Reverse Logistics Practice, Challenges, Opportunities and Employee's Perception: The Case of Ethiopian Pharmaceuticals Supply Service

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Reverse Logistics Practice, Challenges, Opportunities and Employee's Perception: The Case of Ethiopian Pharmaceuticals Supply Service

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This is to certify that the thesis prepared by Hirut Mebrate entitled ***Reverse Logistics Practice, Challenges, Opportunities and Employees Perception: - The Case of Ethiopian Pharmaceuticals Supply Service***, and submitted in partial fulfillment of the requirements for the degree of Master of Science (MSc.) in Health Supply Chain Management complies with the regulations of the University and meets the accepted standards concerning originality and quality.

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Abstract

In the pharmaceutical industry, reverse logistics specifically refers to a return of pharmaceuticals due to over-stock, distribution error, damage, quality problems including counterfeit products, expiry and clinical trial recoveries. A good reverse logistics system keeps the public's safety, saves costs, and gains a competitive advantage including increased reliability of the supplier. Despite its importance, in developing countries, attention given to RL activity is minimal compared to the forward logistics, and Ethiopia's practice isn't an exception. This study aimed to explore the current reverse logistics practice of EPSS and document the challenges, opportunities and employee perceptions associated with its implementation. An institutional-based cross-sectional study design was used and data were collected using a self-administered questionnaire, key informants' interview and data abstraction tool. The self-administered questionnaires were distributed to 158 professionals and were supplemented by in-depth key informant interviews with 11 directors working in the selected EPSS hubs. The collected quantitative data were analyzed using SPSS V-26 descriptive statistics and the qualitative findings were analyzed with generated six themes. The study revealed that reverse logistics practice exists in EPSS. However, the practice is in its premature stage as it lacks core components of planning, designing and standardization of the process, and setting a well-documented policy and procedure for RL. The main driving forces were increasing stock availability and customer satisfaction followed by the government policy of social responsibility. The key challenges arise from a lack of definite rules and regulations on handling returned products, the unpredictability of return dynamics and forecasting complexity coupled with a lack of appropriate technology. The leading opportunities were found to be the existence of responsible RL and incinerator management directorate, and high-temperature incinerator availability. Employees have a positive perception towards RL practice and believe that RL increases customer satisfaction and brings a competitive advantage. Based on the findings, it is recommended that EPSS to focus on the pre-planning activities of RL and follow its cost-effective implementation, strengthening communication with both upward and downward supply chain partners as well as improving the management commitment towards RL practice.

Keywords: -*challenges, EPSS, Ethiopia, reverse logistics, return management*

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Acronyms

AAU	Addis Ababa University
ART	Anti-Retroviral Treatment
BPR	Business Process and Reengineering
EPSA	Ethiopian Pharmaceutical Supply Agency
EPSS	Ethiopian Pharmaceutical Supply service
HCSMIS	Health Commodity Supply Management Information System
HSTP-I	Health System Transformation Plan one
HSTP-II	Health System Transformation Plan two
IPLS	Integrated Pharmaceutical Logistics System
MOH	Ministry of Health
PFSA	Pharmaceutical and Fund Supply Agency
RDF	Revolving Drug Fund
RL	Reverse Logistics
RSC	Reverse Supply Chain
SC	Supply Chain
SCM	Supply Chain Management
SPSS	Statistical Package for Social Science

Chapter one

1. Introduction

Reverse logistic is relatively a recent practice in pharmaceutical logistic system compared to forward logistics. Globally, government and private companies practice reverse logistics to recapture value or safely dispose products. However, there is a limited data about pharmaceutical reverse logistic practice in Ethiopia. The aim of this study is to assess the current reverse logistics practice, associated challenges and opportunities at the Ethiopian Pharmaceutical Supply Service (EPSS) in 2022/23.

1.1. Background of the study

According to Reverse Logistics Executive Council, reverse logistics is defined as the "*planning, controlling, and implementing the cost-effective flow of raw materials, finished products, in process inventory and related information from the point of consumption to the point of origin to recapture value or proper disposal*" (Rogers and Tibben-Lembke, 1998, 2001). Products can be returned from the point of consumption to the point of origin for many reasons. Major activities of reverse logistics include processing of products returned due to damage, restock, recalls, excess inventory, salvage, and seasonal inventory(Narayana, Elias and Pati, 2014; Rogers, Melamed and Lembke, 2012). It also incorporates recycling programs of hazardous material, obsolete equipment disposition and asset recovery (Tonanont, 2009; Kaluarachchi *et al.*, 2019).

In the past two decades, the reverse logistics concept has become a global issue (Kwateng and Debrah, 2014; da Silva et al., 2022). A good reverse logistics system keeps the public safe, saves costs, increase revenues, and gives competitors a competitive advantage. Additionally, it increases customer satisfaction and supplier reliability (Singh, Kumar and Kumar, 2016). Most companies in developed countries have started to adopt and give more attention to reverse logistics strategies to gain value from returns. Whereas, in developing countries, reverse logistics is way back compared to forward logistics due to the attention given for it (Larsen et al., 2018; da Silva et al., 2022).

Lack of a formal channel for reverse logistics pushes returned products to stay uncollected in the supply system allowing expired, counterfeit, relabeled and stolen products to freely circulate in the black market and this continued to pose a major threat to the public (Kwateng and Debrah, 2014; Singh, Kumar and Kumar, 2016; Larsen *et al.*, 2018). Thus, it is important to implement proper reverse logistics system to provide safe and cost-effective products (Kumar, Dieveney and Dieveney, 2009; Tonanont, 2009; da Silva *et al.*, 2022).

In the pharmaceutical industry, reverse logistics specifically refers to a return of pharmaceuticals due to over-stock, distribution error, damage, quality problems including counterfeit products, expiry and clinical trial recoveries (Kwateng and Debrah, 2014; Narayana, Elias and Pati, 2014). The nature of reverse logistics in the pharmaceutical industry differs from other manufacturing industries because returned and retrieved products are rarely repaired or recycled instead destroyed and disposed-off in environmentally friendly way (Kabir, 2013; Kwateng and Debrah, 2014; Hosseini-Motlagh, Jazinaninejad and Nami, 2022).

The ability to manage, track and retrieve returned pharmaceutical products in the entire pharmaceutical supply chain is very important. Worldwide, unrecovered expired pharmaceutical products are causing major health problems (Vatovec *et al.*, 2021; da Silva *et al.*, 2022). Studies show that only 3-4% of pharmaceutical products get back to the manufacturer for proper disposal (Kwateng and Debrah, 2014).

In Ethiopia, the exact extent and whereabouts of unused medications is unclear. According to Ministry of Health study done in 2020, 64 out of 82 public hospitals (82%) reported having unfit for use medications in the hospitals that worth 57,374,603.59 birr by value and only 20% of these hospitals disposed of the unfit-for-use medicines at least in the previous year of 2018/19. The average wastage rate in these hospitals was 3.9% (2% for program medicines and 1.9% for Revolving Drug Fund) (FMOH, 2020). Similarly, the national Integrated Pharmaceutical Logistics System (IPLS) survey report of 2018, confirmed that national wastage rate has been 5.5% and 7.1% for Revolving Drug Fund (RDF) and program drugs respectively that is far from the National Health Sector Transformation Plan one (HSTP-I) agenda of reducing pharmaceutical wastage rate from 8% to 2% (FMOH, 2015, 2020; EPSA, 2018a)

The above studies assessed major factors that contributed towards medicine wastage. The result showed that supply of near expiry medicines, unrequested donation and application of push system for some of the items, poor inventory management, lack of stock rotation or exchange policy, lack of communication among stakeholders were major factors contributing for wastages (EPSA, 2018b; FMOH, 2020)

Therefore, this study aimed to study the current challenges of reverse logistics practice and pinpoint opportunities and explore employee's perception towards reverse logistics practice at Ethiopian Pharmaceutical Supplying Service, and propose recommendations for policy and decision-makers to act upon.

1.2. Statement of the problem

Pharmaceutical wastage cannot be eliminated but can be reduced to acceptable level. One means of reducing wastage is improving the pharmaceuticals supply management and the efficiency of budget utilization. One of the strategies used to improve the pharmaceuticals supply management is reverse logistics implementation (Sushmita *et al.*, 2012; Narayana, Elias and Pati, 2014). Unfortunately, studies done on reverse logistics in the pharmaceutical industry are so limited compared to other industries. Of these studies most of them focus on manufacturing companies, and very few focuses on health facilities (Sushmita *et al.*, 2012; Weraikat, Zanjani and Lehoux, 2019; Lima *et al.*, 2022).

According to Weraikat *et al.* worldwide, 20% to 40% of the unused medications remain uncollected in the supply chain. Developed countries like the US are forcing organizations to invest in reverse logistics processes to ensure the proper use and disposal of their products (Weraikat, Zanjani and Lehoux, 2019). However, it is still emerging in developing countries. Govindan and Soleimani states that despite worldwide growing acknowledgement of reverse logistics (RL), organizations in developing countries consider this practice as an extra burden rather than a waste and cost reduction mechanism. Therefore, the practice was overlooked, and the issue lacked due attention by managers (Tonanont, 2009; Govindan and Soleimani, 2017; Ebrahim, Teni and Yimenu, 2019; Lima *et al.*, 2022).

In Ethiopia, EPSS, sole governmental pharmaceuticals supplying organization, takes the biggest share and responsibility importing and distribution of pharmaceuticals for public health facilities.

Following the implementation of business process re-engineering (BPR) and restructuring of the agency in 2018, the agency identified that equipping and introducing a proper pharmaceutical waste management and reverse logistics operation is one of the focus areas of the organization (EPSA, 2018a, 2018b). In its transformation plan, EPSS included pre-planned redistribution of items having less than six months of expiry and implementation of 'reverse logistics operation' as a means of wastage reduction and proper utilization of products. Furthermore, equipping EPSS with modern incinerators and strengthening the closed loop SCM network throughout the country hubs recommended as a means of disposition of expired and damaged pharmaceutical products (EPSA, 2018b). To support the plan, MOH funded 3.6million USD for procurement and installation of eight high temperature incinerators. The recommendation aligns with one of HSTP-II major strategy to implement reverse logistics at health facilities and pharmacy retail outlets that extends to households (EPSA, MOH, 2021).

However, during the same period, a performance report of EPSS from June – December 2018, showed that health products costing 116 million ETB expired and 214 million ETB was the cost of health products that have less than six months of expiry in the warehouses. Adding the two, products with less than 6 months of expiry and expired, approximately 330 million ETB were at risk within the specified time in all hubs which puts RL practice in question (EPSS, 2019). Previous studies focused on RL challenges in pharmaceutical manufacturers and health facilities that creates a breach of information regarding pharmaceutical suppliers. A study made at EPSS Jimma hub assessed RL challenges and disposal practice which is specific to the hub. Additionally, this study didn't investigate employee's perception which is one of the factors that affects RL practice.

Therefore, this study assessed the RL practice challenges, opportunities and employee's perception at the sole public owned pharmaceuticals supplying company, EPSS head office and selected hubs.

1.3. Significance of the study

The findings of this study will enhance a better understanding of reverse logistics' importance for pharmaceutical supplying companies. The result of the study is expected to reveal the challenges of reverse logistics practice in EPSS for decision-makers to act. The study is expected to reveal existing opportunities that facilitate reverse logistics practice in EPSS. Additionally, the study will disclose employees' attitude towards reverse logistics practice.

Furthermore, the study will also serve as input for policymakers to formulate policies and strategies to establish an efficient, sustainable, and environment-friendly reverse logistics system.

Moreover, the study could serve as a source of secondary data for different interested researchers in conducting research in reverse logistics, and it can be a basis from which the researchers can draw ideas.

1.4. Research questions

This research aims to answer the following questions.

1. Which reverse logistics practices exist in EPSS?
2. What drives EPSS to implement efficient RL?
3. What are the main challenges faced in implementing RL?
4. What opportunities exist in EPSS to facilitate RL practice?
5. How far the concept of RL recognized by employees?

1.5. Objective of the study

1.5.1. General objective

To explore the reverse logistics practice of EPSS, challenges, opportunities and employee's perception associated in its implementation, Addis Ababa, 2022/23.

1.5.2. Specific objectives

- ✓ Assess the status of reverse logistics practice in EPSS
- ✓ Identify driving forces of reverse logistics practice
- ✓ Investigate challenges associated with reverse logistic practice
- ✓ Assess available opportunities that facilitate implementation of reverse logistics
- ✓ Explore perception of EPSS employees towards RL practice

1.6. Scope of the study

This study is designed to assess the current pharmaceutical reverse logistics practice, challenges and available opportunities to practice RL in the Ethiopian Pharmaceutical Supply Service (EPSS). The study geographically covered EPSS's head office and selected hubs. It has focused on current EPSS's RL practice, extent of RL adoption, driving force for its implementation, return reasons, the challenges and opportunities the organization is facing during implementation. The study is not inclusive of facilities served by the hubs.

1.7. Operational definitions

Reverse logistics the process of planning, implementing, and controlling the backward movement of health products from hubs to the central warehouse of EPSS, and from central EPSS to their suppliers for the purpose of redistribution or proper disposal.

Pharmaceuticals medicines, supplies, reagents and medical devices.

Reverse logistics practice when either of reverse logistic activities like recall, redistribution, or disposal are performed in the organization.

1.8. Organization of the study

This study has five chapters. The first chapter, introduces and discuss the background of the study, problem statement, research questions, objectives, scope and significance of the study plus operational definition of key terms. Chapter Two, presents a summary of the related literature review and main findings on RL practices. Chapter three shows the research methodology used, sampling methods, data collection instruments and data analysis used. Chapter four covers the result and discussion portion of the study. Chapter five presents the conclusion and recommendation of the study.

Chapter two

2. Literature review

In this chapter, literature related to reverse logistics practice and important findings from studies are summarized. Using concepts derived from literature, research questions and conceptual frameworks are developed. The reviewed literatures are presented in theoretical and empirical sections. While the theoretical review discusses the concept of RL, RL activities, components of RL, importance, drivers, and challenges of RL practices, the empirical review emphasizes on findings of related literature to develop the conceptual framework.

2.1. Theoretical review

2.1.1. Concept of reverse logistics

In most logistic activities, returns happen and organizations must come up with better solutions and strategies to handle reverse flow of products to increase their profit margins, customer satisfaction and environmental conservation (Mogaka, 2015; Vatovec et al., 2021). Many companies have gained benefits from having a well-organized reverse logistics system in place (Insani et al., 2020; Cricelli, Greco and Grimaldi, 2021).

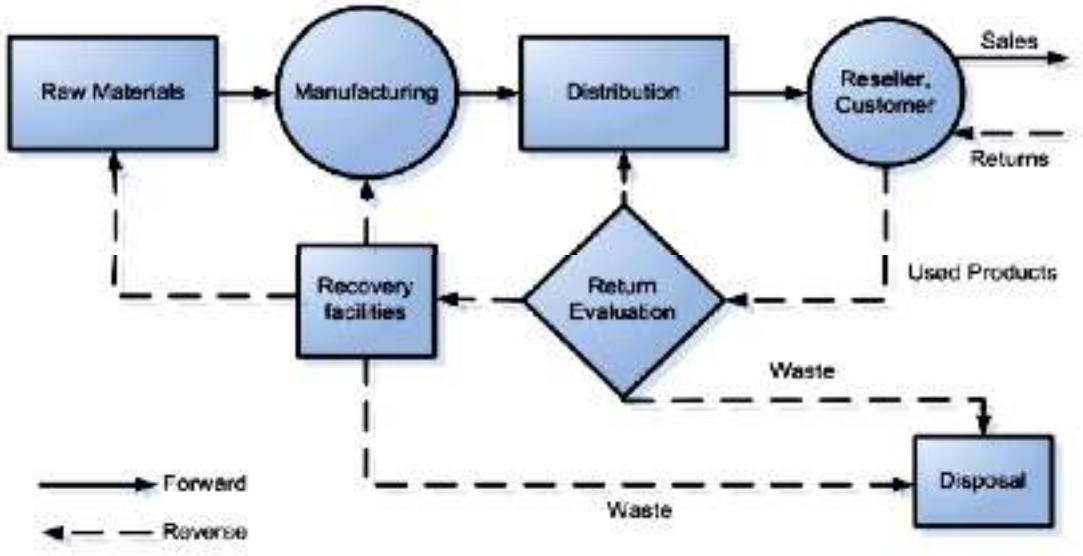

Figure 1 Generic supply chain *Adopted from* (Tonanont, 2009)

Reverse logistics is sometimes used interchangeably with terms such as closed-loop supply chain, green supply chain and green logistics, returns and recycling (Ricardianto *et al.*, 2022). As also considered as a subsection of Closed Loop Supply Chains because it integrates both the forward supply chain and backward logistics (see Figure 1). Reverse logistics is inclusive of the physical handling of the product, arrangements for transportation, and informational support of the entire returns process (G/Hiwot and Temesgen, 2018; Ricardianto *et al.*, 2022).

Management of products in forward and reverse logistics activities differs quietly. In case of forward logistics, product and packaging quality is uniform. The life cycle of the product is well defined by expiry (Dembi and Ensermu, 2016). Marketing method and distribution cost are predetermined, and pricing is relatively uniform. Forecasting is relatively forward as well as transportation schedule and route is clear. There is relatively consistent inventory management and readily available real-time information to track the product (Rogers, Melamed and Lembke, 2012).

Whereas in case of reverse logistics, product and packaging quality is not uniform. The product life cycle is hard to determine. Marketing method and distribution cost are dependent on the status of the returned product, and quite difficult to set a uniform price (Rogers, Melamed and Lembke, 2012). Forecasting is complex and transportation schedule and as well as predetermining route is hard since both are dependent on many factors like product nature, quality and return reason. Inventory management and tracing of the product is less transparent because of not knowing exactly why, when and where products get returned (Rogers, Melamed and Lembke, 2012; Dembi and Ensermu, 2016).

Until recent days, attention and improvement strategies focused forward side of the SC referred to as the 'traditional' supply chain by most scholars. It starts with the movement of the products from manufacturers then to distributors and finally delivering to consumers (de Campos *et al.*, 2017). However, another essential component of the supply chain that deals with product recalls and trade returns plays a significant part in the equation, and this component is called reverse logistics. Reverse logistics was thought to be a minor piece, but now it evolved to be a significant part of managing product flow (Weraikat, Zanjani and Lehoux, 2019; Efendi *et al.*, 2023).

2.1.2. Reverse logistics activities

Generally, activities of Reverse logistics include the course of planning, implementing, and monitoring the efficient and cost-effective flow of returned products. In this process collection, transportation, storing and sorting of returned products are integrated (Srivastava and Karamchandani, 2017; G/Hiwot and Temesgen, 2018; Hosseini-Motlagh, Jazinaninejad and Nami, 2022). An organization that receives a returned product has a lot of options to select from. Generally, Tibben and Rogers classified returns into two parts, product and packaging depending on the type of the returned material (Rogers and Tibben-Lembke, 1998; Olariu, 2014).

Depending on the nature and status of the products or packaging materials, and agreements with the suppliers, returned or recalled products can be either returned to the supplier, resoled, refurbished or remanufactured, recycled or disposed in environmentally friendly way (Rogers and Tibben-Lembke, 1998; Jamshidi, 2011). Similarly, in the pharmaceutical industry, the fate of returned pharmaceuticals is re-distribution, disposal and return to the manufacturer (Dembi and Ensermu, 2016; G/Hiwot and Temesgen, 2018; Efendi *et al.*, 2023).

Generally, products especially medical devises can be returned for direct reuse or upgrading the product through repairing, refurbishing or remanufacturing activities. But if the product is confirmed to be totally damaged or irreparable, material recovery activities like cannibalization or recycling will be performed. Then after safe disposal will take place to those parts which have no use at all (Srivastava and Karamchandani, 2017).

2.1.3. Importance of reverse logistics

Implementation of reverse logistics can bring three advantages for an organization; namely positive environmental impact, competitiveness advancement and regaining value (Xie and Breen, 2012; Kaluarachchi *et al.*, 2019). Positive environmental impact refers to legislation acts; also called “producer responsibility laws” that demand manufacturers to prepare a collection and reuse policy for products at the end of their life cycle. Developed countries force organizations to implement reverse logistics to keep the environment safe (Kumar, Dieveney and Dieveney, 2009;). Engaging organizations in the RL network reduce the amount of pharmaceutical waste generated and disposed of improperly. Furthermore, it is important to select suppliers, wholesalers or

logistics providers that comply with environmental regulations and acquire licenses for these services before contracting (Kumar, Dieveney and Dieveney, 2009; Kaluarachchi *et al.*, 2019).

Competitiveness advancement integrates the concept of efficient handling of returns, and improved customer satisfaction as well as service delivery. This benefits organizations to appear as competitive in the market due to customer recognition (Dembi and Ensermu, 2016). In the long run, this increases market share and sales volume which allows organizations to have less production costs due to bulk production and increase profit margin (Dembi and Ensermu, 2016; Kaluarachchi *et al.*, 2019; Hosseini-Motlagh, Jazinaninejad and Nami, 2022).

Regaining value is a concept of application of efficient reverse logistics by capturing values from returned materials by directly resealing the product as it is, reusing the products or parts as raw material or recycling materials for production (Hosseini-Motlagh, Jazinaninejad and Nami, 2022). This concept applies when the price of raw materials becomes so high and when there is a possibility to use returned products like packaging materials to reduce production costs that will bring significant input for the company in terms of the pricing of products (Govindan and Soleimani, 2017; Khan and Ali, 2022).

Generally, importance of reverse logistics emanates from improving product availability and increase stock turn-over rate which enhance market effectiveness and competitiveness (Baah, C., & Jin, Z. (2019). The other benefit of RL is cost efficiency gained from reselling of used or unwanted products, decreased manufacturing cost from use of recycled raw materials. Additional importance of reverse logistics practice is improvement of customer relation, better firm reputation and global acceptance (David and Shalle, 2014).

2.1.4. Drivers of reverse logistics

Drivers for returns are of two types. The first one is “traditional returns” that refers to unplanned or undesired returns and the second type is “desired” or “planned returns”. The reasons for unplanned product returns can be a defective product, damaged product, recalled product, wrong destiny, wrong item or quantity, expiry, customer’s perception of the product or change of their minds (Huscroft, 2010; Abbas and Farooquie, 2020). Since organizations are unsure of what will

be returned and when, it is challenging to predict unplanned product returns (Huscroft, 2010; da Silva *et al.*, 2022).

Whereas, planned returns are predictable in terms of what will return when that make it much easier for organizations to plan their reverse supply chain. The reasons for planned product returns can be trade-in programs, company takebacks, leased, or rented products and service work (Abbas and Farooquie, 2020; Biru and Denu, 2017). Organizations that provide trade-in programs allow customers to exchange their outdated goods for new ones in exchange for partial credit. Company take-backs are defined as situations in which organizations retrieve end-of-life products from their customers for economic or environmental concerns (Biru and Denu, 2017; Vatovec *et al.*, 2021). Leased or rented products mean when products are returned at the end of a specific rental time. When products are shipped back to a site for maintenance or repairs and then returned to customers is referred as service work (Abbas and Farooquie, 2013; Vatovec *et al.*, 2021).

Furthermore, the other categories for drivers of reverse logistics are external and internal. External drivers arise from social accountability, economic interest, stakeholder pressures, legislation, and ethics (Govindan and Soleimani, 2017). Simultaneously, external pressures can come from the public, customers, government, non-governmental organizations, and even the media forcing organizations to deal with environmental policies (Govindan and Soleimani, 2017; El Baz, Frei and Laguir, 2018).

Internal pressures come from employees, the firm's cost reduction strategy, or from the goal of protecting the intellectual possessions of end-of-life products (Govindan and Soleimani, 2017). Organizations are usually faced with demand from numerous stakeholders to implement RL from both the inside and the outside. The majority of organizations implement RL strategies as a result of their supply chain partners' interest (Antonyová, Antony and Soewito, 2016). However, some organizations consider RL as an undervalued portion of the SC for a number of reasons, for instance, its undefined profitability, lack of technically skilled personnel, and complications with SC partners. But the performance of the organization may suffer if it disregards the interests of several stakeholders (Antonyová, Antony and Soewito, 2016; El Baz, Frei and Laguir, 2018).

2.1.5. Challenges of reverse logistics

Due to several reasons, many organizations are not prepared to handle the challenges that come with the implementation of the RL supply system (Lima et al., 2022). The ability of organizations to effectively control the flow of unwanted products returning from the market is sometimes outpaced by the rapid growth in the volume of returns (Tonanont, 2009; Lima et al., 2022).

Reverse logistics practice challenges can be internal or external. Internal challenges arise from management support, firm's policy, uncertainty, incentive system and employees' attitude. Whereas external challenge comes from customer, government regulation and policy, stakeholders of the supply chain and poor coordination of partners (Huscroft, 2010).

Generally, the challenges organizations face in the practice of reverse logistics are categorized into two (Rogers and Tibben-Lembke, 1998; Tonanont, 2009). The first challenge emanates from the complex nature of implementing reverse logistics implementation when compared to forward logistics. The second challenge arises from the lack of expertise in its implementation (Rogers and Tibben-Lembke, 1998; Tonanont, 2009; Bungau et al., 2018; Lima et al., 2022).

Challenges of RL have four dimensions; they are managerial, financial, policy and infrastructure (Breen, 2006; Khan and Ali, 2022). Different studies showed that challenges to implement reverse logistics mainly arise from a lack of awareness, managerial activities, financial constraints, governing policy, infrastructure and shortage of skilled human resources (Andrade *et al.*, 2013; Bungau *et al.*, 2018; Viegas *et al.*, 2019; Abbas and Farooquie, 2020; Lima *et al.*, 2022).

The managerial challenge can be due to lack of common understanding and awareness about reverse logistics, management commitment and /or little senior management attention, lack of strategic planning and structure for reverse logistics and lack of appropriate performance management system (Breen, 2006; Khan and Ali, 2022). It can also be due to difficulties in extended producer responsibility across countries, competitive issues lack of coordination or collaboration support from members and experienced personnel resources coupled with lack of training and poor level of technical knowledge (Khan and Ali, 2022; Lima *et al.*, 2022).

The policy dimension of RL challenge emanates from lack of supportive government policies, lack of enforceable law or lack of waste management practices, lack of regulations or directives to

motivate manufacturers and customers not being informed about take back channels (Bungau *et al.*, 2018; Abbas and Farooquie, 2020). The financial challenge arises from financial resources constraints, insufficient funds for training, and less resource to establish return monitoring system whereas, the infrastructure challenge come from lack of advanced technology to monitor product movement, inadequate storage and handling equipment, lack of standardized disposal firm and lack of in-house facilities (Dembi and Ensermu, 2016).

2.1.6. Employee perception towards reverse logistics

One of the important factors in executing reverse logistics is understanding of employees towards its practice. The perception of employees plays significant role in the success of RL implementation in an organization. Ibrahim suggested that to implement successful RL, organizations should train their employees to bring positive perception and clear image why the company is practicing RL (Sithole, 2019; İbrahim Karakan, 2023). According to Choi and his colleagues, awareness creation and in-depth discussion is important to enhance positive perception and avoid ethical conflicts(Choi, Myung and Kim, 2018)

2.2.Empirical review

Several studies show that there is a direct relation between the presence of reverse logistics implementation and increased company performance. A study made on 159 companies in USA by Green *et al.* (2012) showed that a successful implementation of cost saving reverse logistics improve both economic and environmental performance that leads to operational efficiency of an organization (Green *et al.,* 2012). Similarly, a study made by Eltayeb *et al.* (2011) on 132 certified manufacturing companies in Malaysia found that implementation of reverse logistics in an organization has a significant effect on cost reduction which leads to improved financial and marketing performance of an organization (Eltayeb *et al.,* 2011).

Additionally, a study made on Kenya Medical Supplies Authority-KEMSA by Wambaya *et al.* (2018) revealed that reverse logistics plays an important role in the performance of the organization. The study proves that integrating forward and reverse logistics has a significant relationship with improved procurement performance (Wambaya *et al.*, 2018). Similarly, a study made by Larsen *et al.* (2018) on seven manufacturing companies in Denmark revealed that

application of reverse logistics improves firm's competitive strategy operationally and strategically (Larsen *et al.*, 2018) . Another study made on 122 food and beverage manufacturing firm in Kenya showed that implementation of reverse logistics has significant relation with improved performance of the manufacturing firms (Mutuku and Moronge, 2020).

Organizations implement reverse logistics due to different driving factors. A study made by Kabir (2013) that aimed to assess aspects of reverse Logistics in Pharmaceutical organization showed a need to make various considerations like accurate tracking and visibility, batches and expiry control, cold chain requirements, reporting, proper storage and disposal to be well thought-out while practicing RL. It concluded that environmental legislation and competitive advantage are important driving factors to engage pharmaceutical companies on reverse logistics (Kabir, 2013). Similarly, a study made by Zhu and Geng (2013) in Chinese manufacturers revealed that increased environmental awareness of consumers drives manufacturers to implement reverse logistics than government rules and regulations. Additionally, it shows that customer cooperation has contribution in implementation of reverse logistics (Zhu and Geng, 2013).

There are numerous factors that can hinder reverse logistics implementation. A study made by Wanjora and Wangethi (2014) showed some of the factors affecting implementation of reverse logistics in manufacturing businesses in Kenya. According to the study, financial constraints, corporate citizenship, legislation, and collaboration among supply chain partners were found to be the major factors that hinder the implementation of reverse logistics in costal manufacturing company in Kenya (Wanjora and Wangethi, 2014). Similarly, Zhu and Geng (2013) study showed that internal barriers, such as lack of financial gains, resource and capability, are main obstacles for the implementation of reverse logistics in manufacturing companies (Zhu and Geng, 2013). Another study made on pharmaceutical manufacturing companies in South Africa indicated that lack of skills and skills transfer, transport, and gatekeeping (amongst others) have been major challenges of reverse logistics implementation (Makaleng and Lambert, 2021). Additionally, a study made on starch and glucose manufacturing industries in South Africa noted insufficient communication and training, resistance to change, cost implications and lack of adoption of technology advancement were challenges of reverse logistics implementation in the sector (Sithole, 2019).

Furthermore, employee's perception plays a crucial role in implementing reverse logistics practice. A study made by Ibrahim (2023) on reveres logistics and employees in production enterprises found that perception of employees is low towards revers logistics implementation in the sector. It also pointed that there is a significant difference on perception of employees depending on their educational level (İbrahim Karakan, 2023). Whereas, a study made in South Africa by Sithole (2019) shows that employees are aware of environmental goals and targets, environmental policies, legislation and standards implemented as well as collaboration with suppliers and contractors is in place, however, government partnerships was found to be insufficient (Sithole, 2019).

Regarding to reverse logistics practice in Ethiopia, a study made by G/Hiwot and Temesen (2018) on construction company found that main challenges of implementing reverse logistics in the company were top management style and commitment, wrong perception about local product and weak linkage with local manufacturing companies (G/Hiwot and Temesen, 2018). Another study made on bottling companies in Addis Ababa by Biru and Denu (2017) showed that only 18% of the companies practiced reverse logistics. The main challenges to implement were cost related, information-related and management related problems (Biru and Denu, 2017). Additionally, study made by Guta and Afework (2016) on a bottling company indicated that practicing reverse logistics is a strategic method to achieve organizational performance (Guta and Afework, 2016).

Concerning pharmaceuticals waste management practice in the country, a study made by Ebrahim, and his colleagues (2019) showed that the existence of a push system, shortage of standard disposal firms and inexistence of formal channels for reverse logistics management like redistribution and expiry collection in the country have aggravated the problem. It is a known fact that the presence of piles of expired drugs stocked at health facilities will incur unnecessary extra expense for warehousing and inventory management including disposal costs (Ebrahim, Teni and Yimenu, 2019; FMOH, 2020; Gidey *et al.*, 2020).

Similarly, a study in Amhara and Oromia region showed that more than 7.5% of program medications and essential antibiotics were wasted in five governmental hospitals and nine health centers in 2017. Respondents mentioned pushing program medications that have near-expiry by EPSS as one of the aggravating factors of wastage in health facilities (Gebremariam, 2017; Ebrahim, Teni and Yimenu, 2019).

Being this the fact, a study made by Wendwosen and Temesgen (2020) regarding reverse logistics practice in six public hospitals under Addis Ababa city administration shows that the management practice of existing unfit medicines in public hospitals with respect to collection, storage, transportation and disposal is poor. The study identified the main challenges being shortage of storage and transportation, resource mobilization, and awareness creation (Wendwosen and Temesgen, 2020).

Another study made on challenges of reverse logistics practice in pharmaceuticals manufacturing company (EPHARM) by Dembi and Ensermu (2016) found that reuse and disposal being predominantly adopted reverse logistics practices. The finding came up with that implementing reverse logistics plays a great role on the economic, market and mostly green image of the company (Dembi and Ensermu, 2016). Similarly, a study made by Ababulgu., Mokennin and Jaleta (2020) on reverse logistics practice and challenge of EPSS Jima hub revealed that even though the agency has good transportation facilities or infrastructure, recall products had not been immediately collected from facilities. Additionally, it showed that the agency had no functional disposal way (Ababulgu., Mokennin and Jaleta, 2020).

2.3.Conceptual framework

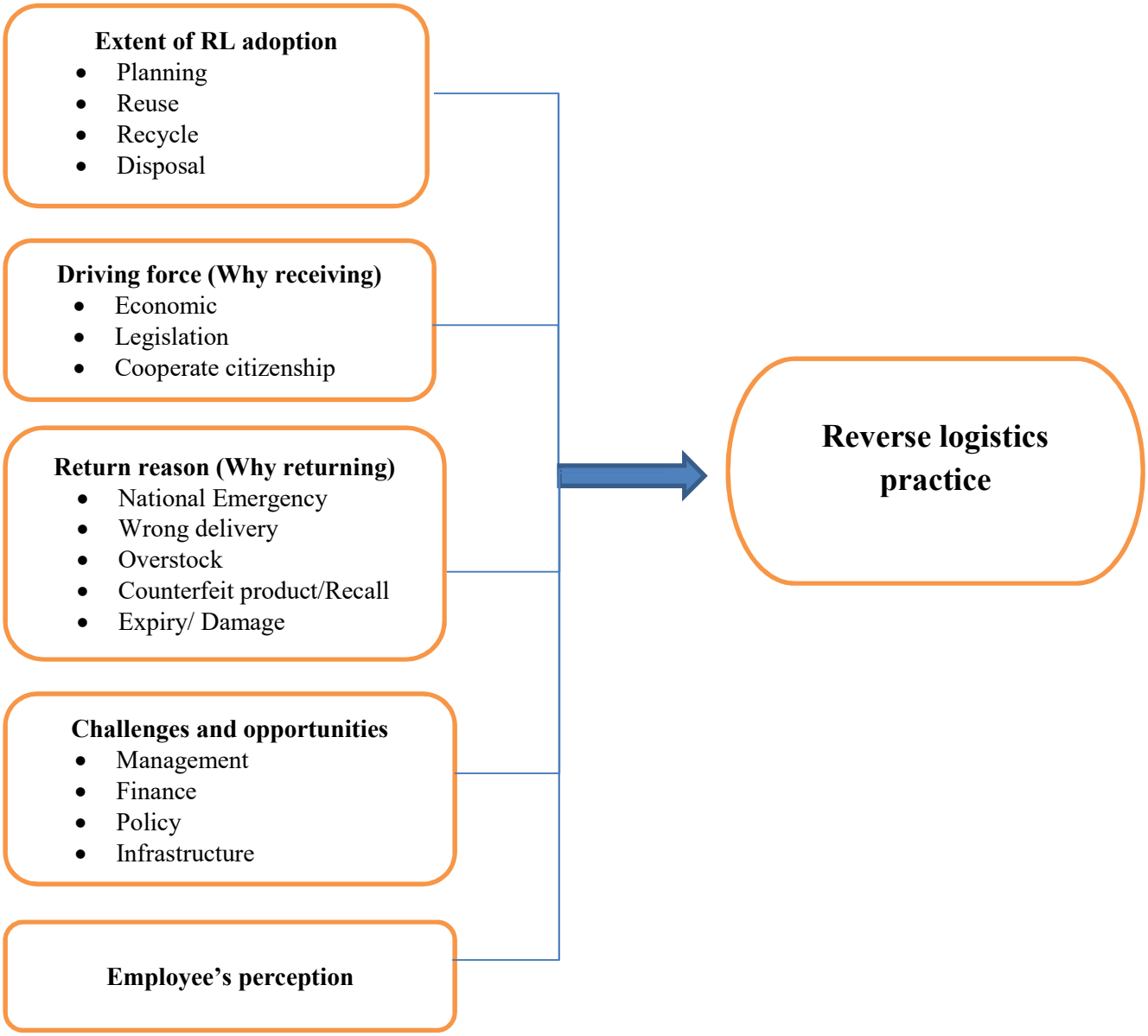

Figure 2. Conceptual framework *Adopted from* (Tonanont, 2009)

The above Figure 2, demonstrates the conceptual framework of the study. It shows different factors that affect RL practice. These factors are extent of RL adoption, driving forces, return reasons, challenges, opportunities and employee's perception towards RL practice implementation. Each having a sub-categorized activity. The framework was adopted from the theory of Tonanont's study on performance evaluation of RL with some modification.

Chapter three

3. Research methodology

This section describes the research approach, design, sampling and sample size determination, and data collection instrument used. Also, it also details how data were analyzed and presented.

3.1. Study setting

Ethiopian Pharmaceutical Supplying Service (EPSS) is a government entity that supplies pharmaceuticals, laboratory reagents, medical supplies and medical equipment to public health facilities across the country. The organization was established in 1947 with a capital of 80 million ETB under the name of 'the main Pharmacy' with the main objective of supplying safe and effective pharmaceuticals for the health system at an affordable price (EPSS, 2023).

At present, EPSS has 19 branches or hubs grouped into 7 clusters. It also has 2,535 employees and of these 409 are pharmacists. By purposive sampling, this study mainly focused on the head office, the central cluster of Addis Ababa hub one, the Northwestern cluster of the Gondar hub and the Adama cluster (EPSS, 2023).

The head office located in Addis Ababa floats tenders, manages contracts, procures pharmaceuticals, coordinates the activities of the seven clusters which have nineteen hubs, acting as epicenter of the pharmaceutical supply chain. The hubs serve as outposts to distribute pharmaceuticals, gather pharmaceutical demand within their domain and communicate it with the head office to form an aggregate demand at the national level.

The Central Cluster comprises of Addis Ababa 1 and 2 hubs serving 518 health facilities (hospitals and health centers). Adama Cluster is located about 100 km Southeast of Addis Ababa. It is comprised of Adama hub and Adama project office, serving 342 health facilities. Gondar hub is one of the hubs in the Northwestern cluster located 738km North of Addis Ababa. The hub serves 302 health facilities under its catchment.

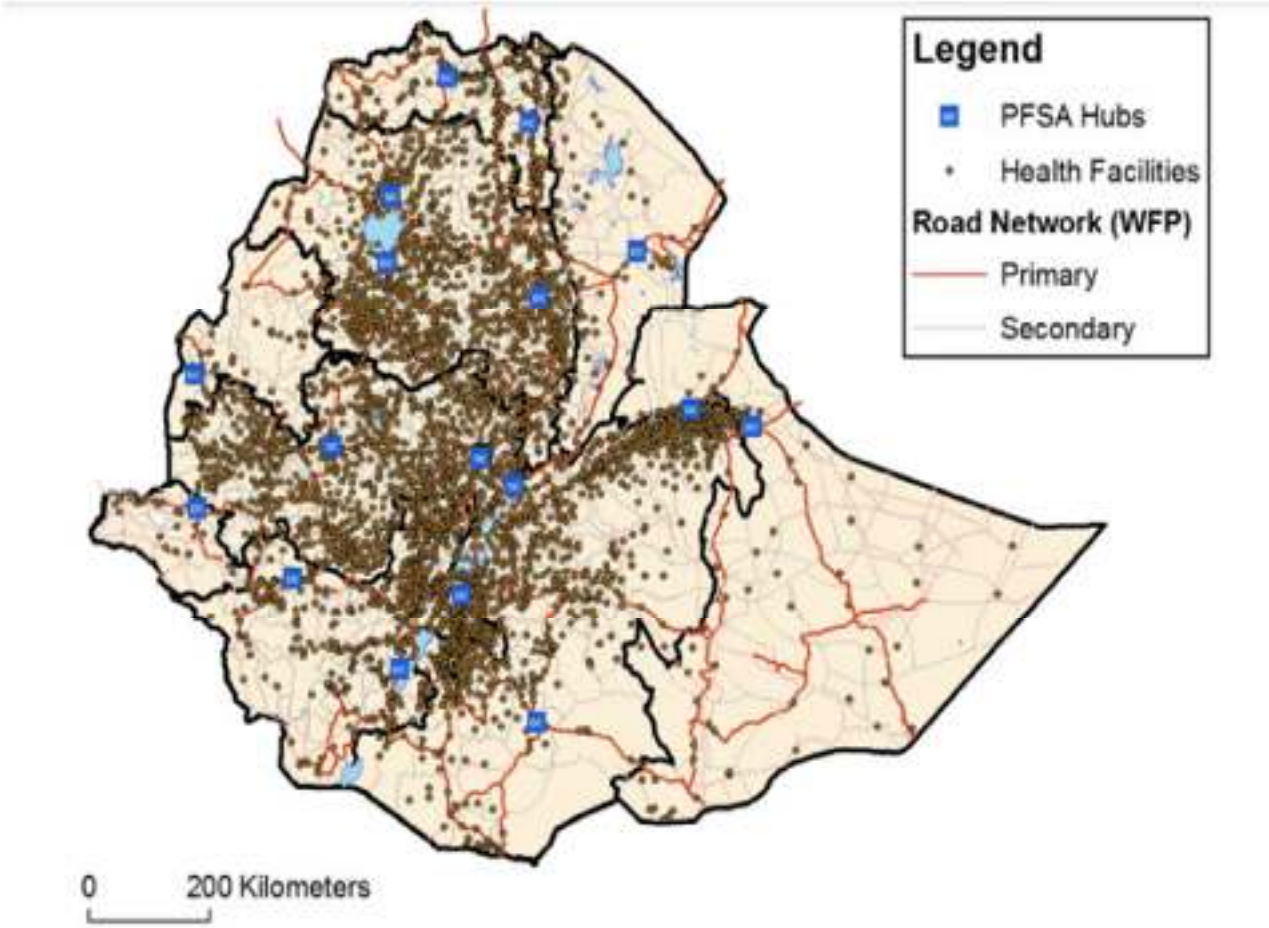

Figure 3. EPSS central office and hubs distribution *Adopted from* (USAID, 2020)

3.2.Research approach and design

3.2.1. Research approach

This research used a mixed-study approach. The quantitative approach focused on 'what' questions to explore key drivers for adopting and practicing reverse logistics. The qualitative approach is employed to capture 'how', the more refined and subjective issues to enrich the research findings as well as increase the validity of the results. Regarding the secondary data, the recording of EPSS was thoroughly reviewed using the data abstraction tool prepared.

3.2.2. Study design and period

This study used an institution based cross-sectional survey which is a mixed design of qualitative and quantitative data collection at the same time frame. The data collection period was from February 21, 2023 to May 28, 2023.

3.3.Data source

For the quantitative part, primary and secondary data were collected. Primary data were gathered from study participants using self-administered questionnaires to assess the RL practice, challenges, opportunities and employee's perception. Similarly, secondary data were collected from EPSS's electronic Data Management System (HCMIS) to show the burden of pharmaceuticals expiry and return from April 1/2022 to March 30/2023.

For the qualitative part, primary data were collected from Key Informants (KIs) using an interview guide prepared to identify challenges, opportunities and employee's perception towards RL practice.

3.4.Source and study population

The target population are all professional employees of EPSS. The source population are health professionals who were working under the selected departments at head office, Addis Ababa Hub 1, Gondar Hub and Adama Hub. The study population were all health experts, team leaders and directors working at selected directorates. Directorates participated in the study were RL and incinerator management, Pharmaceutical and Medical Supplies Procurement, Quantification and market shaping, Pharmaceutical and Medical Supply Distribution and Fleet Management, Warehouse and Inventory Management, Contract Management as well as Finance Directorate, and Information and Communication Technology.

3.5.Eligibility criteria

3.5.1. Inclusion criteria

- Health professionals who were working in EPSS central office and the selected hubs of RL and incinerator management, Pharmaceutical and Medical Supplies Procurement,

Quantification and market shaping, Pharmaceutical and Medical Supply Distribution and Fleet Management, Warehouse and Inventory Management, Contract Management, and Finance Directorate.

3.5.2. Exclusion criteria

- Individuals who refused to give consent to the study
- Individuals who were not available at the time of data collection

3.6.Sampling

The head office and three hubs were selected using a purposive sampling method. Due to the conflict in the country, only 16 of 19 hubs were functional during the time of data collection. Therefore, from the functional 16 hubs, 3 hubs and the head office were selected. The central head office was selected since procurement and contract management as well as redistribution activities are managed centrally. Assuming all other RL activities performed in all hubs are similar, as per EPSS's SOP, distance from the head office were taken as parameter to select the two hubs. Since distance has a direct transportation cost implication on collection and re-distribution of the reverse logistics practice. Therefore, Addis Ababa hub 1 and Gondar Hub, which are the nearest and the furthest hubs respectively managing both RDF and program medicines were selected. Adama Hub which is a center of excellence having a disposal site was also included.

According to the human resource register of EPSS, the total eligible population of the study from the selected hubs and the head office were 293 health professionals. Therefore, by using Yamane (1967) sampling formula, with a confidence interval of 95% the sample size reduced to 169 for a self-administered questionnaire.

$$n = \frac{N}{1+N(\mathcal{E}^2)}$$

Where: n = sample size N = population size $\mathcal{E}$ = the level of precision

Given the population of N = 293 and level of precision for sampling error, $\mathcal{E}$ = 5%, the sample size will be

$$\frac{293}{1+(293(0.05)^2)} = 169$$

Therefore, to determine proportion of the sample size from each hub,

Sample size = 169 x 100% = **57.7%**

293

A factor used to calculate quota of each hub and directorates was 57.7% (see Table 4)
After the sample size of each hub and directorate were determined, the questionnaires were distributed randomly to the experts (health professionals) working under each directorate during data collection period.

Table 1. Sample size of Self-administered questionnaire.

	Directorate	Head office		A.A hub 1		Adama hub		Gondar hub		Total
		Total	Sample size	Total	Sample size	Total	Sample size	Total	Sample size	
1	Reverse logistics	2	1	-	-	-	-	-	-	1
2	Distribution and Fleet Management	9	5	2	1	2	1	2	1	8
3	Warehouse and Inventory Management	63	36	16	9	16	9	10	6	60
4	Quantification and Market Shaping	23	13	8	5	8	5	6	3	26
5	Finance directorate	40	23	10	6	10	6	7	4	39
6	Procurement and tender management	20	12	-	-	-	-	-	-	12
7	Contract Management	39	23	-	-	-	-	-	-	23
	Total	196	**113**	36	**21**	37	**21**	24	**14**	**169**

For the qualitative study, all the directors/delegates of the above selected hub directorates were the key informants and the interview took place face to face with the directors/delegates that were present at EPSS during the data collection period.

Table 2. Sources of key informant interview

	Directorate	Head office	A. A1	Adama	Gondar	Total
1	Reverse logistics and Incinerator Management	1	-	-	-	1
2	Distribution and Fleet Management	1	1	1	1	4
3	Warehouse and Inventory Management	1	1	1	1	4
4	Quantification and Market Shaping	1	1	1	1	4
5	Finance	1	1	1	1	4
6	Procurement and Tender Management	1	-	-	-	1
7	Contract Management	1	-	-	-	1
	Total	7	4	4	4	**19**

3.7.Data collection and management

3.7.1. Data collection methods and instruments

This study used two basic sources of data: primary and secondary data sources (EPSS HCMIS recording). Thus, both qualitative and quantitative data collected as a source of primary data. Quantitative data were collected using self-administered structured questionnaire. The Likert scale structured questionnaire with five scale was adopted, modified, and contextualized from previously studies ((Kwateng and Debrah, 2014; Dembi and Ensermu, 2016; Biru and Denu, 2017; G/Hiwot and Temesgen, 2018) with some modifications to fit to supplier context and validation. The questionnaire has four sections. The first part asks demographic data such as gender, age, level of education and experience of the study population. The second part collect data about the extent and drivers of reverse logistics practices. The third were about the challenges and opportunities of

reverse logistics practices and the last part collected perception of employees towards reverse logistics practices.

For the secondary data, an abstraction tool was designed to obtain monetary value of returned, expired and, disposed pharmaceuticals for 2022/23 fiscal year from EPSS recordings (HCMIS/VITAS) to show the magnitude of reverse logistics practice.

For the qualitative data, the above-mentioned directorate's director/representative were interviewed by the principal investigator using structured interview guide with probing questions to gather in-depth information on the current reverse logistics practice and challenges associated with it. During interviewing an Amharic version was used, and to those who were willing an audiotape were requested to be captured. The key informant interview was designed to complement, validate, and strengthen the self-administered questionnaire findings.

3.7.2. Data quality assurance

Different measures were taken to ensure validity of the tool. Questionnaires have clear instruction to avoid biased answers without clear understanding of the question. Furthermore, pilot test was conducted on 30 respondents at EPSS A.A hub 2 to test the construct and content validity; and reliability of the research instruments. First, the questionnaire was given for 10 respondents, after taking their comments, modifications made and administered to another 20 respondents. The pilot test facilitated modification of the tool by eliminating inconsistencies, redundancies, and feasibility of generating the expected study results, increase response rate and understandability.

To assure data quality, pharmacy professionals who had experience in data collection were involved. Prior to data collection, they were given orientation on the purpose of the study and how to administer questions to ensure appropriateness and correctness.

Additionally, structured questionnaires from standardized tools used by previous researchers adopted to collect the data from reliable sources. Questionnaires were checked for completeness, consistency, and accuracy using reliability test, Cronbach's alpha, to measure internal scale consistency. During on site data collection, completeness of the data collection tool was followed and the extracted secondary data crosschecked with finance directorate record and triangulated

with primary data findings. To increase the validity and reliability, data clearance performed for type error, missing value and wrong data before entering to SPSS for analysis.

Cronbach's Alpha was tested to measure internal consistency of items (n=43) in the questionnaire. As reliability statistics shows (see Table 6), the obtained Cronbach's Alpha value of were 0.75 for extent of RL adoption, 0.90 for drivers of RL, 0.84 for challenges of implementing RL, 0.79 for return reasons and 0.78 for perception of employees. All the Cronbach's Alpha values were > 0.700, showing that the instrument is reliable regarding to internal consistency.

Table 3. Cronbach's Alpha reliability test

S. N	Question type	Cronbach's Alpha	No. of items
1.	Extent of adoption of reverse logistics practice	0.747	8
2.	Drivers for Adopting Reverse Logistics Practice	0.905	9
3.	Challenges of Implementing Reverse Logistics Practice	0.844	8
4.	Reason for return	0.796	6
5.	Perception towards Reverse Logistics practice	0.784	12

Source: own survey

3.7.3. Data analysis

Quantitative data were entered and cleared using Microsoft Excel for missed data, type error, and out layers then, transported into SPSS V-26 for analysis. Results of the study presented by using Tables, and different kinds of statistical data presentation techniques showing the practice of reverse logistics in EPSS, the challenges faced and opportunities as well as employees' perception towards reverse logistics.

The descriptive statistics utilized to analyze and present the Likert scale findings of summary statistics of means and standard deviations. A rule of thumb used to create equal intervals for a range of five points Likert and 0.8 served as a boundary for each elements of the measurement in

the questionnaire. It was computed by dividing the difference between the maximum (5) and minimum (1) in to five equal parts. Therefore, the calculated mean value that ranges from 1 to 1.80 implies strong disagreement, from 1.81 to 2.6 disagreement, from 2.61 to 3.4 moderate agreement, from 3.41 to 4.2 agreement and from 4.21 to 5.00 represented strong agreement of the respondents.

While qualitative data analyzed by the researcher using Microsoft word thematic descriptive statistical analysis method, which followed an inductive approach. First the interview was transcribed and carefully translated to English version. Then the translated interview was coded line by line for each sentence and after removing redundant codes, a total of 132 cods generated. Similar cods describing similar ideas were grouped to generate 06 major themes. The themes got carefully analyzed to capture respondent's profound insight about EPSS RL practice. The result is presented using narrative descriptive manner.

3.8. Ethical considerations

All participants of the study were well informed about the purpose of the study and guaranteed about the confidentiality of the information. The result of the study only used for academic purpose and the response of the participant is fully confidential.

The data collected from respondents through questionnaires did not require respondents to write their name. Respondent's information given codes and no name to display to assure confidentiality of the results. During data collection, each respondent was informed about the purpose, scope, and expected outcome of the research, the chance to ask any thing about the study and chance to feel free to refuse to reply any question. Oral consent taken from all respondents to assure full willingness to participate in the research and to provide information on voluntary basis. Information gathered from respondents analyzed without any change in the research.

Furthermore, letter of permission secured from Addis Ababa University, School of Pharmacy to enable the researcher to carry out the research and approach the informants officially. Moreover, EPSS higher officials were informed before actual data collection being carried out. Additionally, references used in this study cited appropriately to acknowledge the work of previous studies.

3.9.Data dissemination plan

Results of the research and recommendations will be Submitted and Presented to AAU, school of pharmacy, and AAU library, and disseminated to central EPSS, EPSS hub 1, Gonder hub and Adama hub. Publication at journals, presenting to research workshops, forums, and conferences and used as reference in updating strategies towards reverse logistics practice.

Chapter four

4. Results and discussion

This chapter presents results, analysis and discusses the findings on the Reverse logistics practice and challenges of Ethiopian Pharmaceuticals Supply Service. The first section presents the findings of the data abstraction tool that shows the burden of returned, expired and damaged total value compared with total value of procurement with in the same period of time and the list of top ten returned products presented. The second section presents findings of self-administered Likert scale questionnaire that describes demographic characteristics of respondents, extent of adoption of reverse logistics practice, drivers for adopting RL, opportunities to implement RL, return reasons, challenges of implementing RL and perception towards RL analyzed by descriptive statistics using their mean and standard deviation values. The last section demonstrates the finding of key informant interview result analyzed thematically.

4.1.Quantitative findings

4.1.1. Burden of expiry and return

The below Table 7, shows the burden of damage and expiry during the review period, April 1, 2022 - March 30, 2023. Compared to other health commodities, percentage of medicine damaged and expired contributed more both in RDF and program commodities, 0.30% and 2.76% respectively. Percentage of expired and damaged program reagents and chemicals take the second place, which is 1.7%. the percentage of expired and damaged supplies is 0.03% and 0.05% for RDF and program commodities respectively. Medical device has no contribution for wastage rate during the reviewed period.

Overall the percentage of expiry and damage of program commodities is more than RDF. Even if the total wastage rate is 1.54%, which is in the acceptable range, in monitory terms it is 538,446,128 birrs per year, which nearly is an annual health commodities procurement budget of seven to eight specialized hospitals. Therefore, it shows that designing wastage reduction mechanism is crucial.

Table 4. Burden of damage and expiry April 1, 2022 - March 30, 2023 in EPSS

Budget line	Items	Procured (Birr)	Damaged and expired (Birr)	Wastage rate
RDF	Medicine	3,665,728,993.65	11,064,120.57	0.302%
	Supply	2,702,113,886.84	8,069,992.66	0.030%
	Reagent & chemicals	-	24,275,566.26	
	Medical device	1,499,309,401.98	-	0.000%
	Total	7,867,152,282.47	43,409,679.49	0.459%
Program	Medicine	17,084,071,918.18	470,796,449.58	2.756%
	Supply	4,960,888,520.37	2,641,013.21	0.053%
	Reagent & chemicals	1,694,500,447.84	28,861,985.27	1.703%
	Medical device	3,432,378,386.30	-	0.000%
	Total	27,171,839,272.69	502,299,448.06	1.849%
Grand total		**35,038,991,555.16**	**538,446,127.55**	**1.537%**

Source: EPSS HCMIS data, 2023

Table 8 shows the total amount of returned products in value. The percentage value of returned program product is 73% when compared to RDF, which shows that there is more return of program commodities both in value and item wise.

Table 5. Burden of return April 1, 2022 – March 30, 2023 in EPSS

S. N	Return budget source	Line of Items	Value of returned products in Birr
1	RDF	142	11,884,067.80
2	Program	355	32,424,854.68
	Total	497	**44,308,922.48**

Source: EPSS HCMIS data, 2023

The below Table 9 shows value and list of top 10 returned products. From all of the returned products, the listed top 10 products accounts for 30% of the total return. Therefore, closely examining the return reason and applying an intervention can be area of improvement for return handling cost minimization.

Table 6. Top 10 returned products April 1, 2022 – March 30, 2023 in EPSS

S. N	Full Item Name	Unit	Received quantity	Total cost in Birr	Budget source
1.	COVID - 19 Vaccine Suspension (Without VVM) Injection	vial	11,537	5,354,629	Health Program
2.	Mask N95 -	20	2,620	2,186,885	Health Program
3.	Tenofovir Disproxil Fumerate - 300mg - Tablet	30	8,430	1,137,713	Health Program
4.	Glove Examination Latex Non-Powdered - Medium	100	2,663	1,167,632	RDF and Health Program
5.	Glove Surgical Latex Sterile Powder Free - No. 7.5	50 pairs	1,270	1,026,565	RDF
6.	Sofosbuvir (SOF) + Daclatasvir (DCV) - (400mg + 60mg) - Tablet	28	504	695,233	Health Program
7.	Adrenaline (Epinephrine) - 0.1% in 1ml Ampoule - Injection	10	2,015	575,478	RDF
8.	Coverall – Medium -	Each	1,327	476,274	Health Program
9.	Heparin Sodium - 5000IU/ml in 5ml Ampoule - Injection	10	173	469,629	RDF
10.	Sodium Chloride (Normal Saline) - 0.009 - Intravenous Infusion with Giving Set	1000 ml	6,048	337,440	RDF
Total				**13,427,477**	

Source: EPSS HCMIS data, 2023

4.1.2. Overall response rate

Of 169 self-administered questionnaires distributed, 158 were returned and 4 were incomplete responses. Therefore, the remaining 154 questionnaires were used for analysis making a response rate of 91%.

4.1.3. Demographic information of the respondents

Majority of the respondents were male (74%), in the age range of 26-35 years, BSc degree (71%) and worked for five and more than five years 79% of experience in the field. Also, 85% of the respondents were working as experts and 15% as middle to senior managers.

Table 7. Demographic information of the respondents (April, 2023)

Demographic Information		Frequency	Percentage
Gender	Male	114	74%
	Female	40	26%
Age category	18 - 25	8	5%
	26 - 35	108	70%
	36 - 45	37	24%
	46 - 55	1	1%
	Above 55	0	0.0%
Highest educational qualification	MSc Degree	39	25%
	BSc Degree	109	71%
	Diploma	6	4%
Total Experience	less than 5	32	21%
	5 - 10	84	54%
	10 years or more	38	25%
Position within the organization	Senior management	4	3%
	Middle level management	19	12%
	Expert	131	85%

4.1.4. Extent of adoption of reverse logistics practice

The study revealed that with an average mean value of 2.8 response rate, there is small extent of pre-planning and follow-up of reverse logistics practice in EPSS. Likewise, setting quality standards as well as designing products for redistribution or reuse practiced in small extent with average mean value of 2.31 and 2.36 respectively. Additionally, with an average mean value of 1.91 the respondents agree that there is small existence of a well-documented policy for recycling of packaging materials.

Table 8. Extent of reverse logistics practice

Reverse logistics practice	Not at all (1)	Small extent (2)	Moderate extent (3)	Large extent (4)	Very large extent (5)	Mean	St. D
Planning							
Pre-plan RL ahead of time and follow its practice	27	51	66	10	0	2.38	0.849
Reuse/Redistribution							
Set quality standards for reuse/ Redistribution	21	72	54	7	0	2.31	0.761
Design products for reuse/Redistribution	37	48	49	17	3	2.36	1.027
Recycling of packaging materials/ containers							
A well-documented policy for recycling	65	44	39	6	0	1.91	0.910
Disposal							
Landfill	70	53	27	4	0	1.77	0.829
Burn to open air	42	35	69	8	0	2.28	0.925
Incinerate	13	29	57	53	2	3.01	0.963
Return to manufacturer/ supplier	58	62	32	2	0	1.86	0.787

Valid n = 154

Regarding disposal method, with a mean value of 3.01, most of the respondents agree that there is moderate practice of incineration followed by small extent practice of burning to the open air and

return to the manufacturer or to the supplier with a mean value of 2.28 and 1.86 respectively. The average mean value of 1.77 show that respondents disagree on existence of landfill disposal practice in EPSS.

Generally, Table 8 shows that there is small adoption of planning, documenting and setting standard for reverse logistics practice in EPSS except incineration that is practiced in a moderate way.

4.1.5. Drivers for adopting reverse logistics practice

From the data collected, the respondents moderately agree that the economic driver for adopting reverse logistics is to enhance stock availability followed by increasing customer satisfaction, competitive advantage and cost reduction with average mean of 3.30, 3.12, 3., 2.95 and 2.9 respectively. The study result shows that gross profit margin contributes in a small extent as an economic driver with a mean value of 2.79.

The below Table 9 shows that, with a mean value of 3.27 government rules and regulations contributes more as moderate legislation driver than EPSS manual and policy that has mean value of 3.05. Regarding social responsibility driver, establishing an image of environmentally responsible organization or creating a green image of the organization contributes in a moderate way with a mean value of 3.25 followed by values or principles that an organization holds to be responsible with RL or executing social responsibility with a mean value of 3.10.

In general, the result of the study shows that as a driver of implementing RL, respondents moderately agree that enhancement of stock availability contributes more followed by government rule and regulation and establishment of environmentally responsible organization and finally increasing customer satisfaction respectively.

Table 9. Drivers of reverse logistics practice

Drivers	Strongly disagree (1)	Disagree (2)	Moderately agree (3)	Fully agree (4)	Strongly agree (5)	Mean	St. D
Economic							
Enhance stock availability	7	35	63	34	15	3.30	1.008
Increase in Customer satisfaction	11	23	69	39	12	3.12	0.996
Cost reduction	12	38	65	32	7	2.90	0.971
Gross profit margin	11	45	71	20	7	2.79	0.922
Competitive advantage	15	29	66	37	7	2.95	1.002
Legislation							
Government rule and regulations	8	21	60	51	14	3.27	0.985
EPSS manual and policy	7	44	53	34	16	3.05	1.053
Social responsibility							
Values or principles that an organization holds to be responsible with RL (Social responsibility)	5	26	75	44	4	3.10	0.999
Establish the image of an environmentally responsible organization (Green image)	8	24	60	45	17	3.25	1.020

Valid n = 154

4.1.6. Reason for return

From the data collected, the respondents fully agree that the common reason for products return is expiry of products for disposal followed by over stock and counterfeit products recall with a mean of 3.48, 3.10 and 2.71 respectively. With an average mean of 2.67, respondents moderately agree

that national emergency contributes for products to get into return pathway while damage of products and wrong delivery contributes less with a mean of 2.51nand 2.48 respectively.

Table 10. Reason for return

Reason	Strongly disagree (1)	Disagree (2)	Moderately agree (3)	Fully agree (4)	Strongly agree (5)	Mean	St. D
Damage to product/ package	28	41	63	22	0	2.51	0.951
Wrong delivery	22	54	60	18	0	2.48	0.880
National emergency	15	58	51	23	7	2.67	0.997
Counterfeit products /re-call	7	4	68	69	6	3.41	0.934
Overstock	11	6	54	64	19	3.48	0.919
Expired products for disposal	8	1	53	79	13	3.57	0.808

Valid n = 154

4.1.7. Challenges of implementing reverse logistics practice

The below Table 11 shows that the respondents fully agree, with a mean value of 3.42, that management of forecasting complexity and unpredictability of return dynamics being the main challenge of EPSS RL practice. The respondents agree that the second challenge of management dimension in practicing RL is poor communication and corporation with supply chain partners like manufacturers, EFDA, MOH and facilities with EPSS with a mean value of 3.18. The result show that management commitment and support as well as lack of expertise in RL moderately contribute as management challenge in practicing RL with mean respondent's agreement of 2.92 and 2.78 respectively. Similarly, respondents moderately agree that it is costly to manage reverse logistics with mean value of 2.8.

Regarding policy, the respondents fully agrees that lack of definite rules and regulations on how to handle returned products with a mean value of 3.51. According to the study result in terms of

infrastructure, respondents moderately agree that lack of appropriate technology and infrastructure are challenge with mean value of 3.21 and 3.18 respectively in practicing RL at EPSS.

Table 11. Challenges of reverse logistics practice

Challenges	Strongly disagree (1)	Disagree (2)	Moderately agree (3)	Fully agree (4)	Strongly agree (5)	Mean	St. D
Management							
Management commitment and style /Lack of managerial support	11	42	59	33	9	2.92	1.003
Poor communication and cooperation with supply chain partners such as Manufacturers, EFDA, MOH, Facilities	5	34	59	41	15	3.18	0.991
Lack of expertise in reverse logistics	14	50	52	32	6	2.78	1.005
Return dynamics and forecasting complexity	4	22	50	61	17	3.42	1.016
Finance							
Costly to manage reverse logistics	21	43	36	54	0	2.80	1.069
Policy							
Lack of definite rules and regulations on handling returned products	14	2	50	68	20	3.51	1.053
Infrastructure							
Lack of appropriate technology	6	28	58	51	11	3.21	0.998
Lack of appropriate infrastructure	6	37	46	53	12	3.18	1.013

Valid n = 154

From the finding of Table 11, lack of definite rules and regulations being the main challenges to practice RL followed by forecasting complexity of return dynamics. Additionally, lack of appropriate technology and infrastructure, and poor communication and cooperation with supply chain partners contribute moderately as a challenge to practice RL in EPSS.

4.1.8. Perception towards reverse logistics practice

Table 12 illustrates that respondents fully agree that reverse logistics increase customer satisfaction followed by giving competitive advantage globally and creation of environmentally responsible organization with a mean score of 3.61, 3.53 and 3.42 respectively.

Respondents disagree about existence of clear rules and regulations on handling returned products respondents with a mean score of 2.56. Regarding cost implications respondents moderately agree that practicing RL incurs additional cost to the system followed by cost of handling collection, redistribution and disposal of returned products in the system with mean score of 2.66, 2.63 and 2.6 respectively.

From the collected data, most of the respondents fully agree that management involvement and attention is crucial in practicing RL in the organization with a mean score of 3.76. The respondents also fully agree that communication and coordination of supply chain partners is important and needs improvement with a mean score of 3.57. Similarly, importance of appropriate technology and expertise as well as difficulty of unpredictability of RL dynamics and forecast fully agreed by respondents with a mean score of 3.49 and 3.46 respectively. Difficulty of RL practice has mean score of 2.53 showing disagreement of the respondent's perception; in other words, respondents do not believe that practicing RL in EPSS is not difficult.

Table 12. Perception towards reverse logistics practice

Perception	Strongly disagree (1)	Disagree (2)	Moderately agree (3)	Fully agree (4)	Strongly agree (5)	Mean	St. D
Importance							
Reverse logistics increase customer satisfaction	14	2	34	84	20	3.61	0.862
Reverse logistics gives a competitive advantage globally	7	6	45	90	6	3.53	0.866
Reverse logistics helps EPSS to be an environmentally responsible organization	9	6	55	80	4	3.42	0.896
Policy							
There are clear rules and regulations on handling returned products	6	70	64	14	0	2.56	0.935
Cost							
Reverse logistics incurs additional cost	17	58	49	21	9	2.66	1.038
It is very costly to collect and return drugs sold	16	59	52	20	7	2.63	0.999
It is very costly to redistribute or dispose of drugs	9	64	61	20	0	2.60	1.019
Management							
Reverse logistics is difficult to practice	9	69	61	15	0	2.53	1.059
It is difficult to predict the dynamics and forecast reverse logistics	4	16	53	67	14	3.46	1.010
Appropriate technology and expertise are needed to manage reverse logistics	3	9	61	72	9	3.49	0.875
Management attention and involvement is crucial	0	3	45	92	14	3.76	0.801
Communication and cooperation with supply chain partners should be improved	0	3	65	81	5	3.57	0.752

Valid n = 154

One-way ANOVA test was performed to test if there are significant difference in employee's perception across years of experience. The hypothesis tests if perception of employees differs across different years of experience. Respondents were divided into three groups (Group 1: less than 5; Group 2: 5 – 10; Group 3: Above 10). The ANOVA result suggests that the employee's perception scores of the groups differ significantly ($F_{2, 151} = 3.596$, $p < 0.05$).

Since the Levene's Statistics shows no significance, equal variance was assumed. To check for individual differences between groups, post-hoe comparison was assessed using Tukey HSD. The test indicated that the mean score for 5-10 years of experience ($M = 3.1081$, $SD = 0.32847$) was significantly different from Above 10 years of experience ($M = 3.2719$, $SD = 0.32847$). the mean difference was significant at 0.027 level. However, no significances were detected between less than 5 years of experience and 5-10 years; and less than 5 years of experience and Above 10 years.

Table 13. Difference in employee's perception across years of experience (n = 154)

	Descriptive		Test of homogeneity		ANOVA	
Years of experience	Mean	Std. Deviation	Levene Statistic	Sig.	F	Sig.
Less than 5	3.1198	0.37384	0.937	0.394	3.596	0.030
5 - 10	3.1081	0.32847				
Above 10	3.2719	0.24788				
Total	3.1510	0.32642				

	Group difference		95% Confidence Interval	
Years of experience	Mean Difference	Sig.	Lower Bound	Upper Bound
5-10 and Above 10	-0.16379	0.027	-.3124	-.0152

4.1.9. Opportunities to practice reverse logistics

An open-ended questionnaire given for respondents to discuss existing opportunities that helps to practice RL in EPSS. The most frequent opportunities the respondent's mention is establishment of RL and incinerator management directorate, presence of high temperature incinerators at different hubs, supportive government policy towards environment protection, presence of

expertise familiar with the general SCM activity, existence of technology that can integrate RL practice, increased need of customers and good relation of EPSS with suppliers respectively.

4.2.Qualitative findings

To support the quantitative findings key informant interview were conducted. A total of 11 key informants selected from EPSS Central, AA hub 1, Adama hub and Gondar hub were interviewed face to face, which is 58% from the initial plan of 19 interviews. The interviews were carefully transcribed, translated, coded and categorized to generate a total of 06 major themes. The generated themes are reverse logistics description, extent of reverse logistics adoption, flow of reverse logistics practice, drivers of RL, challenges, and opportunities of RL.

4.2.1. Demographic information of the key informants

All of the respondents were males with median age of 39 with a range of 35 – 44 years. Nine of the key informants were pharmacists and two were having finance expertise. All key informants have an average of 12 years of experience in the sector.

4.2.2. Theme 1: Reverse logistics description

Defining reverse logistics is important step before discussing its practice. Therefore, key informants were requested to describe RL and all defined it as the backward movement of products from the point of consumption to the point of origin for various purpose. Only two respondents, describe reverse logistics practice comprehensively.

> "*RL 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*" *(Age 39, EPSS central and Age 42, EPSS central)*

4.2.3. Theme 2: Extent of reverse logistics adoption

All key informants said that even if RL is practiced in the organization, the level of its adoption is low. The activities that have been practiced so far are redistribution of usable pharmaceuticals, reuse of packaging materials like containers and pallets, and rarely, recall of defective

pharmaceuticals with quality problems from health facilities back to suppliers/manufacturers and proper disposal of expired and damaged pharmaceuticals.

These activities are mainly expected to be managed by the recently established reverse logistics and incinerator management directorate. However, all informants said that the directorate fully manage product disposal only. Other activities like return and redistribution activities are still managed by warehouse and inventory management directorate. Furthermore, other dimensions of RL like planned RL, recycling, and refurbishment are not practiced yet.

Key informants said that since the directorate is coupled with incinerators management, staff members perceive that the major responsibility of directorate is disposal.

> *"Many staff members associate RL activities with disposal activities only. However, RL is not attending a safe burial rather it is a cost saving and environmental protection mechanism. Therefore, its full implementation and proactive management is important." (Age 37, Adama hub)*

4.2.4. Theme 3: Flow of reverse logistics practice

All key informants explained that except recall initiation, all other RL request arise from hubs. The request then be analysed and decision will be made centrally. Once RL approved, prior notification will be sent to warehouse and inventory management and fleet management directorate for transport arrangement. Key informant said that

> "*Before any RL operation started, the data should come first, and get approval by appropriate body, and then arrangement of vehicles, warehouse and other resource planning carried out"* (Age 39, EPSS central)

Upon arrival, products will be inspected, received and then recording will get updated. Depending on the condition of the product decision will be made either to redistribute, send to manufacturer or dispose. In the case of product recall, the difference is that information either come from EFDA or supplier or manufacturer.

4.2.5. Theme 4: Drivers for adopting reverse logistics practice

According to response of eight key informants, the major driving force for EPSS to practice RL arises from product availability, wastage reduction and supply chain sustainability which is an economic driving force followed by the legislation of the country and executing social responsibility respectively.

> "*The forces for EPSS to practice reverse logistics come mainly from scarcity of products and increased demand from facilities. Additionally, RL is practiced to follow EFDA regulations and keep the public safe. The implementation of redistribution currently maximized product availability and improved the hubs customer satisfaction" (Age 42 EPSS central).*

4.2.6. Theme 5: Challenges of implementing reverse logistics practice

Since RL is an emerging practice for EPSS, all of the key informants agree that several challenges exist in its implementation. The most frequent challenges mentioned by the respondents are unavailability of clear policy, property transfer manual and guideline as well as a problem of not having a well-functioning disposal firm. Additionally, forecasting complexity and unpredictable nature of return coupled with lack of expertise, technology and infrastructure in the field has been a hindering factor for its practice. One key informant mentioned lack of management attention, insufficient budget allocation and cost related implication of RL practice as a challenge. All key informants stressed on lack of stakeholder's engagement in the filed especially developmental partners and private sectors involvement.

> *"RL practices is a newly emerging practice not only in EPSS but also in the supply chain system of Ethiopia, therefore it needs uninterrupted follow-up and support from all stakeholders". (Age 38, A.A Hub 1)*

4.2.7. Opportunities for implementing reverse logistics

Even though several challenges mentioned, key informants agree that some opportunities exist in EPSS to practice RL. These are establishment of RL and incinerator management directorate and physical existence of eight disposal sites with incinerators at different hubs, even if all have functionality and effectiveness issue. Additionally, availability of EPSS transportation facility,

government policy towards environment protection, increased need of customers and good relation of EPSS with suppliers mentioned by most key informants.

> *"having responsible department and dedicated disposal firm is a golden opportunity for EPSS to practice RL" (Age 36, Gonder hub)*

4.3. Discussion

A cross sectional study-involving total of 154 self-administered questionnaires and 11 key informant interviews were conducted to the permanent staff of EPSS to study reverse logistics practice, challenges, opportunities and employee's perception.

Even if RL is practiced in EPSS, the extent of its adoption is limited to certain activities like disposal of expired and damaged pharmaceuticals and return management. A similar finding of adaptation of disposal practice was noted in a study made by Mogaka (2015) in Kenya pharmaceutical manufacturing companies. Similarly, a study made by Dembi and Ensermu (2016) at pharmaceutical manufacturing company in Ethiopia show that relatively disposal is more practiced than the other dimensions of RL practice (Mogaka 2015; Dembi and Ensermu, 2016). Additionally, a study made by Wendwosen and Temesgen (2020) shows that pharmaceutical disposal is the adopted RL practice in public hospitals found in Addis Ababa (Wendwosen and Temesgen, 2020).

The other dimensions of RL practice that lacks due attention were pre-planning, designing redistribution, policy setting and standardizing the processes. A study conducted by Mogaka (2015) on pharmaceutical manufacturing companies in Kenya show that firms did not have a standardized policy to practice RL. Similar finding noted in a study made by G/Hiwot and Temesgen (2018) on construction company in Ethiopia showing that the extent of planning, policy setting and designing RL has been practiced in a very limited way (Mogaka, 2015; G/Hiwot and Temesgen, 2018). Additionally, in a study made by Bungau *et al.* (2018) on pharmaceutical retailor organizations shows that there is lack of policy and procedure in practicing RL that points a potential area for improvement in the sector (Bungau *et al.* (2018).

Identifying drivers help organizations to understand why certain strategy is needed to be adopted. The result of studies made by different researchers come up with different drivers depending on

the nature of the sector and type of products handled. Studies made on the pharmaceutical manufacturing industries by Govindan and Soleimani (2017) show that the main driver to practice RL is government policy towards environmental protection (Govindan and Soleimani, 2017). Similarly, a study made on pharmaceutical manufacturing company by Dembi and Ensermu (2016) shows that the main driver is environmental factor followed by economic gain to practice RL (Dembi and Ensermu, 2016). Whereas in this study both the reflection of the key informants and self-administered questionnaire show that financial gain being the main factor followed by government policy and social responsibility to practice RL in EPSS respectively. The result shows that the main reason why EPSS is implementing RL emanates from an economic driver which is enhancing stock availability that may bring both customer satisfaction and financial gain.

There are different reasons for pharmaceuticals to get into RL path. From the finding of the Likert scale and data abstraction, the leading reasons for product return in EPSS were expired items for proper disposal followed by overstock products for re-distribution. According to the finding of the abstracted data from EPSS recording, the most returned pharmaceuticals are program products contributing 73% of all the retuned products. A practice of returning products to manufacturers rarely done with local manufacturers when compared to companies found out of the country. Respondents agree that there is small extent of returned products from defective products recall and national emergency respectively. The least contributor for product return were wrong delivery.

Knowing the main challenges aid an organization to prioritize which hindering factor to tackle at a time. The result of this study shows that the main challenges to practice RL in EPSS are lack of organizational definite rules and regulation in handling return and ownership transfer. A study made by da Silva *et al.* (2022) show that lack of governmental policy and regulation is one of the challenges to practice RL in health centres of Brazil. Similarly, a study made by Bungau *et al.* (2018) found that lack of government rule and policy have contributed for challenge of pharmaceutical retailers RL practice in Romania (Bungau *et al.*, 2018; da Silva *et al.,* 2022).

Additionally, unpredictable nature of return dynamics and forecasting complexity coupled with lack of appropriate technology and infrastructure were found to be identified challenges to practice RL in EPSS. Similarly, a study made by Mogaka (2015) found that the major challenge in practicing RL was lack of appropriate technology. Likewise, a study made on pharmaceutical manufacturers show that lack of appropriate infrastructure and technology were identified

challenges in practicing RL (Mogaka, 2015; Kahan and Ali, 2022). Additionally, Abbas and Farooque (2020) found that lesser predictability about returning medicines were identified challenges in Indian pharmaceutical manufacturing companies (Abbas and Farooque, 2020), A study made by Ababulgu, Mokennin and Jaleta (2020) in Jimma EPSS hub shows that, erratic availability of products and erratic return of unwanted products from facilities contributed to unpredictability of RL forecasting (Ababulgu, Mokennin and Jaleta, 2020).

The other challenges identified in this study were poor coordination of SCM partners coupled with less management commitment in practicing RL. A study made by Kahan and Ali (2022) revealed that lack of coordination and collaboration among the entire supply chain network was the top-most barriers in practicing RL in the pharmaceutical industry (Kahan and Ali, 2022). On the contrary, a study made in pharmaceutical manufacturing companies of South Africa shows that lack of skills and skills transfer was found to be the main challenge in practicing RL which is the least contributor of managerial challenge in EPSS (Mekaleng and Lambert, 2021).

Perception of employees is one of the determinant factors in practicing effective RL in an organization. According to respondent's perception about RL practice in EPSS, majority of the respondents agree that management attention and SC partner's communication and cooperation is crucial to implement effective RL practice. The result resembles the finding of Kwateng and Debrah (2015) regarding importance of management attention and SC partner's cooperation towards RL practice in an organization. Similarly, study made by G/Hiwot and Temesgen (2018) shows the importance of management attention for effective RL implementation (Kwateng and Debrah, 2014; G/Hiwot and Temesgen, 2018).

Additionally, the finding of this study indicates that respondents perceive that RL increases customer satisfaction and give competitive advantage for EPSS. Which shows that employees believe that implementation of RL bring an advantage for EPSS. According to Choi, Myung and Kim (2018) as employees has positive perception towards certain practice, their willingness to adopt the practice increases. Therefore, knowing that reverse logistics has a positive outcome to EPSS, encourage employees to adopt the practice. Aadditionally, respondents agree on the importance of adopting appropriate technology and expertise on the field. Some respondents mention difficulty of RL forecasting and unpredictable nature of the RL dynamics.

Additionally, the finding shows that the perception of employee's differs as years of experience increases. A study made by Ibrahim (2023) shows that years of experience affects perception of employees in a positive way. That is, as years of experience increases the perception of employees increases. (İbrahim Karakan, 2023). Upon the finding of this study, the perception difference occurs as years of experience gets above ten.

Opportunities are one of the enabling factors in practicing RL. The qualitative finding of the research shows that there are enabling opportunities in EPSS to implement effective RL. According to the respondents, the game changer opportunities are the newly established RL management directorate and besides its functionality, existence of disposal site with high temperature incinerators located at different hubs. Existence of incinerators facilitates safe disposal of expired and damaged pharmaceuticals which is one of the requirements of the regulatory. Therefore, if functionality guaranteed, existence of incinerators creates an opportunity for EPSS to achieve socially responsible organisation towards environmental protection. Key informant's mentioned availability of own transportation facility as an opportunity. A study made by Ababulgu, Mokennin and Jaleta (2020) at EPSS Jima hub found that availability of transportation facility has improved interconnection of the hub with its catchment regarding RL practice. Therefore, if well managed having own transportation facility is an added value for the practice (Ababulgu, Mokennin and Jaleta, 2020).

Additionally, government policy towards environment protection, increased need of customers and good relation of EPSS with suppliers mentioned by most key informants. Generally, the study shows that enabler opportunities exist to improve the RL practice of EPSS.

4.4.Summary of the study findings

Pharmaceuticals worth of 538,446,128 birr has been damaged and expired, and 44,308,922.48 birr returned in a review period of April 2022 – March 2023. Product pharmaceuticals take the biggest share in both scenarios.

The extent of adaptation of reverse logistic practice is limited and it focuses on disposal of pharmaceuticals. The other dimensions of the practice like availability of documented policy, quality standard for reuse/ redistribution and planning has been practiced in a limited way.

The major driver for adoption of reverse logistics in EPSS is stock availability which an economic driver followed by government rules and customer satisfaction.

The main challenges were lack of policy to practice, unpredictable nature of returns and Poor communication and cooperation with supply chain partners.

The common reason for products to return were expiry for proper disposal, overstock for redistribution, and re-call respectively.

Employees perceive that management attention and involvement is crucial, believes that reverse logistics increase customer satisfaction and gives a competitive advantage globally, additionally agree that communication and cooperation with supply chain partners should be improved.

The major opportunities to implement reverse logistics were establishment of RL and incinerator management directorate, despite having functionality issue physical existence of eight disposal sites with incinerators at different hubs, and government policy towards environment protection.

4.5. Limitations of the study

Some of the technical terms of the self-administered questionnaire might have been new for some respondents creating a possibility to misunderstand the question. Key informants were not willing to be audiotaped and some were not willing to be interviewed which might compromise the quality of the qualitative findings. Furthermore, due to visibility issue, the study used a one-year data from the dashboard of EPSS recording that limited computing trend analysis. Moreover, the study was limited to selected hubs and departments therefore, the practice might be different in other hubs., study was limited to EPSS central and hubs and did not include the practice of down-stream of the SCM (health facilities) and end users that might have different saying on the scenario.

Chapter five

5. Conclusion and recommendations

This chapter presents conclusion of the findings and further recommendation to improve RL practice in EPSS. The first section presents conclusion drawn from the results and the second section shows possible recommendations to be used to improve the current RL practice.

5.1. Conclusion

This research examined reverse logistics practice and its challenges in EPSS. According to the globally accepted definition, the result revealed that reverse logistics practice exists in EPSS. However, the practice is in its premature stage as it lacks main components of planning, designing and set quality standard for return management, as well as setting a well-documented policy and procedure for RL. Additionally, the disposal method is limited to incineration and burning to the open air, which is a practice that has an environmental issue.

Regarding the driving forces, the main driving forces to practice RL in EPSS are increasing customer satisfaction by enhancing stock availability which is an economic driving force followed by legislative component of government policy. And the third driving force were from social responsibility mainly creating image of environmentally responsible organization.

From the result one can concluded that challenges associated with reverse logistic practice arises from lack of definite rules and regulations on handling returned products, unpredictability of return dynamics and forecasting complexity coupled with lack of appropriate technology as well as poor communication and cooperation with supply chain partners respectively.

The leading opportunities that can facilitate implementation of reverse logistics in EPSS are existence of newly established RL and incinerator management directorate and high temperature incinerator at different hubs. With these two valuable assets on hand, it is true that RL practice will become easier for facilitation.

The study result identified that there is a positive perception of EPSS employees towards importance of RL practice. Respondents believe that RL increases customer satisfaction and give competitive advantage for EPSS. Employees believe that management attention and involvement

is crucial as well as communication and cooperation with supply chain partners should be improved. The ANOVA result shows that employee's perception differs as years of experience increases.

5.2.Recommendation

Based on the findings, this study recommends EPSS to focus on pre-planning of RL activities., designing and set quality standard for return management, as well as setting a well-documented policy and procedure for RL and follow its cost-effective implementation.

Furthermore, EPSS should invest on adoption of appropriate technology to facilitate forecasting and tracking of returned products.

It is recommended that EPSS to consider strengthening communication and cooperation with both upward and downward supply chain partners to facilitate RL management as well as attract developmental partners and private sectors to revolutionize cost effective disposal mechanism and place a system for returning products to manufacturers.

5.3. Suggestion for future work

In the future, it will be good to study multi-sectorial stakeholder's coordination with regard of RL practice, study the downward RL practice and to assess end users feeling. Moreover, studies that can deeply investigate and address cost benefit analysis of RL practice should be done. It is also advisable to asses practice and experience of private sector towards RL practice.

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Annex

1. Informed consent form

Addis Ababa University School of Pharmacy

Master of Science in Health Supply Chain Management

My name is Hirut Mebrate, a post graduate student from Addis Ababa University, College of Pharmacy, Department of Pharmaceutics and Social Pharmacy. I would like to express my gratitude for giving me your precious time. The purpose of this study is to investigate Reverse logistics practice and its challenges in Ethiopian Pharmaceuticals Supply Service focusing on the current RL practice, challenges and opportunities faced by EPSS while implementing it. and give recommendation that will facilitate RL implementation. The study is purely for academic purpose and will remain confidential and anonymous; thus, not affects you in any case. Your participation is purely voluntary, and you have the right not to answer any question and stop the interview at any time if you have any doubt. However, your timely response is vital for successfulness of the study. Therefore, I kindly request you to answer each item of the question genuinely and carefully. Instructions on the completion of this questionnaire will be stated before each section.

In case of any question or clarity please contact me via phone: +251-911-16-94-14

Your contribution is highly appreciated.

Is the above explanation clear? Yes ___ No ___

Are you willing to participate in the study? Yes ___ No ___

If yes, Let's start.

2. Self-administered Questionnaire

I. General information

Gender	Male Female
Age	_____ Years
Name of your directorate	
Respondent's highest educational qualification in Pharmacy	Bachelor's degree Master's degree Other (specify) _____
Work experience in the profession	_____ Years
Work experience in this directorate	_____ Years
Position within the organization is (check one):	Senior management _____ Middle management_____ Expert _____ Other (please specify) _____
Is there reverse logistic practice system in your institution?	Yes No
If yes, how long has been since your institution has established reverse logistics practice?	_____ Years
What is the primary focus of your reverse logistics operation(s)? (Check all that apply)	____ Product Returns/Recall ____ Resale/redistribute ____ Recycling ____ Remanufacturing/Refurbishing ____ Disposal

II. Extent of adoption of reverse logistics practice

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

1=Not at all 2=Small Extent 3=Moderate extent 4= large extent 5=Very large extent

Reverse logistics practice	1	2	3	4	5
Planning					
Pre-plan RL ahead of time and follow its practice					
Reuse/Redistribution					
Set quality standard for reuse/Redistribution					
Design products for reuse/Redistribution					
Recycling of packaging materials/ containers					
A well-documented policy for recycling					
Dispose					
Land fill					
Burn to open air					
Incinerate					
Return to manufacturer/ supplier					
Others Specify					

III. Drivers for Adopting Reverse Logistics Practice

2. Rate the drivers for adopting reverse logistics practice in your firm by ticking the appropriate box using the following scale:

1=Strongly Disagree 2=Disagree 3=Moderately Agree 4=Agree 5= Strongly Agree

Drivers	1	2	3	4	5
Economic					
Enhance stock availability					
Increase in Customer satisfaction					
Cost reduction					
Gross profit margin					
Competitive advantage					
Legislation					
Government rule and regulations					
EPSS manual and policy					
Social responsibility					

Values or principles that an organization holds to be responsible with RL (Social responsibility)					
Establish image of environmentally responsible organization (Green image)					
Others (Specify)					

IV. Challenges of Implementing Reverse Logistics Practice

3. 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:
4. 1=Strongly Disagree 2=Disagree 3=Moderately Agree 4=Agree 5= Strongly Agree

Challenges	1	2	3	4	5
Costly to manage reverse logistics					
Lack of appropriate technology					
Lack of expertise in reverse logistics					
Lack of appropriate infrastructure					
Lack of definite rules and regulations on handling returned products					
Return dynamics and forecasting complexity					
Management commitment and style /Lack of managerial support					
Poor communication and cooperation with supply chain partners such as Manufacturer, EFDA, MOH, Facilities					
Others (Specify)					

V. Reason for return

5. Indicate the reason/s for the return of products in your firm by ticking the appropriate box using the following scale:

   1=Strongly Disagree 2=Disagree 3=Moderately Agree 4=Agree 5= Strongly Agree

Reasons	1	2	3	4	5
Damage to product/ package					
Wrong delivery					
National emergency					
Counterfeit products /re-call					

Over stock					
Expired products for disposal					
Others, specify					

VI. Perception towards Reverse Logistics practice

6. How do you rate reverse logistics practice in EPSS? Indicate your answer by ticking the appropriate box using the following scale:
7. 1=Strongly Disagree 2=Disagree 3=Moderately Agree 4=Agree 5= Strongly Agree

Perception	1	2	3	4	5
To what extent you agree/disagree with reverse logistics practice in EPSS: • Reverse logistics increase customer satisfaction					
• Reverse logistics give competitive advantage globally					
• Reverse logistics helps to EPSS to an be environmentally responsible organization					
• Reverse logistics is difficult to practice					
• Reverse logistics incurs additional cost					
• It is very costly to collect and return drugs sold					
• It is very costly to redistribute or dispose drugs					
• It is difficult to predict the dynamics and forecast reverse logistics					
• Appropriate technology and expertise are needed to manage reverse logistics					
• There is clear rules and regulations on handling returned products					
• Management attention and involvement is crucial					
• Communication and cooperation with supply chain partners should be improved					

VII. Opportunities of implementing reverse logistics

8. What opportunities do you think the future holds to EPSS for improving and adopting reverse logistics practice?

_____

_____

_____

9. Please indicate any other relevant comments

_____

_____

_____

Thank you!

3. Interview checklist

Socio-demographic characteristics

1. Age_____ Sex_____
2. Educational status_____ Profession_____
3. Current occupation and position_____
4. Total years of experience_____

Key Informant guiding questions

1. How do you describe RL?

   Probe: tools policy/manual/ EPSS have

   - common reverse logistics activities (e.g., Reuse/redistribution, dispose, practiced by EPSS?)
   - increase customer satisfaction, product availability, environmental responsibility, cost saving

2. How do you coordinate RL activities?
   Probe: directorates involved/stakeholders involved/ collaboration and engagement of strategic supply chain partners
3. What drives EPSS to practice RL?

   Probe: Economical, legislation and social responsibility

4. How do you manage returned products?
   Probe: planning, segregation, recording, storing, distribution, disposal

5. What are the challenges and opportunities to practice RL in EPSS?
   Probe: human resource, legislation, budget, management commitment, RL nature

6. What do you suggest to improve the current RL Practices?
   Probe: Stakeholders (manufacturers, MOH, EFDA and disposal sites) should do to improve engagement

4. Data abstraction tool

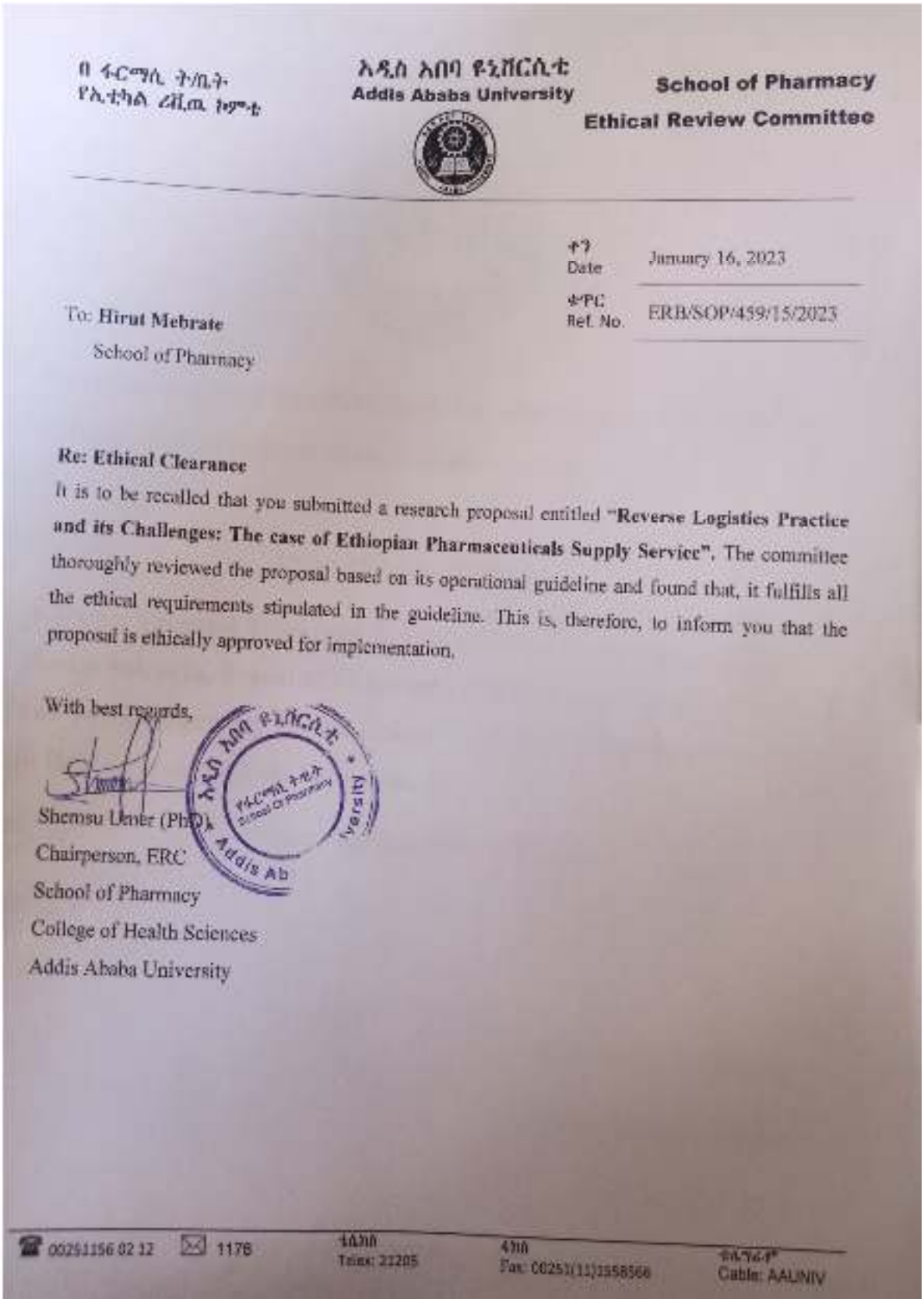
Total monetary value of products in 2022/23

Budget line	Items	Procured	Redistributed/ resale	Returned (recalled) from			Returned to manufacturer	Recycled	Refurbished	Damaged and expired	Disposed
				Hub	Hospitals	H.Cs					
RDF	Medicine										
	Supply										
	Reagent										
	Medical device										
Program	Medicine										
	Supply										
	Reagent										
	Medical device										

List of returned damaged and expired products in 2022/23 fiscal year

S. No	Item list	Brand name	Generic name (Strength, dosage form)	Country of origin	Category Medicine, Supply, lab reagent, Equipment)	Budget source	Monetary value	Return Reason	Returned to
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									

5. Ethical clearance



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Addis Ababa University

School of Pharmacy
Ethical Review Committee

ቀን Date: January 16, 2023

ቁ/PC Ref. No.: ERB/SOP/459/15/2023

To: Hirut Mebrate
School of Pharmacy

Re: Ethical Clearance

It is to be recalled that you submitted a research proposal entitled **"Reverse Logistics Practice and its Challenges: The case of Ethiopian Pharmaceuticals Supply Service"**. The committee thoroughly reviewed the proposal based on its operational guideline and found that, it fulfills all the ethical requirements stipulated in the guideline. This is, therefore, to inform you that the proposal is ethically approved for implementation.

With best regards,

Shemsu Umer (PhD)
Chairperson, ERC
School of Pharmacy
College of Health Sciences
Addis Ababa University

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