ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE
DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

PRACTICE, CHALLENGES AND DRIVERS OF REVERSE LOGISTICS MANAGEMENT IN PHARMACEUTICAL MANUFACTURERS IN ETHIOPIA

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By Asnakech Abate

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A thesis submitted to the School of Commerce of Addis Ababa University in Partial fulfillment of the requirements for Masters in Logistics and Supply chain Management

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DECLARATION

I declare that “PRACTICE, CHALLENGES AND DRIVERS OF REVERSE LOGISTICS MANAGEMENT IN PHARMACEUTICAL MANUFACTURERS IN ETHIOPIA” is my original work and all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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Letter of Certification

This is to certify that Asnakech Abate has carried out her thesis on the topic entitled: PRACTICE, CHALLENGES AND DRIVERS OF REVERSE LOGISTICS MANAGEMENT IN PHARMACEUTICAL MANUFACTURERS IN ETHIOPIA. This work is original in nature and suitable for the award of Masters of Arts (MA) in Logistics and Supply Chain Management.

Matiwos Ensermu (PhD)

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ABERRATION and ACRONYMS

CGMP	Current Good Manufacturing Practice
EFDA	Ethiopian Food and Drug Authority
EFMHACA	Ethiopian Food, Medicines and Healthcare Administration and Control Authority
FBPIDI	Food, Beverage and Pharmaceutical Industry Development Institute
FDA	American Food and Drug Authority
RL	Reverse Logistic
RLM	Reverse Logistic Management
RLP	Reverse Logistic Practice
TFDA	Tanzania Food and Drug Authority
SPSS	Statistical Package for Social Science

Abstract

The practice of reverse logistics management is an unexplored area in the pharmaceutical industry. Many companies have misunderstood the process and procedure involved and what it means. The main objective is to examine the extent of RL practices and drivers and to identify the main challenges in implementing reverse logistics management in drug manufacturing in Ethiopia. A mixed approach with a qualitative and exploratory research design was used in the study. The study sample consisted of 148 employees who were selected using a non-probabilistic sampling method from managers, marketing, finance, sales, logistics and supply chain departments with 70.5% response rate. The collected data from the respondents analyzed using the Statistical Package for Social Sciences (SPSS) V 23. To get a better result, both descriptive and inferential analyzes were used. The results showed that reuse, recycling, remanufacturing and refurbishing reverse logistics management were not practiced in human medicine and supply manufacturing companies. Rather, they made moderate use of recall and disposal practices for reverse logistics management. These practices were primarily derived through prioritization of population health and safety, legislation, corporate green image, environmental sustainability, customer satisfaction and top management initiation. Lack of tracking and traceability technology, financial constraints, lack of strategic planning, lack of training and lack of interest from top management were identified as the main challenges. The study recommended that pharmaceutical companies invest in tracking and tracing technology, understand the importance of RLM through training, and that regulators develop strategic planning and enforcement policies and guidance.

Key words: Reverse logistic, Reverse Logistics Practice, Drivers of reverse logistics Reverse Logistics Challenges

Chapter one

Introduction

1.1 Back ground study

Supply chain is only focused on the flow of product from the manufacturer to the customer and also the reverse flow of product from the customer to the manufacturer due to different reasons. According to the American Reverse Logistics Executive Council “Reverse logistics is 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 recapturing value or proper disposal”(Mpho & Keith , 2021).

The link between reverse logistics and logistics is being increasingly noted by logistics experts and researchers globally, especially in pharmaceutical manufacturing companies”(Mpho & Keith, 2021).

Reverse logistics has high importance from the safety, economic, environmental and regulatory point of view in pharmaceutical industries. That is why reverse logistics in pharmaceutical industries are one of the most important supply chain management like the forwarding logistics(USAID , 2018).

Even if the growth and understanding the importance of reverse logistics management in developing countries are at early stage, especially in pharmaceutical industry, still different firms in different industrial sectors uses it in the daily bases.

The pharmaceutical industries are the one who produces safe, quality and efficacy medicine to the society. The goals of the pharmaceutical supply chain are to ensure the right medicine, at the right quantity, distribute through the right route, to the right customer, at the right time. Therefore, ensuring its medicinal quality along the supply chain is very important.

As Chehab,A.(2017) stated, It is very challenging for most manufacturing pharmaceutical companies to accept and implement the system of the reverse logistics of medicine as the supply chain process which was initially implemented to produce medicine that move from suppliers to customers and not back from the customer to the supplier.

The reverse logistics of medicine is different from the forward logistics. Medicine cannot be recycled, refurbished, or resold and can only be disposed of based on set regulatory procedures which shows reverse logistic is costly in this sector.

In pharmaceutical industries, the main reasons to implement reverse logistics is when product returns due to wrong shipments, counterfeit, expired or damaged goods, product recalls and clinical trial recovery(Venkatesh, Bigoniy & Kumar, 2017).

Following post marketing surveillance, many medications have been withdrawn from the market globally due to their severe harmful or life-threatening effects observed in post marketing surveillance, wrong distribution destination, wrong packaging and labeling, expired or damaged goods while transporting, mixing of counterfeit product in the market(Venkatesh, Bigoniya & Kumar, 2017).

As Chehab,(2017) stated "Drug recalls are common for countries with well-defined regulatory guidelines that often involve returning of defective products that pose health risks to patients".

And also Mpho and Keith,(2021) cited that returns in the pharmaceutical industry are on the rise and it is becoming a growing concern for the companies affected where Pharmaceutical product recall is the most effective way to protect the public from a defective or potentially harmful product which bring health risk. During pharmaceutical product recall, drugs are normally returned by the consumer to the retailer, then go to the wholesalers and distributors, and are finally returned to the manufacturers. Thus brings where reverse logistics is becoming increasingly important.

(American Food and Drug authority (FDA) announced to the public the pharmaceutical products recalled in its website. Almost 343 pharmaceutical products were recalled due to minor as well as major problem in the year between 2020 to 2022 (https://www.fda.gov/drugs/drug-safety-and-availability/drug-recalls).

Many studies have been done in USA and Europe regarding the product recall and reverse logistics but very few studies showed in Africa especially in Ethiopia. Drug regulatory authorities and the health care industry have been aligning on adoption of global standards for identification, including serialization, product labeling, and data exchange to enable pharmaceutical traceability in the supply chain. Ethiopia, Ghana, Nigeria, Pakistan, and Rwanda have initiatives underway to enable their adoption and use global standards for pharmaceutical traceability (USAID, 2018).

There are government protocols set by FDA that naturally command product recovery from markets for safe disposal relating to the shelf life, the threat of counterfeiting, adulteration of the medicines or any defect observed. Most of the recalled are voluntary action initiated by the company, but also FDA also command mandatory recall where the company failed to do so (Venkatesh, Bigoniya & Kumar, 2017).

Proper traceability and disposal of recalled, unused, and expired pharmaceuticals is an important issue because of the nature of these products containing hazardous chemicals which implies for the safety of the society and legal implications. Also, the sensitive nature of medicines as well as the potential harm from use of expired or non-effective medicines means that pharmaceutical companies must effectively implement reverse logistics to promptly clear their supply chain channels of expired and non-conforming drugs (Shaurabh, Saurabh, & Moti,2013).

Only one study was done regarding the reverse logistics implementation in pharmaceutical industries in Ethiopia and the challenges observed in implementing the reverse logistics in this sector.

1.1.1 Pharmaceutical industry In Ethiopia

Drugs have been used as medications for most of human history. The use of medicine or drugs dates back as far as to the 5th century where there are records of earlier peoples using herbs and other plants for their supposed healing properties. Some of these plants actually did have legitimate healing properties and are still used today. However, the modern pharmaceutical industry can be traced back to the discoveries of insulin and penicillin in the early 20th century.

These products began to be mass manufactured, particularly in European countries, with other developed countries following close behind. The implementation of scientific processes to the research and discovery of new medicines has led to the industry that exists today, with companies constantly searching for new products that heal, prevent, and cure consumers.

The pharmaceuticals industry consists of drug manufacturers, biotechnology and vaccine manufacturing companies, medical supply and equipment manufacturing companies, cosmetics manufacturers and traditional medicine manufacturers. The study was especially focused on human drug manufacturing companies and medical equipment and supplies manufacturing companies.

There are seventeen (17) human medicine and supplies manufacturing companies in Ethiopia. From these companies-11 are producing human medicine in the form of different dosage forms (tablet,

capsule, suspension, syrup, ointment, powder for suspension, injectable and intravenous injection) and 6 of them are producing medical supplies like reagents, testing kits, gloves and empty capsules. From these companies four of them have the current good manufacturing practice (cGMP) certificate. (Table 5.16 data collected by Food, beverage and pharmaceutical industry development Institute (FBPIDI)).

The kilinto Industrial park is one of the largest and dedicated pharmaceutical industry park in the country, where many local and foreign investors are entering and start to build there shed according to GMP criteria to manufacture different human medicine and medical supplies (https:// investin.et kilinto industrial park-iportal).

The sector is one of the focus areas of the government for import substitution, export and job creation which also brings the supply chain and logistics management practices into the big picture.

1.2 Statement of the problem

Logistics is the backbone of a certain country economy as it ensures free flow of goods and services required for the functioning of industries and the economy. Ethiopia's logistics sector is rapidly evolving despite facing enormous challenges.

According to De Brito & Dekker (2004), some of the driving forces adopted by firms to implement the reverse logistics practices are either to achieve the economic benefits which are inborn in the competitive advantage or forced by the governmental legislations and environmental awareness of public.

Pharmaceutical logistics in supply chain means much more than the movement of pharmaceuticals and other products between the suppliers and the customer and vice versa. Pharmaceutical logistics involves in delivering of live saving products from the manufacturer to the end customer which is the patient. It definitely deals with starting from obtaining the right raw material for the right product, then manufacturing the product with the standard quality and efficacy, transportation, distribution, storage of the product based on the set Good Manufacturing and Distribution practice. The major challenges faced by Pharmaceutical logistics includes traceability of products, lack of logistic infrastructure includes updated technology, lack of cooperation between different partners, transporters and couriers not functioning timely and also lack of awareness of its importance.

All this problem and others also brings in wrong distribution destination, wrong packaging and labeling, expired or damaged goods while transporting, Mixing of counterfeit product in the market.

As WHO announces, increased cases of substandard products are observed, example of which a product alert for substandard pediatric products (twelve pediatric syrups) and also in two liquid dosage form product (AMBRONOL syrup and DOK-1 Max syrup) containing unacceptable level of contaminant which endanger the customer health as mentioned in its Medical Product Alert N°6/2022, Medical Product Alert N°7/2022 & Medical Product Alert N°1/2023 . The substandard products referenced in the annex of this Alert are unsafe and their use, especially in children, may result in serious injury or death. The toxic effect of the product can include abdominal pain, vomiting, diarrhea, inability to pass urine, headache, altered mental state and acute kidney injury which may lead to death.

According to the Ethiopian Food, Medicines and Healthcare Administration and Control Authority (EFMHACA) report released in 2018 by the Ethiopian herald, out of the total distributed medicines in 2015, 4.82 percent were found to be substandard medicines that do not meet appropriate quality standards and/or specifications after post market surveillance done.

Improper management of returned drugs can involve rerouting into the black market and relabeled for sale or accidentally dispensing of expired product. This would have negative impact on the health of the people and the environment in the long term. This global concern further signifies the social, ethical, corporate responsibility and economic importance of reverse logistics practices, programs or systems designed to recapture value, and to ensure proper disposal of damaged, substandard and expired products.

To assure the safety of the customer and preventing from using expired or damaged product, product recovery from markets for safe disposal require reverse logistics implementation. Implementing reverse logistics in pharmaceutical manufacturing has so many benefits in addition to its major duty of assuring the safety of the society and proper disposal of the products.

As Kumar and Saravanan, (2016) stated, reverse logistics has economic, environmental and regulatory importance.

Even though, the application of reverse logistics in this industry is more challenging than in any other industries, as most pharmaceuticals get destroyed when they are recalled or returned, they are not reprocessed or reused (Kabir,2013).

Reverse logistics is very important in the pharmaceutical industry not only from the economic point of view but also from the environmental and the regulatory points of view .This reasons have made organizations responsive to reverse logistics practice (Kabir, 2013).

Therefore, implementing reverse logistics in pharmaceutical industry is very crucial. Implementing cost effective tracking and tracing technology in the pharmaceutical supply chain is very important for reverse logistic implementation (Kwame, 2014).

As many literature reviewed, reverse logistics implementations is in its early stage in the developing country especially in pharmaceutical manufacturing.

In Ethiopia, there is only one study done to assess the implementation of reverse logistics practice and its challenges in one of pharmaceutical industry, Ethiopian pharmaceutical manufacturing Sc (Epharm) by Denbi,(2016).

Therefore, the purposes of the study have been to find out the extent of practices, drivers and challenges of reverse logistic management in pharmaceutical manufacturing industries to provide baseline information for the future studies. Therefore, the study identifies the practices, the drivers and challenges of RLM, analysis, and suggests direction for the future of reverse logistics practices in Pharmaceutical manufacturing in our country perspective.

1.3 Research questions

This research sought to explore the drivers, practices of reverse logistics and the different challenges that hinder the application of reverse logistics practices at a leading human medicine and supply manufacturer in Ethiopia. In order to achieve this goal, the following research questions have been addressed.

1. How reverse logistic is being practiced in the Ethiopian pharmaceutical industry?

2. What are the main challenges of reverse logistic practices in Ethiopian pharmaceutical industry?

3. What are the drivers of reverse logistics in pharmaceutical industry?

1.4 Objectives of the study

1.4.1 .General Objective

The main objective is to study the practices, drivers and challenges of reverse logistics management in pharmaceutical manufacturing in Ethiopia.

1.4.2 .Specific Objective

The specific objectives of this research were to:-

- To assess the reverse logistic management practice in Ethiopia pharmaceutical industries
- To identify the major challenges faced by the companies implementing reverse logistics practice
- To analyze the enablers of reverse logistics management in Ethiopia pharmaceutical industry

1.5. Significance of the study

As the growing importance of the pharmaceutical supply chain management in the country, there are limited bodies of extant knowledge in the reverse logistic area in the sector. Therefore, this research will contribute for the development of the discipline in this sector.

More specifically, research endeavors about the supply chin and logistics are limited within the Pharmaceutical manufacturing Company. This study, which is undertaken in the area, will contribute to the development and effective implementation of reverse logistics management strategies. It also provides baseline information about reverse logistics implementation practice in the pharmaceutical manufacturing sector.

The findings of this study will help the top management in manufacturing firms in understanding the role that reverse logistics plays from the environmental standards and regulations that govern their industry.

Additionally, this research will serve as a point of departure for further research by academicians because the concept of this research in this sector is not well studied in the country.

1.6. Scope of the study

Reverse logistic process is all about planning, implementing, and controlling of goods and related information from the point of consumption to the point of origin for recapturing value or proper disposal (Mpho& Keith,2021).

Therefore, the scope of this study limited to the practices, drivers and challenges of reserve logistics management in Pharmaceutical industry producing human medicine and medical supplies. Other pharmaceutical segments traditional medicine manufacturers, biological and vaccine manufacturers, cosmetics and personal hygiene manufacturers and veterinary medicine manufacturers were not included in this study.

The subject scope of this study also delimited to the company's employees working in managerial position, finance staffs, marketing, sales and logistic and supply department staffs.

The area of the study also limited to the pharmaceutical companies manufacturing human medicine and medical supply manufacturers found in Ethiopia.

1.7. Definition of terms

- **Supply chain**- is a network between a company and its suppliers to produce and distribute a specific product to the final buyer
- **Pharmaceutical supply chain**- is the planning, execution, and control of all activities related to the flow of pharmaceutical materials and information, from the purchase of raw materials to the final delivery of the product to the customer (https://www.qualifyze.com/blog/what-is-the-pharmaceutical-supply-chain/).
- **Reverse Logistics -** is 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 recapturing value or proper disposal (Mpho & Keith,2021)
- **Pharmaceutical industry-** Industry involved in discovers, develops, produces, and markets drugs or pharmaceutical drugs for use as medications to be administered to patients, with the aimtocurethem,vaccinatethem,oralleviatessymptoms (https://en.wikipedia.org/wiki/Pharmaceutical_industry).

- **Recall** -withdrawing or removing a pharmaceutical product from the pharmaceutical distribution chain because of defects in the product, complaints of serious adverse reactions to the product and/ or concerns that the product is or may be counterfeit (RECALL GUIDELINES , 2022).
- **Traceability** - means the ability to track forward the movement through specified stage(s) of the extended supply chain and trace backward the history, application or location of a pharmaceutical product (http://www.efda.gov.et/traceability/).
- **Unfit medicines**-medicines that are expired, improperly sealed, damaged, improperly stored, improperly labeled, counter fit, substandard, prohibited, and unauthorized medicines (Tanzania Food and Drugs Authority (TFDA)).

1.8 LIMITATION OF THE RESEARCH

- The study sought to conduct on seventeen human medicine and supply manufacturer, but only fifteen of them functioning during data collection.
- Time limitation for data filling from the respondent side observed

1.9. Organization of the paper

The paper consists of five different chapters: Chapter one comprised of nine separate sub-sections. It gives a general introduction about the research and the industry, defines statement of the problem, raises the main research questions, clarifies the general and specific objective of the research, defines significant terms, and clarifies scope of the research and the limitation encountered. Literature reviews were presented in chapter two. Chapter three described the research methodology and analysis method. In this chapter description of the study area, the research approach, research design, population and sampling, data source and type , data collection procedures, sampling techniques, data validity and reliability, and the research protocols were discussed. Data analysis and interpretation of the research results were discussed in chapter four. The final chapter covered the summary of the result, conclusions and recommendations.

Chapter Two

Literature Review

Introduction

This chapter provides information from publications on related topics. It examines findings from various authors about reverse logistics practices and challenges. It includes the theoretical review, empirical review and conceptual review of the subject matter.

Reverse logistics management has been the subject of scientific and practical attention for a few decades now. With concerns about product returns and proper implementation of systems, the academic community has been studying this area and as a result, in recent years, increasingly more scientific articles on this subject have been published (Rubio, 2008).

2.1 Theoretical review

Concepts of Reverse Logistics

A number of scholars have published literature on reverse logistics concepts, practices, enablers and challenges.

Lambert and Stock (1982) provide one of the oldest descriptions of reverse logistics by saying that it is like “going the wrong way on a one-way street because the great majority of products shipments flow in one direction”

Carter and Ellram (1998) defined reverse logistics as “a process that enables companies to become environmentally efficient through recycling, reusing and reducing the amount of materials used”.

As Rogers and Tibben-Lembke (1999), defines reverse logistic is "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.

According to Brito and Dekker (2002), reverse flow was not necessarily to the origin of the product, so they adopted the following definition provided by The European Working Group on Reverse

Logistics REVLOG (1998): The process of planning, implementing and controlling flows of raw materials, in process inventory, and finished goods from a manufacturing, distribution or use point to a point of recovery or point of proper disposal.

Reverse Logistics (RL) is associated with a holistic set of activities like recycling, repair, reuse and reprocessing, as well as collection, disassembly and the processing of used products, components and/or materials (Kokkinaki, Dekker, Coster & Pappis 2001).

The activities of a reverse logistics network in supply chains may differ based on the type of products returned, the desired recovery and the logistics network implemented.

2.2. Empirical review

Reverse logistics practice has many benefits like environmental, economic, customer satisfaction and safety of the customers. Though it has many advantages, there are so many challenges in implementing reverse logistics in industrial area as studied by different scholars.

The main reasons that lead companies to adopt RL operations are economics, legislation and corporate citizenship (Brito and Dekker, 2003).

Implementing an effective system generate multiple benefits for businesses, including increased customer satisfaction level, reducing the level of investment in resources, and reduce storage and distribution costs (Ricardo, Carlos ,Ricardo and Amílcar,2017).

As Tompkin (2010), mentioned in the Industry week newsletter, 40% of Americans have expired medication in their household, which ends up in sewers and eventually the water supply; or it can make its way to landfills if thrown in the trash, essentially posing a health risk to people and wildlife.

Tompkin (2010), also stated, about 3-4% of medical products leaving pharmaceutical warehouses comes back as a return for disposal or redistribution, according to the USA healthcare distribution management association.

The application of reverse logistics in pharmaceutical industry is more challenging than in any other industries, as most pharmaceuticals get destroyed when they are recalled or returned, they are seldom repaired or resold (Kabir, 2013).

As Dale S. Rogers & Tibben-Lembke stated some of the most common challenges facing companies implementing reverse logistics in different industries are: Importance of reverse logistics

relative to other issues, company policies, lack of systems, competitive issues, management inattention, financial and personnel resources, and legal issues.

The biggest barrier in the implementation of reverse logistic is a lack of strategic planning by the companies on handling returned products. The poor implementation of RL systems have disastrous effects for businesses and cause high costs in transportation and storage, increase processing times and accumulation of products with no destination, conflicts with customers/suppliers, legal and environmental issues (Ricardo, Carlos,Ricardo and Amílcar ,2017).

The lack of advanced information system is a major barrier in implementing good reverse logistics, as the implementation of efficient reverse logistics requires an advanced information system which enables companies to track and trace returns as well as to link returns to previous sales in order to forecast the product returns across the supply chain (Ravi and Shankar,2005).

The top five barriers of implementing reverse logistics were lack of initial capital, lack of skilled professionals in RL, companies' policies against RL, lack of new technology and information systems and lack of community pressure (Muhammad, Qian-li, Naveed, Yuming, and Muhammad ,2018).

2.2.1. Reverse logistics in pharmaceutical company

Medicines may enter a reverse chain for various reasons and the reverse process may be initiated by the end user, retailer, distributor or the manufacturer. Any medicine shall be referred to as unused medicine if the medicine is either unfit for use or not presently required**.** It appears to be logical that medicines found unfit for use due to some supply error are the ones which will be returned to the source (Abbas and Farooquie).

As medicines are generally high value chemicals which are critical to the health of consumers, the proper management of product returns, expired stock and product recalls is necessary through the implementation of efficient reverse logistics systems in the pharmaceutical industry (Sushmita et.al, 2012).

Drugs are chemical substances, so improper handling and disposal may cost the life of many by entering the market again.

As Blumberg in 2008 indicated, the general direction of global pharmaceutical reverse logistic comprises recall management, disposal and destruction, Asset recovery and liquidation, rebalancing and restocking of products as well as Optimization of transportation & shipping costs.

Factors to consider when implementing reverse logistics in pharmaceutical industry include traceability of the returned goods, using automation to keep costs low, the security of goods returned by customers, and the final stage of disposition.

The ability to track, retrieve and manage return product in the entire supply chain is of prime importance in the pharmaceutical manufacturing sector (Kwame, Bernice, Daniel, Reginald & Hilda, 2014).

Drugs are normally returned by the consumer to the retailer, then go to the wholesalers and distributors, and are finally returned to the manufacturers (which were the focus of this study). Various reasons such as warranty failures, incorrect product orders or shipment, damaged products, product recalls, reusable packaging materials and product upgrading account for reverse flow (Kabir, 2013).

It is challenging for most manufacturing pharmaceutical companies to accept the reverse logistics of medicine as the supply chain process was initially implemented to produce medicine that move from suppliers to customers and not back from the customer to the supplier (Chehab, 2017).

As Venkatesh, Bigoniya,and Kumar,(2017) cited “Drug recalls are common for countries with well-defined regulatory guidelines that often involve defective products that pose health risks to patients”. Recalls can be done if the drugs are a health hazard, mislabeled, or poorly packaged, have manufacturing defects, and are counterfeits.

As Abbas and Farooquie stated Product recalls is an important area in pharmaceutical industry where reverse logistics is becoming increasingly important. Where the health of the patient may be put at risk if the drugs are not withdrawn expeditiously.

Proper disposal of recalled, unused, and expired pharmaceuticals is an important issue with legal implications, as some of these products contain hazardous chemicals. Also, the sensitive nature of medicines as well as the potential harm from use of expired or non-effective medicines means that pharmaceutical companies must effectively implement reverse logistics to promptly clear their supply chain channels of expired and non-conforming drugs (Shaurabh, Saurabh, & Moti, 2013).

In USA from 2020 to2022 almost 343 pharmaceutical were recalled due to minor as well as major problem observed (https://www.fda.gov/drugs/drug-safety-and-availability/drug-recalls).

In 2015 Johnson & Johnson recalled Benylin original and Benylin with codeine due to delivered in the wrong country because of a set-up error. The enclosed package leaflets of Johnson & Johnson Benylin original and Benylin with codeine were in Portuguese and not in English as these products were intended to be delivered in Mozambique. Since the information on the leaflet was not in English, it did not meet the South African customers' requirements-as they did not understand the information within the leaflet (Johnson & Johnson recall letter. 2021).

Government, society, customers, investors, employees, regulators, and suppliers are some of the many stakeholders in reverse logistics firms and they have an important influence on the enterprises' performance, and on the external environment (Chehab, 2017).

2.2.2 Reverse logistics management practice in pharmaceutical industry

Reverse logistics management includes several practices ranging from re-use/re-sell, recycling, landfilling/suitable disposal, remanufacturing, incineration, repackaging, and, product recall management amongst others (Makaleng and Lambert, 2021).

Reuse

Reuse is the process of collecting used products from the field, and redistributing or selling them used. Thus, although the ultimate value of the product is reduced from its original value, no additional processing is required. Mainly involves products returned by retailers back to manufacturers due to slow movement on the shelves, wrong orders or oversupply and reselling the product to secondary market (Tarig and Suhaiza ,2011).

Remanufacturing

Remanufacturing is the process of collecting a used product or component from the field, assessing its condition, and replacing worn, broken, or obsolete parts with new or refurbished parts. In this case, the identity and functionality of the original product is retained (Tarig and Suhaiza, 2011).

Remanufacturing is a form of product recovery that involves rebuilding of the product to manufacturers specification using a combination of reused, repaired and new parts (LILIAN M., 2015).

Recycling

Recycling is the process of collecting used products, disassembling them (when necessary), separating them into categories of like materials (e.g., specific plastic types, steel, glass, paper, etc.), and processing them into recycled products, components, or materials. In this case, the identity and functionality of the original materials is lost (Tarig and Suhaiza, 2011).

Recall

Recall is the process of withdrawing or removing a pharmaceutical product from the pharmaceutical distribution chain because of defects in the product, complaints of serious adverse reactions to the product and/ or concerns that the product is or maybe counterfeit (Venkatesh, Bigoniya, Kumar,2017).

Refurbishing

Refurbishing is the process of repairing the defect and re-decorating the defective product returned by customer. Normally repaired and tested for its functionality and defects before they are sold to the public again (Wikipedia ,2023).

2.2.3. Reverse logistics management benefits in pharmaceutical industry

Companies are becoming active in reverse logistics for different reasons, including economic reasons, legislative reasons, and corporate citizenship. Especially reverse logistics in pharmaceutical industry is a growing occurrence and holds high importance from economic, environmental, and regulatory points of view (Brito & Dekker, 2003).

Returns in the pharmaceutical industry are pegged to be worth more than $2.5 billion with the reverse flow of goods estimated at $5 billion. In the pharmaceutical business, common reasons for returns include wrong shipments, counterfeit or fake goods, expired or damaged goods, product recalls, and clinical trial recovery (Sharma, 2020).

Reverse logistics is very important in the pharmaceutical industry, not only from the economic point of view but also from the environmental and the regulatory points of view (Chehab, 2017).

Reverse logistics is also gaining interest in developing countries due to increased competition, market growth, and large numbers of products users. Therefore, the management of product returns

in an effective as well as a cost-efficient way has become important as it leads to profitability and elevation of customer service levels, and ensure higher customer retention(Chehab and Abdelsalam,2017).

2.2.4. Reverse logistics management drivers in pharmaceutical industry

Reverse logistics practice becomes a major strategic importance due to its impact on alleviating environmental problem, generating economic benefit and in securing the health of the society. However, little is known about the actual drivers that motivate business firms to adopt reverse logistics initiatives in pharmaceutical industry.

Based on the study done on Malaysia, reverse logistics are affected by four drivers: regulations, customer pressures, social responsibility and expected business benefits (Tarig and Suhaiza, 2011).

As Raman and Peir (2006) conducted assessments and found that the main drivers for corporate social responsibility to implement reverse logistic activities are: professional code of conduct and ethics, customer pressures, expected financial returns, personal values of the owner and reputation.

As Ferguson and Browne (2001) illustrated with example regulation and legislation is the most driving enablers of reverse logistics implementation in Europe. Based on the legislation, business organizations to take responsibility for their products from production up to the final disposal stage and promote recycling and take-back of end-of-life products.

2.2.5. Reverse logistics management challenges in pharmaceutical industry

As most of the reverse logistic scholarity mentioned, the application of reverse logistics practices can result in environmental, economic benefits and filling corporate responsibility. But it is not free from challenges.

Some of the most common challenges explained by different scholars were summarized by Chehab and Abdelsalam, (2017) as Importance of reverse logistics relative to other, Supply Chain Management & Information Systems, company policies, lack of system, competitive issues, management inattention, financial and personnel resources, and legal issues.

The biggest barrier in the implementation of reverse logistic is a lack of strategic planning by the companies on handling returned products (Carlos, Ricardo and Amílcar,2017).

The lack of advanced information system is a major barrier in implementing good reverse logistics, as the implementation of efficient reverse logistics requires an advanced information system which enables companies to track and trace returns as well as to link returns to previous sales in order to forecast the product returns across the supply chain (Ravi and Shankar, 2005).

Muhammad, Qian-li, Naveed, Yuming, and Muhammad,(2018),summarized and discussed the top five barriers of implementing reverse logistics as lack of initial capital, lack of skilled professionals in RL, companies' policies against RL, lack of new technology and information systems and lack of community pressure.

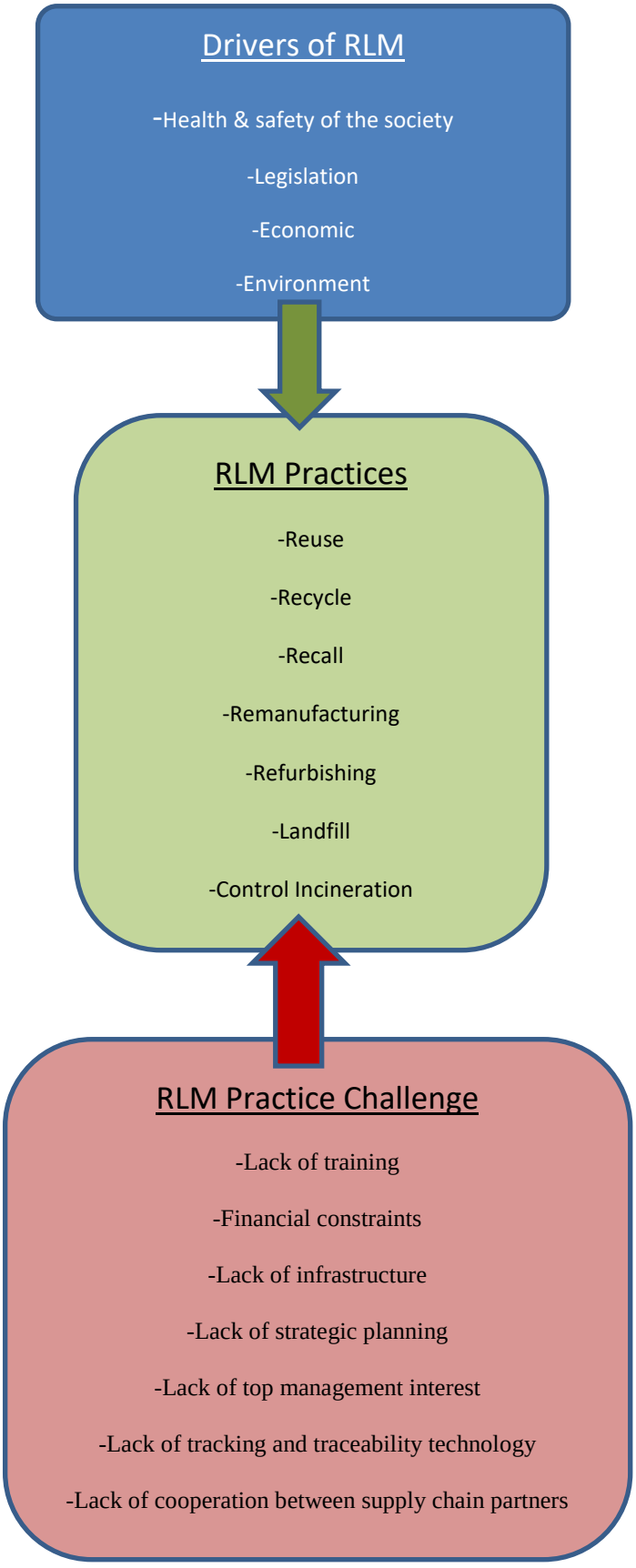
2.3. Research Gap Identified

Since the study was about the reverse logistic management practice, drivers and challenges in human medicine and supply manufacturer and the future of reverse logistics implementation in pharmaceutical industries found in Ethiopia, there is only one study particularly focused in one industry was done .We have about 17 pharmaceutical manufacturing companies, including both medicine and medical supply manufacturer and so many more companies are entering the Kilinto Industrial park. Doing more studies in this area will minimize the challenges and understanding gap. Globally, so many studies done by different scholars about reverse logistics in pharmaceutical Industry as identified by the empirical review of literature. There was no study done in the context of Ethiopia, therefore this study was done to fill the gap in the context of giving the base line information for future studies.

2.4 Conceptual framework

Based on overall review of related literature the conceptual framework in which this specific study intended to be governed.

Figure 2.1: Conceptual framework



Source: Adopted & modified from (S.Kumar, 2009)

Chapter 3

Research Design and Methodology

Introduction

Research methodology provides a means to systematically solve a research problem. This chapter explains the methodological approach adopted when conducting the research. Research methodology consists of research approach, sample design-sampling technique, sample size, source and instruments of data collection used, methods of data analyzed, ethical issues, validity and reliability of the study.

3.1 Description of the study area

The study was conducted in pharmaceutical companies producing human medicine and medical supplies found in different parts of Ethiopia. Ethiopian consists of 17 human medicine and supply pharmaceutical manufacturers, of which eleven produce medicines, one manufactures empty gelatin capsules, and the rest are engaged in producing medical supplies such as, testing kit, syringes, absorbent cottons, gauzes, bandages and sanitary products.

3.2. Research approach

The study adopted qualitative approach since the major focus of the research was to study the assessing the practice, drivers and challenges of implementing reverse logistics in pharmaceutical industry.

3.3. Research design

The study adopted mixed study design using descriptive and exploratory research design since the major focus of the research was to assess the practice, challenges and drivers of reverse logistics management and give base line information in pharmaceutical industry in Ethiopia.

Descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual, or of a group. Studies concerned with specific predictions, with narration of facts and characteristics concerning individual, group or situation are all examples of descriptive

research studies (Kothari, 2004). Therefore, in order to accurately describe the effect & relationships between the variables descriptive research study was employed.

3.4. Population and sampling

3.4.1 Target population

The target populations were employees of Pharmaceutical Company, particularly managers, finance staffs, logistics and supply management staffs, marketing and sales staffs of the companies.

3.4.2. Sampling Technique

This study adopted non-probability purposive sampling technique since it was mostly focused on the opinions and the perspectives of the employees involved.

The target population of the study were managers (General, technical, Production, quality assurance & logistics), marketing, finance, sales, logistic and supply chain employee of the company. Since the information required for the study needs different people who have knowledge and awareness about reverse logistics from every concerned department or section.

3.4.3. Sample size and sampling procedure

Malhortra and Peterson (2006) and Zikmund (2003) stated that, the larger the sampling size of a research, the more accurate the data generated. However, due to time and financial limitations and the nature of the study population, sample determination method developed by Taro Yamane's formula for calculating sample size was adopted as a method to determine a sample size.

Sample size determination

In this study, the formula used to determine the sample size was Taro Yamane‘s formula of sample Size determination with an error 5% and with confidence coefficient of 95% (Yaman,1965), the Yamane‘s formula has been presented as flows

n = N/ 1+ N(e)2 Where::n is the required sample size from the population under study

:N is the whole population that is under study

:e is the precision or sampling error which is usually 0.10,0.05 or 0.01.

Table 3.1 illustrated the total populations of the study from the 17 pharmaceutical manufacturing companies.

Table 3. 1: Total number of population from 17 human medicine and medical supply manufacturers

Study population	**General Manager**	**Technical Manager**	**Quality assurance Manager**	**Production Manager**	**Logistics Department**	**Marketing Department**	**Sales Department**	**Finance Department**	**Total**
Addis Pharmaceutical Factory Sh.co	1	1	1	1	3	3	3	2	**15**
East African Pharmaceuticals PLC	1	1	1	1	2	3	2	2	**13**
Kilitch Estro Biotech plc(cGMP approved)	1	1	1	1	3	3	3	3	**16**
Sino Ethiop Associate Africa PLC	1	1	1	1	2	3	3	2	**14**
The New Millinnium WorldMedical device manufacturing Plc.	1	1	1	1	1	2	1	2	**10**
Sanshing Pharmaceutical(cGMP approved)	1	1	1	1	3	3	3	3	**16**
Julphar Pharmaceuticals PLC	1	1	1	1	2	3	3	3	**15**
Pharmacure PLC	1	1	1	1	2	3	2	2	**13**
Cadila Pharmaceuticals (Ethiopia) PLC (cGMP approved)	1	1	1	1	2	3	3	3	**15**
Ethiopian Pharmaceutical Manufacturing S.c	1	1	1	1	3	3	3	5	**18**
Humnwell pharmaceutical Ethiopia PLC (cGMP approved)	1	1	1	1	2	3	3	3	**15**
Medisol Pharmaceuticals	1	1	1	1	1	2	2	2	**11**
Access Bio Inc. PLC	1	1	1	1	2	2	2	2	**12**
B.G.I Ethiopia	1	1	1	1	2	2	2	2	**12**
CGF	1	1	1	1	2	3	3	2	**14**
Glocare Pharma	1	1	1	1	2	3	3	3	**15**
SAMIDE	1	1	1	1	1	2	1	2	**10**
Total	**17**	**17**	**17**	**17**	**35**	**46**	**42**	**43**	**234**

Source: (FBPIDI)

The total population of study (N) is 234.

The minimum reliable representative sample size required for the study was determined using the formula

n = N/ 1+ N(e)2=234/1+234(0.05)2

n=148 is the total sample size taken from the 17 pharmaceutical manufacturing companies.
To find proportionality coefficient for each company sample size number

n/N*100=148/234*100=63.2% of each company total population was taken.

3.5. Data sources and types

The required data for the study was collected using both primary and secondary data collection methods.

3.5.1. Primary data sources

Primary data collected from employees of the company by using a self-administered questionnaire that consist both open and more of closed ended questions that were designed to collect responses for qualitative analysis respectively. The open questions were designed to explore the opinions of the respondents about the subject matter. The five point Likert scales for measuring was an ideal measurement approach since it helps to ask respondents to rate their opinion for the items of various dimensions. The standard questionnaire was used to collect the necessary information regarding the study was adopted from the work of other studies from (Salazar, 2012, Lilian Moraa., 2015) which increase its validity.

3.5.2. Secondary source data

Secondary data were collected from previously written journals, article, books, researches and documents about reverse logistics practice in pharmaceutical industry to enrich the literature.

3.6. Data collection procedures

For the data collection purposes, a structured questionnaire was prepared based on the review of the related literature and distributed to the firm's mangers or higher officials within the firm to collect relevant data. Because the numbers of respondents were large, this tool is appropriate to gather the necessary data. The items were close ended supplemented with few open-ended items to explore the opinions of the respondents. The questionnaire was carefully developed in a way that measures the

impact of the proposed variables. The type of questions, form, wording and sequences were considered carefully. With this data gathering tools, different journals and articles were reviewed and gathered.

3.7. Data analysis

The data collected through questionnaire was presented in table form and descriptive statistics using frequency of occurrence was employed. After making the necessary coding, to analyze the usable data collected from respondents Statistical Package for Social Sciences (SPSS) V 23 was used. Both descriptive and inferential were applied in order to come up with a better result. Descriptive statistics was used to describe a set of data in terms of its frequency distribution, mean, and its dispersion. Then results were presented using tables and graphs to show respondent's position on the practice of reveres logistics in the company, the challenges faced and opportunities of the future.

3.8. Reliability and Validity of the Research

Validity defined as the extent to which data collection method or methods accurately measure what they were intended to measure (Anol, 2012).

To validate the study two major steps were taken.

1. The survey questioner was adopted from standardized and used by previous researchers.
2. The sampled population were expected to have knowledge about the study matters and a reliable source of information about the company

Reliability according to Tokeetal, (2012), the aim of reliability analysis is to find the extent to which an effect procedure produced the same result if the process is repeated over and over again under the same conditions. The most common technique was used in the literature to assess the scales reliability and stability is use of the Cronbach Alpha. An alpha value of 0.7 or above will be considered reliable. Based on this concept, the reliability test score for our variables of study indicated on table 2 is 0.856 which is greater than 0 .7, indicating its reliability.

Table: 3.2 Reliability statistics

	Number of Variables	Cronbach's Alpha
RLM Practices	**7**	**0.810**
RLM Drivers	**10**	**0.811**
RLM Challenges	**12**	**0.897**

3.9. Ethical consideration

A formal letter was written from Addis Ababa University, School of Commerce, Department of Logistics and Supply Chain Management to Different Pharmaceutical Companies in Ethiopia and concerned authorities. The data collection was started after getting consent from the parties mentioned above. In addition to this, name of the employees (selected for the sample) were not included to maintain confidentiality.

Chapter Four

Results, Discussion and Interpretation

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4.1 Demographic information

The study targeted on 148 respondents from seventeen companies with 63.2% of proportion from each company total population. Respondents were from marketing, sales division, finance division, technical manager, production manager, logistic department and general manager.104 questionnaires were returned which makes 70.2 % of response rate.

4.1.1. Gender of respondents

Table 4.3, tries to summarize the gender combination of the respondents.63 of the respondents were male and 41 of the respondents were female respondents.

Table 4.3: Gender of respondents

S/N	Sex	Frequency	Percent
1	Male	63	60.6
2	Female	41	39.4
	Total	**104**	**100.0**

Source: Primary Data, 2023

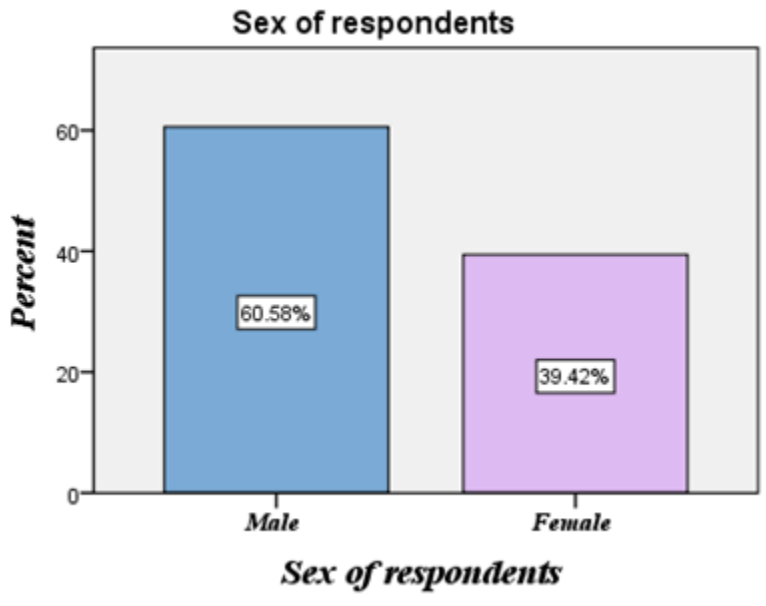

Figure 4.2: Gender of respondents

4.1.2. Age of respondents

Table 4.4, tries to summarize the age of the respondents.3 of the respondents were age less than 25 years old,45 of the respondents age were between26-34,39 of the respondents are age group were between35-44,11 of the respondents were age group between45-54 and 6 of the respondents were age greater than 54 .

Table 4.4: Age of respondents

S/N	Age category	Frequency	Percent
1	less than 25	3	2.9
2	26-34	45	43.3
3	35-44	39	37.5
4	45-54	11	10.6
5	greater than 54	6	5.8
	Total	**104**	**100.0**

Source: Primary data 2023

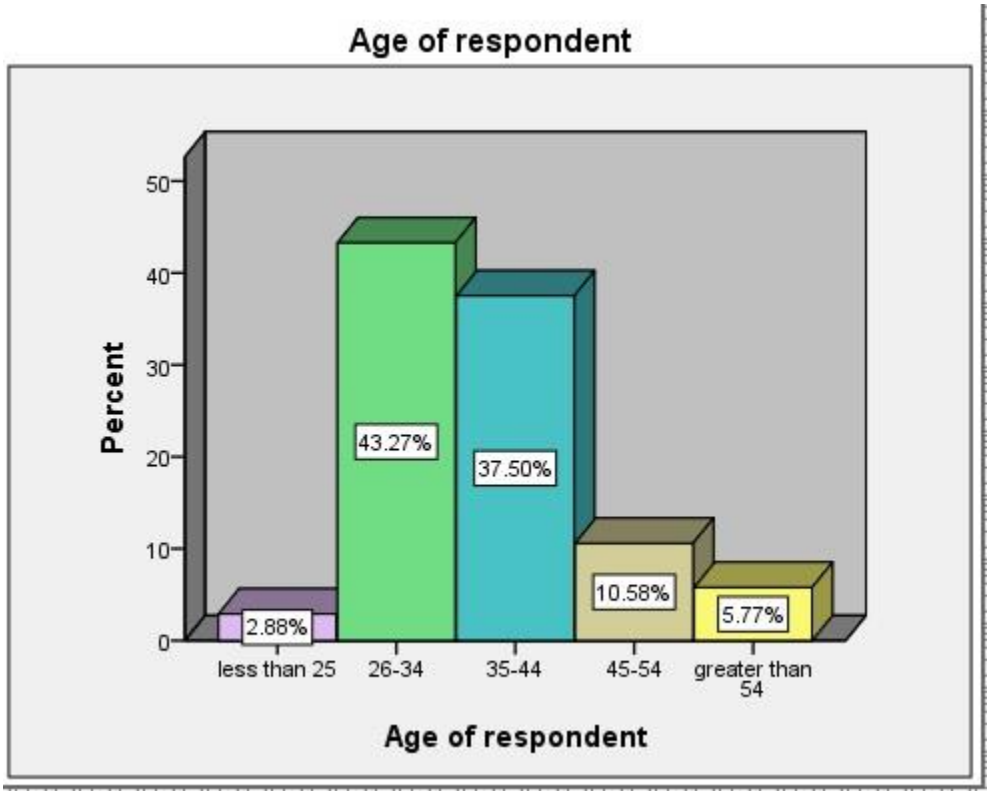

Figure 4. 3 : Age of respondents

4.1.3 Educational background of respondents

Table 4.5, summarizes the educational background of the respondents.65.4% of the respondents have BA/BSc degree holder, and 34.6% of the respondents have MSc holder. This implied as the study focused on purposive sampling the majority of the respondents occupy managerial position ,finance and logistic departments.

Table 4.5: Educational background of respondents

Educational background

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BA/BSc	68	65.4	65.4	65.4
	MSc	36	34.6	34.6	100.0
	Total	104	100.0	100.0	

Source:Primary data 2023

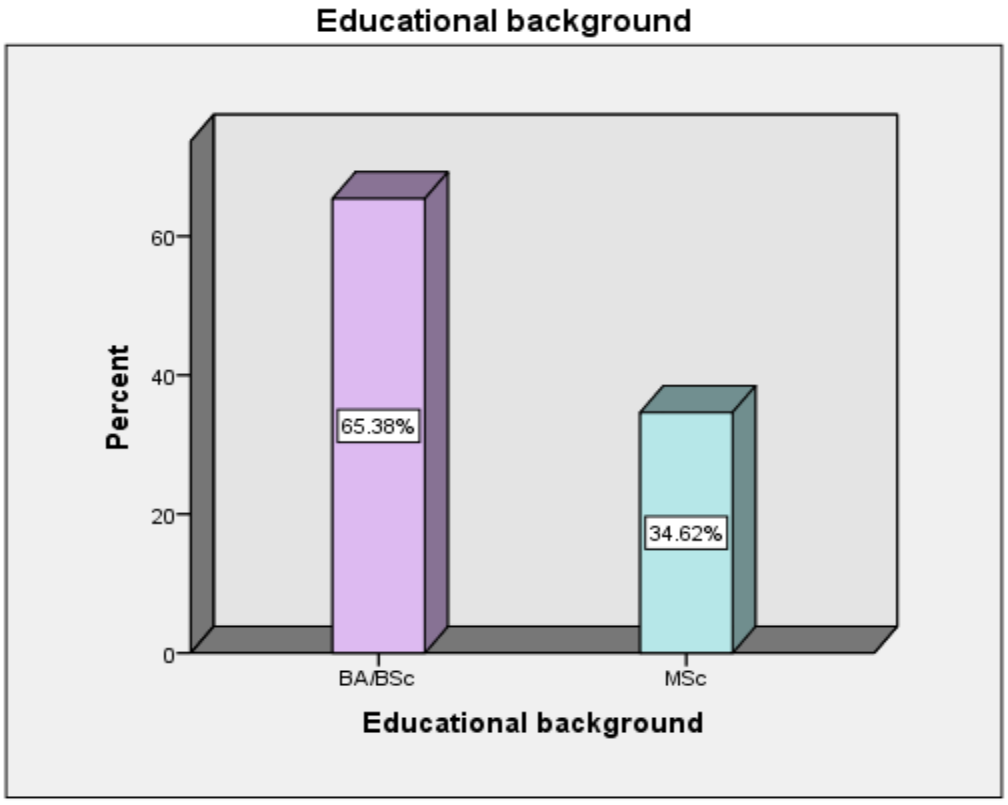

Figure 4. 4: Educational back ground

4.1.1.4 Position of respondents in the company

Table 4.6. Summarizes the position of respondents in the company. 11 general manager, 12 technical manager, 19 Quality manager,18 production manager,13 logistic department,11 marketing,11 sales and 9 finance staff responded to the question

Table 4.6: Position of respondents in the company

Position in the company

Posision of Respondent		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	GM	11	10.6	10.6	10.6
	Techinical manager	12	11.5	11.5	22.1
	Quality manager	19	18.3	18.3	40.4
	production manager	18	17.3	17.3	57.7
	logistic dep	13	12.5	12.5	70.2
	marketing	11	10.6	10.6	80.8
	sales	11	10.6	10.6	91.3
	finance	9	8.7	8.7	100.0
	Total	104	100.0	100.0	

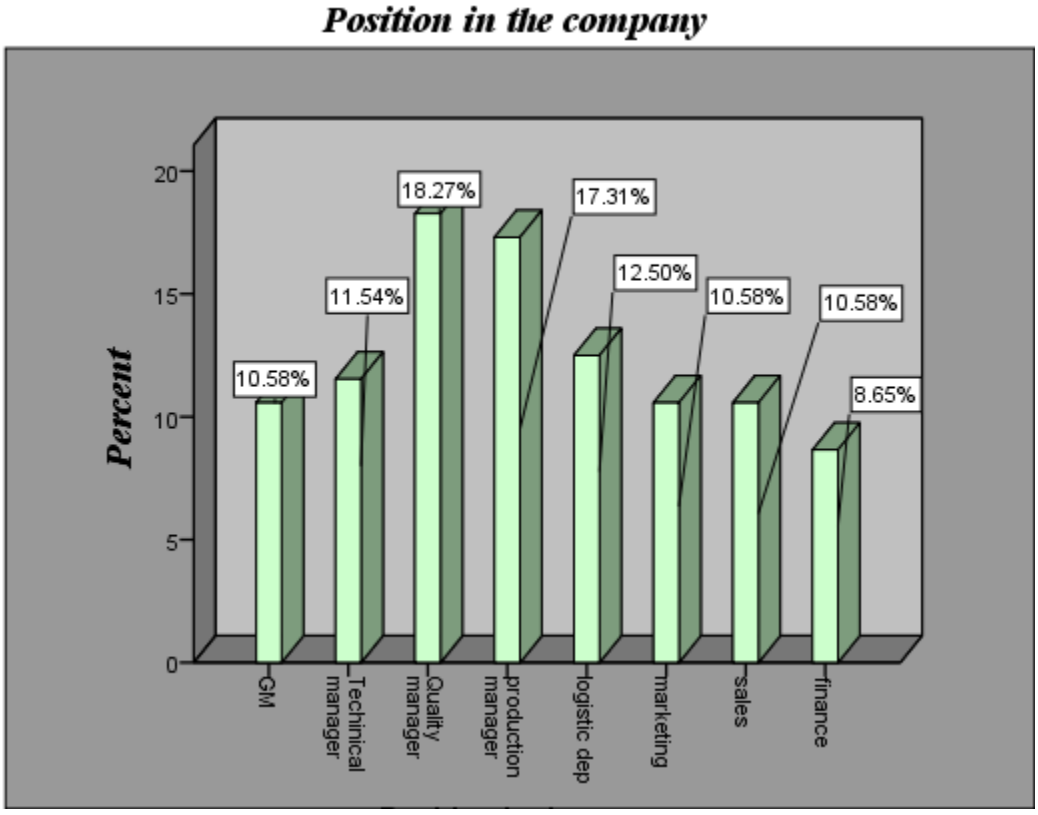

Figure 4.5 Respondent Position in the company

4.1.5 Years of employment in the sector respondents in the sector

Table 4.7. Summarizes the years of employment in the pharmaceutical sector of respondents in the company. 32 respondents were working 1-5 years in the sector,34 of the respondents were between

6-10 years of experience in the sector,28 of respondent were experience between 11-15 years and 10 of the respondent were experience of over 15 years in the sector.

Table 4.7: Years of employment in the sector respondents in the company

Years of employment in the sector

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5 years	32	30.8	30.8	30.8
	6-10 years	34	32.7	32.7	63.5
	11-15 years	28	26.9	26.9	90.4
	over 15 years	10	9.6	9.6	100.0
	Total	104	100.0	100.0	

Source: Primary 2023

4.1.6 Years of employment in the company

Table 4.8, summarized the years of employment in the company. 41.3% respondents were working experience less than 5 years, 58.7% of the respondents were experience greater than and equal to 5 in the company.

Table 4.8:,years of employment in the company

working years in the company

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 5	43	41.3	41.3	41.3
	greater than and equal 5	61	58.7	58.7	100.0
	Total	104	100.0	100.0	

Source: Primary data 2023

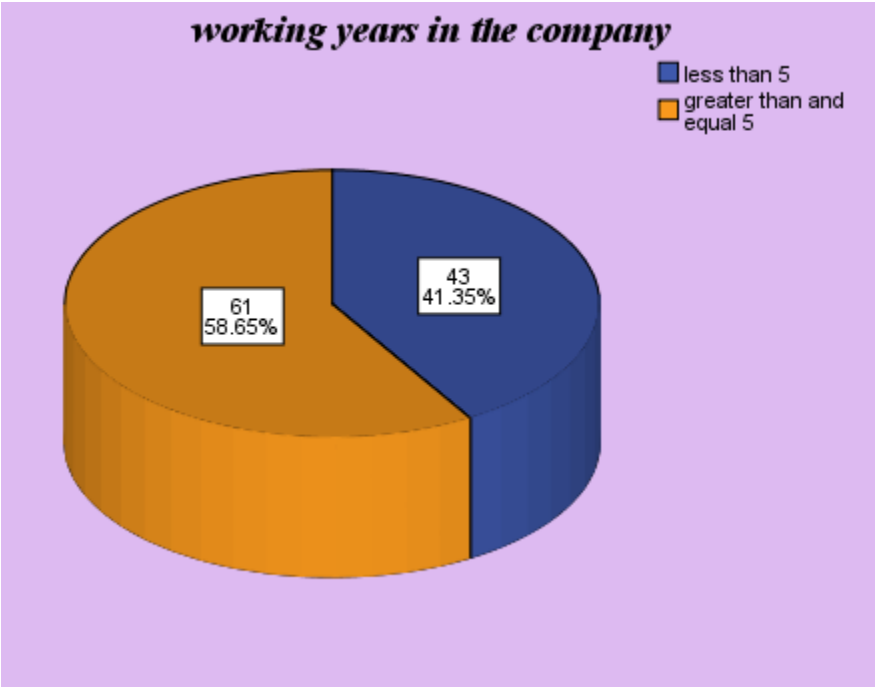

Figure 4.6: working experience of respondents in the company

4.1.7 Years of the company operating

Table 4.9, summarized the years the company operating. 68.3% of the respondents work in the company having greater than 10 years of experience of operating,24% of the respondents work in the company having 5-10 years of experience of operating and 7.7% of the respondents work in the company with less than 5 years of experience in the sector.

Table 4.9: Years of the company operating

years of company operating

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 5	8	7.7	7.7	7.7
	5-10	25	24.0	24.0	31.7
	greater than 10	71	68.3	68.3	100.0
	Total	104	100.0	100.0	

Source:Primary data 2023

4.1.8 Reverse logistics training

Table 4.10, summarizes whether the respondents have taken training on Reverse logistics training or not.62.5% of the respondents were not take any training on reverse logistics,37.5% of the respondents took reverse logistics .

Table 4.10: Reverse logistic training

Reverse logistics training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	39	37.5	37.5	37.5
	No	65	62.5	62.5	100.0
	Total	104	100.0	100.0	

Source: Primary data 2023

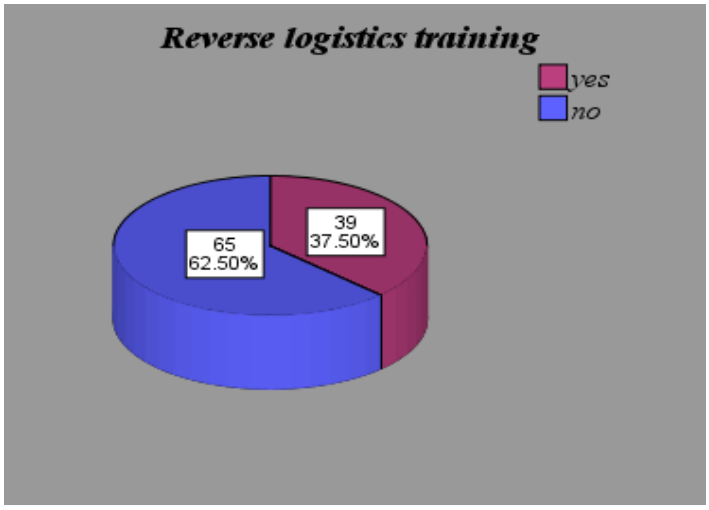

Figure 4.7: Reverse logistic training experience of respondents

4.2. RLM practices, Drivers and Challenges

All of the variables were measured using a five point Likert scale where 1 stands for “not at all “and 5 stands of” a very large extent”. Therefore the interpretation made using the mean of each variable where the mean falls between the two ranges was explained using the rules of thumb created by Mesfin (2016).

Mesfin (2016) create equal intervals for a range of five points Likert scale (that ranges from not at all to a very large extent in the survey questionnaire). 0.8 was obtained by dividing the difference between the maximum (5) and the minimum (1) to the maximum (5), which used as boundary for each measurement in the questionnaire. Based on this a calculated mean value that ranges from 1 to

1.80 implies not at all, a mean range from 1.81 to 2.6 implies a small extent, from 2.61 to 3.4 implies to a moderate extent, from 3.41 to 4.2 implies to a large extent and from 4.21 to 5.00 implies to a very large extent represented respondents' perceptions .

The study sought to establish the extent to which human medicine and supply manufacturer companies in Ethiopia adopted RL practices. The results are presented in the Table 11.

Table 4.11: Reverse logistic practice

Reverse Logistic Practice	Mean	Std.devation
Reuse	1.65	0.973
Recycle	1.53	0.934
Recall	2.72	1.056
Remanufacturing	1.73	0.958
Refurbishing	1.67	0.96
Disposal practice		
1.Landfill	2.8	1.332
2.Controllincineration	3.58	1.349
Grand mean	2.24	

The majority of the respondents indicated that their firm do not apply reuse, recycling refurbishing and remanufacturing as reverse logistics as the mean score indicated as 1.65,1.53,1.67 and 1.73 respectively and as based on the explained range all four of the RLM practices were in not at all Likert scale. From the data collected, majority of the respondents indicated that the company implements disposal reverse logistics practice specially control incineration in large extent with the mean value of 3.58, and landfill as indicated by a mean score of 2.8 in moderate extent with others. The data collected indicated that the firm use incinerator to dispose returned products in a large extent with a mean score of 3.58 which was the highest score. The result indicates practice of reverse logistics is limited to recall as moderate extent with the mean score of 2.72 out of 5 which is between the Likert scales of "2 to 3". As recall is one of the methods of announcing and practicing the flow or return of medicine in back ward direction of the supply chain due to observed defects. This is because almost all of the pharmaceutical products are under strict regulation from the Food and Drug authority. There are no guide lines that support the implementation of reusing, recycling and refurbishing of pharmaceutical products. Though it is obvious using control incineration and landfilling for disposing of unused product based on the products type. This is an indicator that the companies are not supported with relevant technology that encourages recycling, reusing or refurbishing of some of the packaging material thrown to trash after use for manufacturing for better

performance and assures environmental sustainability. Based on the observed mean of different practices, the mean of reuse, recycle, remanufacturing and refurbishing are less than “2”.So based on the Likert scale which can implicate human medicine and supply manufacturers are not utilized them .These reverse logistic practices are not practiced due quality requirement, sensitivity of the product and drugs are Internationally regulated based on WHO guide lines and as well national controlling authority.

As recall is one of the method of announcing and practicing the flow or return of medicine in back ward direction of the supply chain due to defects observed during post market surveillance, mislabeling, counterfeit mixing, misdistribution and also if it expired during storage and transportation handling problems and so many problems. All most all companies try to produce and distributed the medicine based on the stated guide lines, if defects may occur recall can be done voluntarily by the manufacture or ordered by controlling authority for the sake of the safety of the society.

Landfilling and control incineration are the most practiced disposal of reverse logistic practiced based on the product type and the chemical content in the pharmaceutical manufacturing. That is clearly observed on the mean value of reverse logistic practices where control incineration of returned product mean is 3.58 and land fill into dedicated place has a mean value of 2.8.This directly related with the manufacturing guideline requirements of having dedicated place of waste treatment and disposal in the manufacturing compound due to the nature of the products.

4.3. Enablers of RL management practice

The drivers of the reverse logistic management are the main factors that cause the adoption of reverse logistics practice in the firm. Based on the respondents answer and analysis shown in the table 4.12 keeping the health and safety of the population score the largest mean compared with others enablers and followed by the legal requirement with the mean score of 4.39 and 4.06 respectively. The green image of the company, environmental sustainability, customer satisfaction, top management influence, market share growth and competitive advantage influences the implementation and practice of reverse logistics in the next steps with the mean score of 3.9,3.72,3.49,3.34,3.25and 3.23 respectively. Recapturing value and life cycle of the product the least driving compared to the other enablers as the mean score showed 2.91 and 2.72 respect.

As the result showed, the companies give priority to the health and safety of the population and the legal requirements stated for human medicine and pharmaceutical supply manufacturing practices. Especially pharmaceutical product recall and disposal are highly regulated and controlled based on directives and guidelines of the EFDA and WHO.

As table 4.12, indicated, the health and safety of the population is the first priority that drives the application and practice of reverse logistic management in human medicine and supply manufacturers and one of the social and ethical responsibilities of the manufacturers. Manufacturers produce medicine in the motto of, safe, efficacies and affordable medicine for all. So during recall, keeping the society safety is their first priority then legal requirement is the second driver that initiates the application of reverse logistic practice. One of the responsibility of EFDA given by law is, initiation of recall when defects observed or information that require reverse logistics of medicinal products which supported by recall guide line.

Table 4.12: Drivers of Reverse logistic practice

Drivers of RL	N	Mean	Std. Deviation
Legal requirement	104	4.06	.933
Market share growth	104	3.25	1.050
Customer satisfaction	104	3.49	1.024
Competitive advantage	104	3.23	.997
Recupturing value	104	2.72	1.065
Envirnomental sustainability	104	3.72	.929
Green image of the company	104	3.90	.940
Health and safety of the population	104	4.39	.949
Lifecycles of the product	104	2.91	1.286
Top management	104	3.34	1.103

One of the benefits of applying reverse logistic management practices is keeping environmental sustainability. This can be achieved by safe reverse logistic management practice and as well as environmentally safe disposal mechanism. So based on the RL M driving factors on table 4.12, environmental sustainability which directly related with land filling and control incineration disposal mechanism has the mean value of 3.72 and also the green Image of the company also matters during

a reverse logistic practice with the mean value of 3.9. Top management interest average mean score is 3.34, based on the Likert scale; moderately drive the implementation of RLM in this sector.

Market share value, competitive advantage, customer satisfaction and recapturing value shows the economic advantage of implementing reverse logistics. Customer satisfaction showed 3.49 mean score, followed by competitive advantage and market share value mean score of 3.23 and 3.25. Customer satisfaction and competitive advantage are the base line for economic drive in the sector as the practices are not directly related with profit maximization. Recapturing value scores the smallest of all mean value 2.72, indicating that recapturing value is not the priority drivers in this sector.

4.4. Challenges of Implementing RL practice

The study sought the main challenges the companies faced to implement and practice reverse logistics management practices. A 5 point Likert scale was used to rate the extent of adoption of reuse, recycling and Dispose RL practices, with 1 indicating “not at all”, 2 “to a small extent”, 3 “to a moderate extent”, 4 “to a large extent” and 5 “to a very large extent”. Based on the mean value that ranges from 1 to 1.80 implies not at all, a mean range from 1.81 to 2.6 implies a small extent, from 2.61 to 3.4 implies to a moderate extent, from 3.41 to 4.2 implies to a large extent and from 4.21 to 5.00 implies to a very large extent represented respondents’ perceptions .The results are presented in the Table 4.13.

Table 4.13: Challenges of implementing RL practice

Challenges of RL	N	Mean	Std. Deviation
Lack of strategic planning	104	3.53	1.157
Lack of training	104	3.34	1.076
Lack of top management interest	104	3.33	1.119
Lack of understanding	104	3.12	1.046
Lack of cooperation b/n supply chain	104	2.90	1.111
Financial constraints	104	3.57	1.121
Lack of tracking and traceability	104	3.61	1.074
Lack of information about RL regulation	104	3.11	1.096
Lack of infrastructure	104	3.19	1.062

Lack of legislation and enforcement polices	104	2.70	1.046
Lack of customer awareness	104	2.64	1.060
Lack rules of handling returns	104	2.51	1.014

Source: Primary data, 2023

Based on the table 4.13, most of the challenges listed are large extent of challenging the implementation of reverse logistics management. The most common challenges observed from the mean score of the analysis results are lack of tracking and traceability, financial constraints and lack of strategic planning with the score of 3.61, 3.57 and 3.53 respectively. The other major challenges the respondents indicated affect the practice in moderate extent on the table are lack of training on reverse logistic management practice and lack of top management interest, lack of customer awareness, lack of legislation and enforcement police and lack of cooperation between supply chain partners, with the mean score of 3.34,3.33,2.64,2.7 and 2.9 respectively to implementing the reverse logistics practice. Lack of rules of handling returns, with the mean score 2.51 challenges with small extent.

As the table indicated there is absence of tracking and traceability of the product after it inters the supply chain is high, therefore implementing reverse logistics becomes a challenge. Introducing a bar code and standardization of the product will alleviate the challenges. The other main challenge observed is financial constraints with the mean value of 3.57.As the sector is a capital intensive area, implementation of tracking and tracing technology will also cost a lot.

Lack of strategic planning of reverse logistic was one of the most observed challenges in the sector. This is because of the thinking and interest of the top management, reverse logistic practice may or may not happen, and if it happens they think they could manage it. Lack of training about RLM practice also influence RLM practices, As the survey data of the demography shows out of 104 respondents of the study 65 (62.5%)0f the respondents have not trained about RLM.

The top management view of reverse logistic management practice as a challenge to the company, so implementing it is not their interest area.

4.5. Factors affecting the Implementing RL practice in pharmaceutical manufacturing companies

This section explores the general assessment of the level and reasons for the firms towards implementing reverse logistic practice in pharmaceutical manufacturing companies. Based on the a 5

point Likert scale was used to rate the extent where the factors affecting the implementation of reverse logistics in the pharmaceutical, with 1 indicating “not at all”, 2 “to a small extent”, 3 “to a moderate extent”, 4 “to a large extent” and 5 “to a very large extent”.

Table 4.14: Factors that affecting RL implementation

Factors that affect RL implementation	N	Mean	Std. Deviation
Uneven returned product	104	2.86	1.118
Difficulty in predicting returns	104	3.48	1.106
Visibility cost	104	2.68	1.082
Transportation from many place/few	104	2.95	.939
Poor inventory management	104	2.22	1.114
Product lifecycle	104	2.61	1.573
Difficulties in marketing used product	104	3.31	1.344
Lack of clarity of disposal	104	2.97	1.127

Source :Primary data 2023

Based on the table 4.14, there are different factors contributing for the small practice of reverse logistics management in the pharmaceutical companies. Difficulty in predicting returns and difficulties in marketing used product are the main contributing factors that affect the practice of Reverse logistic management with the mean score of 3.48 and 3.31 respectively. This result shows as the pharmaceutical product production, storage and distribution of the medicine is based on the guide lines of WHO and EFDA to reach to the end customer use not to return back.

The uncertainty related to quality, quantity, and the time of returned products influence the scope of reverse logistics activities in companies, as companies seek to minimize the impact of returns on their current activities related to the distribution of new products (Chouinard et al. 2005)

Lack of clarity of disposal, transporting from many places and uneven returned product in the sector contribute to the factors affecting implementation of Reverse logistic management practices with the mean score of 2.97, 2.95 and 2.86 respectively. Product lifecycle and visibility cost affect RL in small extent with mean score of 2.61 and 2.68 respectively. The least factors affecting the implementation of reverse logistics in pharmaceutical manufacturing companies is poor inventory management of the product.

4.6. Exploring the implementing stage of RLM practice in pharmaceutical industry

This assessment shows the companies in practicing Reverse logistics management in pharmaceutical manufacturing company. A 5 point Likert scale was used to rate the extent to how the companies implement reverse logistics management in the pharmaceutical manufacturing, with 1 indicating "not at all", 2 "to a small extent", 3 "to a moderate extent", 4 "to a large extent" and 5 "to a very large extent". Table 4.15 illustrates the Reverse logistics management practice in pharmaceutical manufacturing companies.

Table 4.15: Level of RL management practice in pharmaceutical manufacturing

Assessing RL Management	N	Mean	Std. Deviation
Organized RL team present	104	2.00	1.262
Regular assessment of preparedness	104	2.70	1.023
Developed plan in case of recall	104	2.81	1.115
Designed reverse logistic network	104	2.41	1.085
Employee understands about RL	104	2.51	1.024
Supply chain partner's knows RL	104	2.86	.949
Developed technology for tracing recall	104	2.07	.988

Source:Primary data, 2023

Based on the table 4.15,supply chain partners knows about RL ,developed plan in case of recall and regular assessment of preparedness have been practiced between small extent to moderate extent based on the Likert scale with the mean score of 2.89,2.81 and 2.7 respectively in the pharmaceutical industries. Organized RL team present, developed technology for tracing recall and designed reverse logistic network are the least implemented practices of reverse logistic management in pharma industry in Ethiopia according to the mean score result 2.0,2.07 and 2,41 respectively. Which indicate there is small extent reverse logistic department or team present in the firm as well as no technology for tracking and traceability of the product other than the manual and paper based sales document with direct suppliers only. Employee understands about RL practice score 2.51 which indicate there is small extent understanding which is not enough for practicing Reverse logistic in the firm.

4.7. What future holds for the firm

In this section, the opinions of the respondents were explored and summarized. Even though all the respondents didn't give their opinion about what the future holds for reverse logistics practice in pharmaceutical manufacturer focused on human medicine and supply manufacturing in Ethiopia.

Most of the respondents believe that reverse logistic management practice in pharmaceutical industry is in small extent, but they suggest that implementing RLM is very important from the perspective of GMP implementation, global competition, inventory management, quality management, warehouse management, handling of returns management, asset recovery management and they believe that it improves profit. For this, investing in modern and up-to-date technology for tracing and tracking of forward and reverse flow of products in the supply chain requires well designed monitoring and control system, training about the importance of implementing reverse logistic management and as well as government needs to establish policies and procedures suitable for implementing and improving RLM in pharmaceutical manufacturing companies.

CHAPTER FIVE

SUMMARY, CONCLUSION, & RECOMMENDATION

5.1. SUMMARY OF MAJOR FINDINGS

The study sought to collect data from 148 people working in 17 pharmaceutical companies producing human medicine and supplies from general managerial position, technical managerial position, quality manger, production manager, logistic and supply chain department, marketing, sales and financial departments but the researcher managed to collect 104 questionnaires from 15 companies. This represents a response rate of 70.2 percent which is feasible and logical for analysis.

5.1. 1 Summary of demographic data

Regarding distribution of respondents' sex, larger proportion of respondents 60.58% was male whereas the remaining 39.42% were female. From this we can conclude that the proportions of male employees on the selected job position are greater than female employee.

Concerning the distribution of the age group of the respondents, 43.27% of the respondents were age group between 26 and34 years, followed by 37.5% of the respondent were age group 35 to 44 years.10.58% of the respondents are age group between45 and 54 years old. The least percentage of respondents age observed in age group less than 25 years old and also age group greater than 54 years old with 2.88% and 5.77% respectively.

Regarding the educational background of the respondents, larger percentages of the respondents were BSc holder with 65.38% and 34.62 % of MSc holder employee on the targeted study departments of the company include managerial position, finance and logistics and supply chain.

According the information observed, regarding respondents department the larger proportion 18.27 % were from the quality manager followed by 17.31 % from production manager, 12.5% from logistic and supply management department, 11.54% of the respondents were from the technical manager. General Manager, marketing department and sales department each responded 10.58% of the total respondents and the remaining least group 8.65% were from finance department.

The larger percentage of year of experience of the respondents in the pharmaceutical sector were between 6 and 10 years with the 32.69%,followed by 30.77% of the respondents are 1 to 5 years of experience. The other large percentage of respondents experience observed between 11 and 15 years

of experience were 26.92%.The least respondents observed were experience having more than15 years in the sector counts 9.62%.

Regarding work experience in the company, larger numbers of the respondents were greater than and equal to 5 years in the firm which accounts 58.65% and the remaining 41.35% of the respondents were less than 5 years of experience in the firm.

Considering the years of operation of the company, the larger number of respondents are from the company having more than 10 years of establishment which counts 68.3%, followed by 5 to 10 years of operating counts 24 % and the least respondents counter from the firm operating less than 5 years which were 7.7%.

Based on the assessment done whether the respondents had reverse logistic training or not, larger numbers of the respondents, 62.5% have no training about RLM.The reaming 37.5% of the respondents were took the RLM training.

5.1.2. Summary of Reverse logistics practices

The implementation of reverse logistics practice helps a company to take back returned products and handled for the safe removal from the supply chain without miss using the damaged or expired products. The most known reverse logistics procedures are reuse, recycle,recall,remanufacture, refurbishing landfill and control incineration. Firms should know and decide which reverse logistics practice to use in a way they can minimize the cost of return handling and maximize the benefit they can get as much as possible. And most of all their concern must be securing the health of the society and on how to preserve the environment from these unused, unfit or unwanted medicines. In the case of pharmaceutical products, removal from the supply chain taken seriously because if not handled properly can cause a serious damage to the life of the society and huge environmental damage as it is made of chemicals (Shaurabh, Saurabh, & Moti,2013).

The first objective of the study aimed to review on the extent of adoption of reverse logistics management practices. The questioner included most of RL practices and the responses review that pharmaceutical manufacturing companies producing human medicine and supplies are not practicing reuse, recycling, remanufacturing and refurbishing reverse logistics practices. The findings showed there is a significant level of adoption of control incineration and landfilling disposal reverse logistic practice .As indicated control Incineration with the mean of 3.58 practiced in large extent and landfill of mean ranking 2.8 practiced in moderate extent .The other reverse logistic practice scoring 2.72 the mean average is recall reverse logistic management practice which practiced in moderate

extent in pharmaceutical companies producing human medicine and supplies. From the score we can infer that the human medicine and supply manufacturing pharmaceutical company does not use reuse, recycle, and remanufacturing and refurbishing reverse logistics management practice. They practice recall in moderate extent and disposal reverse logistics in larger extent.

5.1.3 Summary of Drivers for Adopting Reverse Logistics Practices in Pharmaceutical Manufacturing

As several researches showed, the major reasons a company implementing reverse logistics are Economic, Social/ corporate citizen ship and legislation. The finding tried to explain the drivers of reverse logistics practice from these dimensions.

The health and safety of the society scores the largest mean value of 4.39, which indicates that the priority responsibility of any facility responsible in producing, distributing and as well as delivery of medicine is to keep the safety of the patient. This infer that the companies fulfilling their social, corporate citizen ship and as well as ethical responsibility to serve the society.

Similarly, the other largest mean score is observed in legal requirement which score 4.06.This implies the legislation in pharmaceutical manufacturing inforce the use of recall when defects observed on the product to keep the safety of society, which initiate reverse logistic practice in pharmaceutical manufacturing.

The finding also shows that environmental sustainability and green image of the company plays a vital role for companies to extend their responsibility. As the mean average score of the green image and environmental sustainability indicated (3.9 and 3.72 out of 5) the companies applying the disposal reverse logistics responsibly by dedicating areas in their firm.

The other reasons that drive the company to implement reverse logistic are its economic benefit. Based on the response to customer satisfaction, market share growth, competitive advantage, and recapturing value have mean score of 3.49, 3.25, 3.23 and 2.72.This infers that reverse logistic practices which directly bring profit by reusing, recycling and remanufacturing is not applicable in pharmaceutical company to bring economic value, but increasing customer satisfaction and competitive advantage through implementation of reverse logistic may contribute to the economic value.

Top management interest means average score of 3.34 out of 5.This indicate the interest of the management also contribute for the implementation of reverse logistic management practice.

Similarly the life cycle of the product also score above the mean average which is 2.91 out of 5 also moderately contribute for the implementation of reverse logistic practice.

5.1.4. Summary of Challenges of reverse logistics practices in pharmaceutical manufacturing

There are different challenges encountered in implementing reverse logistics. The most known challenges observed and reviewed in different literature are lack of tracking and traceability, financial constraints, lack of strategic planning, lack of infrastructure, lack of top management interest, lack of training about RL and lack of information about RLM regulation. Based on this the largest mean score observed as a challenge are lack of tracking and traceability of the product which has a mean average score of 3.61.This indicate the absence of application of standardizing the product using bar code and other tools in the sector was a big challenge for its traceability during applying reverse logistics from different destination point.

Similarly, financial constraint mean average is 3.57, which indicate implementation of reverse logistics requires investments of capital on technology of tracking and tracing, infrastructures as well as transportation signifies the challenge.

Lack of strategic planning with the mean score of 3.53 out of 5 showed lack of strategy to implement and manage reverse logistics is one of the main challenge observed. Lacks of reverse logistic training also score 3.34 out of5, which indicate and correlate with the demographic data having RL training or not. Lack of Infrastructures (mean score of 3.19) to facilitate the logistic is also the main challenge observed in Ethiopia in general also contributor for the challenges of implementation of reverse logistics. The other challenges of implementing reverse logistics is top management interest with the mean score of(3.33), especially firms correlate implementing reverse logistic as the challenge in quality, image of the company as well as loss of profit of the company. Lack of understanding and also lack of information showed a significant challenge in implementation of RL with the mean score of 3.12 and 3.11 out of 5.

Lack of cooperation between supply chain partners, lack of legislation and enforcement polices and lack of customer awareness challenges the implementation of reverse logistic in moderate extent as observed in average mean value of 2.9, 2.7 and 2.64 out of 5.This implies this challenges affect in small to moderate extent the implementation of RL in pharmaceutical manufacturing companies.

The least challenge is lack of handling of returns with the average mean score of 2,5 the result showed that there is handling and disposal method of returns in pharmaceutical manufacturers.

5.1.5. Summary of RLM practice level in pharmaceutical companies

The general assessment done to explore the level of the pharmaceutical manufacturing firms reverse logistic management practice are summarized as follow.

Difficulty in predicting returns especially recall in this case was one of the main reasons the pharmaceutical companies least practices reverse logistics management. Marketing of used or returned product was difficult and also not applied to pharmaceutical products as reuse is not applicable in this sector. And transporting from different destination also complicated due to the absence of tracking and traceability issues. Some of the respondents also show difficulty of clarity which disposal method to use is also one of the reasons.

Visibility cost and Product lifecycle are another reason why pharmaceutical company's moderately considers implementing reverse logistic management in the sector.

As review by the respondents answer and analysis, pharmaceutical manufacturers have moderate experience in developed plan in case of recall, regular assessment of preparedness in case of recall and also supply chain partners know RL practice but lack of cooperation between supply chain partners observed.

The main result showed in this response are absence of organized RL team, no developed technology for tracing and absence of designed reverse logistic network in the pharmaceutical manufacturing sector.

5.2 CONCLUSIONS

From the result and discussion it can be concluded that pharmaceutical companies producing human medicine and supply had adopted reverse logistic practices to small levels. The reverse logistics practices common to these pharmaceutical companies are recall and disposal reverse logistic practice (control Incineration and landfill).Especially, recall is not a continuous reverse logistic management practice, it depends on challenges and problem encountered during the supply chain process, and this is indicated on the descriptive analysis mean result. Reuse, recycle, remanufacturing and refurbishing practice are not common practice in these companies.

Bloomberg (2008) indicated that the general direction in global pharmaceutical reverse logistics comprises of recall management, disposal and destruction management as well as asset recovery with optimization of transport cost.

According to the descriptive analysis result, the major drivers to adopt and practice RLM in pharmaceutical industries are the health and safety of the society, legal requirements environmental sustainability, green image of the company also showed a positive relationship with the practice of reverse logistic management practice. Recapturing value and life cycle of the product showed least drivers with the practice of RLM.

Based on the results and analysis, the principal problems in reverse logistics implementation were perceived to be the lack of tracking and traceability and financial constraints are significantly association to the practice of RLM.

As Kwame O. and Kwame N (2014), explained, the ability to track, retrieve and manage return product in the entire supply chain is of primary importance in the pharmaceutical manufacturing sector.

Lack of strategic planning, lack of top management interest and lack of training also the main challenges affecting the RLM practice. However, the results indicated that lack of rules of handling returns, lack of legislation and enforcement polices and lack of customer awareness tended to be perceived as problems to a lesser extent.

Generally the study concluded that pharmaceutical companies producing human medicine and supply manufacturer practiced reverse logistic management in small extent specifically disposal reverse logistic practices and recall. Reuse, recycle, remanufacturing and refurbishing are not practiced. These practices are mainly derived by legislation and prioritizing the health and safety of the population. And challenged by lack of tracking and traceability technology, lack of allocated finance and lack of strategic plan for the reverse logistic practices.

5.3 RECOMMENDATIONS

As the findings show that adoption of the reverse logistics practice in pharmaceutical manufacturing is at the moderate scale. Applying reverse logistic practice in pharmaceutical manufacturing need to be emphasized due to the increase in an unfit, expired or counterfeit pharmaceutical inters the market in an unlawful way and misdistribution which cause high risk to the human life.

Based on the conclusion of the study the following recommendation are stated

- Companies should invest in appropriate tracking and tracing technology to implement reverse logistic practice as well as differentiating there products from counterfeit product in the market
- Companies consider reverse logistic management practice as one of the important supply chain process, so that they invest and allocate finance for its implementation. This can be achieved by the support and increase understanding of the importance of RLM by the top managements.
- Government especially regulatory body EFDA in this case should also put enforcement polices or directive in place for the implementation of reverse logistic practices by developing strategic planning.
- Responsible body should give emphasis on creating awareness and increase understanding by training the guideline for recall handling ,disposal methods and generally reverse logistic management practices
- Companies should invest to build well organized and technologically supported disposal reverse logistic management and waste treatment to assure environmental sustainability
- Responsible body should search for any possibility and an opportunity to consider other reverse logistic practices with preset criteria’s to recapture economic value from reverse logistic management practices.

5.4 Suggestion for future work

Further Studies that need to be done to assess the practice of reverse logistics are stated as follow

- This study focused on human medicine and supply manufacturing industries, further studies should include other wings of the pharmaceutical industry to get the full picture of the reverse logistic practice in pharmaceutical manufacturing in Ethiopia
- Detailed studies need to be conducted to know the economic benefit of reverse logistic from different supplier and manufacturing level
- Reverse logistic management practice and its implementation in the value chain of the pharmaceutical sector should be studied to get the level of understanding and practice in the supply chain

6. Reference

Abbas, H. and Farooquie,A. (2018) Framework for Reverse Logistics Practices in Pharmaceutical Supply Chains. International Journal of Pure and Applied Mathematics Volume 119 No. 16 2018, 2343-2358 ,ISSN: 1314-3395

Ali, C.M.S.E. (2017) "Analyzing Pharmaceutical Reverse Logistics Barriers," *International Journal of Applied Logistics*, 7(1), pp. 16–48.

Bhattacherjee, A. (2012) *Social Science Research: Principles, Methods, and Practices*.

Blomberg, R. (2008) Modern pharmaceuticals. W.W.W.blumberg-advisor.com/portals

Carter,C.R.and Ellram, L.M. (1998). Reverse logistics: A review of the literature and framework for future investigation. International Journal of Business Logistics, 19(1):85{102.

Chouinard, M., D'Amours, S. and Ait-Kadi, D. (2005) "Integration of reverse logistics activities within a supply chain information system," *Computers in Industry*, 56(1), pp.105–124.

Cousins,P.,Lamming,R.andSquire,B.(2008)Strategic Supply Management : Principles,Theories and Practice .International Journal of Operations &Production Management, 26: 697-702.

De Brito, M.P. and Dekker, R. (2003) *Reverse Logistics: A Framework* Erasmus University Rotterdam Econometric Institute Report EI 2002-38

De Brito, M.P. and Dekker, R. (2003) *Reverse Logistics: A Framework*. Rottedam School of Management: Erasmus Research Institute of Management. ERIM

Dekker, R., Fleischmann, M., Inderfurth, K., and van Wassenhove, L. N. (2013) Reverse logistics: Quantitative models for closed-loop supply chains. Berlin, Germany: Springer Science & Business Media.

Ferguson, N. and Browne, J. (2001) 'Issues in end-of-life product recovery and reverse logistics'. Production Planning & Control, Vol. 12, No. 5, pp.537–547.

Carvalho, J. (1984) "Archival application of mathematical sampling techniques", Records Management Quarterly

Dembi,. (2016) The Challenges and prospects of Implementing reverse logistics in pharmaceutical in the case of EPHARM.

Imões, R., Carvalho, C., Félix, R. and Arantes, A. (2017).Survey of Reverse Logistics Practices - The Case of Portugal. *Proceedings of the 6th International Conference on Operations Research and Enterprise Systems*

Johnson&Johnson.Johnson&Johnsonrecallletter(2021).https://www.jnj.com/johnson-johnson-consumerinc-issues-voluntary-recall-of-specific-neutrogena-and-aveeno-aerosol-sunscreen-products-due-to-the-presence-of-benzene

Kabir, M. I. (2013). Reverse Logistics in Pharmaceutical Industry. International Journal Of Supply Chain Management, 2(1).

Kokkinaki, A.I., Dekker, R.,Rene` de Koster and Pappis, C.P. (2001). From e-trash to e-treasure: how value can be created by the new e-business models for reverse logistics.

Kothari, W. (2004) Research Methodology, 2nd Edition, New age international publisher, India

Kwame, O., Bernice, D., Daniel, V., Reginald, N., and Hilda, P. (2014). Reverse logistics practice in pharmaceutical manufacturing industry experience from Ghana. Global journal of business research, 17-26.

Manjo, K. T., & S., S. (2016). Development of conceptual framework for household medicine disposal practices in India and its impact on environment.World journal of pharmacy and pharmaceutical sciences, 2269-2280.

Makaleng, M.S.M. and Lambert, K.R.(2021).Evaluation of Reverse Logistics in Challenges within the Manufacturing Pharmaceutical Companies *Emerging Science Journal*, 5(4), pp.486–496.

Mesfin, S. (2016). The Curriculum Development Process of the New Engineering Education Program and Its Practices in Ethiopia: The Case of Three Higher Engineering Education Institutions.

Mogaka, L. M. (2015). The influence of reverse logistics practices of returned new products on performance of pharmaceutical firms in Nairobi city country, Kenya.

Raman,M.M. and Peir,W.P. (2006) 'Awareness of corporate social responsibility amongst Malaysian small and medium-sized enterprises: an exploratory study', Proceedings of the SME-Entrepreneurship Global Conference, Malaysia.

Ravi, V.and Shankar,R.(2005).Analysis of interactions among the barriers of reverse logistics.*Technological Forecasting and Social Change*, 72(8), pp.1011–1029.

Rogers, D.S.,Tibben-Lembke, R.S. and Reno, N. (1999). *Going backwards: Reverse logistics trends and practices*. Reverse Logistics Executive Council, Cop.

Ronald, M. Salazar, BS (2012).The effect of Supply Chain Management Process on Competitive Advantage and Organizational Performance. Degree of Master of Science thesis, Department of Systems and Engineering Management Graduate School of Engineering and Management Air Force Institute of Technology Air University

Rubio, S.,Chamorro,A. and Miranda, F.J. (2008). Characteristics of the research on reverse logistics (1995–2005).*International Journal of Production Research*, 46(4), pp.1099–1120.

Shaurabh, S., Saurabh, B., & Moti, K.(201 3).Strategic Framework for reverse logistics in Pharmacuetical Industry. Asian Research journal of business management

Kumar,S., Dieveney,E. and Dieveney, A.(2009). Reverse logistic process control measures for the pharmaceutical industry supply chain. *International Journal ofProductivity and Performance Management*, 58(2), pp.188 204.

Sushmita, A. N., Arun, A. E.,and Rupesh, K. P. (2012). Analyzing reverse logistics in the Indian pharmaceuticals industry: A system approach. Technology, Innovation and supply chain management, 16-19

Sharma,T.,(2020) Reverse logistics in pharma industry.

The Ethiopian Herald, 17 April 2018, Ethiopia: Raising Guard on Substandard, Counterfeit Drug.

USAID Global Health Supply Chain Program, Procurement and Supply Management (2018). Global Standards in Low- and Lower- Middle Income Settings: Policy Design Considerations to Address Domestic Manufacturer Needs.

Venkatesh, M.P.,Bigoniya, D. and Kumar, T.M.,(2017) Pharmaceutical product recall procedures in India, South Africa and China.International Journal of Pharmaceutical Sciences Review and Research.

Waqas, M.,Dong, Q.,Ahmad, N.,Zhu, Y.and Nadeem, M. (2018). Critical Barriers to Implementation of Reverse Logistics in the Manufacturing Industry: A Case Study of a Developing Country. *Sustainability*,10 (11),p.4202.

Yamane, T. (2013). Elementary sampling theory. Journal of the Royal Statistical Society 62(5):649-764

https://cdn.who.int/media/docs/default-source/substandard-and-falsified/n6_2022_contaminated-pediatric-syrups_en.pdf?sfvrsn=e8e0175c_6

https://cdn.who.int/media/docs/default-source/substandard-and-falsified/n7_2022_contaminated-paediatric-syrups_en.pdf?sfvrsn=48a2d29c_1

https://cdn.who.int/media/docs/default-source/substandard-and-falsified/n1_2023_contaminated-syrup_en.pdf?sfvrsn=18ff5f62_8

https://www.industryweek.com/supply-chain/article/21959697/reverse-logistics-in-the-pharmaceutical-industry-is-so-important

https://jungleworks.com/reverse-logistics-in-pharma-industry

https://www.drugoffice.gov.hk/eps/do/en/doc/guidelines_forms/Pharmaceutical_Products_Recall_Guidelines.pdf

https://en.wikipedia.org/wiki/Pharmaceutical_industry

https://www.fda.gov/drugs/drug-safety-and-availability/drug-recalls

https://www.sahpra.org.za/wp-content/uploads/2019/10/MSA-cough-and-cold-medicines-1.pdf

Annex-1 Data collection Questioner

Addis Ababa University

School of Commerce

MA program in Logistics and Supply chain Management

Dear respondents,

The following questions are prepared for masters of logistic and supply chain management thesis work topic. The topic is **Reverse logistic practice, drivers and challenges in pharmaceutical industry in Ethiopia.**

The study is purely for academic purpose and will remain confidential and not to be used to assess your performance; thus, not affects you in any case. Please also make sure that you are not forced to reply any of the questions that you are not comfortable with. However, I encourage you to provide your best of knowledge on the questions so that the study will be useful. Finally, I would like to appreciate and thank you in advance for your dedication, time and genuine response to the questions.

Asnakech Abate

0940240096

Section I: Background Information

1. Socio-demographic characteristics of informants

1. Gender Male ---------- Female----------

2. Age Less than 25 Years ---------- 26-34 Years----------

35-44 Year ---------- 45-54 Years----------

Over 54Years----------

3. Educational Background

Certificate---------- Diploma----------

BA/BSC Degree---------- MSc/ MA----------

If other, please specify _____

4. Position in the company …….

5. How many years have you been employed in the pharmaceutical sector?

1-5 Years---------- 6-10 Years----------

11-15 Years---------- Over 15 Years----------

6. How long have you worked in this company? _____ Years

7. How long has this company been operating? _____ Years

8. Have you attend any training about reverse logistic in your company?

Yes---------- No----------

Section II: - structured questionnaires (please put your response inside the table)

Reverse logistics practice

Indicate the extent to which your firm has adopted the following reverse logistics practices by ticking the appropriate box using the following scale:

I=Not at all, II=Small Extent, III=Moderate extent, IV= large extent, V=Very large extent

Reverse logistics practice	I	II	III	IV	V
Reuse					
Recycling					
Recall					
Landfill					
Remanufacturing					
Controlled Incineration					
Refurbishing					

2. Drivers for Adopting Reverse Logistics Practice

Indicate the main factors that cause the adoption of reverse logistics practice in your firm by ticking the appropriate box using the following scale:

I=Not at all, II=Small Extent, III=Moderate extent, IV= large extent, V=Very large extent

Drivers of reverse logistic practice	I	II	III	IV	V
Legal requirements					
Market share growth					
Customer satisfaction					
Competitive advantage					
Recapturing value of returned products					
Environmental sustainability					

Green image of the company					
Health and safety of the population					
Lifecycles of Product					
Top management support					
If other please specify					

3. Challenges of Implementing Reverse Logistics Practice

To what extent are the following challenges experienced in your firm when implementing reverse logistics? Indicate your answer by ticking the appropriate box using the following scale:

I=Not at all, II=Small Extent, III=Moderate extent, IV= large extent, V=Very large extent

Challenges of reverse logistics implementation	I	II	III	IV	V
Lack of strategic planning related to reverse logistics					
Lack of training about reverse logistics					
Lack of top management interest					
Lack of Understanding the Importance of reverse logistics					
Lack of cooperation between supply chain partners					
Financial constraints					
Lack of tracking and traceability technology					
Lack of information about reverse logistics regulations					
Lack of infrastructure					
Lack of legislation and enforcement policies					
Lack of customer awareness					
Lack of definite rules and regulations on handling returned products					

If other, please specify	

4. **Reasons that affect the implementation of reverse logistics by sector.**

Factors that may affect the implementation of reverse logistics in pharmaceutical sector. Tick the appropriate box by using the following scale:

I=Not at all, II=Small Extent, III=Moderate extent, IV= large extent, V=Very large extent

Factors affecting implementation of RL	I	II	III	IV	V
Uneven returned product					
Difficulty in predicting returns/recalls					
Visibility/Viability of costs					
Transportation from many places to one/few places					
Poor inventory management					
Product lifecycle issues					
Lack of clarity in relation to the disposal options					
Difficulties in marketing used products					
If other, please specify					

5. Level of Implementation of reverse logistics

Reverse logistics implementation assessment in pharmaceutical manufacturing. Tick the appropriate box by using the following scale:

I=Not at all, II=Small Extent, III=Moderate extent, IV= large extent, V=Very large extent

Assessing implementation of RL	I	II	III	IV	V
Organized reverse logistics team Present					
Regular assessment of preparedness in case of recall					
Developed plan in case of product recall					
Designed reverse logistic network that minimize the supply chain cost in case of recall					
Employee understands about reverse logistic action					
Supply chain partners knows about reverse logistic action					
Developed technology for tracing recalls					
If other, please specify					

6. What opportunities do you think the future holds to your firm for improving and implementing reverse logistics practice?

_____

_____

Thank you for your time and cooperation!

Annex-2 SPSS OUT PUT

Descriptive

Sex of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
	Male	63	60.6	60.6	60.6
	Female	41	39.4	39.4	100.0
	Total	104	100.0	100.0	

Age of respondent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 25	3	2.9	2.9	2.9
	26-34	45	43.3	43.3	46.2
	35-44	39	37.5	37.5	83.7
	45-54	11	10.6	10.6	94.2
	greater than 54	6	5.8	5.8	100.0
	Total	104	100.0	100.0	

Educational background

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BA/BSc	68	65.4	65.4	65.4
	MSc	36	34.6	34.6	100.0
	Total	104	100.0	100.0	

Position in the company

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	GM	11	10.6	10.6	10.6
	Technical manager	12	11.5	11.5	22.1
	Quality manager	19	18.3	18.3	40.4
	production manager	18	17.3	17.3	57.7
	logistic dep	13	12.5	12.5	70.2
	marketing	11	10.6	10.6	80.8
	sales	11	10.6	10.6	91.3
	finance	9	8.7	8.7	100.0
	Total	104	100.0	100.0	

Years of employments in the sector

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5 years	32	30.8	30.8	30.8
	6-10 years	34	32.7	32.7	63.5
	11-15 years	28	26.9	26.9	90.4
	over 15 years	10	9.6	9.6	100.0
	Total	104	100.0	100.0	

working years in the company

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 5	43	41.3	41.3	41.3
	greater than and equal 5	61	58.7	58.7	100.0
	Total	104	100.0	100.0	

years of company operating

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 5	8	7.7	7.7	7.7
	5-10	25	24.0	24.0	31.7
	greater than 10	71	68.3	68.3	100.0
	Total	104	100.0	100.0	

Reverse logistics training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	39	37.5	37.5	37.5
	no	65	62.5	62.5	100.0
	Total	104	100.0	100.0	

Descriptive

Statistics

		Reuse	Recycle	Recall	Landfill	Remanufacturing	Control Incineration	Refurbishing
N	Valid	104	104	104	104	104	104	104
	Missing	0	0	0	0	0	0	0
Mean		1.65	1.53	2.72	2.80	1.73	3.58	1.67
Mode		1	1	3	4	1	4	1
Std. Deviation		.973	.934	1.056	1.332	.958	1.349	.960
Variance		.947	.873	1.116	1.774	.917	1.819	.921

Descriptive statistics

Drivers of RLM	N	Mean		Std. Deviation
	Statistic	Statistic	Std. Error	Statistic
legal requirement	104	4.06	.091	.933
market share growth	104	3.25	.103	1.050
customer satisfaction	104	3.49	.100	1.024
competitive advantage	104	3.23	.098	.997
Recapturing value	104	2.72	.104	1.065
Environmental sustainability	104	3.72	.091	.929
Green image of the company	104	3.90	.092	.940
Health and safety of the population	104	4.39	.093	.949
Lifecycles of the product	104	2.91	.126	1.286
Top management	104	3.34	.108	1.103
Valid N (list wise)	104			

Descriptive

Descriptive Statistics

	N	Mean	Std. Deviation
lack of strategic planning	104	3.53	1.157
lack of training	104	3.34	1.076
lack of top management interest	104	3.33	1.119
lack of understanding	104	3.12	1.046
Lack of cooperation b/n supply chain	104	2.90	1.111
financial constraints	104	3.57	1.121
lack of tracking and traceability	104	3.61	1.074
lack of information about RL regulation	104	3.11	1.096
lack of infrastructure	104	3.19	1.062
Lack of legislation and enforcement polices	103	2.70	1.046
lack of customer awareness	104	2.64	1.060
lack rules of handling returns	104	2.51	1.014
Valid N (list wise)	103		

Descriptive Statistics

	N	Mean	Std. Deviation
uneven returned product	104	2.86	1.118
Difficulty in predicting returns	104	3.48	1.106
Visibility cost	104	2.68	1.082
transportation from many place/few	104	2.95	.939
poor inventory management	104	2.22	1.114
product lifecycle	104	2.61	1.573
lack of clarity of disposal	104	2.97	1.127
difficulties in marketing used product	104	3.31	1.344
Valid N (list wise)	104		

Descriptive Statistics

	N	Mean	Std. Deviation
Organized RL team present	104	2.00	1.262
regular assessment of preparedness	104	2.70	1.023
developed plan in case of recall	104	2.81	1.115
designed reverse logistic network	104	2.41	1.085
employee understands about RL	104	2.51	1.024
supply chain partners knows RL	104	2.86	.949
developed technology for tracing recall	104	2.07	.988
Valid N (list wise)	104		

Annex -3

Lists of pharmaceutical manufacturers in Ethiopia

N/o	Name of the company	Address
1	Addis Pharmaceutical Factory Sh.co	Addis Ababa
2	East African Pharmaceuticals PLC	Addis Ababa
3	Kilitch Estro Biotech plc (cGMP approved)	Oromia,Sendafa
4	Sino Ethiop Associate Africa PLC	Oromia,Gelan
5	The New Millinnium World Medical device manufacturing Plc.	Addis Ababa,Killinto IP
6	Sanshing Pharmaceutical(cGMP approved)	Oromia,Bishoftu
7	Julphar Pharmaceuticals PLC	Addis Ababa
8	Pharmacure PLC	Addis Ababa
9	Cadila Pharmaceuticals (Ethiopia) PLC(cGMP approved)	Oromia,Gelan
10	Ethiopian Pharmaceutical Manufacturing S.c	Addis Ababa
11	Humnwell pharmaceutical EthiopiaPLC(cGMP approved)	Amahra,Hager Mariam
12	Medisol Pharmaceuticals	Addis Ababa
13	Access Bio Inc. PLC	Addis Ababa
14	B.G.I Ethiopia	Addis Ababa
15	CGF	Oromia,Sebeta
16	Glocare Pharma	Addis Ababa,Kilinto IP
17	SAMIDE	Oromia,Dukem

Source: FBPIDI