

ASSESSMENT OF REVERS LOGISTIC ON PHARMASTUCAL MATERIALS  
IN PHARMASTICAL FUND AND SUPPLY AGENCY OF ETHIOPIA, JIMMA  
BRANCH.

A Thesis

Submitted to the School of graduate studies of Jimma University in Partial  
Fulfillments of the Requirements for the award of the degree of Master of art in  
Logistic and Transport Management (MA).

BY

ELFENESH GUCHE



JIMMA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

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JIMMA UNIVERSITY  
SCHOOL OF POSTGRADUATE STUDIES  
DEPARTMENT OF MANAGEMENT

DECLARATION

The thesis entitled “ASSESSMENT OF REVERS LOGISTIC ON PHARMASTUCAL MATERIALS IN PHARMASTICAL FUND AND SUPPLY AGENCY OF ETHIOPIA, JIMMA BRANCH”. Submitted to research and PG students office of business and Economics College is original and it has not been submitted previously in part or full to any university or other funding organization.

----- Date -----

Signature

JIMMA UNIVERSITY  
SCHOOL OF POSTGRADUATE STUDIES  
DEPARTMENT OF MANAGEMENT

CERTIFICATE

We certify that the thesis entitled “ASSESSMENT OF REVERS LOGISTIC ON PHARMASTUCAL MATERIALS IN PHARMASTICAL FUND AND SUPPLY AGENCY OF ETHIOPIA, JIMMA BRANCH.” was done by Ms. Elfefnesh Guche Wubshet for the partial fulfillment of Master’s degree under our supervision.

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Main Advisor

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signature

## **Dedication**

This research work is dedicated to my five Month old daughter HERAN Addisalem.

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## ABSTRACT

*The research paper on Assessment of reverse logistic on Pharmaceutical Materials in Pharmaceutical Fund and Supply Agency of Ethiopia, Jimma Branch. The aim of this study was to describe the extent to which Pharmaceutical fund and supply agency of Ethiopia, Jimma Branch has implemented reverse logistics, to identify the economic benefits that can result from adoption of reverse logistics by Pharmaceutical fund and supply agency of Ethiopia, Jimma Branch and the problem for the study was based on the researcher's observation of the Pharmaceutical fund and supply agency of Ethiopia (PFSA) Jimma Branch that has no clear reverse logistic practice that helps to minimize pharmaceutical material disposal rate and shortage of pharmaceutical material in PFSA Ethiopia Jimma Branch. In addition, there was huge amount of drugs which is expired and a reason for loss of more than seven million birr in 2009E.C. This study was use cross sectional research design and the study prefers to use **census** or include all staff members to maintain the validity of the result at higher possible level. The reason for using census was due to less number of staff at PFSA Ethiopia, Jimma Branch. According to the result of these studies, the practice of reverse logistics in PFSA Ethiopia, Jimma Branch introduced in organizational policy level. This means they plan and develop a policy to use reverse logistics practice in order to minimize pharmaceutical materials from damage and disposal. The results of multiple regression analyses show that the variation in Finance performance and pharmaceutical materials (drug) both negatively attributed to the reverse logistics variable, where  $18 \leq R^2 \leq .20$ . But the rest multiple regression analyses contributed for prediction of positive customer satisfaction to the reverse logistics variable. Finally these studies recommend that, the practice of reverse logistics (reuse, recycling and Transfer) must be implemented practically rather than organizational policy level. Hence our country is developing country; every stockholder must strive for proper use and management of pharmaceutical materials seriously and this research design a framework that helps as a solution for existing problem in PFSA Ethiopia, Jimma Branch. The proposed framework have important role regarding safe use of pharmaceutical materials without loss if it was deployed practically within the chain of the sectors in PFSA Ethiopia Jimma branch and other branches of PFSA Ethiopia.*

*Key Word: - Reverse logistics, reuse, recycle, transfer, disposal, PFSA Ethiopia Jimma Branch and Pharmaceutical Materials.*

# CHAPTER ONE

## INTRODUCTION

This chapter contains background of the study, statement of the problem, research question, objective of the study, specific objective, significance of the study, scope of the study and limitation of the study.

### 1.1 Background of the study

Recently, considerable attention has been given to the study of reverse logistics in the pharmaceutical manufacturing industry. Abundant time and resources are now being devoted to the understanding of reverse logistics practices by companies who previously did not do so (Kwateng, Debrah, Parker, Owusu, & Prempeh, 2014). Almost all businesses must deal with some nature of return due to issues of marketing returns, quality problems, overstock, goods brought back for refurbishing or re-manufacturing. Learning to manage reverse flow is of key importance for various industries since return rates differ significantly from business to business (Lembke, 2001).

Reverse logistics is one of the most critical aspects for any business related to manufacturing, distribution, and service and support of any type of product (Blumberg, 2004). It is also practiced in different industries, including those producing steel, commercial aircrafts, computers, automobiles, appliances, and chemicals and medical items (Dowlatshahi, 2000). The importance of reverse logistics is underscored by its increasing popularity in both business and academic communities since the last decade (Nikolaou, Evangelinos, & Allan, 2013).

Earlier, reverse logistics was often considered as a process that has little effect on enterprises as a whole. However, the evolving financial and competitive pressures, as well as the complexity in environmental regulations, have made it clear that reverse logistics is no longer an option for an organization to meet its goals and increase profitability (Partida, 2011).

Reverse logistic here is the back ward collection of pharmaceutical material from the customer like hospital, health care, clinics, pharmacies to the pharmaceutical Fund and supply Agency of Ethiopia. So this study will assess the effectiveness and efficiency of the existing reverse logistic system of pharmaceutical material and finally recommend ideas to solve negative impact of reverse

logistic on pharmaceutical materials to the pharmaceutical Fund and supply Agency of Ethiopia and save the country economy. Lau & Wang, (2009), argue that practicing reverse logistics can help reduce waste and increase profit through an effective recycling process in the developing countries. It is important to perform reverse logistics efficiently and effectively to obtain maximum benefits of its opportunities (Adebayo, 2012).

To sum up, PFSA Ethiopia Jimma Branch has a loss of more than seven million birr in the 2009 E.C working year. This gap shows that there is a problem regarding pharmaceutical materials after distribution and follow up during disposal. So this research try to identify possible solution for this research gap in order to minimize the rate of disposal and shortage pharmaceutical materials in PFSA Ethiopia Jimma Branch.

## **1.2 Statement of the problem**

Reverse Logistics has become a fairly serious issue in recent times primarily because retailers have been forced, due to increased competition, many forces drive reverse logistics, like competition and marketing motives, direct economic motives and concerns with the environment. Whatever the reason, returned goods have to be processed in the best manner possible. Reverse logistics in the pharmaceutical industry is extreme important, not only from the economic point of view, but also from the environment as well as regulatory point of view.

Reverse logistics encompasses the collection of goods from end consumers arranging of the goods received disposal of goods and retrieval of components at various stages in the supply chain and re manufacturing processes (Bhavin, 2010). Various reasons such as guarantee failures, inappropriate product orders or shipment, damaged products, product recalls, reusable packaging materials and product upgrading account for reverse flow (Kabir, 2013). In the pharmaceutical industry, reasons for product returns are often associated with damages and product expiry, reproductions, product recalls and clinical trial recoveries (Bhavin, 2010). Issues of temperature excursion and product expiry are often not evidenced in Ethiopia and can cause losses and negative side effects. For instance temperature excursions can reduce effectiveness, reduce shelf life, or alter the strength of a drug and make it risky. Counterfeit and stolen product continues to be a major threat in the pharmaceutical manufacturing industry (World Health Organization, 2010).

Improper management of returned drugs can involve rerouting into the black market and relabeled for sale or disposed of into sewerage and landfill. This would have negative impact on the health of the people and the environment in the long term. Another aspect has to do with securing and proper disposal of returned products. Thus, it is increasingly important to implement an improved reverse logistical chain to provide a cost effective tract and trace options for the pharmaceutical supply chain.

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

The nature of work in this industry differs from other manufacturing industries as such, products returned and retrieved in times of reverse logistics are seldom repaired or resold but instead destroyed and disposed-off properly (Kabir, 2013). Blumberg in 2008 indicated that the general direction of global pharmaceutical reverse comprises recall management, disposal & destruction, Asset recovery and liquidation, Rebalancing and restocking of products as well as Optimization of transportation and shipping costs. The capability to track, retrieve & manage return product in the entire supply chain is of prime importance in the pharmaceutical manufacturing sector. Lots of pharmaceutical products are unable to be recovered in times of reverse logistics. It was estimated that only 3-4 % of pharmaceutical products are returned to manufacturer for disposal (Sartori, 2010). Different literature shows that the practices of reverse logistics encompass reuse, recycle and disposal of pharmaceutical materials. Reuse and recycle of pharmaceutical materials did not start yet in developing country. The existing opportunity regarding reverse logistic in developing country is disposal as a final option of removing expired pharmaceutical materials. So, what are the possible solutions to minimize the rate of disposal in PFSA Jimma branch? What are the possible way in order to minimize the shortage drugs or pharmaceutical materials in PFSA Jimma branch? These are the major gaps the researches were going to address.

According to the annual report of PFSA Ethiopia Jimma Branch 2009 E.C has the loss more than seven million birr. The report show that the loss was from two different sources. The first source was the fund from the government and the second source was from non-governmental funding organization.

In addition, there is high amount of pharmaceutical materials in the process of disposal as the result of expire. These are very high losing for developing country like Ethiopia. In study, it should be transferred to other branch of pharmaceutical materials distributor where there is limitation or shortage of pharmaceutical materials during expire date of drugs. Therefore, this research were aim to find solution in pharmaceutical fund supply agency of Ethiopia, Jimma Branch.

### **1.3 Research Question**

1. What is the extent to which Pharmastical fund and supply agency of Ethiopia; Jimma Branch has implemented reverse logistics?
2. What are problems of reverse logistics implementation in Pharmastical fund and supply agency of Ethiopia, Jimma Branch?
3. What are the economic benefits that can result from adoption of reverse logistics in Pharmastical fund and supply agency of Ethiopia, Jimma Branch?

### **1.4 Objective of the study**

#### **1.4.1 General Objective**

The general objective of these studies was to assess the reverse logistic Pharmastical Materials on Pharmastical fund and supply agency of Ethiopia, Jimma Branch.

#### **1.4.2 Specific objectives**

1. To describe the extent to which Pharmastical fund and supply agency of Ethiopia, Jimma Branch has implemented reverse logistics.
2. To identify problems of reverse logistics implementation in Pharmastical fund and supply agency of Ethiopia, Jimma Branch.
3. To identify the economic benefits that can result from adoption of reverse logistics by Pharmastical fund and supply agency of Ethiopia, Jimma Branch.
4. To design a framework for revers logistic practice in pharmastical fund and supply agency of Ethiopia, Jimma Branch

### **1.5 Significance of the Study**

This study is important in several aspects for several stakeholders (PFSA, Ethiopia, different branches of PFSA, Hospitals, Health centers, pharmacy and drugstore). Firstly, the findings of this thesis were serve as inputs to Pharmastical fund and supply agency of Ethiopia, Jimma Branch, as well other branch of Pharmastical fund and supply agency of Ethiopia and the government in general on how to formulate and implement reverse logistics strategies. Second, it is a piece of contribution to the existing knowledge of reverse logistics practices on used

Pharmaceutical fund and supply agency of Ethiopia, Jimma Branch and can be referred by other researchers for further research on the area.

### **1.6 Scope of the study**

These papers were delimited to investigate the reverse logistic Pharmaceutical Materials on Pharmaceutical fund and supply agency of Ethiopia, Jimma Branch. The data for the analysis were obtained from Pharmaceutical fund and supply agency of Ethiopia, Jimma Branch. Finally, this study does not include other branches of Pharmaceutical fund and supply agency of Ethiopia.

### **1.7 Limitation of the study**

There was external (Uncontrollable) variables that discourage the horizontal implementation of the study For instance, finding and Locating respondents, the lack of cooperation of the respondents and their willingness to complete the questionnaires, located far apart in Jimma city and lack of other studies or books on this area in Ethiopia. Moreover, the budget pressure were face by the researcher is also the other constraint to undertake wide survey in Ethiopia with respect reverse logistics on Pharmaceutical Material in Pharmaceutical fund and supply agency of Ethiopia, Jimma Branch. The lack of relevant and up to date literature, lack of localized previous research papers in the area of the study was also major constraints in this study.

### **1.8 Definition of terms**

1. **Re use:** using the pharmaceutical material by collecting unrequested materials for long period of time during expire.
2. **Recycle:** distribution of pharmaceutical materials to different clients those collected from different clients for reuse.
3. **Disposal:** - removal of pharmaceutical materials after expires.
4. **TRANSFER:** - substitution of pharmaceutical materials from un sold or less or no demand environment to high request environment through communication line.
5. **Framework:** - logical design / optimized solutions to overcome the existing problems.



## **CHAPTER TWO**

### **2. LITERATURE REVIEW**

#### **INTRODUCTION**

This chapter was containing two broad concepts this are literature review which include theoretical review and empirical review. The theoretical review was containing definition of revers logistics, aim of reverses logistics, and importance of revers logistics, Economics Factors, revers logistic derivers and disposal. The other one is empirical review which includes review of different papers which is related to the topics.

#### **2.1 Definition of Reverse Logistics**

Reverse logistics can be defined as the process of planning, implementing and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal (Roger's and Tibben-Lembke, 1998).

Reverses logistics is the process of moving products from their typical final destination with the purpose of revalorization or proper disposal (Rogersand Tibben-Lembke, 1999). The Council of Logistics Management (CLM) published the first known definition of Reverse Logistics in the early nineties (Stock, 1992):

The term often used to refer to the role of logistics in recycling, waste disposal, and management of hazardous materials; a broader perspective includes all relating to logistics activities carried out in source reduction, recycling, substitution, reuse of materials and disposal.

Originally reverse logistics was defined as the process of recapturing value through planning, implementing and controlling effective and efficient flow of materials from customer's end towards the origin (Murphy and Poist, 1989; Kroon and Vrijens, 1995).

Reverse Logistics (RL) is associated with a holistic set of activities like recycling, repair, reuse and reprocessing, as well as collection, disassembly and the processing of used products, components and/or materials (Kokkinaki, Dekker,de Coster & Pappis 2001). However, instead of a holistic approach, most journal articles on reverse logistics focus on tactical and operational

problems in production planning and inventory management (Rubio, Chamorro & Miranda 2008). In terms of resource recovery, the most often described option was recycling and re-use (De Koster et al., 2001) . Products, components, materials, equipment and even complete technical systems may go backwards in the supply chain.

## **2.2 Aim of reverse logistics**

Reverse logistics objective is to minimize the handling cost while maximizing the value from the goods, or proper disposal. Basically, Products are returned to the manufacturer or retailer for any number of reasons. Some of the more common reasons are warranty failures, damaged products, product recalls, incorrect product orders/shipment, exchange of impaired products for functional ones, reusable packaging materials, product upgrading and so on. Whatever the reason, returned goods have to be processed in the best manner possible.

Various reasons such as warranty failures, incorrect product orders or shipment, damaged products, product recalls, reusable packaging materials and product upgrading account for reverse flow (Kabir, 2013). In the pharmaceutical industry, reasons for product returns are often associated with damages and product expiry, counterfeits, product recalls and clinical trial recoveries (Bhavin, 2010).

## **2.3 Importance of reverse logistics**

Reverse logistics in the pharmaceutical industry is extreme important, not only from the economic point of view, but also from the environment as well as regulatory point of view.

Reverse logistics has become significant because organizations are under increasing pressure from many stakeholder groups, including shareholders, customers, employees, suppliers, reverse supply chain partners, government agencies, nonprofit organizations and the (public) environment (Vachon & Klassen 2006) owing to environmental issues, legislation and consumer expectations. This section focuses on the importance of reverse logistics by discussing the different drivers of reverse logistics, followed by the benefits that reverse logistics has to offer organizations and their stakeholders.

Improper management of returned drugs can involve rerouting into the black market and relabeled for sale or disposed of into sewerage and landfill. This would have negative impact on the health of the people and the environment in the long term. Another aspect has to do with securing and proper disposal of returned products. Thus, it is increasingly important to

implement an improved reverse logistical chain to provide a cost effective, tract and trace options for the pharmaceutical supply chain. Consequently, product return and recovery activities have been studied for their economic implications in the distribution networks of the pharmaceutical supply chain (Ritchie et al. 2000; Amaro & Barbosa-Povoa 2008, 2009).

## **2.4 Economics factors**

According to Buellens (2004) points out, a company that is considering adopting a reverse logistics or product recovery programme may be able to overcome any technical or legal difficulties, but might be dissuaded from adopting such processes due to the financial implications. The evolvement of financial, competitive and customer pressures, as well as the increased complexity regarding the environmental policies and regulations, raised the need for organizations to engage in reverse logistics processes (Partida, 2011).

Reverse logistics is also gaining interest in developing countries due to increased competition, market growth, and large numbers of products users. Therefore, the management of product returns in an effective as well as a cost-efficient way has become important as it leads to profitability and elevation of customer service levels, and ensure higher customer retention (Samir & Rajiv, 2006).

The existence of a reverse logistics programme has been shown to bring direct monetary gains to companies by reducing the use of raw materials, by adding value with recovery, or by reducing disposal costs (Rogers *et al.*, 2001; De Brito *et al.*, 2003).

## **2.5 Reverse Logistics Drivers**

According to (Bonev, 2012) Two main parties are involved in reverse logistics: First, the returning party which possesses the product; and second, a receiving party which is interested in capturing value from the product. In this regard, the driving forces from the receiver's perspective are different than those from the returning party's perspective (de Brito & Dekker, 2002,).

## **2.6 Disposal**

Landfilling or incineration as a disposal method is an option for products that cannot be reused due to technical or economic reasons. Also, during the sorting level, disposal could be an option for those rejected products which do not have satisfactory market potential or which require extensive repair (Fleischmann et al., 2000).

## **2.7 LOGISTICS IN BUSINESS**

Logistics for many years centered on what is known as forward logistics. According to general business environment, the flow of forward logistics is the sending of the semi-final or final products from the production to the user, with the participation of several key sectors, namely the manufacturer, wholesaler, supplier, and distributor or forwarder (Zelbst et al, 2009). In retail, for example, forward logistics was dependent on sales forecasts for future requirements of the supply chain network. As product was needed, it was sent first to a distribution center and then to the retail stores. At each level in the network, forecasts would be used to help predict what will be needed, and shipments are sent in response to need at the distribution center or retail level (Tibben-Lembke & Rogers, 2002). Not much thought was put into what happens after these steps for products that do not find their way to a planned final destination with a customer. Reverse logistics flow is very different from the forward flow logistics. By contrast, a reverse logistics flow is much more reactive, with much less visibility. With returned product, a wide range of disposition options is available, all with different revenue streams (Theirry et al. 1995). Companies generally, however, will not initiate reverse logistics activity as a result of planning and decision-making on the part of the firm but in response to actions by consumers or downstream channel members. Hammaduddin (2012) provides a comprehensive summary on how forward logistics differs from reverse logistics (see Table 1). Forecasting reverse logistics flow initiated from customers for example, can be much undefined especially when compared to planning accessible for the forward logistics of the same product. In some cases, however, a trend can be observed where reverse logistics flow would naturally follow trends in forward flows. For example, sales and special promotions can correlate with an increase of returned products, which would help a company plan for reverse logistics needs.

This means that the information about the demand, based on sales or special promotions should be shared and analyzed with the forward and the reverse logistics planning in order to prepare in advance the resources needed at any time. Additionally, different products could have very different returns rates, depending on the quality and on a series of factors which makes forecasting the return more complicated than forecasting the demand (Tibben-Lembke & Rogers, 2002).

Table 1

Forward Logistics	Reverse Logistics
Forecasting relatively straightforward	Forecasting is difficult
One to many distribution points	Many to one distribution points
Product quality uniform	Product quality not uniform
Product packaging uniform	Product packaging damaged
Destination/routing clear	Destination/routing not clear
Disposition options clear	Disposition not clear
Pricing relatively uniform	Pricing dependent on many factors
Importance of speed recognized	Speed often not considered a priority
Forward distribution costs easily visible	Reverse costs not directly visible
Inventory management consistent	Inventory management not consistent
Product life cycle manageable	Product life cycle issues more complex
Negotiation between parties straightforward	Negotiation complicated by additional considerations
Marketing methods well known	Marketing complicated by several factors
Visibility of process more transparent	Visibility of process less transparent

Hammaduddin (2012)

Retail reverse logistics describes the activity of returning goods back through the supply chain with a focus on retailers (Bernon, Rossi, & Cullen, 2011). Although retail reverse logistics is not a new concept, the growth of the Internet and home shopping has seen a marked rise in the volumes of products being returned (Richey, Tokman, Wright, & Harvey, 2005). This does not need to be a burden on a company but should be seen as a potential benefit. High quality reverse logistics can promote longer-term relationships according to Daugherty, Myers & Richey (2002), as customers are more likely to repurchase from companies who do a good job at handling returns. Customers, for the most part, are no longer concerned with the product once it is returned, but for organizations, this is a critical component of the returns policy as it is a major expense (Skinner, Bryant & Richey, 2008). The following is an example of reverse logistics within a bricks and mortar retail business. As noted by Tibben-Lembke & Rogers (2002), differences in reverse logistics will exist based on the destination to which the returned items

will be sent: return to vendor; resell via outlet, or to a broker, either as is, or reconditioned; donation to charity; or disposal via recycling or landfill. The disposition strategy that the organization adopts is going to be correlated with its returns policy and is ultimately part of its customer service offering. The position within the supply chain often drives the size and scope of the reverse logistics problems that the firm faces. Generally, the closer the firm is to the end consumer, the greater the size and scope of the reverse logistics issues. Because retailers deal with customers directly, the retailer typically has a larger volume of returned merchandise to deal with than its suppliers (Tibben-Lembke & Rogers, 2002). The retailer is the first line in the process of returns and from an efficiency perspective the retailer's last preference would be to return to the supplier. If possible, a retailer's first preference would be to sell the item as new at the original price. This option maximizes profit potential and should have a minimal impact on resources as the item should be able to be processed all within the same store. If this cannot be done, a full refund from the vendor is the next most profitable depending on the agreement in place with the vendor. Also, depending on the volume this could lead to a strained relationship with a vendor. If a return to the vendor is not possible, the retailer may be able to sell the product again at a markdown in its store, or through an outlet at a reduced profit. In this case, an organization might have more stringent requirements for the condition of the product upon customer return (Skinner, Bryant & Richey, 2008). Short of recycling or landfilling the product, one of any company's last resorts is to sell the product to a broker (Tibben-Lembke & Rogers, 2002). Brokers operate in a secondary market, buying and selling product that for one reason or another cannot be sold in the primary retail channel. Brokers can be found who are willing to buy almost any product in any condition. As a result, the prices, which brokers will pay, are typically very low. Retailers also have to be careful that the sale of products through these brokers does not hurt the value of their operations as customers seek the new discounted prices found with the broker's channel (i.e. the Dollar Store or TJ Maxx).

Retailers need to enhance returns processing to allow consumers to return their purchases to the channel of their choice, thereby enabling a seamless experience. In order to keep retail prices low, reverse logistics must focus on taking advantage of every possible opportunity for reducing costs or increasing revenues. Any way to process returns more quickly, or to find new brokers to whom to sell, must be taken advantage of, to reduce the cost of the returns (TibbenLembke, 2002).

## **2.8 Logistics & the Environment**

Although economic performance has traditionally been, and continues to be, the first priority for manufacturers, environmental performance has become increasingly important (Huang & Yang, 2014). Reverse logistics has been found to be positively correlated to both environmental and economic performance (Huang & Yang, 2014). An organizations methodology to reuse, restore, and reuse items can advantage the environment, increment benefits and save money. In case a company, for illustration, can diminish wasteful aspects in their return prepare, which in turn decreases transportation, they can successfully decrease carbon outflows whereas moving forward air quality and possibly decrease costs. An case of reverse logistics profiting the environment can be found within the hardware industry. This industry has been developing quickly, and with fast changes in innovation items such as cell phones, computerized cameras, video gaming frameworks, computers, tvs, tablet computers and other electronic gadgets can become obsolete in a number of a long time. This comes about in undesirable items that may, without a reusing procedure, conclusion up in filling up landfills with possibly harmful squander. Samsung, a multinational combination company, started a program called Reusing Coordinate in 2007. In addition, the company created the Samsung Take-back And Recycling (S.T.A.R.) toner-recycling program, which recycles used printer cartridges. Using a pre-paid Smart Label, customers can return old printer cartridges to Samsung for recycling and reuse.

Increasingly, rigid natural and bundling controls are driving companies to become more responsible for remaining and last items, long after they offer the items (Dowlatshahi, 2000). Less items will be arranged of as firms explore their reusability, re-manufacturability, and recyclability (Dowlatshahi, 2000). Since Reverse logistics by definition incorporates forms like reusing, repairing, reusing, and remanufacturing engaging in Reverse logistics exercises makes a difference organizations accomplish a certain level of green. Environmental protection is getting to be a key issue in our society, and the Reverse logistics administration plays a significant part in making green supply chain and natural security (Li & Luo, 2012). For a assortment of financial, natural, or authoritative reasons, item transfer may no longer be the consumer's obligation as items come to be reused or remanufactured by the original producers (Dowlatshahi, 2000). The success of a reverse logistics program will be positively related to the existence of an incentive system that rewards employees and managers for their involvement with reverse

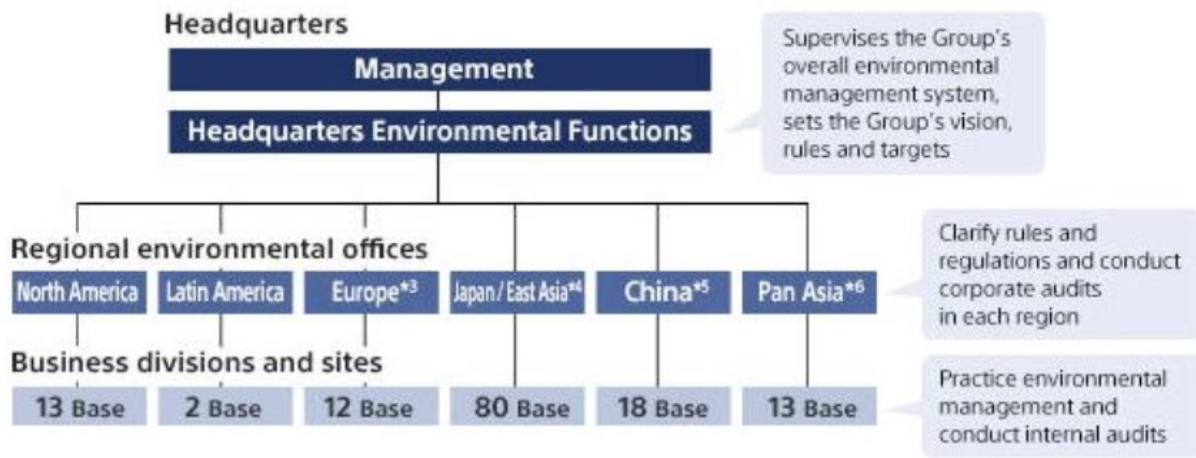
logistics activities (Carter & Ellram, (1998). This could be seen with a company that looked for to reduce the sum of vitality devoured, the volume of nursery gasses made and packaging (i.e. cardboard or beds) utilized within the transportation of parts and finished merchandise is noteworthy to reduction of the natural squander because it relates to fabricating logistics. Sony Corporation is a incredible example of how a company can address natural squander within the reverse logistics process. Sony Organization could be a Japanese multinational organization headquartered in Japan. The company is one of the driving around the world producers of electronic items for the customer and professional markets. Sony Organization, the parent company of the Sony Gather, is made up of the taking after four working units: gadgets (Sony Bunch), movement pictures (Sony Pictures Entertainment), budgetary administrations (Sony Budgetary) and music (Sony Music Entertainment). Sony produces a part of squander in their operations handle as one of the biggest producers in the world.

According to Sony's website, the headquarters is responsible for environmental management related to energy consumed at sites and by products; resource conservation, including recycling; chemical substance management; biodiversity conservation; procurement; logistics; technological development; and communications, which the Corporate Executive Officer is in charge of overseeing. Working with regional offices and departments, goals have been established and progress towards those goals are measured and reported. In addition, regional environmental offices facilitate region wide environmental management activities, such as a better understanding of local, legal and regulatory trends, effective communication of standards and instructions set forth by headquarters to the regional divisions and sites, and effective performance of audits at all regional business divisions and sites (see Figure 2).



Figure 1

**The Sony Group Global Environmental Management System (As of March 31, 2015)**

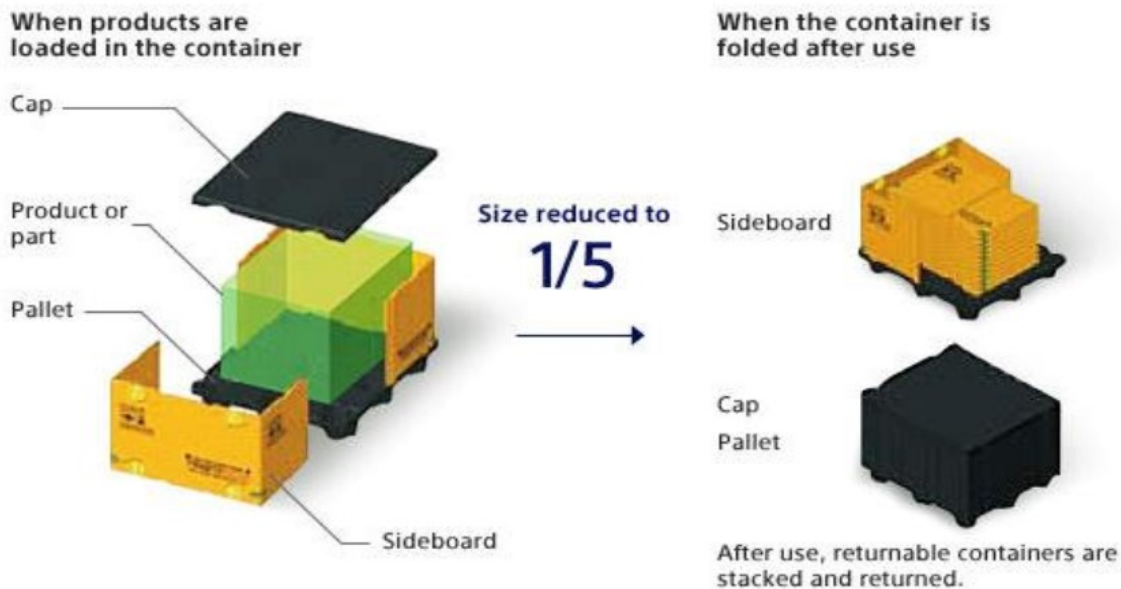


[http://www.sony.net/SonyInfo/csr\\_report/environment/management/structure/index2.html](http://www.sony.net/SonyInfo/csr_report/environment/management/structure/index2.html)

The following is an example how Sony is reducing environmental impact through improvements in packaging in the logistics process. Packaging produces CO2 emissions and packaging materials that can adversely affect the environment. To improve on the impact created by the packaging manufacturing process requires many departments working together including logistics, procurement, product design and manufacturing. One area with high potential returns is found with containers used in the transportation of goods. Sony reuses packaging materials and reduces waste by using returnable containers which can be reused repeatedly for products and parts transport (see Figure 3). Sony has been using returnable containers since 2005 in Japan and expanded outside of Japan to include production to sites around the world.

Figure 2

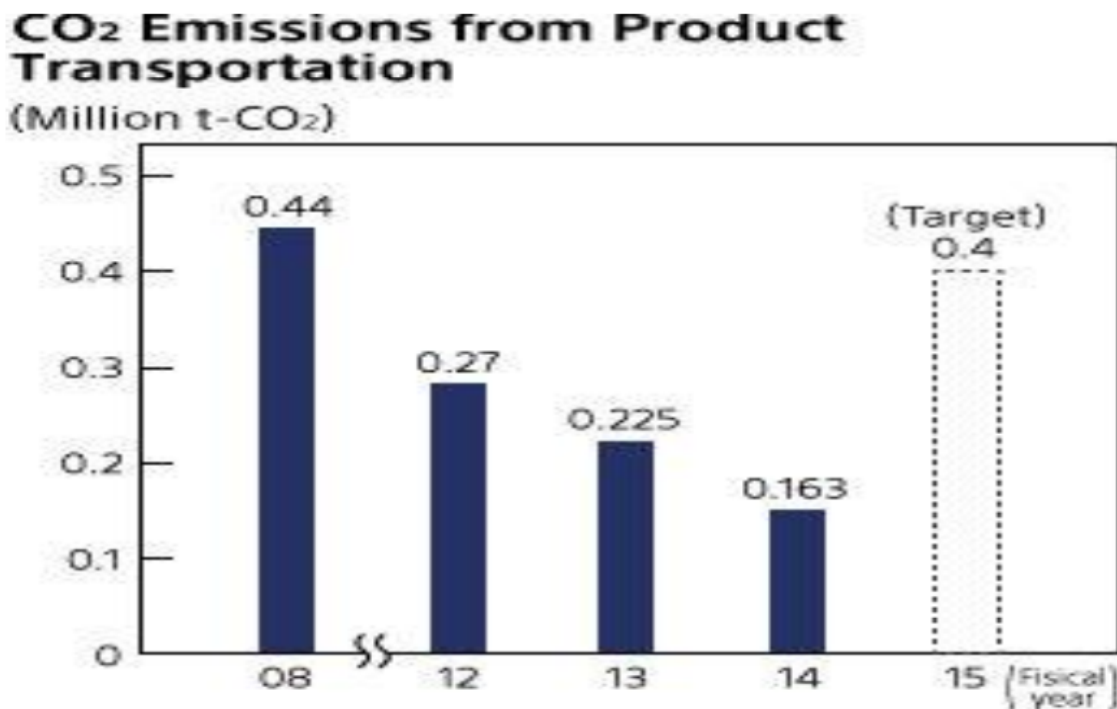
### Structural overview of a returnable container



[http://www.sony.net/SonyInfo/csr\\_report/environment/index.html](http://www.sony.net/SonyInfo/csr_report/environment/index.html)

These standardized modular containers are designed to enable the efficient loading goods going out to customers on transportation carriers (i.e. sea freighters). These same containers which are built to be broken down to 1/5<sup>th</sup> the original size are returned to the manufacturing facility to be reused again. As mentioned earlier, Sony reports the progress toward achieving the results of the Road to Zero initiatives to the public. One of the measurements is called the Green Management Environmental Targets for Logistics. According the website, the goal is to reduce CO<sub>2</sub> emissions generated from transport and packaging materials by means of optimization of transport efficiency (i.e., downsizing of product packages, improving loading efficiency and optimizing parts packages) and switching to alternative transport modes which can reduce environmental impact (i.e. modal shift and joint shipping), as well as by reduction of gross transport weight through weight reduction of each product. For 2015, the goals are to reduce CO<sub>2</sub> emissions from logistics by 14% and reduce waste from packaging for incoming parts by 16% from the fiscal year 2008 levels. In fiscal year 2014, CO<sub>2</sub> emissions from logistics totaled approximately 163,000 tons, 62% lower than in fiscal year 2008 (see Figure 4).

Figure 3



[http://www.sony.net/SonyInfo/csr\\_report/environment/logistics/index2.html](http://www.sony.net/SonyInfo/csr_report/environment/logistics/index2.html)

Sony continues to target further reductions of CO<sub>2</sub> emissions through downsizing and weight reduction of products and packages and also modal shifting of transport (i.e. by rail, sea and/or road).

## 2.9 Logistics and Supply Chain Management

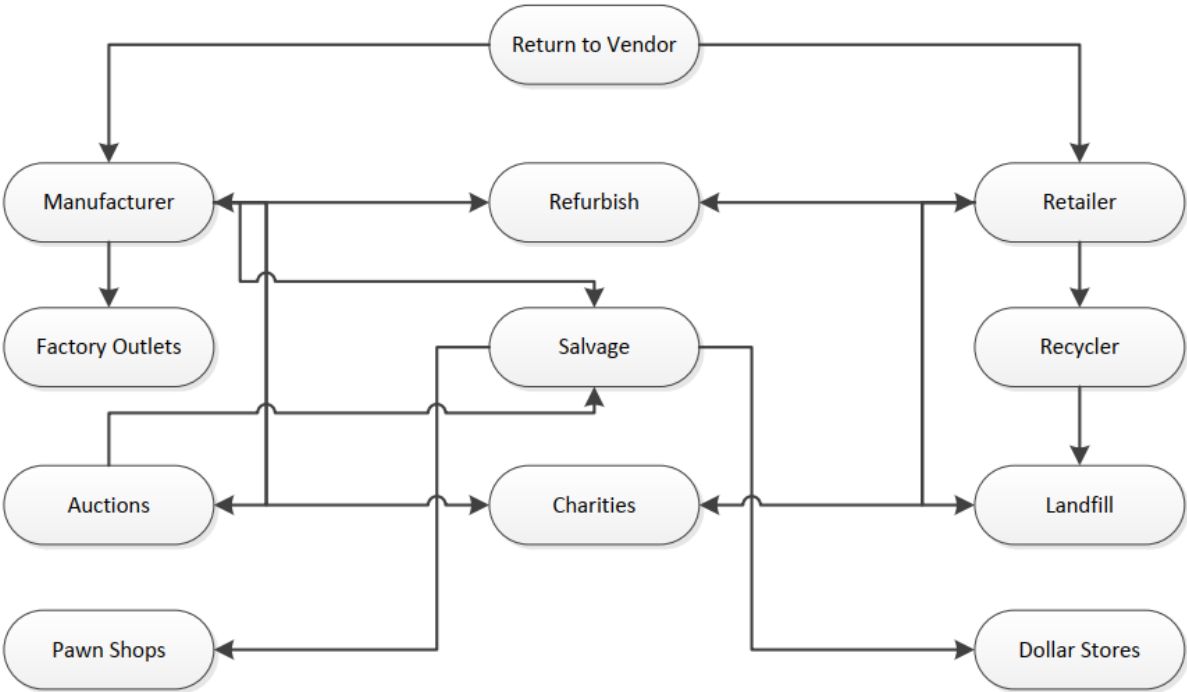
The supply chain is the network of companies involved in providing products and services to the end-customer (Lambert, García-Dastugue & Croxton, 2008). Supply chain management describes the business practice that combines logistics, production and inventory control and operations management. According to Ballou (2007) logistics is now being viewed as a subset of supply chain management. Logistics and supply chain process integration is much more than sharing information and the development of proper communication channels; it requires significant investments in inter-organizational process development, joint decision making, and inter-firm relationship management (Mellat-Parast & Spillan, 2014).

Firms such as Toyota have developed unique logistics and supply chain systems enabling them to achieve superior performance and competitive edge in the marketplace (Barney, 2012). Supply-chain management at Toyota is based on the Toyota Production System (TPS) which was developed in the 1940's by Taiichi Ohno and Shigeo Shingo. TPS is often referred to as lean manufacturing. Liker (2005) lists following components of Toyota Supplier Partnering Hierarchy: mutual understanding and trust, interlocking structures, control systems, compatible capabilities, information sharing, joint improvement activities, and Kaizen and learning. For example, Toyota's way to capacity planning is to eliminate inventory. By keeping inventory lean Toyota helps save on expenses such as an excess inventory of parts not being used or parts that become obsolete because they were not used in time. In achieving this objective Toyota relies heavily what is referred to as the pull system. A pull system reduces waste in the production process as only make enough products to meet customer demand. Companies like Amazon and Wal-Mart, two of the world's largest retailers, continue to grow due to the way they use their logistics and supply chain management to reduce costs and in turn to provide products and services at a lower cost to customers (Bonney, 2012). Amazon has come a long way since its founder and chief executive officer, Jeff Bezos started the company in 1994 as a virtual bookstore. It has evolved into an online retail giant that sells every type of product imaginable and generates over \$88 billion in revenues. Much of this revenue comes from the over two million companies that use Amazon to sell their products online and distribute them to customers. From a supply chain and logistics perspective, Amazon provides its customers with a means to store their products in its fulfillment centers; pick, pack, and ship them; and provide customer service including handling returns. These centers include 84 in the United States and a total of 145 warehouses around the world in Canada, Europe, China, Japan India). This amounts to more than 40 million square feet of space. Amazon has also has made substantial investments in material handling systems, including the acquisition of Kiva in 2012. Kiva designs robots, software, workstations, and other hardware that has been used in the distribution facilities of companies such as Staples, Office Depot, and The Gap. Walmart's excellence in supply chain management and logistics was create over many decades and serves over 4,5000 stores in the U.S alone. In 2014, the retailer moved from No.14 to No.13 on research and analyst company Gartner's annual ranking, according to Aronow (2014), placing among Gartner's top 20 supply chains for half a decade. Wal-Mart can leverage its tremendous purchasing power to force

suppliers' to drive down costs and increase speed to market while maintaining adequate supply to meet their needs. The retailer started dealing directly with manufacturers in the 1980s, giving suppliers the job of managing inventory in its warehouses (Gilmore, 2012). This was called vendor managed inventory, or VMI. The goal was to smooth out irregularities of inventory flow which helped ensure that products were always available on store shelves. The process involved cooperation and collaboration with suppliers that produced a more efficient supply chain. WalMart also uses information from stores such as point-of-sale data, warehouse inventory and real time sales to help suppliers who know when to ship more products. These methods produce lower costs for products and inventory, better control over selection in its stores and the ultimately lower prices that can be passed to customers.

Although there are differences in definitions between logistics and supply chain management, there are similarities across all regarding what is taking place, which is the coordination and communication of interactions for the efficient and effective delivery of goods.

Figure 5



As shown in Figure 5, the transfer of goods from one business entity to the next requires the coordination of demand and supply between many different institutions, from the original vendor

to many possible destinations. Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities (Ballou, 2007). Logistics and supply chain management, the process of managing material and information flows from the source, through the firm and to the customer, has been recognized as an important part of organizational strategy (Heskett, 1977).

## **2.10 Reverse Logistics themes 2000 – 2015**

Literature review on logistics starting in the 2000's starts to show more complex explanations, analysis, statistics and adoption of reverse logistics as a basic need for companies to operate in a competitive market. Responsibility for product disposal, for example, forces manufacturing firms to incorporate disposal costs in product prices according to Klausner & Hendrickson (2000) as this gives manufacturers incentives to design their products for lower costs at end of life, often through reuse or recycling. Firms are starting to see the need to develop reverse logistics systems that rival outbound logistics in the terms of efficiency, cost effectiveness and competitiveness (Daugherty, Myers & Richey, 2002).

High quality reverse logistics can promote longer-term relationships, according to Daugherty, Myers & Richey (2002), as buyers are more likely to repurchase from vendors who do a good job at handling returns. With the increase of online purchases, many customers are concerned with how an online purchase will translate into a store return (Jack, Powers & Skinner, 2010). According to Daugherty, Myers & Richey (2002) information support is particularly critical to achieving efficient reverse logistics operations. With reverse logistics, companies are dealing with the non-routine events of product returns, recalls, refusals, reworks and rejects. Technology provides a critical link to a successful system, which is the need for rapid timing and processing of goods. Information coordination, however, is complicated because of multiple parties involved (Daugherty, Myers & Richey, 2002).

Growing concern for the environment, coupled with economic incentives and legislative compulsions, has enhanced producer's responsibilities to take back end of life and used products from the consumers (Patel, Li, Bose, Timmer, & Gonzalez (2006). In the past, companies have not had much incentive to refurbish returned products. Returns, in essence, were a liability to be disposed of as cheaply as possible which often meant sending them to a local landfill. Increasing

restrictions on what can be placed in a landfill and the cost of land filling have made disposal a less attractive option (Rogers & Tibben-Lembke, 2001).

The operational factors of reverse logistics consist of cost-benefit analysis, transportation, warehousing, supply management, remanufacturing and recycling and packaging (Dowlatshahi, 2000). Reverse logistics can be broken into two general areas, depending on whether the reverse flow consists primarily of product or packaging (Rogers & Tibben-Lembke, 2001). Product could be in the reverse flow for remanufacture, refurbishment or simply because a customer returned it. Packaging, however, flows back because it is reusable (i.e. pallets) or because regulations restrict its disposal (i.e. corrugated). Operational factors of reverse-logistics systems include: cost-benefit analysis, transportation, warehousing, supply management, remanufacturing and recycling, and packaging (Dowlatshahi, 2000). The importance of these operational factors can be different depending on the organization so they should be weighed according to their importance. The customers of today expect and demand the ability to return defective or unwanted products and efficiently as possible. In addition, monitoring the performance of any logistics system should include measures both internal and external to the firm (Stank, Crum and Arango, 1999).

The e-commerce business and online transactions have brought a new dimension to the buying and selling of goods and services during this period. Today the e-commerce industry is on the ramp up, thanks to the phenomenal success of amazon.com and other similar online enterprises (Jayaraman, Srivastava, Balgi, & Prasad, 2013). Reverse logistics of e-commerce refers to the return, counter-flow or reverse-flow of products which are ordered on the Internet from customers to suppliers (XiaoYan, Han, Qinli & Stokes, 2012). These products can be returned for a number of reasons including poor quality, incorrect product or size, product was not needed or wanted, product did not match the description on the Website or in the catalog, product did not fit the customer's expectations or the company shipped the incorrect product or size. Compared with traditional bricks and mortar facility, e-commerce is becoming more acceptable and popular among consumers because of its high efficiency, convenience and low cost. In addition, the explosive growth in this area can be linked to the development of technology such as smart phones, computer tablets and the Internet. An example of reverse logistics with e-commerce can be found in the retail fashion industry. According to Nitse, Parker, Krumwiede & Ottaway (2004), as the number of Internet purchases of fashion items

increases, the problem of inaccurate color representation on the Web becomes more significant. Something such as color inaccuracy can end up having many negative consequences for retailers including loss of sales, increased returns and complaints, and customer defections. This can also lead to higher costs, as customer service representatives try to resolve complaints and the reverse logistics system is used to handle a returned product and possibly send out a new one at the company's expense. In a survey by Nitse, Parker, Krumwiede & Ottaway (2004) a majority of the respondents indicated that they would not make additional purchases from an e-commerce retailer if they received items in colors different than they expected.

Reverse logistics models based on e-business environment have received a degree of attention (Ni & Liao, 2009). Generally, there are three typical forms and these include manufacturing collecting, online retailer collecting and the third-party logistics providers (3PL) collecting suppliers (XiaoYan, Han, Qinli & Stokes, 2012). In the early stages of e-business, the most adopted models were the first two. That has changed, however, as companies struggled to satisfy customers since the reverse logistics process was more complex and more costly than anticipated. Furthermore, as more retail stores are setting up or refining their Internet presence, pressure to run an effective and efficient reverse logistics process has intensified. Therefore, owing to concerns to reduce logistics costs and improve efficiency, it is hardly surprising that enterprises tend to prefer outsourcing it to the third-party reverse logistics service providers (XiaoYan, Han, Qinli & Stokes, 2012). Companies can then focus on their core business. The outsourcing of logistics to 3PLs has become an increasingly powerful trend in modern companies. 3PLs are used to perform traditional logistics functions, such as inbound transport, outbound transport, warehousing and for other services, such as reverse logistics (Qureshi, Kumar & Kumar (2008). Companies can leverage 3PLs to set themselves apart from the competition. Such differentiation may allow firms to maintain or gain market share, increase revenue, and possibly reduce transportation and inventory costs through efficiencies gained within their reverse logistics processes (Daugherty et al., 2002).

### **2.11 Current Examples of Reverse Logistics United Parcel Service**

According to Tibben-Lembke & Rogers (2002) reverse logistics networks may be classified into several categories, depending on the source of the reverse flow: catalog/ecommerce customer returns; retail customer returns; retailer returns; and manufacturer returns to a supplier. There are



many examples of reverse logistics at use in today's markets. United Parcel Service (UPS) is a leading provider of logistics. Founded in 1907, UPS is the world's largest package delivery company and a leading global provider of specialized transportation and logistics services. According to their website, UPS had revenues of \$55.4 billion in 2013 with 395,000 employees worldwide (318,000 U.S.; 77,000 International) while delivering 4.3 billion packages and documents. One specific solution offering from UPS is Reverse Logistics, which can provide a customer with many benefits (see Table 3). Agreeing to Moore (2005), a reverse logistics accomplice with UPS, the significance of reverse logistics to organizations incorporates: returning merchandise into the supply chain which is similarly vital as moving merchandise to advertise, overseeing and progressing the asset-recovery program which is essential to accomplishing beneficial comes about, income producing openings exist in reverse logistics programs, and administrative controls which range getting to be more exacting on appropriate transfer of items. An case of UPS's turn reverse logistics framework can be found with their organization with HP. HP's LaserJet Toner Cartridge Reusing Program, called HP Plant Accomplices, has reusing programs all through the world and claims that since 1990 HP has been able to occupy over 18 million pounds of fabric from landfills by reusing each toner cartridge gotten by giving shoppers with pre-paid UPS name to send the utilized toner cartridge back to HP (Yen-Chun & Wei-Ping, 2006). In expansion to natural and taken a toll

Table 2

Key incentives for Reverse Logistics
Customer retention/satisfaction
Container reuse
Recycling programs (Transport packaging)
Damaged material returns
Asset recovery/restock
Downstream excess inventory (Seasonality)
Hazardous material programs
Obsolete equipment disposition
Recalls

*Source: UPS (2014)*

## **2.12 Current Examples of Reverse Logistics – Wal-Mart**

Wal-Mart may be a company that depends intensely on reverse logistics. Raul Castilla, executive of reverse logistics at Wal-Mart, said each year the retailer forms 45 million cases of returned merchandise through its territorial return centers with 40% of that volume coming through in January and February taking after the frenzied occasion buying season (Souza, 2013). Wal-Mart sorts the returned items into four levels: back to seller for credit, gift to charitable organization, reuse or send to landfill. Most of the time, for case, up to 70% of electronic returns are related to buyer regret, not inadequate items, which makes the repair centers a valuable expansion to the retailer's turn reverse logistics arrange (Souza, 2013). Another illustration of how Wal-Mart employments reverse logistics can be found through their Web trade location Walmart.com. This location mixes online obtaining with returns either online or in individual at any of its stores throughout the nation. According to the web site, all merchandise sold and shipped by Walmart.com may be returned either to a store or by mail within 90 days of receiving it. This returns policy evidences an adequate management of reverse logistics and synergies from integrating clicks and bricks (Kumar, Eidem & Diana, 2012). This return policy is evidence of a positive process of reverse logistics, which is fundamental for online retailers since customers are not able to check a product before making a purchase decision. Furthermore, this return policy and the brick-and-mortar stores of Wal-Mart represent an important element of trust for consumers.

## **2.13 Current Examples of Reverse Logistics – Ryder**

Ryder may be a publically exchanged company within the transportation industry. Established in 1933 it had income of \$6.63 billion, net salary of \$218.57 billion and add up to resources of \$6.6 billion in 2014. Ryder specializes in armada administration, supply chain administration and dedicated contracted carriage. Ryder works in North America, the Joined together Kingdom and Asia with its headquarters found in Miami, Florida. Agreeing to Ryder, what happens to items after the point of deal is as basic to the client encounter and productivity as the activities that bring them to showcase. In 2009, for illustration, retail returns within the Joined together States measured to \$185 billion, break even with to almost 8 percent of the assessed \$2.3 trillion in retail items sold by the members of the National Retail League. With regard to switch reverse

logistics, Ryder coordinating item returns into the in general supply chain procedure for companies by giving administrations that get item returns into the forward supply chain, auxiliary marke (see Table 3).

Table 3

Reverse Logistics Services
Product inspection, including Return Material Authorization (RMA) verification and tracking.
Product sorting.
Credit reconciliation
Triage and testing, including disposition
Repackaging/restocking for future order fulfillment or resale
Repair/refurbishment, including cosmetic, board and component-level repair and parts reclamation
Recycle/disposal/scrap, including harvesting parts for re-use

Source: Ryder Logistics (2015)

This is done by co-locating repair and refurbishment with forward distribution into a single facility where companies can realize significant benefits. Basically, Ryder takes care of every function associated with product returns management by consolidating all the functions needed for returns into a single entity. The goal is for fewer hand-offs, warehouses and touches which adds up to increased asset recovery value, an improved customer experience and lower infrastructure, transportation and labor costs (see Figure 6).

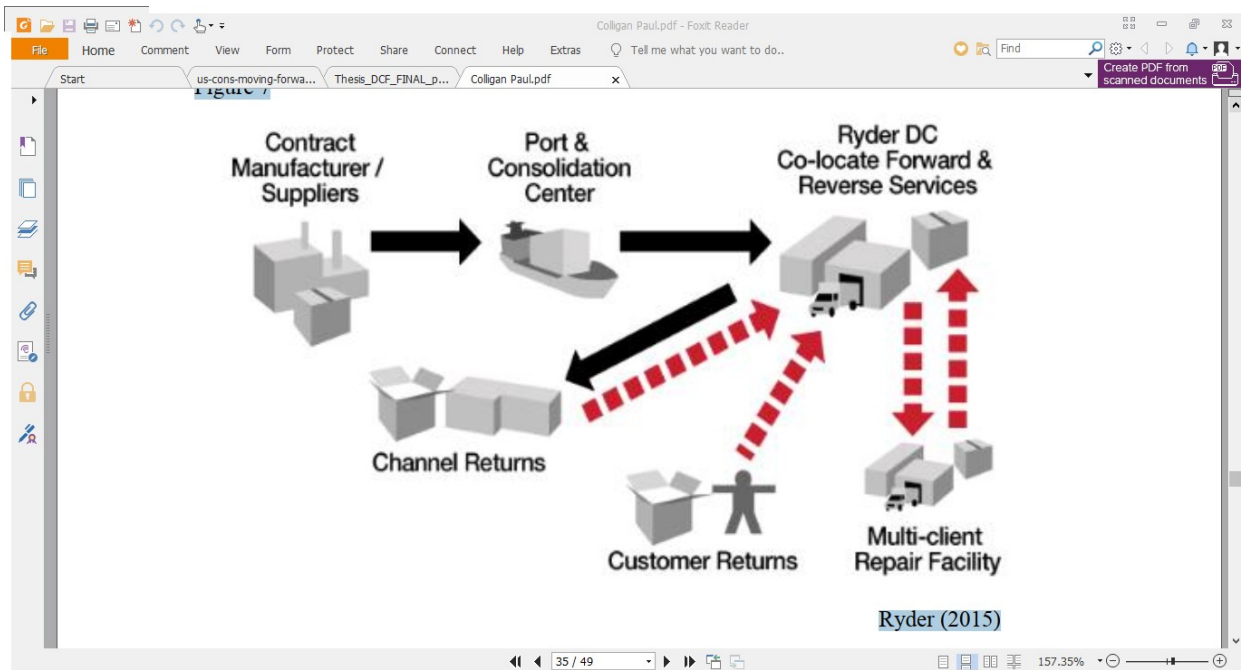


Figure 6

The ultimate goal of reverse logistics is to maximize asset recovery rates and supply chain efficiency to ensure the lowest possible costs. In a recent survey by the Aberdeen Group (2010) of over 160 companies in the computer, consumer electronics, telecom, aerospace and manufacturing industries, those that used best-in-class reverse logistics processes report an:

- Average customer satisfaction rate of 93 percent (vs. 86 percent industry average)
- 4.4 average days parts return times (vs. 14.5 days industry average)
- 21 percent decrease in cost per return materials authorization over a 12-month period (vs. 6 percent industry average)

According to the Consumer Electronics Association (2010) return rates for all consumer electronics products are averaged about 8 percent overall and 13 percent for video products, driven by the fast-growing popularity of HDTVs. That adds up to a lot of returned products considering the 325 million televisions, 233 million cell phones, 222 million DVD players, 164 million digital cameras and 128 million desktop computers in U.S. households. Ryder hopes to capitalize on these trends in reverse logistics to help companies achieve their goals.

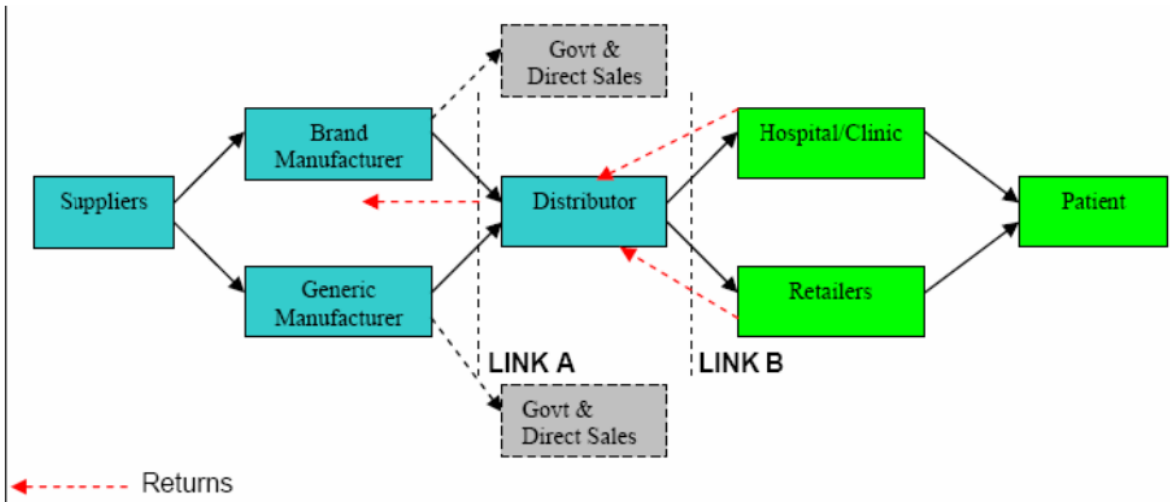
## **2.14 Current Examples of Reverse Logistics – Dell Incorporated**

Dell Consolidated may be a secretly possessed multinational computer innovation company with annual deals over \$59 billion and 106,000 representatives. Dell ships items to 180 countries worldwide, at a rate of one framework per moment. Clients run from single orders for an individual to orders within the thousands for expansive organizations. In either case Dell's objective is to ship products in a way that gets each arrange to its redress goal on time, with all substance intact while minimizing returns. Dell handles reverse logistics proactively to assist increment their placement of computers. Specialized client benefit agents are they guardians for the reverse logistics prepare where no computer can be returned unless a phone call from the customer goes through them to begin with. Agreeing to Cojocariu (2013) Dell specialized customer service specialists regularly walk shoppers through set-up and early utilization issues and, in effect conversation them out of returning the machines. In expansion, this door keeping approach possible profit while the remaining 6% of returned resources are recycled responsibly.

## **2.15 Pharmaceutical Supply Chain**

In show disdain toward of the likenesses between supply chains in common, characteristic contrasts that distinguish one industry supply chain from another too exist (Cooper et al., 1997). Concurring to Mahender (2005) the supply chains of distinctive businesses are disparate as they address different needs. The pharmaceutical industry is one of a kind in numerous ways and in a ponder made by Mahender (2005), it plays an greatly vital part in protecting the wellbeing of individuals, and unlike other merchandise and administrations, get to to wellbeing care administrations and items is regularly considered a individual right or widespread privilege. Typically backed by Ghana National Medicate Policy Statement (2004) which expressed that, a national medicate approach shapes the premise of government's responsibility to guarantee get to of its citizens to great quality drugs at reasonable costs, enacting drug directions, creating proficient measures, and advancing the sound utilize of drugs. Without a question, items and administrations advertised by the pharmaceutical industry are of a very different nature than those advertised by most other businesses. Subsequently, the underlying dynamics of the industry are atypical, which in turn bring approximately vital and operational contrasts between the pharmaceutical industry supply chain and rest of the showcase supply chain (PhRMA, 2004). Furthermore, Bradley and Weber (2004) hypothesized that the interesting highlight of the pharmaceutical industry is that it works two exceptionally distinctive sorts of supply chains at all

times. One supply chain underpins the sedate advancement stage and the other one to offer a successful drug within the showcase. After a sedate is propelled, a totally distinctive set of goals, drivers, and limitations gotten to be prevailing. Presently, the center shifts from agility to tall availability. Consequently, there's a sensational move within the models and strategies utilized to back this phase of medicate life cycle. A typical pharmaceutical supply chain after a drug launch identified by Mahender (2005) is depicted in Figure 7 below.



**Figure 2.1 Pharmaceutical Supply Chain**

In this stage, the complexity of the pharmaceutical supply chain comes about from the involvement of different expansive free organizations of exceptionally different nature. The key partners in this supply chain incorporate different government organizations, clinics, clinics, sedate producers, drug distributors, drug store chains, retailers and investigate organizations. To compound matters further, the same supply chain is capable for the conveyance of medicine drugs, over-the-counter (OTC) solutions, generics, as well as biologics having distinctive taking care of needs and operational destinations. Moreover, due to the administrative nature of the industry and numerous mergers and acquisitions to secure more investigate and improvement (R&D) expertise, numerous pharmaceutical supply systems have developed in an uncontrolled mold rather than being arranged for ideal execution. On this Bradley and Weber (2004) pointed out that a basic review will, be that as it may, uncover that, in common, the pharmaceutical in Obviously, the objectives and constraints active in these two phases are very different requiring

very different types of supply chain capabilities. Whereas one supply chain is centered on facilitating a speedy completion of the clinical trials to get a fast endorsement, the point of the other supply chain is to meet deals targets. As a result the drivers spurring the supply chain design are speed and tall accessibility individually. Imperative contemplations in both cases include secure guardianship and uncommon dealing with requirements.

## 2.16 Pharmaceutical Supply Chain Risk

Mahender (2005) proposed that pharmaceutical supply chain chance incorporate supply shortages, reverse coordinations, forging and crude fabric quality and accessibility. He included that along with security, the issue of deficiencies is additionally getting to be fundamentally important to the pharmaceutical industry. The most reasons for deficiencies incorporate administrative issues, product discontinuation, crude materials issues, fabricating issues, supply and request problems (Tyler and Check, 2002).

In Johnston (2004) see, the issues of deficiencies emerging due to destitute estimates are central to the effective operation of any supply chain. In common, item deficiencies happen when unexpected demand for a item surpasses generation capability. Within the pharmaceutical industry, destitute estimate precision may result from, modern sign for an existing item, bizarre illness flare-up , unused item deals drastically surpassing desires, wrong request determining methods, Just-in-time (JIT) stock levels incapable Furthermore, Mahender (2005) asserted that inventory management also poses risk in pharmaceutical supply chain. He said that, in the meantime, the industry also had a realization that throwing more inventories at the supply chain does not always guarantee that product availability targets are met. But, due to the highly segmented nature of the market, inventory management in the pharmaceutical industry is inherently difficult. The complexity of stock administration issue comes about from different stock arrangements, volume inconstancy, regularity, and neighborhood qualities or occasions. It is assist compounded by the weight to reply quickly. A key necessity with moral and monetary suggestions provoking over cautious approach for extraordinary over-buffering on stock levels driving to pointless financial squander. Again, due to various items, advertise combinations, administrative confinements, and security concerns present a intense challenge (Bradley and Weber, 2004). Moreover, need of information keenness makes it greatly difficult for organizers to estimate and choose with certainty how much stock of each thing ought to be kept at any point

within the chain at any time. Another hazard which is predominant in pharmaceutical supply chain is reverse logistics. Johnston (2004) commented that, overseeing item returns within the pharmaceutical industry is much more than a straightforward reverse logistics challenge. Due to the delicate nature of sedate



## 2.17 Empirical studies

According to Kabir (2013) study on reverse logistic in pharmaceutical industry, the researcher looks into detailed aspects of reverse logistics on the issues that pharmaceutical organizations face. Reverse logistics is presently taking after a slant where it is seen as a competitive advantage and a source of potential income. The discernment is changing from the convention of returns being an obstruction to benefits and a taken a toll burden. Moreover the supportability issue being tended to by reverse logistics is recipient to pharmaceutical organizations with end-of life items. The dialog contributed to the showcase point of view and to back up the misinterpretation of returns being a taken a toll issue, when it keeps up advertise share by holding quality. The perception of those industry practices on the environment and sustainability practiced by organizations has shown less enthusiasm than once thought (Kabir, 2013).

According to Kariuki (2014) study on the Factors Affecting Adoption of Reverse Logistics in the Kenya Manufacturing Sector, the researcher find out that, competitive environments have led to short the product life cycle for many consumer goods. This has driven to complex natural challenges particularly in creating nations. Reverse Logistics plays a major part in tending to diminishing squander and ensuring the environment not as it were in Kenya but too around the world. In any case, the advancement of the hone of turn around Reverse Logistics in Kenya is generally moo with as it were restricted number of businesses having attempted it. The ponder looked for to set up the variables influencing the usage of turn around Reverse Logistics in fabricating companies in Kenya. The ponder received a case think about design and stratified examining strategy to choose respondents. Information was collected utilizing self-administered, semi-organized surveys. Information collected was assist analyzed and displayed in tables, cruel, mode and standard deviation. The ponder set up that enactment, financial matters, corporate citizenship and collaboration among supply chain accomplices are major influenced selection of Reverse Logistics at Coastal Bottlers Restricted. The study concluded that the identified factors are very significant in reverse logistics implementation and every organization planning to implement reverse logistic practices should consider them (Kariuki & Waiganjo, 2014).

According to (Kwateng et al., 2014) the study on the reverse logistics practices in pharmaceutical manufacturing industry, the researcher examines reverse logistics practices in the pharmaceutical manufacturing industry in Ghana. The test were chosen on various leveled levels utilizing stratified examining strategies. With a 100% reaction rate, information accumulated from both essential and auxiliary sources were analyzed utilizing quantitative and subjective methods. The inquire about uncovered a hole within the stream of invert calculated exercises; from medicate returns to its transfer. Most returns were from wholesalers with the conclusion shopper playing small or no part. Drugs were as often as possible arranged of by burning in open holders or through open uncontrolled non- building dumps. Be that as it may such hones are prescribed as a final resort within the extant writing. We recommend adoption of an enterprise system such as enterprise resource planning (ERP) for drugs reverse logistics activities and implementation of an efficient method for drug disposal by pharmaceutical manufacturing(Kwateng et al., 2014)

The issue of reproductions is a disturbing risk facing the pharmaceutical industry globally (Mahender, 2005). A later report shown that, the Pharmaceutical Security Organized stated that forging, robbery, and preoccupation of medicine drugs rose by 16% around the world in 2004 ( PhRMA, 2004). Moreover, concurring to the USA Nowadays report, the Joined together States detailed the highest number of episodes for the moment year in a push. Of the 553 occurrences reported worldwide final year (up from 477 in 2003,) 76 took put within the Joined together States, whereas 60 occurred in Columbia, and 59 were in China. For counterfeit events alone, the United States ranked fifth (Mahender 2005).

Furthermore according to Mahender (2005), raw material quality and availability have a huge impact on the ability of a pharmaceutical company to manufacture drugs for the market. The pharmaceutical companies, in any case, are interestingly restricted in their capacity to control these variables. In most cases, there are as it were a modest bunch of providers of basic crude materials and producers are at the leniency of their capability to preserve supply. An act of nature or a administrative concern at a single plant can cripple the supply of the raw fabric to the total world for a long length. The pharmaceutical companies react to this circumstance by keeping up huge stocks of such crude materials at all times. Since the taken a toll of crude fabric is unimportant compared to the opportunity fetched of a misplaced deals, it is fitting for the pharmaceutical companies to hold this approach.

According to Aghalaya (2012) the study on Analyzing Reverse Logistics in the Indian Pharmaceuticals Industry, the researcher analyses the complexities affecting the reverse logistics processes in the Indian pharmaceutical industry. Starting issue organizing included the examination of the behavior- over-time of fundamental factors and the joined partner investigation. Encourage, a participative bunch demonstrate building handle was utilized to create a frameworks show. In conclusion, a couple of methodologies recommended by the partners are highlighted, pointed at making long-term structural changes to the turn reverse logistics forms within the Indian pharmaceutical industry (Aghalaya, 2012).

To sum up, different studies on revers logistic practice specific to Pharmastical materials done on the recent time in the world. Different literature shows that the implementation of revers logistics makes the organization successful in terms of protecting pharmastical materials (drugs) from expire and disposal by using revers logistic practice. In our country revers logistic practice on the area of pharmastical materials not yet started. Due to this, there is high amount of drugs removed and disposed from PFSA, Jimma Branch stock each year. This is high loss to our country. So this research were aimed to solve such exiting problems in the context of our country and design a framework in order to solve the same problem in other branch of PFSA in the country.

## **2.16 Research Framework**

This research work has the following structure. Chapter one was contain background of the study, statement of the problem, research question, objective of the study, specific objective, significance of the study, scope of the study and limitation of the study and Definition of terms. Chapter two was contain two broad concepts this are literature review which include theoretical review and empirical review. The theoretical review was containing definition of revers logistics, aim of revers logistics, and importance of revers logistics, Economics Factors, revers logistic drivers and disposal. The other one is empirical review which includes review of different papers which is related to the topics and finally it contain research framework. Chapter three was contain discussions on methodological part of the study which includes, study area of the study, study design, population of the study, study population, inclusion and exclusion criteria, sample size and sampling techniques, data collection techniques and instruments, data quality control, data analysis, study variables (dependent and independent variables) and ethical consideration. Chapter four is all about result and discussion. And finally, chapter five contain main findings, conclusions and recommendation

## CHAPTER THREE

### INTRODUCTION

This chapter was discuss on methodological part of the study which includes, study area of the study, study design, population of the study, study population, inclusion and exclusion criteria, sample size and sampling techniques, data collection techniques and instruments, data quality control, data analysis, study variables (dependent and independent variables) and ethical consideration.

### 3.0 METHODOLOGY

**3.1 Study area:** - The study was conducted in pharmastical fund and supply agency of Ethiopia, Jimma Branch.

**3.2 Study design:** - Cross sectional study design were employed. Mugenda (1999) define survey as a strategy used to collect information from a large population by use of structured interviews, questionnaires among other methods. This research design is suitable for this study because it is an efficient way of collecting information from all number of respondents being targeted from a given population. Cross- sectional studies involve data collection from a population, or a selected subset, at one specific point in time (Cooper & Schindler, 2006). Cross-sectional surveys have been used in previous studies dealing with reverse logistics including Serut (2013). It is chosen due to its importance to show current status in all research areas at a given time and situation.

**3.3 Population:** The population for this study was the staffs/employees in pharmastical fund and supply agency of Ethiopia, Jimma Branch a lone.

**3.4. Study population:** The study populations were the staff/employees of in pharmastical fund and supply agency of Ethiopia, Jimma Branch.

### **3.5 Inclusion and Exclusion criteria**

**3.5.1 Inclusion criteria:** To be participant of the study, an individual should have been working as a staff of in pharmastical fund and supply agency of Ethiopia, Jimma Branch for at least a year.

**3.5.2 Exclusion criteria:** Employees who do not fulfill the minimum qualification Criteria. That did not work for at least a year in in pharmastical fund and supply agency of Ethiopia, Jimma Branch.

### **3.6 Sample size and sample technique**

According to the administrative structure of in pharmastical fund and supply agency of Ethiopia, Jimma Branch, the total staff are nighty one (91). So that this study prefers to use **census** or include all staff members to maintain the validity of the result at higher possible level. A census is a study of every unit, everyone in a population. It is known as a complete enumeration, which means a complete count in population. Census is statistical method that studies all the units or members of a population (Kothari 2004). Census method is adopted for the staff because the population in all the select organization is very small. Therefore, according to the HR information in Jimma Branch, there are **91** workers in the office; all staff was under consideration.

### **3.7 Data collection techniques and instruments**

#### **3.7.1 Data collection technique**

In business research, the most common method of generating primary data is the survey. A survey method involves studies that are normally quantitative and endeavor to provide a broad overview (Mouton, 2001). In other words, a survey design provides a quantitative or numerical explanation of trends, attitudes or views of a population, by studying a sample of that population (Creswell, 2009). Data for this study were obtained from primary sources. The primary data were collected through the use of a structured questionnaire. The questionnaires were adopted from A. Eshikhati (2014) and A. Badenhorst (2013) with some modification. The data collected were qualitative in nature; a five point Likert scale were used. The data collection methods were questionnaires. Questionnaires are preferred since they are easy to analyze and save time in data collection (Oso and Onen, 2011).

### **3.7.2 Data analysis**

The questionnaire was first checked for accuracy, consistency and completeness. Data were edited and coded, before entry to a computer, then entered, and analyzed using SPSS version 20.0 for Windows. This researcher were used both descriptive and inferential statistics for analysis. Frequencies and percentages were used to analyze background data on employees, mean and standard deviation were used to achieve the objectives of the research while Regression analysis were used to determine the first objective which is understanding the extent of revers logistic implementation and the second objective which is problems for reverse logistics implementation. And the findings of this study were present using tables. Every table was supplemented by result explanation.

## **3.8 Study Variables**

### **3.8.1. Dependent Variable**

The dependent variable of the study was pharmastical Materials (Drugs), Finance performance and customer satisfaction.

### **3.8.2. Independent Variables**

Reuse, Recycle and Transfer revers logistic practices are dependent variable of the study. In this study these factors:- Cost-related problems, Information-related problems, Organizational and management- related problem, Problems with supply chain partners, Customer-related problems and Year of service were considered and investigated as independent variable.

### **3.8.3 Ethical consideration**

Introductory letter which is telling the objective or title of the research is required from Jimma University to the study sites to get permission. After having permission in the organization where the research data were collected.

A verbal consent was taken from all the study participants. Information was given to all participants about the objective, the contents of the study, as well as their right to refuse and discontinue the data collection. Besides to this all the information collected from the study subjects was handled confidentially and data were used for the research purpose only.

## CHAPTER FOUR

### 4. RESULTS AND DISCUSSIONS

#### 4.1 INTRODUCTION

These chapters have General information, revers logistics practice, problems in revers logistics and the role of drugs, customer satisfaction and finance on organizational performance and regression analysis results. Finally it contains questioner and references with APA style.

#### 4.1.1 General Information of the respondents

Table 4.1 General Information of the respondents

Variables	Category	Frequency	Percentages
Gender	M	59	64.8
	F	32	35.2
Age	<25	7	7.7
	26 - 34	59	64.8
	35 - 44	7	7.7
	45 - 54	9	9.9
	>55	9	9.9
Education	<25	7	7.7
	Degree	45	49.5
	Masters	25	27.5
	Diploma	14	15.4
Position	Missing	7	7.7
	Director	9	9.9
	Team leader officer	29	31.9
	Store manager	14	15.4
Experiences	Support staff	39	42.9
	<5 year	47	51.6
	5 - 10year	26	28.6



	16 - 20year	9	9.9
	>20year	9	9.9
Respondents different working section	Storage and distribution	43	47.3
	Human resource and General service	10	11.0
	Other	38	41.8

From the Above table, the researcher revile that 59% of respondents were male and the remaining 32% of respondents were female. Majority (59%) of the respondents are in the age of 26-34. This indicates that majority of the employees working in pfsa Jimma Branch are young and at productive age group. Half of the respondents (49.5%) are degree holders. This is because all of the positions at pfsa are require degree level professionals. However 27% of the professionals are Msc holders. This indicates that most of the employees working in the Pharmaceuticals distribution area of PFSA Jimma are high level professionals. From the table we can see that equivalent percentage of officers and distribution managers were participated. Majority of the respondents have experiences less than five years. The number is reduces as experience is increasing, this is due to leaving of professionals after getting some experience. From all respondents 43% of them are working at Storage and distribution directorates. This is because that majority of distribution activities are managed by this directorate.

#### **4.2 Reverse logistics practices**

The study sought to establish the respondents' level of agreement on statements on the Reverse logistics practices of PFSA Ethiopia Jimma Branch. The response was rated on a scale of 1-5; where 1 =Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree and 5 = Strongly Agree. The responses are as shown in the table below:

Table 4.2 Reverse logistics practices (re use and recycling)

<b>Re-use</b>	N	Mean	S D
There is return system for packaging materials for re use	91	3.2637	1.63187
Our organization set quality standards for reuse of packaging materials	91	3.5385	1.31916
Our organization designs packaging materials for reuse due to this there is no loss	91	1.9560	1.15385
<b>Recycling</b>			
There is return system for used packaging materials to suppliers for recycling.	91	1.6374	.93709
Our organization creates awareness to the public about recyclable packaging materials.	84	2.4643	1.19685
Our organization has well documented recycling policy	91	2.4396	1.27549
Our organization has structured market incentives for recyclable packaging materials.	91	2.0769	1.15692

**Key:** Mean value (M)  $\leq 1.49$  -- very low level of practices, 1.50-2.49 - low level of practices, 2.50-3.49 – moderate level of practices, 3.50-4.49 – high level of practices,  $\geq 4.50$  – very high level of practices.

According to the data presented in Table 4.2, the findings indicates that majority of the respondents strongly agreed that Our organization set quality standards for reuse of packaging materials as shown by a mean score 3.5385 which show that high level of practices, there is return system for used packaging materials for re use as shown by a mean score 3.2637 reveal that moderate level of practices and Our organization designs packaging materials for reuse due to this there is no loss as shown by a mean score 1.9560 low level of practices and it was the least suggested by the study participants. To some up, according to the results PFSA Ethiopia Jimma Branch has quality standards for reuse of packaging materials.

According to the data presented in Table 4.2, the findings indicates that most of the respondents strongly agreed that Our organization create awareness to the public about recyclable packaging materials as shown by a mean score 2.4643 which is low level of practices, Our organization has well documented recycling policy as shown by a mean score 2.4396 which is low level of practices, Our organization has structured market incentives for recyclable packaging materials as shown by a mean score 2.0769 which is low level of practices and There is return system for

used packaging materials to suppliers for recycling as shown by a mean score 1.6374 which is low level of practices and was the least suggested by the study participants. Finally, the study reveals that there is low level of recycling practices Parmastical matrials in PFSA Ethiopia Jimma Branch.

The study sought to establish the respondents’ level of agreement on statements on the Reverse logistics practices of PFSA Ethiopia Jimma Branch. The response was rated on a scale of 1-5; where 1 =Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree and 5 = Strongly Agree. The responses are as shown in the table below:

Table 4.3 Reverse logistics practices (Transfer and disposal)

<b>Transfer</b>	N	Mean	S D
There is transfer system for Pharmastical material within each drug store, Health Centers, Hospitals and pharmacy to PFSA in Jimma Branch.	81	3.0494	1.66509
There is transfer system for pharmastical material before expire within each branch in the country	81	3.0864	1.53458
Our organization has well documented Transfer policy	81	4.0617	.89925
<b>Disposal</b>			
There is disposal system in PFSA Jimma branch	91	4.0659	1.46668
There is no disposal system due to the existence of transfer system	91	3.0110	1.44910
It is very costly to collect and return drugs sold	91	2.4286	1.30079
It is very costly to dispose of drugs	91	3.0989	1.05467

**Key:** Mean value (M) ≤1.49 -- very low level of practices, 1.50-2.49 - low level of practices, 2.50-3.49 – moderate level of practices, 3.50-4.49 – high level of practices, ≥4.50 – very high level of practices.

As shown in Table 4.3, the large majority of the study participants assure that ‘Our organization has well documented Transfer policy’ is the number one factor that the study participants perceived important to revers logistics practice in order to minimize the rate of drug damage or expire in PFSA Ethiopia, Jimma Branch as shown by a mean score 4.0617 which is

high level of practices. Also, they rated that, 'There is transfer system for pharmaceutical material before expire within each branch in the country as shown by a mean score 3.0864 which is moderate level of practices. There is transfer system for Pharmaceutical material within each drug store, Health Centers, Hospitals and pharmacy to PFSA in Jimma Branch as shown by a mean score 3.0494 which is moderate level of practices. Compared with the other statements the study participants valued important to our organization has well documented Transfer policy at the organization studied, Different literature show that Transfer is not the practice of reverse logistics. Reverse Logistics processes have been explained by many authors in different perspectives. Based on the work carried out by Rogers and TibbenLembke (1999), Fleischmann et al. (2000), Fleischmann (2001) as well as Guide and Wassenhove (2003). The used or returned products are collected after their acquisition and are inspected for sorting into the different categories. The next step is to dispose them for repair, remanufacturing, recycling, reuse or final disposal depending on the decision taken to either recapture value or dispose of it. Due to difficulty nature, reverse logistic practice in pharmaceutical environment is not yet started in our country different pharmaceutical material production. The researcher plan "Transfer" of pharmaceutical material to different branches of the organization in the country as possible solution in order to overcome the expire and damage of pharmaceutical material in the PFSA Ethiopia Jimma Branch. But the above table show that the practice of "Transfer" as reverse logistics implemented in the organization as policy level alone. The participants believed that due to less awareness among different sectors the practice of Transfer as reverse logistics cannot practice yet. Due to this, huge amount of different pharmaceutical material was disposed.

As shown in Table 4.3, the majority of the study participants assure that 'There is disposal system in PFSA Jimma branch' is the number one factor that the study participants perceived important to reverse logistics practice in order to minimize the rate of environmental hazards in PFSA Ethiopia, Jimma Branch as shown by a mean score 4.0659 which are high level of practices. Also, they rated that, 'It is very costly to dispose of drugs, as shown by a mean score 3.0989 which are moderate level of practices. Other rated that there is no disposal system due to the existence of transfer system as shown by a mean score 3.0110 which are moderate level of practices. 'It is very costly to collect and return drugs sold, as shown by a mean score 2.4286 which are low level of practices and it was the least suggested by the study participants.

### 4.3 The Variables Used for the Regression Analyses

Table4.13. The Independent and Dependent Variables Used for the Regression Analysis

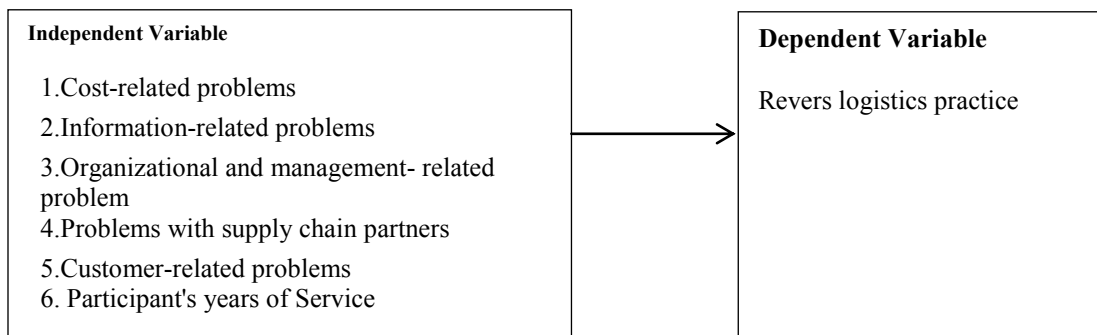
Independent Variable	Dependent Variable
<b>Factors affecting RL</b>	pharmastical Materials (Drugs), Finance performance and customer satisfaction.
Cost-related problems	
Information-related problems	
Organizational and management- related problem	
Problems with supply chain partners	
Customer-related problems	
Year of service	
<b>Revers logistics practice</b>	<b>Revers logistics practice</b>

As shown in Table 7, reverse logistics was used both as independent variable and dependent variable. In studying the factors affects revers logistics, it became the independent variable. Whereas, in studying the reverse logistics practice, it became the dependent variable of interest.

### 4.3 Regression Analyses Results

#### 4.3.1 Measuring the Factors/problems Affecting revers logistics practice in PFSA Ethiopia, Jimma Branch.

One multiple regression analysis was used to identify the factors Affecting revers logistic practice in PFSA Ethiopia Jimma Branch. Figure 2 illustrates the regression model predicting factors Affecting revers logistic by the six Factors as independent variable.



**Figure 2. Regression Models Predicting Job Performance in PFSA Ethiopia, Jimma Branch (N=91)**

In the regression model, as indicated in Figure 2, the researcher used the independent variables Cost-related problems, Information-related problems, Organizational and management-related problem, Problems with supply chain partners, Customer-related problems and participant's years of service to predict factors Affecting revers logistic as an outcome. The staff factors Affecting revers logistic level was measured by a composite score of the 13 items used to measure factors Affecting revers logistic. Similarly, factors were measured by the level of Cost-related problems, Information-related problems, Organizational and management-related problem, Problems with supply chain partners, Customer-related problems. These helped to reveal the proportion of variations in staff factors Affecting revers logistic outcome, explained by the six factors as an independent variable. In the model, the researcher runs a regression analysis to determine which of the six factors (independent variables) have significant influences on the measured factors Affecting revers logistic outcome. Table4.15 presents the summary of the regression finding.

**Table 4.15. Multiple Regression Models Predicting factors Affecting revers logistic practice Outcome at PFSA Ethiopia, Jimma Branch (N = 91).**

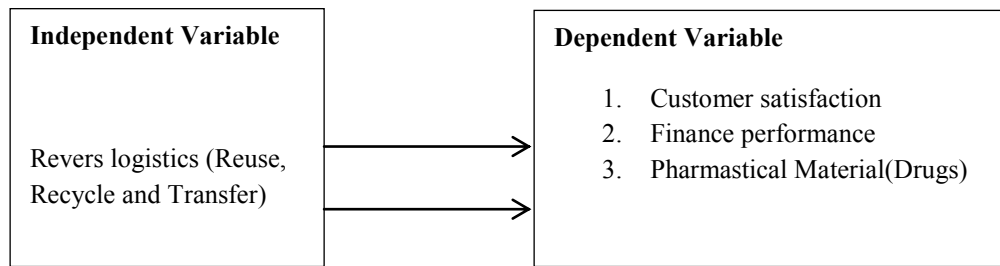
Predictor ( factors Affecting revers logistic practice )	Model 1: Revers logistic practice			
	B	SE <sup>1</sup>	T	B
Cost-related problems	0.07	0.03	2.02	0.14*
Organizational and management- related problem	-0.20	0.03	-3.03	-0.23
Problems with supply chain partners	0.41	0.08	4.99	0.34***
Information-related problems	-0.12	0.05	-2.64	-0.19**
Customer-related problems	-0.26	0.06	-4.44	-0.29***
participant's years of Service	-0.13	0.03	-4.18	-0.27***
<b>R<sup>2</sup></b>	.30			
<b>F for change in R<sup>2</sup></b>	12.03***			

As shown in Table 4.15, the independent variable, Cost-related problems, Problems with supply chain partners, Information-related problems, and the Customer-related problems statistically significantly predicted factors Affecting revers logistic practice for the total staff at PFSA Ethiopia Jimma Branch, when entered into the regression model (Model 1:  $R^2 = .30$ ,  $F[6, 84] = 12.03$ ,  $p < .001$ ). It is clear from Table 10 that in the Model the all of the six factors contributed to the predictions of the measured factors Affecting revers logistic practice outcome. As per the results in Table 10, the variable Cost-related problems ( $\beta = .14$ ,  $t [84] = 2.02$ ,  $p < .044$ ), Organizational and management- related problem ( $\beta = -0.23$ ,  $t [84] = -3.03$ ,  $p < .001$ ), Problems with supply chain partners ( $\beta = .34$ ,  $t [84] = 4.99$ ,  $p < .001$ ), Information-related problems ( $\beta = -.19$ ,  $t [84] = -2.64$ ,  $p < .001$ ), Customer-related problems ( $\beta = -.29$ ,  $t [84] = -4.44$ ,  $p < .001$ ), and service year ( $\beta = -.27$ ,  $t [84] = -4.18$ ,  $p < .001$ ) contributed to the model as a Predictor and negatively attributed to the revers logistics variable. The results of this multiple regression analyses show that the variation in factors Affecting revers logistic practice can be attributed to the six factors, where Problems with supply chain partners and Cost-related problems positively attributed to the factor affecting revers logistics practice. The others, Organizational and management- related problem, Information-related problems, Customer-

related problems and participant's years of Service negatively attributed to the factor affecting revers logistics practice.

#### **4.3.2 Regression Analyses for Measuring the Effects of Revers logistics on Economic benefits of the organization**

Three separate multiple regression analyses were used to evaluate the effects of revers logistics in predicting the economic benefits of the organization through customer satisfaction, finance performance and pharmastical materials (drug) as reported in terms of self-reported level of revers logistics among the staff of PFSA Ethiopia Jimma Branch. Figure 2 illustrates the regression models predicting customer satisfaction, finance performance and pharmastical materials (drug) by the revers logistics as independent variable.



**Figure2. Regression Models Predicting the economic benefits through customer satisfaction, finance performance and pharmastical materials (drug) PFSA Ethiopia Jimma Branch (N=91)**

In the regression models, as indicated in Figure 2, the researcher used the independent variable, revers logistics to predict the customer satisfaction, finance performance and pharmastical materials (drug) of PFSA Ethiopia Jimma Branch as an outcome. The customer satisfaction, finance performance and pharmastical a material (drug) was measured by the self-reported measure of revers logistics in PFSA Ethiopia Jimma Branch in general.

These three regression models helped to reveal the proportion of variations in customer satisfaction, finance performance and pharmastical materials (drug) outcomes, explained by revers logistics as an independent variable. In each model, the researcher runs a regression analysis to determine the effects of revers logistics on the economic benefits of the organization,



measured customer satisfaction; finance performance and pharmaceutical materials (drug) outcomes. Table 9 presents the summary of the regression findings.

	<b>Model 1: customer satisfaction</b>				<b>Model 2: Finance performance</b>				<b>Model 3: pharmaceutical materials(drug)</b>			
<b>Predictor</b>	B	SE <sup>1</sup>	T	$\beta$	B	SE	T	$\beta$	$\beta$	SE	T	$\beta$
<b>Revers logistics</b>	0.27	0.07	3.66	0.22***	0.24	0.07	-3.34	0.20**	0.21	0.07	-3.12	0.18**
<b>R<sup>2</sup></b>	.05				.04				.03			
<b>F for change in R<sup>2</sup></b>	13.40***				11.12***				10.13***			
<b>Note: 1Standard Error</b>												
<b>Significance levels. * p &lt; .05, ** p &lt; .01, *** p &lt; .001</b>												

Table 9. Multiple Regression Models Predicting the economic benefits of the organization through customer satisfaction, finance performance and pharmaceutical materials (drug) at PFSA Ethiopia Jimma Branch (N = 91).

As shown in Table 9 above, in the first step, the independent variable, **Revers logistics** statistically predicted on economic benefits of the organization through customer satisfaction, Finance performance and pharmaceutical materials(drug) for the total staff considered in the study, when entered into the regression models (Model 1:  $R^2 = .5$ ,  $F[1, 91] = 3.66$ ,  $p < .001$ , Model 2:  $R^2 = .4$ ,  $F[1, 91] = -3.34$ ,  $p < .001$  and Model 3:  $R^2 = .3$ ,  $F[1, 91] = -3.12$ ,  $P < .001$ ). It is clear from Table 9 that in Model 1, Model 2 and 3, the revers logistics variable contributed to the predictions of the measured economic benefits of the organization by the variables:- customer satisfaction, Finance performance and pharmaceutical materials (drug) outcome, but in a reverse way (both positive and negative). In model 1, the revers logistics variable ( $\beta = .22$ ,  $t [91] = 3.66$ ,  $p < .001$ ) contributed for predictions of positive customer satisfaction in the model. Among the variables used to determine the economic benefits of the organization, customer satisfaction contributed positively. The result reveals that pfsa, Ethiopia Jimma branch secures its economic benefits through answering the order of its customers. Similarly, in Model 2, the revers logistics variable ( $\beta = .20$ ,  $t [91] = -3.34$ ,  $p < .001$ ) contributed for predictions of negative Finance performance. Among the variables used to determine the economic benefits of the organization, Finance performance contributed negatively. The results reveal that pfsa, Ethiopia Jimma branch

challenged by its Finance performance to secure its economic benefits through reducing lost and cost of removal of drugs in the organization. In addition Model 3, the reverse logistics variables ( $\beta = .18$ ,  $t [91] = -3.12$ ,  $p < .001$ ) contributed for prediction of negative pharmaceutical materials (drug) performance. The results of this multiple regression analyses show that the variation in Finance performance and pharmaceutical materials (drug) both negatively attributed to the reverse logistics variable, where  $18 \leq R^2 \leq .20$ . Among the variables used to determine the economic benefits of the organization, pharmaceutical materials (drug) contributed negatively. The results reveal that PFSA, Ethiopia Jimma branch challenged by its pharmaceutical materials (drug) to secure its economic benefits through reducing disposal rate of drugs in the organization.

#### **4.1.8 Proposed Framework for Reverse logistics**

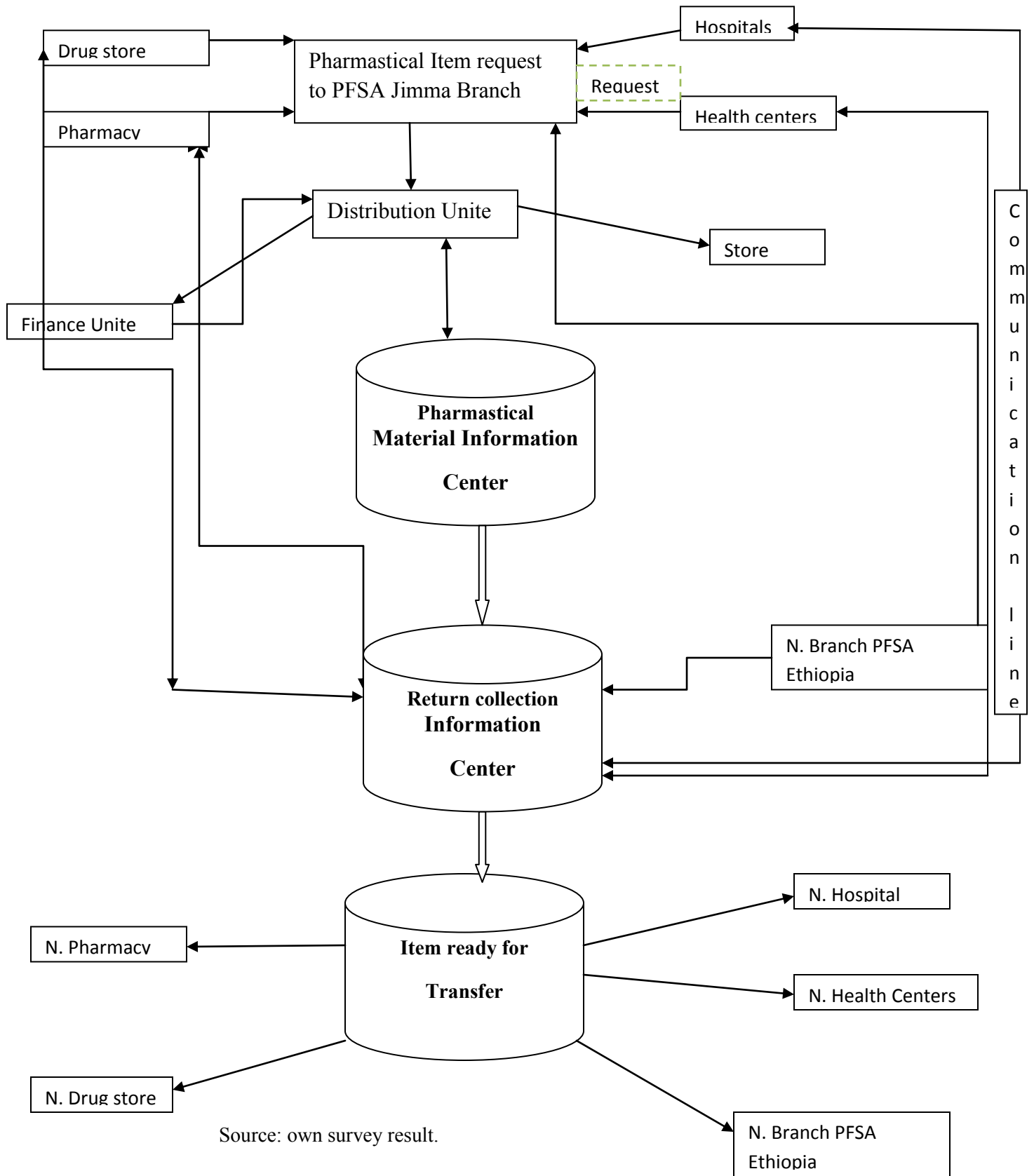
The process of reverse logistics practiced in different industrial sectors for long period of time. Reverse logistics as the task of recovering discarded products; it may include packaging and shipping materials and backhauling them to a central collection point for either recycling or remanufacturing. Reverse logistics encompasses logistics activities all the way from used products that are no longer required by the user to products that are again usable in a market. It involves the physical transportation of used products from the end user to a producer. These all factors are the issue of the reverse logistics practice. In our case the practice of reverse logistics in PFSA cannot work due to different reasons as of these findings assure in the above investigation. So, due to lack of reverse logistics practice in pharmaceutical industry there are huge amounts of lost in drugs through expire and loss of many each year in PFSA Ethiopia Jimma Branch. Losing huge amount of drug and money for developing country have negative effects of the developments of the country Economy. Among the practice of reverse logistics reuse and recycling are the major activities. Reuse and recycling of pharmaceutical materials in the process of remanufacturing is impossible in our country. As the result disposal is the enforcing reverse logistic practice.

The researcher plan to include Transfer as additional new feature in reverse logistics practice in pharmaceutical sectors in order to minimize the disposal rate of pharmaceutical materials. But the result of the research reveal that transfer is set as policy level and not practice very well in the organization. The issue is addressed and has a concern by the organization.

The proposed framework came after the current result and recommends using this for solving the problem that is found in the study. From the current result cost-related, information related, problems relating to product returns and reverse logistics processes, organizational and management-related problem, with supply chain partners in reverse logistics, customer – related problems and Economic Benefits of Adopting reverse logistics the main input or facilitator for organizational productivity. The proposed framework has created collaboration with the above productivity facilitator with organizational culture and creates collaboration between PFSA items with PFSA item service providers (branches of pfsa, hospitals, health centers, drug store and pharmacy).

The availability of Transfer as option of reverse logistics practice was the strength of PFSA Ethiopia, Jimma Branch. The result of the current study shows that Transfer as option of reverse logistics practice is nearly not practiced/ less practiced because there is high disposal rate in the organization. This research finds out those important components that used as reverse logistic practice through exchanging of pharmaceutical materials within hospitals, Health centers, pharmacy and drug store through a communication line. But still there is high loss due to miss use of organizational policy that allows Transfer of un used and shelved item for long period of time during expire and disposal. The other big problems was information related problems within the clients and other sister organization in the country.

The communication line must be created and practiced by giving a brief awareness at organizational level. The organization must exercise the organizational policy that allow to use transfer as other option of reverse logistics practice through designing two ways communication/information line within each clients near and around the organization and expanding to country wise. Once the communication line is created within each client, it is important to know their stock status for the transfer items and any other gaps. The current proposed framework can solve the problem through creating communication line within the clients of PFSA Ethiopia Jimma Branch and possibly proposed to any other PFSA Ethiopia out of Jimma.



## CHAPTER FIVE

### 5. MAIN FINDINGS, CONCLUSION AND RECOMMENDATION

#### 5.1 MAIN FINDINGS,

Based on the above result and discussion of the study, the following main findings were made.

The study on the revers logistics practice was uses four different components of revers logistic practices. Among this, reuse, recycling, transfer and disposal was investigated to know the practice of revers logistic in PFSA Ethiopia, Jimma Branch. The findings show that majority of the respondents strongly agreed that Our organization set quality standards for reuse of packaging materials as shown by a mean score 3.5385 and the controversial issues was Our organization designs packaging materials for reuse due to this there is no loss as shown by a mean score 1.9560 was the least suggested by the study participants. The other revers logistic practice was recycling. According to the respondents, most of the them strongly agreed that Our organization create awareness to the public about recyclable packaging materials as shown by a mean score 2.4643 and There is return system for used packaging materials to suppliers for recycling as shown by a mean score 1.6374 was the least suggested by the study participants. This show that the practice of recycling as revers logistics activities cannot deployed in the organization. The other proposed reveres logistics practice but implemented by the organization as a policy level was Transfer. According to the respondents, they valued important and our organization has well documented Transfer policy at the organization studied, while ‘There is transfer system for Pharmastical material within each drug Hospital, health centers, drug store and pharmacy to PFSA in Jimma Branch,’ was the least suggested by the study participants. This result ensures that organizational policy without exercises have negative impact the economy of the organization. Finally, the respondents strongly agree on disposal revers logistic practice as, There is disposal system in PFSA Jimma branch’ as shown by a mean score 4.0659 is the number one factor that the study participants perceived important to revers logistics practice in order to minimize the rate of environmental hazards in PFSA Ethiopia, Jimma Branch. ‘It is very costly to collect and return drugs sold as shown by a mean score 2.4286,’ was the least suggested by the study participants.

The researcher uses the variables drugs, customer satisfaction and finance for measuring economic benefits of the organization. According to the study result, reverse logistics variable contributed to the predictions of the measured economic benefits of the organization by the variables:- customer satisfaction, Finance performance and pharmaceutical materials (drug) outcome. In model 1, the reverse logistics variable contributed for predictions of positive customer satisfaction in the model. Among the variables used to determine the economic benefits of the organization, customer satisfaction contributed positively. The result reveals that pfsa, Ethiopia Jimma branch secures its economic benefits through answering the order of its customers. Similarly, in Model 2, the reverse logistics variable contributed for predictions of negative Finance performance. Among the variables used to determine the economic benefits of the organization, Finance performance contributed negatively. The results reveal that pfsa, Ethiopia Jimma branch challenged by its Finance performance to secure its economic benefits through reducing loss and cost of removal of drugs in the organization. In addition Model 3, the reverse logistics variables contributed for prediction of negative pharmaceutical materials (drug) performance. The results of this multiple regression analyses show that the variation in pharmaceutical materials (drug) negatively attributed to the reverse logistics variable. Among the variables used to determine the economic benefits of the organization, pharmaceutical materials (drug) contributed negatively. The results reveal that pfsa, Ethiopia Jimma branch challenged by its pharmaceutical materials (drug) to secure its economic benefits through reducing disposal rate of drugs in the organization. This reveals that additional finance was contributed for drug removal when the drug was expired and it has a negative impact on the organizational performance.

## 5.2 CONCLUSION

Based on the above major findings of the study the conclusion was made:-

According to this study, the practice of reverse logistics was implemented as organizational policy level alone in PFSA Ethiopia Jimma Branch. The researcher plan and test TRANSFER as additional reverse logistics practice to deploy in PFSA Ethiopia, Jimma Branch. But the result reveals that Transfer is one of the reverse logistics practice which is included in their organizational policy level. So in order to implement reverse logistics practice and understanding the extents of reverse logistics practice in PFSA Ethiopia, Jimma Branch, and the study identify different problems. The first and the major problem is the organizational and management-related problem. The result reveals that PFSA Ethiopia, Jimma Branch had the policy that allowed using reverse logistics practice which helps to reduce pharmaceutical materials shortage and disposal rate. But the policy was did not changed to ground root for implementation or practice. In addition Lack of top management awareness of the importance of reverse logistics, Lack of top management commitment to reverse logistics and Lack of departmental collaboration / communication in reverse logistics was the major organizational and management-related problem in the PFSA Ethiopia, Jimma Branch. The second problem was information related problems i.e there is no information dissemination and awareness creation mechanism between PFSA Ethiopia Jimma Branch and the customer of PFSA Ethiopia, Jimma Branch. The third problem was Customer-related problems. i.e due to lack of information regarding reverse logistics policy on the customer of PFSA Ethiopia, Jimma Branch. Customers' negative perception of returning products and Customers' abuse of return policies was the main problems of reverse logistics practice in PFSA Ethiopia, Jimma Branch. Regarding the economic benefits that can result from adoption of reverse logistics by Pharmaceutical fund and supply agency of Ethiopia, Jimma Branch, the result reveals that According to the study result, reverse logistics variable contributed to the predictions of the measured economic benefits of the organization by the variables:- customer satisfaction, Finance performance and pharmaceutical materials (drug) outcome. Among the variables used to determine the economic benefits of the organization, customer satisfaction contributed positively. The result reveals that pfsa, Ethiopia Jimma branch secures its economic benefits through answering the order of its customers. The rest two variables Finance performance and pharmaceutical materials (drug) used to determine the

economic benefits of the organization both contributed negatively. The results revile that pfsa, Ethiopia Jimma branch challenged by its finance performance and pharmastical materials (drug) to secure its economic benefits through reducing disposal rate of drugs and cost of drug removal in the organization. Finally, the proposed framework was designed in order to solve the existing problems in the organization.



### **5.3 RECOMMENDATION**

Based on the above conclusion of the study the following points are recommended:-

Hence reverse logistic practice was essential for those organization engaged on product production and distribution of goods and services. Re-production and distribution of pharmaceutical materials in the context of reverse logistics practice cannot yet implemented in the PFSA Ethiopia, Jimma Branch. Due to the sensitivity nature of pharmaceutical materials reprocessing of drugs to remanufacturing activities is impossible unlike plastics and others materials. But it is possible using the components of reverse logistic practice in order to minimize the rate of expires and damage of pharmaceutical materials in PFSA Ethiopia, Jimma Branch.

The practice of reverse logistics (reuse, recycling and Transfer) must be implemented practically rather than organizational policy level. Hence our country is developing country; every stockholder must strive for proper use and management of pharmaceutical materials seriously.

There must be a clear and two way communication line between each client's and PFSA Ethiopia, Jimma Branch as well each branch of PFSA in the country. This communication line helps to understand the status of each client's stock for an input to further decision.

The researcher designs the concepts of Transfer as a practice of reverse logistics in PFSA Ethiopia, Jimma Branch. The study result show that the organization practices TRANSFER in the organizational policy level. The client like Hospital, health centers, drug store and pharmacy has not had the information about the transfer policy. The issues of TRANSFER as another option of reverse logistics practice must be disseminated rather than organizational policy level for each clients through awareness creation.

The proposed framework have important role regarding safe use of pharmaceutical materials without loss if it was deployed practically within the chain of the sectors in PFSA Ethiopia Jimma branch and other branches of PFSA Ethiopia.

Further study must be done to know the extents of damage and loss of pharmaceutical materials in drug store, pharmacy, health centers and hospital level.

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## Appendix

JIMMA UNIVERSITY  
SCHOOL OF GRADUATE STUDY  
DEPARTMENT OF MANAGEMENT  
LOGISTICS AND TRANSPORT MANAGEMEN PROGRAM

Dears

My name is Elfenesh Guche conducting a study on the revers logistic on Pharmaceuticals Material in Pharmastical Fund Supply Agency of Ethiopia, Jimma Branch for the partial fulfillment of master's degree in logistics and Transport management in Jimma University, College of Business and Economics. I would like to extend my deep appreciation to your organization and you for the willingness and cooperation in undertaking this valuable research. Taking part in this study you will contribute towards alleviating the problem of revers logistic on Pharmastical Material. I request your cooperation to fill and respond Truthfully for the asked Questions. If you have any question, you can contact me through 0923434053/.

Thanks!!!

### SECTION A: General Information and Demographic background of respondents

Please tick ((✓)) or Provide your own answers where applicable.

1. Gender Male Female

2. Age Less than 25 26-34 35-44 45-54 Above 55

3. Educational background Certificate Diploma Degree Masters

Others (specify) -----

4. Position in the Agency Director Team leader Officer distribution Officer

Store manager Driver support staff

5. Years of Experience in the Agency Below 5 years 5-10 years 10-15 years

16-20 years Above 20 years

6. In which directorate are you working?

Storage and distribution

Human resource and General Service

others (specify) \_\_\_\_\_

**SECTION B: REVERSE LOGISTICS PRACTICES**

Indicate the extent to which your organization has implemented the following reverse logistics practices. There are five options to answer [1] Not at all [2] Small extent [3] Moderate extent [4] Great extent [5] Very great extent. Please put check mark “?” on the box provided that reflect your idea

No	Reverse logistics practices	1	2	3	4	5
	<b>Reuse</b>					
1	There is return system for used packaging materials to suppliers for					
2	Our organization set quality standards for reuse of packaging materials					
4	Our organization designs packaging materials for reuse due to this there is no loss					
	<b>Recycling</b>					
1	There is return system for used packaging materials to suppliers for recycling.					
2	Our organization create awareness to the public about recyclable packaging materials.					
3	Our organization has well documented recycling policy					
4	Our organization has structured market incentives for recyclable packaging materials.					
	<b>Transfer</b>					
1	There is transfer system for Pharmastical material within each drug store and pharmacy to PFSA in Jimma Branch					
2	There is transfer system for pharmastical material before expire within each branch in the country					
3	Our organization has well documented Transfer policy					
	<b>Disposal</b>					
1	There is disposal system in PFSA Jimma branch					
2	There is no disposal system due to the existence of transfer system					
3	It is very costly to collect and return drugs sold					
4	It is very costly to dispose of drugs					

**SECTION C: Effects of Revers logistics on Economic benefits of the organization**

To what extent has your organization experienced an increase in the following Economic benefits outcomes as a result of adopting reverse logistics practices? [1] Not at all [2] Small extent [3] Moderate extent [4] Great extent [5] Very great extent

No	<b>Pharmastical Material</b>	1	2	3	4	5
	<b>Drugs</b>					
1	There is return system for drug to suppliers / wholesaler before expire					
2	Our organization set quality standards for reuse of drugs in PFSA, Jimma branch.					
3	There is enough drugs in PFSA, Jimma branch					
4	There is a communication line with different branches in order to solve shortage of drugs					
	<b>Customer satisfaction.</b>					
1	There is drug store or pharmacy those can get different drugs based on their order request					
2	Order from drug store and pharmacy can got from PFSA at any time					
3	private and Governmental pharmacy have equal access for their different drugs order					
4	There is Good forecasting accuracy depending on customer demands or drugs needs					
	<b>Finance performance</b>					
1	There is lost of sale in PFSA, Jimma Branch					
2	There is cost of removal in PFSA, Jimma Branch					
3	There is cost of drug removed in PFSA, Jimma Branch					

**SECTION D – PROBLEMS IN REVERSE LOGISTICS**

In your opinion, to what extent do your organizations experience the following problems with reverse logistics? There are five options to answer

[1] Not at all [2] Small extent [3] Moderate extent [4] Great extent [5] Very great extent. Please put check mark “?” on the box provided that reflect your idea.

No	<b>Cost-related problems in reverse logistics</b>	1	2	3	4	5
1	High cost associated with reverse logistics					
2	Inability to reduce costs					
3	Lack of awareness of the hidden cost of reverse logistics					
	<b>Information-related problems</b>					
1	Insufficient investment in information technology					
2	Low reliability of IT solutions					
3	Lack of information visibility					



4	Insufficient, abundant, ambiguous or conflicting data					
	<b>Problems relating to product returns and reverse logistics processes</b>					
1	Uncertainties relating to returns (e.g. irregular material flows and infrequent and erratic timing patterns of returns).					
2	Uncertainty about appropriate disposition option to follow					
3	Lack of knowledge about time and costs involved in the disposition of returns					
	<b>Organizational and management- related problem</b>					
1	Not including reverse logistics in strategic planning					
2	Lack of top management awareness of the importance of reverse logistics					
3	Lack of top management commitment to reverse logistics					
4	Lack of departmental collaboration / communication in reverse logistics					
5	Resistance to change in order to include reverse logistics					
	<b>Problems with supply chain partners in reverse logistics</b>					
1	Lack of collaboration with supply chain partners in reverse logistics					
2	Lack of communication with supply chain partners in reverse logistics					
3	Lack of clear policies on return of products and materials.					
4	Customers' abuse of return policies					
5	Unauthorized return allowance					
6	Customers' negative perception of returning the products and materials Customer-related					
	<b>Customer-related problems</b>					
1	Lack of clear policies on return of products and materials.					
2	Customers' abuse of return policies					
3	Unauthorized return allowance					
4	Customers' negative perception of returning products.					

**Thank you very much for your cooperation!!**