclamations.

Over the past few decades, several studies in Supply Chain Management (SCM) have discussed the barriers of RL. Lack of top management commitment and low awareness about RL practices are the significant barriers to implementation of RL found by Ravi and Shankar (Ravi and Shankar, 2005). High cost, lack of legitimacy, poor supplier commitment, and lack of rules and regulation are the major barriers to implementation of RL found by Walker et al. (Walker et al., 2007). Meelhan and Muir compiled five barriers to SCM: lack of employee skill, lack of improvement and experience, low trust in 3rd party logistics, and lack of interest from top management (Meehan and Muir, 2008). Dashore and Sohani identified seven main barriers in their study: lack of advancement in new technology, lack of commitment from top management, lack of customers awareness, lack of knowledge training and experience, low integration with information and technology systems, lack of skilled professionals, and lack of waste management and energy management (Dashore, K; Muir, L. 2008). Manzouri et al. attempted to highlight the major barriers to implementation of SCM in the manufacturing industry; they include low awareness about SCM practices, lack of logistics executives, lack of information, and low awareness about new technology (Manzouri et al.2010). According to Mudgal et al.,

lack of CSR and lack of commitment from top management are the most significant barriers to implementation of RL (Mudgal et al, 2010). Sharma, Panda, Mahapatra and Sahu examined management negligence, lack of initial capital, lack of SCM performance, lack of improved management systems and company strategies, and administrative issues as barriers that have both strong dependence and driving power. Legal issues, low awareness of RL and financial constraints were found to be independent barriers to a strong driving power Sharman et. al.,2011). Giunipero et al. identified four major barriers in his study: lack of rules and regulation and sustainability standards, lack of coordination at the CEO level, high cost of sustainability, and non-alignment of short and long run strategic goals (Giunipero et al, 2012).

The extensive literature mentions that there are difficulties implementing supply chain management with reverse logistics. This is how previous studies (Korhonen et al., 2017; Araujo et al., 2018; Bilal et al., 2020) have categorized RL barriers: (i) internal, such as material resources, immaterial resources and competencies; (ii) external, such as capital support barrier, policy support barrier, and information support barrier. Nonetheless, Bilal et al. (2020) have argued that the barriers that appear most frequently in the literature are as follows: technological, policy and regulatory barriers, financial and economic barriers management, performance indicators, customer (interest in the environment or lack of information on environmental impact) and social barriers.

Lack of pressure to adapt green supply chain management practices, lack of training and monitoring, and lack of customers' awareness are the key barriers found by Wang et at. in an empirical study (Wang et at., 2016).

Table 2.7.1. Recent Studies on Reverse Logistics in Africa

Author (s)	Study Aim	Research Method	Country
Mwanza, et al, 2019.	To assess the barriers to reverse logistics in the plastic manufacturing industry	Qualitative	Zambia

Meyer, et at, 2017.	To bring to notice the main internal and external drivers and barriers of RL within major South African grocery retailers	Qualitative	South Africa
Makaleng,2018.	To examine reverse logistics challenges in the manufacturing pharmaceutical companies in South Africa.	Qualitative and quantitative	South Africa
Bor, 2020	Performance evaluation of reverse logistics adoption in food industries in Kenya.	Descriptive technique,	Kenya
Anne, 2015	Reverse logistics practices and their effect on competitiveness on food manufacturing, Nairobi, Kenya.	Quantitative	Kenya
Girma, 2018	To analyze and design an effective reverse logistic system for plastic bottles in Dire Dawa city in Ethiopia.	Qualitative and quantitative	Ethiopia
Gupta, 2016	Performance evaluation of RL process in a bottling company, Ethiopia	Qualitative	Ethiopia
Wondimu, 2016	Measuring the performance of reverse logistics system in pet bottles recovery in Ethiopian city.	Qualitative and quantitative	Ethiopia
Amole, et al., 2018	To explore reverse logistics activities' impacts on the management of waste products in the Nigerian manufacturing	Qualitative and quantitative	Nigeria
Mobolaji, 2017	To examine solid waste management with respect to beverage containers of soft and alcoholic drinks.	Quantitative	Nigeria
Ahaiwe & Nwadigoha, 2021	Performance evaluation of RL in a cosmetics company in Abia State, Nigeria.	Quantitative	Nigeria
Amoah, et al. 2017	To investigate factors for successful implementation of reverse logistics (RL) in Ghana.	Qualitative and quantitative	Ghana
Ebenezer & Zhuo, 2019	Performance evaluation of RL in sachet water bottling company in Ghana.	Qualitative and quantitative	Ghana
Bouzon, et al., 2018	Investigation on Reverse Supply Chain (RSC) practices and their obstacles in Moroccan companies.	Quantitative	Morocco

Source: Chukwuebuka, et. al, 2021

Table 2.7.2. Finalized Barriers to implementing Reverse Logistics

Dimensions	Sub-Criteria/Barriers	Reference
Organizational (OG)	• Insufficient top management commitment (OG1) • Financial constraints (OG2)	Mwanza, et al, 2019. Elbaz, et al., 2018 Bouzon, et al., 2018 Bouzon, et al., 2016

	• Poor strategic planning of reverse logistics policies (OG3) • Poor organizational culture (OG4)	Kaviani, et al., 2020 Orji, et at., 2020
Technological (TC)	• Inadequate performance measurement system (TC1) • Lack of proper infrastructure and supporting technologies for reverse logistics practices (TC2) • Negative past experience with innovative technologies (TC3) • Low technical expertise/competence of employees (TC4)	Waqas, et al., 2020 Sari, et al., 2019 Saeed, et al., 2019 Mwanza & Mbohwa, et al., 2019 Simoes, et al., 2017 Kusi-Sarpong, et al., 2019
Institutional (IN)	• Inadequate government policies and support (IN1) • Absence of public awareness on reverse logistics adaptation (IN2) • Market instability and uncertainty of customers' behavior (IN3) • Low competitive pressure (IN4) • Lack of corporate social responsibility (IN5)	Chinda, 2017 Ravi & Shankar, 2017 Wondimu, 2016 Elbaz, 2018 Bouzon, 2018
Product related (PD)	• Low product quality (PD1) • Low traceability of product life cycle (PD2) • Improper marketing strategies for recovered products (PD3) • Risk of storing hazardous materials (PD4) • Insufficient knowledge of the expected values and pricing of returned products (PD5)	Ravi & Shankar, 2017 Elbaz, 2018 Bouzon, 2018 Orji, et al., 2020 Mangla, et al., 2016 Herbert-Hansen, 2018
Supply chain related (SC)	• Minimal collaboration among supply chain partners (SC1) • Geographical location of facilities not close to end-customers (SC2) • Insufficient trust in third-party logistics (SC3)	Mwanza & Mbohwa, 2019 Wondimu, 2016 Nakiboglu, 2019 Han, et al., 2021 Mahadevan, 2019 Paula, et al., 2019 Rehman, et al., 2017 Schamne & Nagalli, 2016

Source: Chukwuebuka, et. al, 2021

2.7.1 Main Drivers and Barriers

In the literature, several studies examining the drivers and barriers to the adoption of RL practices are already available. Drivers are considered as motivational factors

that lead companies to employ some sort of activity (Govindan & Bouzon, 2018) while barriers are defined as something that prevents something else from happening or makes it more difficult (Cambridge Dictionary, 2024). In this section, the main factors driving or hindering the RL implementation in the industry in general, identified in the existing literature, are discussed.

The barriers and drivers to the RL implementation may differ according to the different stakeholders' perceptions (Govindan & Bouzon, 2018). Eight stakeholder categories were recognized as impacting RL activities: the government, customers, society/NGOs, market/competitors, suppliers, organization, employees, and media (Govindan & Bouzon, 2018). These different stakeholders have different roles to play in the industry and have, therefore, different opinions on the barriers and drivers. The main identified drivers and barriers in the literature are from the time government, customers, organizations, and society points of view (Govindan & Bouzon, 2018).

Drivers and barriers can be both classified as internal or external (Govindan & Bouzon, 2018). Internal drivers refer to elements within the company that involve a commitment of resources influencing the adoption of RL, while external drivers refer to external motivations leading to the adoption of RL (Govindan & Bouzon, 2018). On the other hand, internal barriers are hindrances within the company itself that obstruct the adoption of green efforts, while external barriers encompass obstacles originating from sources external to firms that impede the adoption of green activities (Govindan & Bouzon, 2018). In the literature, both the main barriers and main drivers are divided into different categories. In the following part, this classification is first explained for the main drivers identified in the literature and then for the main barriers.

2.7.1.1 Main Drivers

Different stakeholders in an industry have different motivations for implementing RL. The main motivations are, in literature, divided into eight groups. First, there are the policy-related drivers that include issues with regulations concerning product takeback and RL (Andiç et al., 2012; Govindan & Bouzon, 2018; Mathiyazhagan & Haq, 2013; Meade et al., 2007; Sorkun & Onay, 2018). Then, governance and SC process drivers refer to reverse SC issues, cooperation issues, and business partners.

After that, market and competitor drivers include customer satisfaction, competitive advantage potential, green market issues, and competitive pressures (Asamoah et al., 2023; Govindan & Bouzon, 2018; Sorkun & Onay, 2018). The next driver's category is technology and infrastructure, including information technology drivers, availability of eco-design, and design for techniques and recovery technologies (Akdoğan & Coşkun, 2012; Govindan & Bouzon, 2018; Kannan et al., 2014; Sorkun & Onay, 2018). Economic drivers include financial and economic parts, knowledge drivers refer to internal resources such as information flows, and RL awareness in companies, and social drivers are related to societal pressures, such as higher public awareness of environmental conservation and corporate citizenship pressure (Akdoğan & Coşkun, 2012; Chileshe et al., 2016; Govindan & Bouzon, 2018). Finally, commitment drivers include issues such as employee satisfaction and human resources department support for RL practice (Agrawal et al., 2015; Govindan & Bouzon, 2018; Ho et al., 2012). In each category, different sub- categories of drivers exist. The drivers most frequently cited in the literature are explained in greater detail in the following paragraphs.

The leading driver is the regulatory pressure for the adoption of environmental initiatives (Govindan & Bouzon, 2018). Indeed, environmental factors, including regulatory issues, are often cited as drivers to improve sustainability performance by implementing RL (Meade et al., 2007). This is more from a governmental point of view. Different sub- factors emerge from this driver. First, there is regulatory pressure for recovering end-of- life products (Govindan & Bouzon, 2018). Environmental laws forcing firms to take back their products and take care of further treatment is one main reason why RL is continually growing in importance (Meade et al., 2007). Then, the license to operate is also a driver because firms are increasingly embracing RL initiatives to secure their operational licenses (Andiç et al., 2012). Finally, incentives such as tax exemptions have been identified as motivating factors for the implementation of RL. For instance, take-back taxes imposed on manufacturers encourage industries to reclaim their products (Mathiyazhagan & Haq, 2013; Sorkun & Onay, 2018).

The second most important driver is green consumerism (Govindan & Bouzon, 2018). This is more from a customer's point of view. Green consumerism is "the situations in which consumers want to buy things that have been produced in a way that

protects the natural environment" (Cambridge Dictionary, 2024). First, green customer salience drives RL practices (Asamoah et al., 2023). Green customer salience refers to how important organizations place on addressing customers' environmental concerns (Asamoah et al., 2023). Companies that recognize customers' environmental concerns as significant are more likely to respond to green demands by implementing RL practices extensively (Asamoah et al., 2023). Then, customer satisfaction serves as a catalyst for after-sales initiatives. In this respect, assisting in appropriate product disposal and RL activities can strengthen customer loyalty (Govindan & Bouzon, 2018; Sorkun & Onay, 2018).

Afterwards, corporate citizenship is also a driver (Akdoğan & Coşkun, 2012). It is a "set of values or principles that an organization holds to be responsible" (Akdoğan & Coşkun, 2012, p.5). RL will help to create a good corporate social image (Sorkun & Onay, 2018). This is more from a societal point of view. Two main sub-factors emerge from that. First, higher public awareness of environmental issues will drive companies to build a better image because they face pressure to act in a socially responsible manner by fulfilling legal, ethical, and economic obligations placed upon them (Akdoğan & Coşkun, 2012; Govindan & Bouzon, 2018). The scarcity of landfills also drives RL. Indeed, as illegal landfills present significant hazards, implementing RL offers a solution to ensure proper disposal of end-of-life products (Kannan et al., 2014).

Another important driver is economic viability (Govindan & Bouzon, 2018). This is more of an organizational point of view factor. Economic reasons are often cited as driving RL. For instance, reusing products can serve as a cost-effective source of raw materials. Moreover, when the production of new products proves to be significantly more expensive than recovery efforts, RL becomes a viable option (Akdoğan & Coşkun, 2012). In this category, long-term sustainability and performance are a driving force for RL because firms are worried about their survival in the market for a longer period due to environmental issues (Chileshe et al., 2016; Govindan & Bouzon, 2018). Then, the possible reduction in raw material consumption, waste disposal costs, and transportation costs savings could become economic benefits that boost the implementation of RL (Akdoğan & Coşkun, 2012; Chileshe et al., 2016; Govindan & Bouzon, 2018; Sorkun & Onay, 2018). Moreover, RL will help recover the remaining value of used products (Akdoğan & Coşkun, 2012; Chileshe et al., 2016;

Govindan & Bouzon, 2018). Finally, having a green image through environmentally friendly activities such as RL is a good marketing strategy for the firms and will help them to be economically viable (Akdoğan & Coşkun, 2012).

Lastly, commitment drivers refer to the factors that motivate individuals to stay engaged in their roles within an organization. Implementing RL will be beneficial for employee satisfaction. Indeed, feel-good factors, employee morale, and satisfaction can be obtained by adopting environmental practices, RL, for instance (Govindan & Bouzon, 2018). As a result, employees are more inclined to adopt the RL when they perceive that it is likely to improve their satisfaction. Then, the implementation of RL is made easier when top managers are aware of its importance and committed to its execution (Agrawal et al., 2015). Finally, the presence of a larger workforce is positively correlated with the RL implementation, and the support provided by the company's human resources department reinforces RL activities (Ho et al., 2012).

2.7.1.2 Main Barriers

The different stakeholders in an industry also face different challenges when implementing RL. The literature shows that the barriers can be divided into seven different categories. First, there are the economic-related barriers that include financial and economic barriers related to RL (Dutta et al., 2021; Gálvez-Martos & Istrate, 2020; Govindan & Bouzon, 2018; Kaviani et al., 2020; Waqas et al., 2021). Then, technology and infrastructure barriers include information technology barriers, technical skills issues, and barriers related to lack of infrastructure for RL development trust (Govindan & Bouzon, 2018; Kaviani et al., 2020; Waqas et al., 2021). After that, governance and SC process barriers refer to reverse SC issues, cooperation issues, and performance measurement (Chinda, 2017; Correa-Vaca et al., 2023; Dutta et al., 2021; Govindan & Bouzon, 2018; Kaviani et al., 2020; Wu et al., 2022). Knowledge/experience-related barriers refer to information flows and RL awareness in companies (Chinda, 2017; Duttaet al., 2021; Kaviani et al., 2020). Afterward, policy-related barriers include issues on regulations concerning product take-back, and management-related barriers include issues such as managers' posture concerning RL and its relative importance compared to other activities (Dutta et al., 2021; Govindan & Bouzon, 2018). Finally, competitors- and market-related

barriers include competition advantage reasons and recovery market issues as well as lack of customers' trust (Govindan & Bouzon, 2018; Kaviani et al., 2020; Waqas et al., 2021). In each category, different sub-categories of barriers exist. The barriers most frequently cited in the literature are explained in greater detail in the following paragraphs.

The first leading barrier to the implementation of RL is the low commitment of top managers (Govindan & Bouzon, 2018). They believe that RL practices are less important than other practices within the company (Govindan & Bouzon, 2018). Companies typically prioritize their forward logistics infrastructure and the sale of their standard product range (Dutta et al., 2021). Moreover, managers do not pay enough attention to RL in strategic planning (Kaviani et al., 2020). Managers also often do not want to make changes in the current system; they are confident about the current situation (Dutta et al., 2021), and RL is not attractive to them (Govindan & Bouzon, 2018). Finally, managers need to have certain RL experience and knowledge, which is important since they oversee the decision-making process (Chinda, 2017). This low involvement of top managers may also be influenced by the next important barrier explained in the next paragraph.

The second barrier is the lack of governmental initiative, regulations, and incentives (Govindan & Bouzon, 2018). Government support for RL implementation is crucial for promoting jars on a regional scale (Chinda, 2017). The government can provide specific regulations. These were seen as drivers, as presented in the previous section. However, there is a lack of specific laws that hinder the adoption of RL (Govindan & Bouzon, 2018). Indeed, in many countries, incomplete or unregulated waste management practices persist due to the absence of clear return policies or comprehensive regulations (Govindan & Bouzon, 2018). There is also a lack of motivation regulation, i.e., a lack of regulations to stimulate manufacturers for RL and promote environmental sustainability, as well as encourage customers to purchase green products (Kaviani et al., 2020). Finally, there is a lack of incentives and government tax exemptions that discourage companies from initiating the establishment of a RL network (Dutta et al., 2021). It also hinders investment in R&D initiatives towards reducing end-of-life costs (Govindan & Bouzon, 2018).

Finance and economy are also considered to be the main barriers to RL (Waqas et al., 2021). First, RL does not have the required initial capital (Govindan & Bouzon,

2018). This initial investment includes establishing collection points, acquiring machinery, and covering other fixed expenses. It discourages the company from incurring these additional short-term expenses (Dutta et al., 2021; Gálvez-Martos & Istrate, 2020). There is also a lack of funding for training human resources that are necessary for the adoption of RL (Kaviani et al., 2020). Then, the lack of economy of scale also constitutes a barrier. The unpredictability of product returns hinders production scalability, leaving companies uncertain as to how far the RL model can be scaled (Dutta et al., 2021; Kaviani et al., 2020). Finally, shareholders expect profitability. Unfortunately, investment in product recovery activities is considered a highly uncertain undertaking, which makes it difficult to forecast economic gains (Govindan & Bouzon, 2018). This uncertainty is the final economic barrier.

Then, the resources and staff requirement are also a main barrier to the implementation of RL (Waqas et al., 2021). The implementation of RL requires specific equipment and technical capabilities (Chinda, 2017; Govindan & Bouzon, 2018). Unfortunately, for the former, most of the time, companies suffer from a lack of tools to create an efficient RL network (Chinda, 2017; Dutta et al., 2021; Kaviani et al., 2020). For instance, developing an accurate system to forecast the number of product returns (Correa-Vaca et al., 2023). For the latter, there is a lack of relevant training for all stakeholders necessary for the management of RL processes (Dutta et al., 2021).

Finally, the SC process may be a significant barrier (Govindan & Bouzon, 2018). Firstly, there may be difficulties with members of the SC, which can lead to a lack of support and ineffective coordination within the SC for implementing and managing RL (Govindan & Bouzon, 2018). This coordination could be enhanced by information sharing among stakeholders, enabling timely delivery, cost reduction, and addressing discrepancies between the demand and supply of RL (Wu et al., 2022). However, this sharing of information may be hindered by the lack of certainty in the market environment, trust among RL stakeholders, government support, equal speaking rights among stakeholders, and information technology infrastructure (Wu et al., 2022). Finally, another SC problem is the current state of the RL system. It operates in a disorganized way and is being integrated into waste management practices. This integration leads to a reduction in the quality of materials when they reach manufacturers, posing problems for the reprocessing of certain products (Dutta et

al., 2021; Kaviani et al., 2020)

Chapter Three

Research Methodology

3.1 Research Design

The research used a mixed research approach (quantitative and qualitative) to augment the validity of findings and exhaustively analyze the observable facts. Additionally, a descriptive research design was employed for this specific analysis to describe the main findings of the study. Quantitative research design was used to address awareness on the practice of reverse logistics, challenges, and driving forces of reverse logistics through structured approach. Moreover, contribution of consumers, government on reverse logistics will be qualitatively.

Study period and Area: The study was conducted in both SPA and Mercy Plastic Bottled Water Producing Companies found in Mekelle city, Ethiopia from September 2024 – February 2025.

3.2 Nature and Source of Data

The researcher has gathered information from both primary and secondary sources. The researcher employed questionnaires and interviews as primary data gathering tools, whereas manuals, reports and other government policy directives were used as the main sources for secondary data.

3.3 Sample and Sampling Techniques

3.3.1 Sample

A target population is a population incorporated in the study in a particular geographical area like county, state or region or town according to their demographic characteristics. Accordingly, the target population of this study was a total of two hundred eighty four employees of SPA and Mercy Spring Water and end consumers of forty 3-Star Hotels in Mekelle city. Therefore, the researcher selected sample respondents from the employees and took a census of the total 3-star hotels in Mekelle city. The researcher used statistical formula for estimating the sample size provided by Yamane [n=N/1+N(e2))]. Out of 284 employees of both SPA and Mercy 166 employees, i.e. 58% of the total employees of both companies were used as sample respondents. The sample size was determined statistically as follows;

$$n = \frac{N}{1 + N(e2)}$$

[Where; N= total population; n = sample size; e = the acceptable sampling errors]

Using N = 284 employees and e = 0.05, the sample size for the study was

Therefore the sample size of employees (n) $= \frac{284}{1+284(0.05\text{^}2)} = 166$

The proportion of SPA was $\frac{\textit{SPA employees}}{\textit{total N}} = \frac{130}{284} = 45.7\%\ i.e\ 47.5\% * 166 = 76$

The proportion of Mercy was $\frac{\textit{Mercy employees}}{\textit{total N}} = \frac{154}{284} = 54.3\%\ i.e\ 54.3\% * 166 = 90$

From the above formula, It can be seen that from the total population of 284 of employees, the sample size was 166. According to Yamane, these are the lower number of respondents from the total population (284) to maintain a 95% confidence interval.

By using the proportional sampling method, the sample size for both SPA and Mercy spring water producing companies was determined separately. Thus, the total number of employees from SPA was 76 and the total number of employees from Mercy was 90, which were selected by informative and systematic methods. The sample size of employees from SPA spring water producing company was 130 ÷ 284 = 47.5%, thus 0.475 × 166 = 76 respondents, and the sample size of employees from Mercy spring water producing company was 154 ÷ 284 = 54.3, thus 0.543 × 166 = 90 respondents. Therefore, by using the proportional sampling method, the sample size of this study from SPA employees was 76 respondents and the sample size of employees from Mercy was 90 respondents. Hence, total sample size of this study was 166 respondents from both spring water producing companies who are used for this study. Key informative employees who believed to have first-hand information such as managers and unit heads are selected for face-to-face interviews.

3.3.2 Sampling Technique

In order to select sample respondents, the study used simple random sampling technique. The intention of using simple random sampling is to focus on the employees of the companies who are involved logistical and other operations and to give equal opportunity to participate in the study. The main reason to include all employees as a target population is to address and triangulate the reverse logistics

from different angles. This is due to the diverse nature of reverse logistics that encompass multi aspect from production to finance and operation.

3.4 Data Collection Techniques

For the study to achieve its intended objectives it employed both primary and secondary methods of data collection. Primary methods of data collection were interview and questionnaire. To collect primary data from the sample respondents about awareness, driving forces and challenges of reverse logistics the researcher framed and prepared the questionnaire in structured manner. Moreover, for the data about the consumers awareness, government policies and possible way-out the researcher used and supplemented the primary data through unstructured in-depth interview with managers, leaders and government officers who can offer rich insights on reverse logistics. To achieve the objective of the study and in line with the research design the questions in the questionnaire were structured an scaled using a five-point Likert response format because it is inexpensive, comparable, standardized, and easy to analysis and easily understandable by respondents.

The intention of using interview as a data collection method comes from the belief that the nature of the topic to be assessed needs in-depth and complete clarification from the data source. On the other hand, secondary data were collected through reviewing of targeted companies' different report and other written documents.

3.5 Data Handling and Analysis

To analyze the data that was collected, descriptive statistical tools been used. The descriptive statistical tools applied for this study were frequencies and percentage value which were computed using SPSS version 20. Then the data was analyzed and interpreted with regard to the information collected from respondents. The analysis and interpretation has been based on the respondent's responses and stated in simple

and clear sentences to express the qualitative data and quantitative data. The quantitative data was mainly be expressed by using tables, percentages, mean values, and rank order, whereas the data from interviews and documents has been concurrently analyzed qualitatively to strengthen the analysis and findings of the study.

3.6 Reliability and Validity Tests

Validity is the precise measure to which the research is presented by the results of the research analysis. The validity of the data representing the variables helped the researcher to show the accuracy of the research. The questioners in this research were designed in such a way that they avoid vagueness.

Reliability is the degree of consistency in data or results that a research yields after repeated testing. Adjustments and corrections to questions were made as needed to ensure reliability. Reliability refers to the consistency or stability of measuring data overtime.

Cronbach's alpha (quantification of the survey questionnaires' internal reliability) was calculated using data from all survey participants, and distinct reliability tests for each of the individual components computed to examine the stability of the given results. According to Field, Cronbach alpha determines how closely item responses correspond to the generally accepted social science cutoff i.e., values more than 0.70 for a set of items to be considered on a scale. As a result, the Cronbach's alpha test was conducted using SPSS.

Chapter Four

Data Presentation, Analysis and Discussion

4.1 Introduction

As mentioned in the third chapter the next step after data collection is the analysis and interpretation of data in order to come up with meaning full explanations about the research problem and recommendations to solve the problems. The objective of this thesis is to assess the reverse logistics practices in recycling used plastic bottles of water producing companies in Mekelle city and to identify the problems and forward possible solutions in order to improve the understanding and concern of stockholders in the operational and environmental impact of reverse logistics.

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

This chapter shows the detail analysis of the data coded, defined on the SPSS software, entered and processed using categorizations, graphs, tables, frequencies and percentages to summarize data. The analysis begins with the data collected by self-administered questions from 197 employees of those targeted bottler companies and end consumers of hotels using the outputs from SPSS and the information obtained from interviews and observations. The data collected was analyzed and interpreted by attaching to similar variables to strengthen the quantitative data. As stated in the previous chapter, the study sought to collect from 206 employees of the two targeted bottler companies and hotels but the researcher managed to collect only 197 questionnaires. This represents a response rate of 96% which is very good for analysis. According to Babbie (2004) a response rate of 60 percent is good and, therefore that of 96 percent is very good.

4.2 Validity and Reliability

Cronbach's alpha (quantification of the survey questionnaires' internal reliability) was calculated using data from all survey participants, and distinct reliability tests for each of the individual components were computed to examine the stability of the given results. According to Field, Cronbach alpha determines how closely item responses correspond to the generally accepted social science cutoff i.e., values

more than 0.70 for a set of items to be considered on a scale. As a result, the Cronbach's alpha test was conducted using SPSS, and the findings are presented in Table 4.1 below.

Table 4.2.1 The study's validity and reliability test.

Cronbach's Alpha	N of Items
0.948	56

Sources: Own survey, 2025, generated by SPSS V.20.

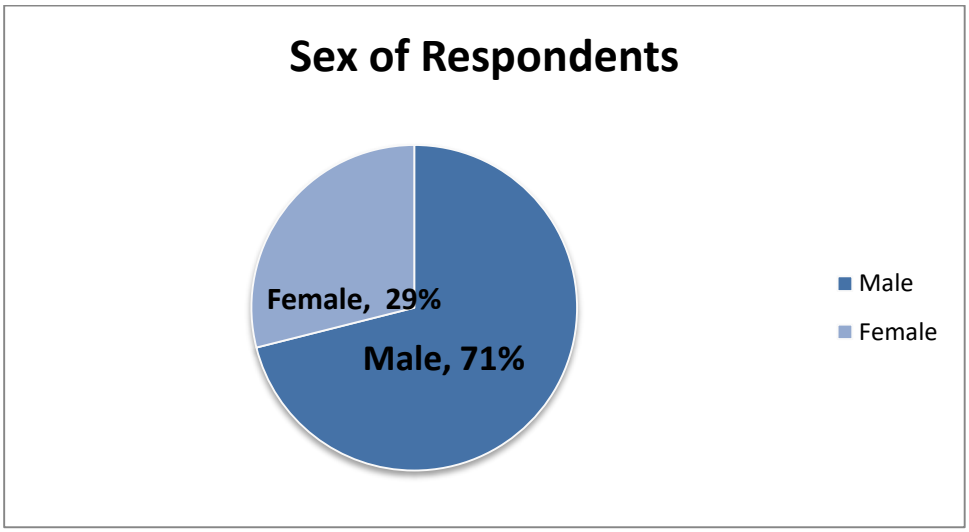
The Cronbach's alpha reliability statistics estimate of all prognosticators and changing results were determined, as shown in Table 4.1. The calculated correlation of alpha for this study was found to be 0.948 for all different factors. As a result, the above-mentioned edge of reliability test result for all variables is greater than 0.7, which is statically significant, and thus the data are reliable for carrying out this study.

4.3 Findings of Demographic Analysis

Before going to the main parts of the study, it was logical first to present the demographic status of the study participants. Therefore, here in this section, the study presented the demographic characteristics of respondents in terms of gender, age group, education level, job position, service years. Based on their response, the demographic characteristics of the respondents are presented in the following sub sections.

4.3.1 Gender Distribution of the Organizations Under Study

Figure 4.3.1.1: Gender Distribution of the Respondents

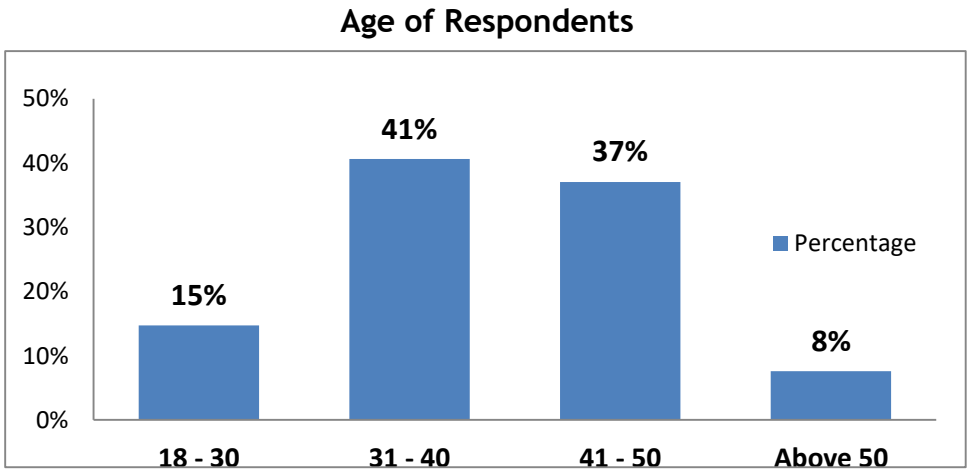


Sources: Own survey, 2025, generated by SPSS V.20.

As it can be observed from the above pie chart 4.1, most of the participants in this study (71 percent) were male, while 29% were female.

4.3.2 Age Distribution of the Respondents

Figure 4.3.2.1: Age Distribution of the Respondents



Sources: Own survey, 2025, generated by SPSS V.20.

The above bar graph 4.2 shows the age distribution of the respondents participated in the study. Majority of the respondents were in the age group from 31 to 40 years which is (41%) followed by the age categories from 41 to 50 years (37%) and from 21 to 30 years (15%) age category. In this result, it is reasonable to deduce that the majority of the study participants were of active working age and mature enough to mitigate performance errors in revere logistics. This might also help in providing authentic and accurate data.

4.3.3 Educational Background of Respondents

Table 4.3.3.1: Respondents' Educational Level and Length of time stayed in the business

Educational Level, Work Experience and Role of Respondents

			SPA		Mercy		Hotels		Total	
			Freq	Perc	Freq	Perc	Freq	Perc	Freq	Perc
1	Education Status	Diploma	24	33.3	30	35.3	9	22.5	63	32
		First Degree	42	58.3	50	58.8	29	72.5	121	61.4
		Master's Degree	6	8.3	5	5.9	2	5	13	6.6
		Total	72	100	85	100	40	100	197	100
2	How long have you been in this business?	Less than 1 year	11	15.3	14	16.5	4	10	29	14.7
		1 - 5 years	20	27.8	31	36.5	29	72.5	80	40.6
		6 - 10 years	31	43.1	36	42.4	6	15	73	37.1
		More than 10 years	10	13.9	4	4.7	1	2.5	15	7.6
		Total	72	100	85	100	40	100	197	100
3	Role (Position)	Manager	5	6.9	5	5.9	16	40	26	13.2
		Employee	67	93.1	80	94.1	24	60	171	86.8
		Total	72	100	85	100	40	100	197	100

Sources: Own survey, 2025, generated by SPSS V.20.

The data in table 4.2 shows the educational level of the members working on different positions in the two-bottler companies and 40 consumers (hotels). One hundred ninety seven of the total two hundred six study participants gave their responses for the questions asked about their educational level. Six and one hundred twenty one of them (i.e. 61.4% and 32%) are holders of Master's Degree and First Degree respectively and the remaining 63 have diploma.

According to collected data from those bottler companies, 26 (13.2%) of the participants are in the position of management while the rest of the participants 171 (86.8%) constitute non-management positions.

A question was given to the study participants to know for how long they have been in work and their responses are shown in table 4.2 above. 15 (7.6%) of the respondents stayed in work for more than 10 years, 73 (37.1%) have been working for 6 - 10 years, 80 (40.6%) worked for 1 - 5 years and 29 (14.7%) for less than 1 years.

In terms of education, most respondents are graduated from a university or college.

This quality could enable the companies capacitate to practice reverse logistics, because the majority workforces can understand and adapt new technology/system easily. Hence their answers for the questionnaire could be responsive, too. In terms of their experiences, most of the participants spent a significant amount of time at their workplace office. This means the majorities could evaluate the performance and indicate the possible major prospects and challenges in implementing reverse logistics practice in the companies.

4.4 Findings of Descriptive Analysis

The descriptive statistics was based on frequency tables to provide information on the challenges and prospects of reverse logistics practices of SPA and Mercy spring water producing companies. The findings were presented through graphs, tables, frequencies, percentages and summary statistics such as means, minimum and maximum are computed for each prospects and challenges indicated in this study. The findings, which identified on this study presented as follows;

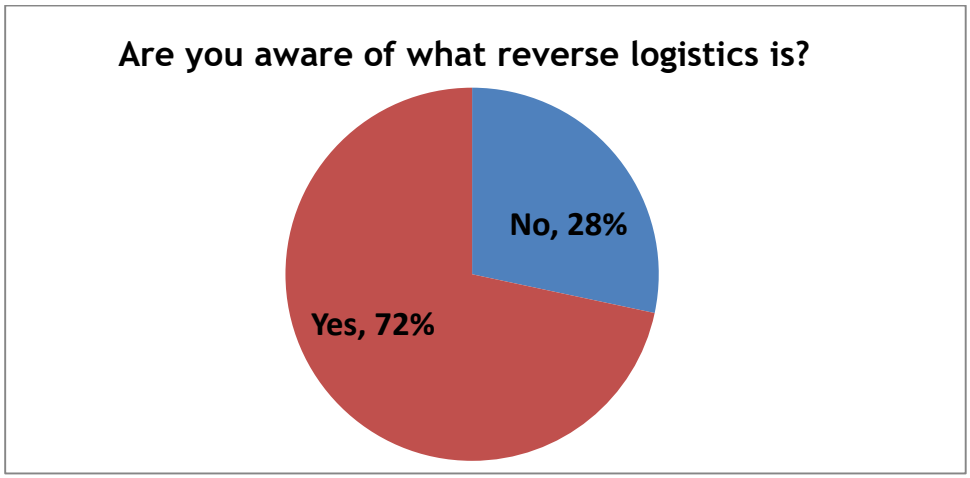
A 5-point Likert scale which ranges from “Strongly Disagree” to “Strongly Agree” and “Indifferent” in the middle, was applied across most questions of the survey to capture the feelings of respondents to different questions for easy analysis of data. In addition, this analysis section also employs frequencies table to interpret the data generated from SPSS. The “indifferent” option of the table was interpreted as neither agrees nor disagrees and natural. The other four choices, namely strongly agree and agree are interpreted as agreed while disagree and strongly disagree are interpreted as disagreed for analyzing the outcome of the survey.

4.4.1 Understanding of the Respondents towards Reverse logistics

The questions for the survey under this section were designed to get an understanding of the concept of reverse logistics as understood by the employees working in the two-bottler spring water-producing companies and forty consumers (hotels). In this section of the paper, an attempt has been made to present the answers given by the respondents in a tangible form, to give an idea of their perception of the concept of reverse logistics.

4.4.1.1 Awareness of Participants on the Concept of Reverse logistics

Figure 4.4.1.1.1 Awareness of the respondents

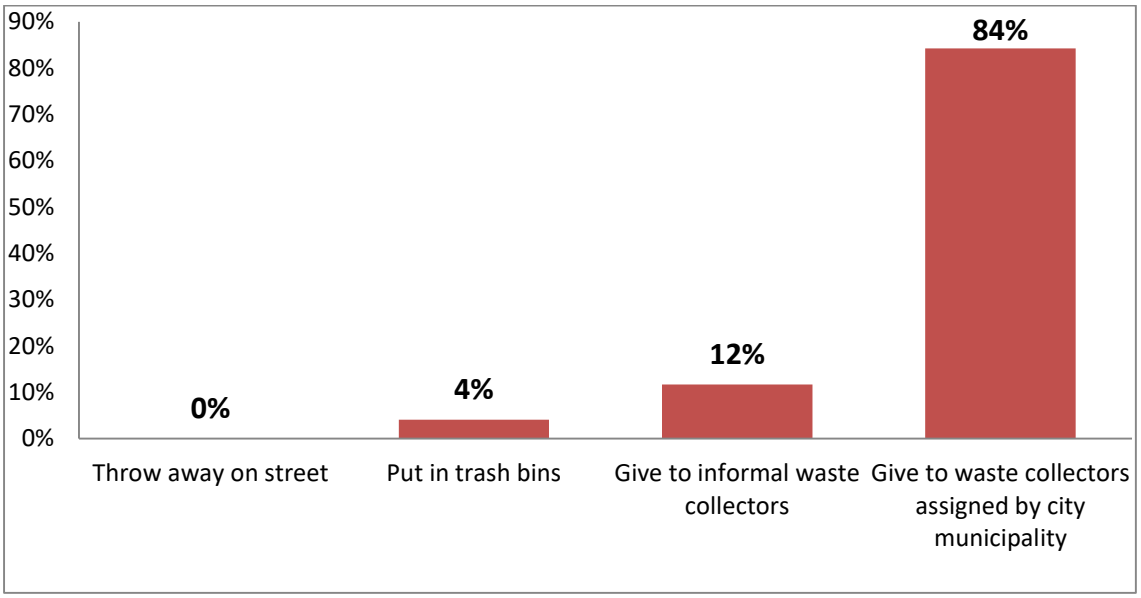


Sources: Own survey, 2025, generated by SPSS V.20.

The very first question of the survey gave the respondents an opportunity to see their awareness on the concept of reverse logistics. Even though the above pie chart 4.3 showed that the awareness of the study participants on the concept of reverse logistics seems good, they had never heard of the term before this study. The study led them to search it over the internet and ask others to find out what exactly the term meant. The responses to the survey given by the participants were based upon what they learnt through the internet and from others. During the discussion, the participants explained that although they had never heard of the term, once they understood the concept they found that they did not perform any of the reverse logistics activities in their companies, except the disposal of their used bottles with a mixes of other wastes to waste collectors.

4.4.1.2 Handling of used plastic bottles by Bottled Water Users

Figure 4.4.1.2.1 Frequency of disposal of an empty bottle.



Sources: Own survey, 2025, generated by SPSS V.20.

As indicated in Figure 4.4 above, the question raised for respondents is about the disposal of bottled water after use. The results indicate that the majority of respondents (84%) agree that plastic bottles after being used were given to waste collectors assigned by city administration and a moderate number of users (12%) give their empty bottles to informal waste collectors and liquid soap producers whereas very few users (4%) put their used plastic bottles in a trash bin.

4.4.2 Contribution of Bottler companies on Reverse Logistics Practices

Table 4.4.2.1; Reverse logistics practice

Awareness of top management and employees on reverse logistics practices of used plastic bottles								
			SPA			Mercy		
			Freq	Perc	Mean	Freq	Perc	Mean
1	Top management is aware of the outcomes of reverse logistics.	Strongly disagree	18	25		20	23.5	
		Disagree	39	54.2		51	60	
		Neutral	6	8.3		6	7.1	
		Agree	9	12.5		8	9.4	
		Total	72	100	2.08	85	100	2.02
2	Top management is committed to enhance the employee's morale to boost reverse logistic activities.	Strongly disagree	29	40.3		39	45.9	
		Disagree	30	41.7		33	38.8	
		Neutral	5	6.9		5	5.9	
		Agree	4	5.6		5	5.9	
		Strongly Agree	4	5.6		3	3.5	
		Total	72	100	1.94	85	100	1.82
3		Strongly disagree	3	4.2		3	3.5	

	Top management is aware of government initiatives for reverse logistics of used plastic bottles	Disagree	45	62.5		57	67.1	
		Neutral	13	18.1		14	16.5	
		Agree	11	15.3		11	12.9	
		Total	72	100	2.44	85	100	2.39
4	Our organization has a well-documented policy for recycling	Strongly disagree	19	26.4		24	28.2	
		Disagree	29	40.3		33	38.8	
		Neutral	18	25		22	25.9	
		Agree	2	2.8		3	3.5	
		Strongly Agree	4	5.6		3	3.5	
		Total	72	100	2.21	85	100	2.15
6	Our organization allocates sufficient budget to create awareness and return used plastic bottles for implanting practices of reverse logistics.	Strongly disagree	5	6.9		5	5.9	
		Disagree	40	55.6		50	58.8	
		Neutral	6	8.3		8	9.4	
		Agree	21	29.2		22	25.9	
		Total	72	100	2.6	85	100	2.55
7	Our organization regulareverese logisticsy reviews its reverse logistics process. (Our organization has a well-documented policy for recycling.	Strongly disagree	17	23.6		19	22.4	
		Disagree	18	25		21	24.7	
		Neutral	27	37.5		34	40	
		Agree	8	11.1		8	9.4	
		Strongly Agree	2	2.8		3	3.5	
		Total	72	100	2.44	85	100	2.47
8	Our organization is a corporate citizen that has sustainable development strategies	Strongly disagree	12	19.4		14	16.5	
		Disagree	32	43.1		36	42.4	
		Neutral	18	25		24	28.2	
		Agree	4	5.6		5	5.9	
		Strongly Agree	6	6.9		6	7.1	
		Total	72	100	2.44	85	100	2.45
9	Our organization is a corporate citizen that fulfills its social responsibility by creating job opportunities for local recyclers.	Strongly disagree	4	5.6		4	4.7	
		Disagree	33	51.4		40	47.1	
		Neutral	11	26.4		13	15.3	
		Agree	24	16.7		28	32.9	
		Total	72	100	2.76	85	100	2.76

Sources: Own survey, 2025, generated by SPSS V.20.

Concerning management and employees understanding on the outcome of reverse logistic practices, 11% and 9% of the respondents from SPA and Mercy companies, respectively replied that, the management and employees of those companies understand about the concept of reverse logistic practices and its importance. On the other hand, 82 % and 84% from those companies respectively disagree on the

issue. The rest 8% and 7% of the respondents from SPA and Mercy respectively were at the middle of the road; they neither agree nor disagree.

Respondents also been asked whether their organization is committed to enhance the employees' morale to boost reverse logistic activities. Subsequently, 10 % and 9% of respondents from SPA and Mercy respectively argued that their organization is committed to enhance the employees' moral to boost reverse logistics activities. On the contrary, 83% and 85% of respondents advocated that their organization is not committed enough to enhance the moral of their employees to boost reverse logistic activities. Furthermore, the rest of the respondents neither agree nor disagree on the matter. From this fact it can be explored that there are still things that need to be done on the attention of the organization to improve reverse logistics practice.

Respondents also been asked a question to assess whether their organization is aware of government initiatives for reverse logistics of used plastic bottles or not. As depicted in the table, 14% and 13% of respondents from SPA and Mercy companies respectively replied that their organization is aware of government initiatives for reverse logistics of used plastic bottles. On the contrary, 69% and 71% of respondents respectively argued that their organization is not aware of government initiatives for reverse logistics. Apart from these perspectives, around 17 % of respondents from each of the two respective companies have preferred to be neutral. These all figures indicate that the management of the companies is less aware of government initiatives for reverse logistics.

The study also tried to assess whether their organization allocates enough resources to the practice of reverse logistics or not and 28% and 26% of the respondents from SPA and Mercy respectively were replied that their organization allocates enough resources to the practice of reverse logistics. On the contrary, 64% and 65% of the respondents respectively argued that their organization does not allocate enough resources to the practice of reverse logistics. Apart from these perspectives, around 8% and 9% of respondents respectively have preferred to be neutral. These all figures indicate that the companies didn't allocate enough resources to the practice of reverse logistics.

The study investigated that whether their organization has a well-documented policy for recycling or not, and subsequently 12% and 13% of the respondents from

respective companies of SPA and Mercy respectively argued that their organization has a well-documented policy for recycling. On the contrary, 51% and 47% of the respondents of the respective companies argued to the contrary. Furthermore, the rest of the respondents are not sure of whether their respective companies have well-documented policies or not. Majority (51% and 47%) of the respondents indicated that their companies did not use recycling reverse logistics or have well documented policy for recycling, with mean scores of 2.44 and 2.45 respectively.

Concerning environmental sustainability policies and actions of their organization, which is aligned with minimizing the impact of used plastic bottle wastes to the environment or not, 18% and 20% of respondents from SPA and Mercy respectively believed that their organizations follows environmental policies and take actions to minimize the impact used plastic bottle wastes to the environment. On the other perspective, 64% and 20% of respondents disagree in the matter and the remaining respondents neither agree nor disagree on this idea. From this fact, it can be infered that the companies are not engaged in sustainable practices of reverse logistics and therefore need to take mandatory actions to minimize the impact of used plastic bottle to the environment and to the community.

The study also assessed whether their organization is a corporate citizen that fulfills its social responsibility by creating job opportunities for local recyclers and collectors or not. Subsequently 18% and 20% of the respondents from respective companies of SPA and Mercy respectively argued that their organization is a social responsible and plays its role in creating jobs for local recyclers and collectors. On the contrary, 57% and 52% of respondents respectively argued that their organization does not engaged in corporate social responsibility activities by creating job opportunities for local recyclers and collectors of used plastic bottles. Furthermore, the rest (26% and 14%) of the respondents were not sure of whether their organizations are playing their role in corporate social responsibilities.

In addition to the replies of the sample respondents, a qualitative data was gathered from the interview held with the bottler companies' production, logistics and marketing department managers as well as their general managers. Bottler companies were asked about their response to the environmental damages caused by their packaging materials and their responses were almost the same.

Their interviews can be summarized as follows. They said that, their companies are interestingly involved in activities that support sustainability of the environmental and waste management. They added that their production practices minimize pressure on the environment, mainly in the form of emissions to the atmosphere and water ecosystems, waste generation and resource consumption. They also said that although it may not be found in the policy statement of their companies, their management is committed to produce environmental friendly products. However, in all of their explanations, they did not mention the role their companies play in environmental sustainability and social responsibility by implanting reverse logistics practice.

4.4.3 Contribution of Government to Reverse Logistics Practices

Table 4.4.3.1; Government contribution to reverse logistics

Government contribution to reverse logistics of used plastic bottles					
			Freq	Perc	Mean
1	Producers are engaged in sustainable practices like reverse logistics because of the fear of not violating environmental legislation regulations.	Strongly disagree	8	11.1	
		Disagree	36	50.0	
		Neutral	14	19.4	
		Agree	8	11.1	
		Strongly Agree	6	8.3	
		Total	72	100.0	2.6
2	Consumers are obliged legally to return used plastic bottles to producers after their useful end of life.	Strongly disagree	13	18.1	
		Disagree	33	45.8	
		Neutral	18	25.0	
		Agree	8	11.1	
		Total	72	100.0	2.3
3	Government plays a crucial role in raising awareness in encouraging behavioral changes that contribute to the reduction of plastic pollution.	Strongly disagree	15	20.8	
		Disagree	26	36.1	
		Neutral	9	12.5	
		Agree	19	26.4	
		Strongly Agree	3	4.2	
		Total	72	100.0	2.6
4	There are government subsidies and tax incentives that influenced green supply chain management ideas and practices in promoting reverse logistics of used plastic bottles.	Strongly disagree	9	12.5	
		Disagree	39	54.2	
		Neutral	8	11.1	
		Agree	16	22.2	
		Total	72	100.0	2.4
5	There is a government body in charge of maintaining the infrastructure for collecting	Strongly disagree	10	13.9	
		Disagree	36	50.0	
		Neutral	8	11.1	

	locations and transporting wastes to the plant.	Agree	18	25.0	
		Total	72	100.0	2.5

Sources: Own survey, 2025, generated by SPSS V.20.

In the modern era, environmental challenges are a significant focus amid population growth, rapid urbanization, and mass consumption that increase pressure on natural resources and waste management. Industrial progress and population require an efficient logistics system (Reardon et al., 2019). Reverse logistics helps manage waste by recycling products, improving transportation efficiency and product quality, and supporting sustainability. However, a pressing issue is faced. Policy fragmentation between government bodies and bottler companies hampered effective implementation of reverse logistics practices. Bottler companies were highly focused on technology and operational efficiencies without fully considering policy impacts and implications. This lack of coordination and harmonization of environmental policies and business strategies hinder the optimization of reverse logistics processes. As it can be seen from the finding of the study on table 4.4 above, majorities (above 60%) of the study participants believe that government policies and institutions could not push the bottler companies to engage in implementing reverse logistics practices and oblige the consumers to return their used plastic bottles to recycling companies.

Too many consumers and collectors were continuing to be unaware of the significant usefulness, demand, and value of used plastic bottles. Literatures and experiences show that waste management and plastic bottle recycling can be increased through sustained local education campaigns. Bottler companies and government municipalities must strive to involve the community to effectively participate in the reverse logistics practices. The study findings depicted on table 4.4, however, showed that majority (57%) of the study participants did not see the government role in raising awareness and encouraging behavioral changes of consumers, collectors and other stockholders.

Tax advantages and financial support from government to subsidize reverse logistics has acted as an incentive for organizations to invest and or collaborate in reverse logistics practice as the products brought back into the reverse chain create high degree of complexity. As it can be seen from the result of the study depicted on the above table 4.4, most (57%) of the study participants believed that there were lack

of government subsidies, tax incentives and financial supports that promote reverse logistics of used plastic bottles.

4.4.4 Consumers Contribution to Reverse Logistics Practice

Table 4.4.4.1; Consumer contribution to reverse logistics

Consumer contribution to reverse logistics of used plastic bottles					
			Hotels		
			Freq	Perc	Mean
1	Put empty plastic bottles together with other solid wastes	Strongly disagree	8	20.0	
		Disagree	2	5.0	
		Neutral	1	2.5	
		Agree	20	50.0	
		Strongly Agree	9	22.5	
		Total	40	100.0	3.50
2	Put empty plastic bottles in separate recycling bin	Strongly disagree	14	35.0	
		Disagree	16	40.0	
		Neutral	1	2.5	
		Agree	6	15.0	
		Strongly Agree	3	7.5	
		Total	40	100.0	2.20
3	Throw empty plastic bottles anywhere	Strongly disagree	6	15.0	
		Disagree	31	77.5	
		Neutral	3	7.5	
		Total	40	100.0	1.93
4	Buried empty plastic bottles in landfills	Strongly disagree	6	15.0	
		Disagree	31	77.5	
		Neutral	3	7.5	
		Total	40	100.0	1.93
5	Burned empty plastic bottles in landfills.	Strongly disagree	6	15.0	
		Disagree	31	77.5	
		Neutral	3	7.5	
		Total	40	100.0	1.93
6	Give empty plastic bottles to solid waste collectors assigned by city administration	Disagree	10	25.0	
		Agree	23	57.5	
		Strongly Agree	7	17.5	
		Total	40	100.0	3.68
7	Give empty plastic bottles to informal solid waste collectors or reusers for various purpose for free	Strongly disagree	10	25.0	
		Disagree	20	50.0	
		Agree	10	25.0	
		Total	40	100.0	2.25
8	Give empty plastic bottles to informal solid waste collectors or reusers for various purpose on sales	Strongly disagree	10	25.0	
		Disagree	30	75.0	
		Total	40	100.0	1.75
9	There are convenient waste collection facilities where	Strongly disagree	10	25.0	
		Disagree	30	75.0	

	consumers can return empty used plastic bottles easily	Total	40	100.0	1.75
10	I am motivated to collect and return my used plastic bottles to the producers or recyclers	Strongly disagree	4	10.0	
		Disagree	21	52.5	
		Neutral	8	20.0	
		Agree	4	10.0	
		Strongly Agree	3	7.5	
		Total	40	100.0	2.53
11	I am aware of government directives on waste management particular reverse logistics of empty used plastic bottles	Strongly disagree	7	17.5	
		Disagree	19	47.5	
		Neutral	10	25.0	
		Agree	4	10.0	
		Total	40	100.0	2.28
12	Regulations from the Government have not been a strong motivation for consumers to collect used plastic bottles after	Strongly disagree	7	17.5	
		Disagree	19	47.5	
		Neutral	10	25.0	
		Agree	4	10.0	
		Total	40	100.0	2.28

Sources: Own survey, 2025, generated by SPSS V.20.

Consumers are the starting point of a reverse supply chain. They act as supplier of raw materials to reverse supply chain activities such as recycling. Though reverse supply chain literature acknowledges the significance of consumers, this can only be true when consumers are aware of and trained in proper disposal and removal of wastes and used plastic bottles. The study explored that most (72%) of the end users participated in the study put their used empty plastic bottles with mixes of other wastes while 23% of them put in separate sacks. Putting used empty plastic bottles with mixes of other wastes makes the bottles to create contamination and to lose their product quality. It was also very difficult and time consuming for collecting and separating used plastic bottles from the mixture of wastes for the collectors.

This finding is consistent with the findings of a study by Yuniar Farida et al, 2023 on the 'Analysis of Consumer Behavior in Reverse Logistic Polyethylene Terephthalate in Indonesia towards a Circular Economy". Consumer behavior after consuming PET bottles still does not support the implementation of reverse logistics. More are throwing post-consumption PET bottles in the trash than collecting them.

4.4.5 Deriving Forces to Adopt Revers Logistics Practices

Table 4.4.5.1; Drivers to reverse logistics practices

Forces that drive organizations to implement reverse logistics practice			SPA			Mercy		
			Freq	Perc	Mean	Freq	Perc	Mean
1	Making profits by reducing raw material cost	Strongly disagree						
		Disagree						
		Neutral	72	100%	3	85	100%	3
		Agree						
		Total						
2	Making profits by reducing waste discarding costs	Strongly disagree						
		Disagree						
		Neutral	72	100%	3	85	100%	3
		Agree						
		Strongly Agree						
		Total						
3	Stay competitive to thrive in today's dynamic business environment	Strongly disagree						
		Disagree						
		Neutral	72	100%	3	85	100%	3
		Agree						
		Strongly Agree						
		Total						
4	Environmental legislation of government pressures adoption of eco-friendly operations in reducing wastes	Strongly disagree						
		Disagree						
		Neutral	72	100%	3	85	100%	3
		Agree						
		Strongly Agree						
		Total						
5	Environmental sustainability for long-term sustainability of a company in a market	Strongly disagree						
		Disagree						
		Neutral	72	100%	3	85	100%	3
		Agree						
		Total						
6	Public awareness of the benefits of the reverse logistics to the environment	Strongly disagree						
		Disagree						
		Neutral	72	100%	3	85	100%	3
		Agree						
		Total						
7	Scarcity of proper landfills	Strongly disagree						
		Disagree						
		Neutral	72	100%	3	85	100%	3
		Agree						
		Total						

Sources: Own survey, 2025, generated by SPSS V.20.

Driving forces are forces that could make the bottler companies engage in reverse logistics practices for their empty plastic bottles after use. The study tried to assess the internal and external drivers of practicing reverse logistics in recycling used plastic bottles by the bottler companies of SPA and Mercy by asking the study participants to expresses their level of agreement on the list of possible driving forces depicted on the above table 4.6 that make them engage in recycling used plastic bottles. The study participants, however, have said nothing with their level of agreement on the driving options.

According to the information gathered from the interview conducted to respective managers of the bottler companies, majority of the respondents indicated that there were no practices of revers logistics at all because they could find no driving forces that overweight challenging factors explained below and due to this fact, they had not actually engaged in implementing reverse logistics practices.

4.4.6 Challenges to Implement Reverse Logistics Practices

Reverse logistics, according to Badenhorst, A., and J. D. Nel, is a complex process and a specialist part of any supply chain by its very nature. So, the following are some of the obstacles that companies could face when implementing reverse logistics. As a result, the table below depicts the sampled respondents' perceptions of barriers to implementing reverse logistics for the organization, as well as the results gained.

Table 4.4.6.1; Challenges to adopt reverse logistics

Challenges, which hinder the companies to adopt reverse logistics			SPA			Mercy		
			Fre	Pe	Me	Fr	Per	Mea
1	High cost related to reverse logistics and financial constraints	Strongly disagree	6	8.3		1	1.2	
		Disagree	7	9.7		9	10.	
		Neutral	5	6.9		14	16.	
		Agree	24	33.		49	57.	
		Strongly Agree	30	41.		12	14.	
		Total	72	10	3.9	85	100	3.73
2	Lack of awareness of top management about the practice of reverse logistics	Strongly disagree	4	5.6		5	5.9	
		Disagree	7	9.7		8	9.4	
		Neutral	22	30.		27	31.	
		Agree	22	30.		28	32.	
		Strongly Agree	17	23.		17	20	
		Total	72	10	3.5	85	100	3.52
3	Lack of commitment of top	Strongly disagree	5	6.9		5	5.9	
		Disagree	9	12.		11	12.	
		Neutral	9	12.		12	14.	

	management to the practice of reverse logistics	Agree	36	50		43	50.	
		Strongly Agree	13	18.		14	16.	
		Total	72	10	3.6	85	100	3.59
4	Insufficient knowledge about the practice of reverse logistics	Strongly disagree	3	4.2		3	3.5	
		Disagree	14	19.		15	17.	
		Neutral	8	11.		9	10.	
		Agree	41	56.		50	58.	
		Strongly Agree	6	8.3		8	9.4	
		Total	72	10	3.4	85	100	3.53
5	Unavailability of clear policy and regulation on reverse logistics practice	Strongly disagree	2	2.8		3	3.5	
		Disagree	13	18.		14	16.	
		Neutral	8	11.		9	10.	
		Agree	41	56.		51	60	
		Strongly Agree	8	11.		8	9.4	
		Total	72	10	3.5	85	100	3.55
6	Lack of support from government to practice reverse logistics	Strongly disagree	1	1.4		2	2.4	
		Disagree	12	16.		16	18.	
		Neutral	18	25		23	27.	
		Agree	37	51.		40	47.	
		Strongly Agree	4	5.6		4	4.7	
		Total	72	10	3.4	85	100	3.33
7	Lack of available expertise in reverse logistics process	Strongly disagree	1	1.4		2	2.4	
		Disagree	8	11.		14	16.	
		Neutral	14	19.		14	16.	
		Agree	38	52.		44	51.	
		Strongly Agree	11	15.		11	12.	
		Total	72	10	3.6	85	100	3.56
8	Poor value and culture of the population in proper management of after use plastic	Strongly disagree	2	2.8		7	8.2	
		Disagree	5	6.9		11	12.	
		Neutral	22	30.		27	31.	
		Agree	24	33.		24	28.	
		Strongly Agree	19	26.		16	18.	
		Total	72	10	3.7	85	100	3.36
9	Poor cooperation and integration of all supply chain partners	Strongly disagree	4	5.6		5	5.9	
		Disagree	4	5.6		4	4.7	
		Neutral	26	36.		31	36.	
		Agree	21	29.		25	29.	
		Strongly Agree	17	23.		20	23.	
		Total	72	10	3.6	85	100	3.6

Sources: Own survey, 2025, generated by SPSS V.20.

According to the information observed on item number 1 of table 4.7 above, majority of the respondents of SPA and Mercy companies stated high cost and financial constraints in implementing reverse logistics practices as the major challenges with a mean score of 3.9 and 3.73 respectively. 75% and 71% of the respondents from SPA and Mercy agreed that these two factors are among the major barriers, which hinder the companies to implement reverse logistics practice while 18% and 11% from SPA and Mercy believed that these two factors could not be a problem for reverse logistics practice. The rest of the respondent, however, are not sure if high cost and financial

constraints could be barriers or not. From this fact, it can be explored that the cost of reverse logistics and financial constraints are among the major challenges that hinder to engage in the practice of reverse logistics. This is consistent with the barriers found by Walker et al. (Walker et al., 2007) and Gemechu et al (Gemechu et al., 2022). High cost is the major barrier to implementation of reverse logistics found by Walker et al. (Walker et al., 2007). Financial constraints is among the major challenges in implementing reverse logistics found by Gemechu et al. (Gemechu et al., 2022)

According to the results in the table 4.7 above, lack of awareness, lack of commitment and insufficient knowledge of top-management stated in item number 2, 3 and 4 are among the major challenges in implementing reverse logistics in the companies under study, since they have a mean score greater than an average value (3.57%, 3.6%, and 3.46%, respectively of SPA and 3.52%, 3.59% and 3.53% respectively of Mercy). This indicates that majority of the respondents argued that these factors are among the challenges that hindered the companies to implement reverse logistics practice. Several (about 18%) respondents, however, still do not believe on the perception of the majorities. The results of the study on these items of the table above are consistent with the barriers found by Ravi and Shankar (Ravi and Shankar, 2005), Walker et al. (Walker et al., 2007) and Meelhan and Muir (Meehan and Muir, 2008). Lack of top management commitment and low awareness about reverse logistics practices are the significant barriers to implementation of reverse logistics found by Ravi and Shankar (Ravi and Shankar, 2005). Poor senior management commitment is the major barrier to implementation of reverse logistics found by Walker et al. (Walker et al., 2007).

As shown in the above tables 4.7, 63% and 61% of the respondents from SPA and Mercy respectively believed that unavailability of clear reverse logistics related policies and lack of government supports listed in item number 5 and 6 are among the barrier that hindered companies to implement reverse logistics in their operations. These two factors are the major challenges in implementing reverse logistics in the companies under study, since they have a mean score greater than an average value (3.56% and 3.43% respectively of SPA as well as 3.55% and 3.33% respectively of Mercy). On the other hand, 19% and 21% of the respondent from SPA and Mercy respectively argued to the contrary. The rest (11% and 10% from SPA

and Mercy) of respondents were neutral. From this fact, it can be observed that these two factors hindered reverse logistics practice from being implemented by the companies and this is consistent with the barriers found by Ravi and Shankar (Ravi and Shankar, 2005). Lack of top management commitment and low awareness about reverse logistics practices are the significant barriers to implementation of reverse logistics found by Ravi and Shankar (Ravi and Shankar, 2005).

The results in the above table 4.7 for item number 7 indicated that, little existence of enough expertise in reverse logistics area is perceived as a barrier by 68 % and 65% of the respondents from SPA and Mercy respectively. Whereas, 13% and 19% of the respondents from SPA and Mercy believed on the contrary. From the findings, most respondents from those companies implicit that unavailability of expertise in the area of reverse logistics processes is a challenge to implement reverse logistics practice. Thus, trained expertise on the area is crucial.

The respondents had also been asked a question in item number 8 whether poor value and culture of the population in managing used plastic products is a challenge for reverse logistics or not. 60% and 47% of respondents from SPA and Mercy companies respectively believed that poor value and culture of the population in managing used plastic products is a challenge to implement reverse logistics practice. On the other hand, 7% and 21% of the respondent from SPA and Mercy respectively perceived on the contrary. Furthermore, the rest of respondents preferred to stay neutral on the matter. Considering these all facts, it is possible to say that largest proportion of the employees of those companies believed the existence of poor value and culture of the population in proper management of used plastic products and considered it as a barrier to the effective implementation of reverse logistics practice.

The study also tried to assess the item in number 9 if poor cooperation and integration among different supply chain partners is a problem to reverse logistics practice or not. As indicated in the above table 4.7, 53% of the respondents from each company believed that the existence of poor cooperation and integration among different supply chain partners is a barrier to the implementation of reverse logistic practice. On the other hand, 11% of the respondents from each company disagree on the matter. The rest around 36% of the respondents remain neutral. Thus, it is noted that supply chain partners still need to work together with cooperation and integration in the area of reversed logistics.

According to the results in the above table 4.7, all the items listed are the major challenge for the implementation of reverse logistics practices in the companies since they have a mean score greater than an average value (3.52, 3.59, 3.53, 3.55, 3.33, 3.56, 3.36, and 3.6 respectively).

In addition to the replies of the sample respondents, an interview was conducted to production, marketing, logistics and general managers of the companies. The managers had considered almost similar constraining barriers to implement reverse logistics practices. They explained that their companies are less engaged in reverse logistics practices because reverse logistics poses a number of specific challenges. Some of them are detailed below;

Variable volumes: return flows are irregular and often unpredictable, which makes it hard to plan the necessary resources.

Stock management: the unpredictable nature of returns makes it harder to maintain optimal stock levels.

High processing costs: processing returns involves collecting, transporting and storing incoming goods, as well as inspecting, sorting, recycling, and more—all of which generates a higher cost per unit, consumes larger time and occupies larger storage space.

Improper disposal **and removal of waste**: empty plastic water bottles were thrown away with mixes of other wastes after use rather than putting into a single waste bin. Such way of disposal makes plastic bottles made them contaminated with various contaminants and lose their quality but also make it difficult to separate them from other wastes.

The researcher tries to see the above results of the study in relative position with the empirical findings of studies stated in the literature review part of the study. He found that the results of the study are consistent with the empirical findings of studies on reverse logistics stated below.

Over the past few decades, several studies in Supply Chain Management (SCM) have discussed the barriers of reverse logistics. Lack of top management commitment and low awareness about reverse logistics practices are the significant barriers to implementation of reverse logistics found by Ravi and Shankar (Ravi and Shankar, 2005). High cost, lack of legitimacy, poor supplier commitment, and lack of rules and

regulation are the major barriers to implementation of reverse logistics found by Walker et al. (Walker et al., 2007). Meelhan and Muir compiled five barriers to SCM: lack of employee skill, lack of improvement and experience, low trust in 3rd party logistics, and lack of interest from top management (Meehan and Muir, 2008). Dashore and Sohani identified seven main barriers in their study: lack of advancement in new technology, lack of commitment from top management, lack of customers awareness, lack of knowledge training and experience, low integration with information and technology systems, lack of skilled professionals, and lack of waste management and energy management (Dashore, K; Muir, L. 2008). Manzouri et al. attempted to highlight the major barriers to implementation of SCM in the manufacturing industry; they include low awareness about SCM practices, lack of logistics executives, lack of information, and low awareness about new technology (Manzouri et al.2010). According to Mudgal et al., lack of corporate social responsibility and lack of commitment from top management are the most significant barriers to implementation of reverse logistics (Mudgal et al, 2010). Sharma, Panda, Mahapatra and Sahu examined management negligence, lack of initial capital, lack of SCM performance, lack of improved management systems and company strategies, and administrative issues as barriers that have both strong dependence and driving power. Legal issues, low awareness of reverse logistics and financial constraints were found to be independent barriers to a strong driving power Sharman et. al., 2011). Giunipero et al. identified four major barriers in his study: lack of rules and regulation and sustainability standards, lack of coordination at the CEO level, high cost of sustainability, and non-alignment of short and long run strategic goals (Giunipero et al, 2012).

The extensive literature mentions that there are difficulties implementing supply chain management with reverse logistics. This is how previous studies (Korhonen et al., 2017; Araujo et al., 2018; Bilal et al., 2020) have categorized reverse logistics barriers: (i) internal, such as material resources, immaterial resources and competencies; (ii) external, such as capital support barrier, policy support barrier, and information support barrier. Nonetheless, Bilal et al. (2020) have argued that the barriers that appear most frequently in the literature are as follows: technological, policy and regulatory barriers, financial and economic barriers management, performance indicators, customer (interest in the environment or lack

of information on environmental impact) and social barriers.

Lack of pressure to adapt green supply chain management practices, lack of training and monitoring, and lack of customers' awareness are the key barriers found by Wang et at. in an empirical study (Wang et at., 2016).

4.4.7 Mechanisms to Improve Reverse logistics

This section contains questions about procedures for improving reverse logistics activities where respondents are asked the extent of their agreement on the statements listed in the following table.

Table 4.4.7.1; Improving Mechanisms to implement Reverse logistics

Mechanisms to improve reverse logistics practice			SPA			Mercy			Hotels	
			Freq	Perc	Mean	Freq	Perc	Mean	Freq	Perc
1	Creating awareness to the society about reverse logistics practice and its importance	Strongly disagree	2	2.8					2	5
		Disagree	6	8.3		8	9.4		16	40
		Neutral	25	34.7		32	37.6		15	37.5
		Agree	39	54.2		42	49.4		7	17.5
		Strongly agree				3	3.5		7	17.5
		Total	72	100	3.4	85	100	3.47	40	100
2	Top level management and employee commitment is crucial to the practice of reverse	Strongly disagree	3	4.2		2	2.4		5	12.5
		Disagree	10	13.9		10	11.8		21	52.5
		Neutral	8	11.1		9	10.6		3	7.5
		Agree	18	25		55	64.7		11	27.5
		Strongly agree	33	45.8		9	10.6		11	27.5
		Total	72	100	3.94	85	100	3.69	40	100
3	Government policy and regulation enforce companies to implement reverse logistics	Strongly disagree	1	1.4		1	1.2		3	7.5
		Disagree	9	12.5		11	12.9		23	57.5
		Neutral	19	26.4		23	27.1		9	22.5
		Agree	39	54.2		45	52.9		5	12.5
		Agree	4	5.6		5	5.9		5	12.5
		Total	72	100	3.5	85	100	3.49	40	100
4	Efficient investment of resources (like financial, labor, and technological) play significant role in reverse logistics	Strongly disagree	1	1.4		1	1.2		4	10
		Disagree	7	9.7		9	10.6		19	47.5
		Neutral	14	19.4		14	16.5		6	15
		Agree	39	54.2		49	57.6		9	22.5
		Strongly Agree	11	15.3		12	14.1		2	5
		Total	72	100	3.72	85	100	3.73	40	100
5	Cooperating and working with supply chain partners promote reverse logistics practice	Strongly disagree	1	1.4		1	1.2		8	20
		Disagree	3	4.2		3	3.5		11	27.5
		Neutral	4	5.6		17	20		13	32.5
		Agree	35	48.6		41	48.2		5	12.5
		Strongly Agree	29	40.3		23	27.1		3	7.5
		Total	72	100	4.22	85	100	3.96	40	100
		Strongly disagree	13	18.1		18	21.2		8	20

6	Outsourcing reverse logistics activities	Disagree	23	31.9		29	34.1		11	27.5
		Neutral	21	29.2		27	31.8		13	32.5
		Agree	8	11.1		7	8.2		5	12.5
		Strongly Agree	7	9.7		4	4.7		3	7.5
		Total	72	100	2.63	85	100	2.41	40	100
7	Raw material cost savings	Strongly disagree	1	1.4		1	1.2		8	20
		Disagree	3	4.2		3	3.5		11	27.5
		Neutral	4	5.6		17	20		13	32.5
		Agree	35	48.6		41	48.2		5	12.5
		Strongly Agree	29	40.3		23	27.1		3	7.5
		Total	72	100	4.22	85	100	3.96	40	100
8	Corporate Citizenship	Strongly disagree	1	1.4		1	1.2		8	20
		Disagree	3	4.2		3	3.5		11	27.5
		Neutral	4	5.6		17	20		13	32.5
		Agree	35	48.6		41	48.2		5	12.5
		Strongly Agree	29	40.3		23	27.1		3	7.5
		Total	72	100	4.22	85	100	3.96	40	100

Sources: Own survey, 2025, generated by SPSS V.20.

The data shown in the above table 4.8 presents revere logistics improvement mechanisms. Accordingly, from the listed items, engagement of all stakeholders as a strategic partner of the reverse logistics system has a mean score of 4.22 and 3.96. 89% and 75% of the respondents from SPA and Mercy water respectively replied cooperating and working with supply chain partners promote reverse logistics practice. On the contrary, 6% and 5% of the respondents believe that coordination and integration among supply chain members is not that much important for implementing reverse logistics practice. Apart from these perspectives, rest (6% and 20%) of the respondent preferred to be neutral. As a result, it is possible to say most of respondents of this study agreed on the significant importance of coordinating and integrating supply chain partners on improving the practice of reverse logistics on the companies and this finding is consistent with the findings of a study by Anna Dunay etal, 2022 on the 'Role of Reverse logistics Activities in the Recycling of Used Plastic Bottled Water Waste Management.

According to the information observed on table 4.8 above, formal and informal training for the community, top management and employee commitment, government policy and law enforcement, sufficient allocation of investment fund on important resources and adoption of technologies have a modest mean score, and outsourcing has a below-average mean score.

As depicted in table 4.8 above, the respondents were asked whether their companies

were thinking to improve the awareness to the society on the importance of reverse logistics practice and their responses showed that 54% and 49% 0f SPA and Mercy employees respectively agreed on the significance of creating awareness to the society. However, 11 % and 10% of the respondent respectively believes on the contrary. Apart from these perspectives, rest (35% and 38%) of the respondent preferred to be neutral. As a result, it is possible to say most of respondents of this study agreed on creating awareness to the society to improve reverse logistics activity.

The other question asked by the researcher is whether commitment of management and employees could help in improving the practice of reverse logistics. The table 4.8 above showed that 71% and 75% of the respondents from SPA and Mercy agreed on the significance of management and employee commitment in improving the practice of recycling used plastic bottles while 18% and 14% believe on the contrary. The rest (11%) of respondents did not take either of the two sides. Therefore, it can be reached on consensus that commitment of management and employees is one of the mechanisms that can help companies to implement and improve the practice of reverse logistics.

Respondents were also asked whether enforcement of government policy and regulation has an impact on improving the practice of reverse logistics. The table 4.8 depicted above showed that 58% of the respondents from each company stands in favor of the item while 14% advocate the opposite. From this fact it can be implicated that government policy and regulation that enforce companies to implement reverse logistics can be one of the mechanisms used to implement reverse logistics practice in the companies.

The study also tried to assess whether efficient investment of resources like financial, labor, and technological can be used as a mechanism to improve the practice of reverse logistics. The table 4.8 above stated that 70% and 72% of the respondents from SPA and Mercy are replied in favor of the item and while 11% and 12% of the respondents gave their response to the contrary. Apart from these perspectives, rest (19% and 16%) of respondents has preferred to be neutral. This all figures indicate that allocation of resources like financial, labor and technological efficiently could help in improving the implementation of the practices of reverse logistics.

Thus, it could implicit that community participation and training, technology adoption and resource allocation, government policy enforcement, employees and management commitment as well as integration among supply chain partners have a significant impact on improving reverse logistics implementation.

According to the qualitative data, which gathered from the interview held, it was identified that many reforms and initiatives will be implemented in the bottler companies to improve the future reverse logistics. As identified from the interview response, center of excellence, quality management system and kaizen were the reforms, which are planned to implement on the companies.

The above mechanisms to improve the implantation of reverse logistics practices are consistent with the driving forces identified by certain empirical studies stated below.

Driving forces are factors that motivate organizations to implement a certain activity (Govindan & Bouzon, 2018, p. 324). Drivers for implementing a reverse logistics system depend on the industry, though some common factors for most industries are Economic reasons, Legislation and Corporate citizenship. Corporate citizenship refers to being legally obliged and creating an image of taking sustainable responsibility which is appreciated by potential customers. By increasing customer awareness regarding returns and refunds, the organizations' image will be affected in a positive way and could give competitive advantages (Akdoğan & Coşkun, 2012). The legislation refers to whether there are legal aspects for the organization regarding taking back and recycling products. Last but not least, economic reasons which are simply explained refer to growth for the organization due to reverse logistics. To exemplify, returned products' raw materials can be used for further processes (Akdoğan & Coşkun, 2012, pp. 1642-1643).

Govindan and Bouzon (2018, p. 324-325) identified more drivers for implementing a reverse logistics system; these drivers are Policy related, Governance and Supply Chain process related, Management related, Market and competitors related, Technology and infrastructure related, Economics related, Knowledge related and Socially related. In the same category as the driver legislation identified by Akdoğan & Coşkun (2012), policy-related drivers were identified by Govindan and Bouzon (2018, p. 326), which builds further upon legislation. Adopting Reverse Logistics by

reason of getting a licence to operate, as a result of legislation and requirements that organizations should have a system and responsibility for their reverse flow in advance to keep their business going. Drivers related to Governance and Supply chain are cooperation and integration with partners within the supply chain, if there are current cooperations between partners or opportunities to create this, it will definitely motivate the organisation to implement Reverse Logistics.

Another driver identified by Govindan and Bouzon (2018, p. 325) is economic viability or economic benefits, simply explained that if the organisation can gain revenue from this system, it motivates them to implement it. One way of economic benefit regarding Reverse Logistics is that the organisation can decrease the use of raw materials by using already recovered ones, this also reduces the costs of final disposal as well. Also, Reverse Logistics permits the organisation to recapture value from spare parts, which recovers its assets. Reverse Logistics also creates an opportunity to enter a "second-hand" market, where the organisation can sell returned and repaired products. Lastly, an economic driver for implementing Reverse Logistics is that fines and taxes could be avoided, for example, carbon taxes.

Social-related drivers are also identified by Govindan and Bouzon (2018, p. 327), where the first one is higher public awareness, which relates to the phenomenon of the aware customer, where awareness of the environment increases among stakeholders and this motivates organizations to implement a Reverse Logistics process. Further, as Akdoğan & Coşkun (2012) also discovered, corporate citizenship motivates the Reverse Logistics process. As explained above, it is explained that organisations' are pushed into meeting ethical, legal and economic responsibilities in a way of taking social responsibility. Additionally, environmental conservation, because substances that are hazardous can be released from end-of-life products, which motivates organisations to take responsibility for their goods.

Govindan & Bouzon (2018, p. 327) further discovered the management-related drivers and one of these is satisfaction among employees, which could be different factors such as morale, good conscience and satisfaction due to the sustainable practices that show that the organisation takes responsibility. An organisation's support from Human Resources also motivates a Reverse Logistics system. Another factor that is crucial for the implementation of Reverse Logistics is the support and commitment from top management, and if the top management shows awareness and the importance of the

system, it will definitely become a driver for implementing it.

Drivers for implementing Reverse Logistics can be considered proactive or reactive. Proactive drivers to adopt Reverse Logistics Management practices could be cost savings, improved profile, competitive advantage, and enhanced environmental performance. On the other hand, reactive motivations would stem from legislative factors that drive businesses to incorporate Reverse Logistics practices into their daily operations (Nikolaou et al., 2013, p. 173). The affected areas can also be seen as different stakeholders within Reverse Logistics and a summary of these and the drivers are presented in Table 2.

According to Srivastava (2008), reverse logistics has three drivers and these are government legislation, economic value to be recovered in the returned product and environmental concerns. These driving forces differ in each country of application but the relevance is the same. In most developed countries with strict government regulations, application of RL has been successful. Japan with the highest recycling rate of PET bottle among developed countries established CPBR in 1993 (Zhang and Wen (2014. Extended producer responsibility has become a key element of public environmental policy in several countries. In this approach, manufacturers and customers are obliged to take back and recover their products after use in order to reduce volumes of waste disposal. Economic factors act as the second motivation for implementing reverse logistics (Lambert, Riopel & Abdul-Kader, 2011). Fleischmann, Krikke, Dekker, Flapper, (2004) eludes that product flows in today's supply chains do not end once they have reached the customer. Many products lead a second and even third or fourth life after having accomplished their original task at their first customer. Consequently, a product may generate revenues multiple times, rather than a single time. Capturing this value requires the broadening of the supply chain perspective to include new processes, known as 'Reverse Logistics (RL)', as well as multiple interrelated usage cycles, linked by specific market interfaces. It represents one of the largest and most overlooked opportunities to facilitate and return profits to a company. Currently, very few companies are doing a good job in addressing this issue in the beverage industry and Zambia is an example.

Chapter Five

Summary, Conclusions and Recommendations

5.1 Introduction

This study has tried to put together the basics concepts of reverse logistics and the benefits of having a good reverse logistics process. It was a tedious job to gather the information necessary to complete this thesis starting from collecting the data, going through numerous articles to find the right kind of information, understanding the

concept, formulating the survey, getting the right people to respond on time, and finally analyzing the gathered data. After all, it can be seen that a majority of the respondents have no idea of what reverse logistics means. However, it can be seen that the participants are disposing their used bottles with a mixes of other wastes to waste collectors with or without the knowledge of what reverse logistics means.

In the previous chapter, the collected data was analyzed and reveal to the findings of the study. This chapter consists of four sections; the first section is summary of findings, the second section is conclusions of the study drown from the previous analysis and findings, the third section is reasonable recommendations forwarded based on the findings of the study and finally end up by forwarding possible further research area.

5.2 Summary of Findings

The objective of this study is to assess the reverse logistics practice on used water plastic bottles in Mekelle city. The basic research questions have been initially identified and based on these research questions different data collection methods and instruments have been incorporated. The methods of collecting data for the study were self-administered questionnaires, structured and unstructured interview. Separate self-administered questions were prepared for study participants from the bottler companies and bottled water consumers in Mekelle city since they have their own different characteristics.

Twelve (12) mixes of open-ended and closed-ended questions were prepared for the bottler companies and end consumers. Another forty-one closed-ended questions with linker scale options and eighteen open-ended questions were also prepared for employees of the bottler companies and end consumers of hotels. Analysis is also be done based on the order, similarity and complementarities of the open with the closed ended questions.

206 questionnaires were distributed and 72 from SPA, 85 from Mercy and 40 from end consumers of hotels was correctly filled and returned which constitutes 96% of the total distributed questionnaires. In order to minimize the accuracy problems data collection was conducted under close supervision, checked, coded and analyzed in relation to the studies conducted on similar areas by other researchers the

experiences, rules and regulations related with. Based on this, the researcher analyzed the practices, barriers, improving mechanisms in recycling used plastic bottles by bottler companies and bottled water consumers.

SPSS version 20 was used to process the data in to meaningful information which can help the researcher to reach some conclusions on reverse logistics of plastic bottles. Different comparisons were made among the responses obtained from different target groups for cross checking purposes of the results obtained from the responses. In general the researcher has identified the following summarized points regarding revere logistics practice in bottler companies in Meklle city.

- ✓ As it can be observed from the analysis most (140 or 71%) of the participants in this study were male while 57 (29%) were female.
- ✓ The analysis shows that majority of the respondents are in the age group from 31 to 40 years which is (41%) followed by the age categories from 41 to 50 years (37%) and from 18 to 30 years (15%) age category. In this result, it is reasonable to deduce that the majority of the study participants are of active working age and mature enough to mitigate performance errors in revere logistics.
- ✓ In terms of education, most respondents are graduated from a university or college. This quality could enable the companies capacitate to practice reverse logistics, because the majority workforces can understand and adapt new technology/system easily. Hence their answers for the questionnaire could be responsive, too.
- ✓ In terms of their experiences, most of the participants spent a significant amount of time at their workplace office. This means the majorities could evaluate the performance and indicate the possible/major prospects and challenges in implementing reverse logistics practice in the companies.
- ✓ The study sought to find out the understanding of the respondents on the concept and importance of reverse logistics and the result indicated the respondents had never heard of the term before this study. The study led them to search it over the internet and ask others to find out what exactly the term meant. Once they understood the concept, however, they admitted that they did not perform any of the reverse logistics activities in their companies,

except the disposal of their used bottles with mixes of other wastes.

- ✓ The descriptive table showed majority of the respondents, which are twenty-nine (73%), said that users put empty plastic bottles together with other solid wastes while nine (22%) answered that users put used bottles on a separate recycle bin.
- ✓ Thirty (75%) respondents agree that users give their empty plastic bottles to solid waste collectors assigned by city administration while ten (25%) argued that users give their empty plastic bottles to informal solid waste collectors or to liquid soap producing small scale enterprises for free.
- ✓ Source collection, separation and improper disposal of used plastic bottles by consumers were one of the major problems of plastic bottle reverse logistics. The improper disposal of empty plastic bottles with mixes of other solid wastes contaminates the bottles by oil, soil, soap, and others. All these make the recycling business more costly and the reverse logistics practice run down.
- ✓ The main problem for the plastic bottle recycling business is collection costs of bottles in relation to their values in the market.
- ✓ The barriers to an increase in plastic bottle recycling are; many consumers continue to be unaware of the significant usefulness, demand, and value of recycled plastic bottles and lack of sufficient access to recycling collection opportunities for products used away from home. Consumers continue to want additional opportunities to be able to recycle at public venues, offices, recreational sites, schools, and retail establishments (Association of Postconsumer Plastic Recyclers, 2013).
- ✓ Plastic bottled water companies are not playing their role to protect the environment from plastic packaging caused problems. The awareness creation on the labeling is not accessible by all residents of the city except for few with the ability and habit of understanding and reading product and packaging information on the labeling.
- ✓ Mekelle City Administration Municipality Office striving to solve the problems observed in disposal practice of solid waste including empty plastic bottles through providing policies, standards, and procedures for solid waste collection in general but these standards were less implemented. On its

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

5.3 Conclusions

This study aimed to investigate the practice of reverse logistics in recycling used plastic bottled water in Mekelle city. Thus, based on the findings of the research, the researcher pointed out the following conclusions.

- ✓ The reverse logistics practice of used plastic bottle in Mekelle city was not seen effective in the research due to the following factors;
- ✓ The result of the study shows low habit of source separation of used plastic bottles and other solid wastes. Consumers put empty plastic bottles together with mixes of other solid wastes, which creates contamination and defects the quality of the bottles.
- ✓ The legal frame works of Mekelle City Administration Municipality Office shows solid waste management standards, policy and manuals but there were no separate policies for empty plastic bottles, which is simply overlooked.
- ✓ It can be said that the spring water producing companies have little social responsibility and role in protecting the environment from the pollution and sanitation problems caused by their packaging materials.
- ✓ It can be said the bottler companies have no role in protecting the environment from pollution and sanitation problems caused by their packaging materials. Their responsibility in this case was limited to awareness creation using the labeling and the symbol of recycling with a message “please”. However, even this was limited because there is a large number of people using plastic bottles who may not have the ability to understand the messages written in English, and a culture of reading labeling and instructions.

5.4 Recommendations

The purpose of the study is to assess the reverse logistics practice on water bottles

specifically on SPA and Mercy spring water producing companies and to forward suggestions and recommendations which help to solve the identified problems related with reverse logistics practice on used water bottles

- ✓ In order to maximize the recovery and value of used water plastic bottles in Mekelle city recycling collection program, two best practices should be followed when designing the program. The first is to establish an effective and ongoing consumer education program about the proper disposal of plastic bottles, the impact of wasting plastic bottles to the environment and the benefit of plastic bottles if it is managed properly.
- ✓ Bottler companies must strive to involve the community to effectively participate in the reverse logistics practices. This can be done through training and awareness creation program using covenant methods. Studies by the American Plastics Council indicate that participation in local recycling programs can increase 10% to 20% immediately following educational and promotional campaigns. However, it has also been shown that participation will decline unless the educational and promotional efforts are maintained.
- ✓ Training and education focusing on collection and segregation process, safety, entrepreneurial and problem solving, etc. should be given to solid waste collectors in order to implement the recycling practice but also to train the customers.
- ✓ Those companies should have special emphasis in developing separate manuals, standards, policies and procedures in order to maximize the recovery of used plastic bottles and to save our environment from the impact of wastes used plastic bottles.
- ✓ Bottler companies, recyclers, transporters, waste collectors, concerned government bodies, and the community at large should integrate each other for implanting reverse logistic practice in Mekelle city. Integrated solid waste management system should be developed among all stake holders.
- ✓ Ethiopia and other developing countries are contributing less to the global climate change and are debating industrialized countries to pay compensation to their emissions and pollutions to the environment. Similarly, Mekelle city administration needs to incorporate polluter pay policy as a prerequisite for

issuance of investment license or work permit to enter into spring water producing industry.

- ✓ Distribution of sacks to all households labeled with information about their products with dual purpose of waste segregation and promoting their products on the other way.
- ✓ Top level Managers need to consider reverse logistics practice as part of their supply chain management. They should give enough attention, follow up the process and allocate sufficient amount of fund to the reverse logistics practice.
- ✓ Government need to take part in companies reverse logistics practice, starting from establishing a restrictive policy and regulation, up to follow up and evaluate the implementation process, and create a mechanism that reward and take a constrictive action.

5.5 Future Research Suggestions

Even though these findings should be interpreted with caution, this study had a few limitations. Firstly, because the variables in the study were measured all at once, this study is cross-sectional, so there may be a need for additional attention to other causes. Second, the original study community and sample were limited to only 196 employees of SPA and Mercy water bottlers and 3-star hotels, and thus the incorporation of other companies with same and different sectors may contribute to results that are more significant. As a result, future scholars will concentrate on trying to incorporate other companies in the same and different sectors as well. Finally, because the researcher intended to report the current situation in the fields of study, he used only descriptive statistical tools to demonstrate the practice of the reverse logistics. As a result, future studies should concentrate on this perspective by designing longitudinal studies to obtain more accurate and quantifiable results.

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Annexes

Annex A

Questionnaire for Management and Staff Members of Water Bottler Companies

Mekelle University

College of Business and Economics

School of Management

Master of Business Administration

Dear respondent,

This research will be conducted in a partial fulfillment of the requirements for Master of Business Administration at Mekelle University. The research is entitled with ***''Reverse Logistic Practice on Spring Water Plastic Bottles in Mekelle City"*** aiming at explaining the overall reverse logistics practice on selected plastic bottle using companies.

I would be very grateful if you would take a few minutes of your time to fill this short questionnaire genuinely and your participation in this survey shall be highly appreciated.

Be assured that all answers will be kept confidentially and shall be used for academic purposes only.

Thank you!

Instructions

✍ Don't write your name

✍ Put this (√) mark inside the box of your choice

Section A-I: Demographic Profile of the respondents

1) Sex ☐Male ☐Female

2) Age ☐18 – 30 ☐31 – 40 ☐41 - 50 ☐Above 51

3) Education Level ☐Diploma ☐First Degree ☐Master's Degree

☐Above Master's Degree ☐other, please specify _____

4) Work Experience ☐Less than 1 year ☐1 – 5 years ☐6 – 10 years ☐ More than 10 years

5) Role in your Organization ☐Manager ☐Employee ☐Consultant ☐ other, please specify

Section A-II: General information about understanding of reverse logistics

1) Are you aware of what reverse logistics is? ☐Yes ☐No

2) If your response for question no. 1 is "Yes", what sources of information influence your reverse logistics habits? ☐Social Media
☐News Outlets ☐Community Programs
☐Educational Institution ☐other, please specify _____

3) Are you aware of any reverse logistics programs in your area? ☐Yes ☐No

4) How do you dispose of plastic bottles if not recycling?
☐Throw away on street ☐Put in trash bins
☐Give to informal waste collectors
☐Give to waste collectors assigned by city municipality
☐Other, please specify _____

5) Rate your knowledge about the impact of plastic waste on the environment.
☐Very High ☐High ☐Medium ☐Low ☐Very Low

6) Have you noticed any improvements in recycling infrastructure recently?
☐Yes ☐No

7) Are you aware of government initiatives for reverse logistics of used plastic bottles? ☐Very High ☐High ☐Medium ☐Low ☐Very Low

Section A-III: Reverse Logistics Practices

1) Awareness of Reverse Logistics

This part of the questionnaire assesses awareness of top management and employees on reverse logistics practices of used plastic bottles. There are five options to answer here.1 stands for "Strongly disagree", 2 for "Disagree", 3 for "Neutral", 4 for "Agree" and 5 for "Strongly agree". Please indicate how much you agree or disagree with each of the following statements by putting check mark "√" on the box provided that best represents your opinion.

Please indicate your level of agreement with the following statements.		**1**	**2**	**3**	**4**	**5**
1.	Top management is aware of the outcomes of reverse logistics.					
2.	Top management is committed to enhance the employee's morale to boost reverse logistic activities.					
3.	Top management is aware of government initiatives for reverse logistics of used plastic bottles					
4.	Top management gives enough support for implementation of reverse logistics practice					
5.	Top management is making efforts to encourage consumers to return used plastic bottles.					
6.	Our organization allocates sufficient budget to the practice of reverse logistics.					
7.	Our organization regularly reviews its reverse logistics process.					
8.	Our organization is a corporate citizen that has sustainable development strategies					
9.	Our organization is a corporate citizen that fulfills its social responsibility by creating job opportunities for local recyclers.					

2) Government Contribution

This part of the questionnaire surveys government contribution to reverse logistics of used plastic bottles. There are five options to answer here.1 stands for “Strongly disagree”, 2 for “Disagree”, 3 for “Neutral”, 4 for “Agree” and 5 for “Strongly agree”. Please indicate how much you agree or disagree with each of the following statements by putting check mark “√” on the box provided that best represents your opinion.

Please indicate your level of agreement with the following statements		**1**	**2**	**3**	**4**	**5**
1.	Producers are engaged in sustainable practices like reverse logistics because of the fear of not violating environmental legislation regulations.					
2.	Consumers are obliged legally to return used plastic bottles to producers after their useful end of life.					
3.	Government plays a crucial role in raising awareness in encouraging behavioral changes that contribute to the reduction of plastic pollution.					
4.	There are government subsidies and tax incentives that influenced green supply chain management ideas and practices in promoting reverse logistics of used plastic bottles.					
5.	There is a government body in charge of maintaining the infrastructure for collecting locations and transporting wastes to the plant.					

3) Driving Forces

This part of the questionnaire assesses the forces that drive organizations to implement reverse logistics practice. There are five options to answer here.1 stands for “Strongly disagree”, 2 for “Disagree”, 3 for “Neutral”, 4 for “Agree” and 5 for “Strongly agree”. Please indicate how much you agree or disagree with each of the following statements by putting check mark “√” on the box provided that best represents your opinion.

Please indicate your level of agreement with the following driving forces to implement reverse logistics practice		**1**	**2**	**3**	**4**	**5**
1.	Making profits by reducing raw material cost					
2.	Making profits by reducing waste discarding costs					
3.	Stay competitive to thrive in today's dynamic business environment					
4.	Environmental legislation of government pressures adoption of eco-friendly operations in reducing wastes					
5.	Environmental sustainability for long-term sustainability of a company in a market					
6.	Public awareness of the benefits of the reverse logistics to the environment					
7.	Scarcity of proper landfills					

4) Challenges

This part of the questionnaire covers about the challenges, which hinder the companies to adopt reverse logistics practice. Please indicate how much the following challenges affect your organization from implementing reverse logistics practice. There are five options to answer here.1 stands for "Strongly disagree", 2 for "Disagree", 3 for "Neutral", 4 for "Agree" and 5 for "Strongly agree". Please indicate how much you agree or disagree with each of the following statements by putting check mark "√" on the box provided that best represents your opinion.

Please indicate your level of agreement with the following barriers that hinders the firms to adopt the reverse logistic practices		**1**	**2**	**3**	**4**	**5**
1.	High cost related to reverse logistics					
2.	Lack of awareness of top management about the practice of reverse logistics					
3.	Lack of commitment of top management to the practice of reverse logistics					
4.	Insufficient knowledge about the practice of reverse logistics					
5.	Unavailability of clear policy and regulation on reverse logistics practice					
6.	Lack of support from government to practice reverse logistics					
7.	Lack of available expertise in reverse logistics process					
8.	Poor value and culture of the population in proper management of after use plastic products.					
9.	Poor cooperation and integration of different organizations in reverse logistics					

5) Way-out Mechanisms

This is part of the questionnaire that addresses mechanisms to implement or to improve reverse logistics practice. There are five options to answer here.1 stands for “Strongly disagree”, 2 for “Disagree”, 3 for “Neutral”, 4 for “Agree” and 5 for “Strongly agree”. Please indicate how much you agree or disagree with each of the following statements by putting check mark “√” on the box provided that best represents your opinion.

Please indicate your level of agreement with the following mechanisms to implement/improve reverse logistics practice		**1**	**2**	**3**	**4**	**5**
1.	Creating awareness to the society about reverse logistics practice and its importance					
2.	Top level management and employee commitment is crucial to the practice of reverse logistics					
3.	Government policy and regulation enforce companies to implement reverse logistics					
4.	Efficient investment of resources (like financial, labor, and technological) play significant role in reverse logistics practice					
5.	Cooperating and working with supply chain partners promote reverse logistics practice					

6) Anything you want to add about the practice of reverse logistics, please specify

_____

_____

_____

_____

Thank you for your time and cooperation!!!

Annex B

Interview Questions for Management Members of Water Bottler Companies

Mekelle University

College of Business and Economics

School of Management

Master of Business Administration

Interview Questions

Interview Guide for Companies

Basic Institutional Information

1) How long has the company been in existence?
2) Reverse Logistics Strategies
3) What is your understanding of the concept of reverse logistics and its relevance to your organization?
4) What efforts has your organization made towards the implementation of recycling of the plastic bottles?
5) Can you provide a brief description of the financial allocation for practicing of reverse logistics?
6) What processes are used by your organization to ensure proper disposal and collection of used plastic bottles in order to protect the environment and to make plastic bottles as a source of income?
7) What awareness is being created by your organization within the society about proper disposal and management of used plastic bottles?
8) What is your organization's relationship with stakeholders (city administration, waste collection companies) in plastic waste recycling collection in order to improve /expand the reverse logistics activity?
9) What are the benefits your company can reap from implementing reverse logistics?
10) What is your organization's principle to waste management, environmental

protection and social responsibility?

11) How is your organization complying with government regulations on plastic waste management?

12) What are the major challenges faced by your organization during plastic waste management and the use of reverse logistics approach to manage it?

Annex C

Interview Questions for Related Governmental Organizations

Interview Guide for governmental organizations responsible for waste management and environmental sustainability

1) What is your organization's mandate?
2) What is your organization's view on plastic waste management?
3) What is your organization's view on reverse logistics in plastic wastes?
4) What are the challenges in implementing policies in plastic waste management?
5) How does your organization regulate manufacturing companies in dealing with plastic waste management through reverse logistics?
6) How can you improve plastic waste management through reverse logistics?
7) What are the environmental policies concerning the production and recovery of plastic bottles?
8) What is the role of your organization in influencing the community to collaborate reverse logistics?

Annex D

Questionnaire for Consumers of Bottled Water

Mekelle University

College of Business and Economics

School of Management

Master of Business Administration

Dear respondent,

This research will be conducted in a partial fulfillment of the requirements for Master of Business Administration at Mekelle University. The research is entitled with "Reverse Logistic Practice on Spring Water Plastic Bottles in Mekelle City" aiming at explaining the overall reverse logistics practice on selected plastic bottle using companies.

I would be very grateful if you would take a few minutes of your time to fill this short questionnaire genuinely and your participation in this survey shall be highly appreciated.

Be assured that all answers will be kept confidentially and shall be used for academic purposes only.

Thank you!

Instructions

✍ Don't write your name

✍ Put this (√) mark inside the box of your choice

Section D-I: Demographic Profile of the respondents

1) Sex ☐Male ☐Female

2) Age ☐18 – 30 ☐31 – 40 ☐41 - 50 ☐Above 51

3) Education Level ☐Diploma ☐First Degree ☐Master's Degree
☐Above Master's Degree ☐other, please specify _____

4) Work Experience ☐Less than 1 year ☐1 – 5 years ☐6 - 10 years

☐More than 10 years

5) Role in your Organization ☐Manager ☐Employee ☐Consultant
   ☐other, please specify _____

Section D-II: General information about understanding of reverse logistics

1) Are you aware of what reverse logistics is? ☐Yes ☐No
2) If your response for question no. 1 is "Yes", what sources of information influence your reverse logistics habits?
   ☐Social Media ☐News Outlets ☐Community Programs
   ☐Educational Institutions ☐other, please specify _____
3) Are you aware of any reverse logistics programs in your area? ☐Yes ☐No
4) How do you dispose of plastic bottles if not recycling?
   ☐Throw away on street ☐Put in trash bins
   ☐Give to informal waste collectors
   ☐Give to waste collectors assigned by city municipality
   ☐Other, please specify _____
5) Rate your knowledge about the impact of plastic waste on the environment.
   ☐Very High ☐High ☐Medium ☐Low ☐Very Low
6) Have you noticed any improvements in recycling infrastructure recently? ☐ Yes ☐No
7) Are you aware of government initiatives for reverse logistics of used plastic bottles?
   ☐Very High ☐High ☐Medium ☐Low ☐Very Low

Section D-III: Consumers' Contribution on Reverse Logistics

1) Consumers' Contribution

This part of the questionnaire surveys consumer contribution to reverse logistics of used plastic bottles. There are five options to answer here.1 stands for "Strongly disagree", 2 for "Disagree", 3 for "Neutral", 4 for "Agree" and 5 for "Strongly agree". Please indicate how much you agree or disagree with each of the following statements by putting check mark "∫" on the box provided that best represents your opinion.

Please indicate your level of agreement with the following statements		**1**	**2**	**3**	**4**	**5**
1.	Consumers already know the dangers of used plastic wastes that are discarded on the environment.					
2.	Waste management is everybody's responsibility.					
3.	Waste management is the sole responsibility of governments at all level.					
4.	Waste management is the sole responsibility of producers.					
5.	There are convenient waste collection facilities where consumers can return empty used plastic bottles easily.					
6.	I am motivated to collect and return my used plastic bottles to the producers or recyclers.					
7.	I am aware of government directives on waste management particularly the ones on empty used plastic bottles.					
8.	Regulations from the Government have not been a strong motivation for consumers to collect used plastic bottles after consumption.					

2) Challenges

This part of the questionnaire covers about the challenges, which hinder consumers to adopt reverse logistics practice. There are five options to answer here.1 stands for “Strongly disagree”, 2 for “Disagree”, 3 for “Neutral”, 4 for “Agree” and 5 for “Strongly agree”. Please indicate how much you agree or disagree with each of the following statements by putting check mark “√” on the box provided that best represents your opinion.

Please indicate your level of agreement with the following barriers that hinders the firms to adopt the reverse logistic practices		**1**	**2**	**3**	**4**	**5**
1.	Lack of awareness on the dangers of used bottles wasted on the environment					
2.	Lack of land at home to store used bottles					
3.	No economic motive to collect and return used bottles					
4.	No availability of collection facilities in in public spaces					
5.	Costly to send their used bottles to collectors					
6.	Lack of commitment of top management to the practice of reverse logistics					
7.	Insufficient knowledge about the practice of reverse logistics					
8.	Lack of knowledge on government regulation on reverse logistics practice					
9.	Lack of support from government to practice reverse logistics					
10.	Poor value and culture in proper management of after use plastic products.					

3) Way-out Mechanisms

This part of the questionnaire addresses mechanisms to implement or to improve reverse logistics practice. There are five options to answer here.1 stands for "Strongly disagree", 2 for "Disagree", 3 for "Neutral", 4 for "Agree" and 5 for "Strongly agree". Please indicate how much you agree or disagree with each of the following statements by putting check mark "√" on the box provided that best represents your opinion.

Please indicate your level of agreement with the following mechanisms to implement/improve reverse logistics practice		**1**	**2**	**3**	**4**	**5**
1.	Creating awareness to the society about reverse logistics practice and its importance					
2.	Top level management and employee commitment is crucial to the practice of reverse logistics					
3.	Government policy and regulation enforce companies to implement reverse logistics					
4.	Efficient investment of resources (like financial, labor, and technological) play significant role in reverse logistics practice					
5.	Cooperating and working with supply chain partners promote reverse logistics practice					