ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERECE DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT GRADUATE PROGRAM

ASSESSMENT OF PHARMACEUTICALS WAREHOUSING PRACTICE: THE CASE OF PHARAMACEUTICALS FUND AND SUPPLY AGENCY, CENTERAL LEVEL, ETHIOPIA

THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ART IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT.

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Declaration

I, the under signed, declare that this thesis entitled Assessment of 'Pharmaceuticals warehousing practice**:** the case of Pharmaceuticals Fund and Supply Agency, central level of Ethiopia' is my original work and to the best of my knowledge has not been presented for the degree by any other person, and all sources of materials used for the thesis have been duly acknowledged.

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Signature & Date

Certification

This is to certify that Habtamu Alene Dassano has carried out this research work on the entitled topic “Assessment of Pharmaceuticals Warehousing Practice: the case of Pharmaceuticals Fund and Supply Agency, central level of Ethiopia” under my supervision. This work is original in nature and has not been presented for a degree in any University and it can be submitted for the partial fulfilment of the requirements for the award of the degree of Master of Art in Logistics and Supply Chain Management.

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Thesis Approval

This is to certify that the thesis carried out by Habtamu Alene Dassano, entitled: "Assessment of Pharmaceuticals Warehousing Practice: the case of Pharmaceuticals Fund and Supply Agency, central level of Ethiopia" and submitted in partial fulfillment of the requirements of the Degree of Master of Art in Logistics and Supply Chain Management complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Acronyms

JIT- Just-In-Time

PFSA-Pharmaceuticals Fund and Supply Agency

USAID-United States Agency International Development

SDPs-Service Delivery Points

MSH-Management Science for Health

PWOM-Pharmaceuticals Warehousing Operations Management

SPSS-Statistical Package for Social Science

Abstract

The purpose of this research was to assess the existing pharmaceuticals warehousing practices of Pharmaceuticals Fund and Supply Agency(PFSA). The researcher preferred to use a descriptive research type, which helps to use both qualitative and quantitative data analysis. The target population was 51 employees from warehousing and distribution unit of the case company. Questionnaire was used to collect primary data. Then, the collected data were analyzed quantitatively so that percentages, frequencies, mean, and standard deviation were used, and the analyzed data were presented in tables. The results of the study revealed that respondents rated the company's overall warehousing practices below moderate except the packing and shipping activity which is little bit better practiced. There are also so many various challenges in performing warehousing activities: lack of designated receiving area, shortage of material handling equipment, insufficient storage space and long searching time of customer order are the most common once. Despite the limitations of warehouse space, PFSA should categorize storage spaces into different zones so that the pharmaceuticals of different characteristics will be transferred to their specific locations and stored with in the zone which will significantly decrease the long searching time of items for customer orders.

Key words: *Pharmaceutical Warehousing Practice, Warehousing activity*

Chapter One: Introduction

1.1. Background of the study

In a supply chain, warehousing function is very critical as it acts as a node in linking the material flows between the supplier and customer. In today's competitive market environment, companies are continuously forced to improve their warehousing operations. Many companies have also customized their value proposition to increase their customer service levels which has led to changes in the role of warehouses (Ramaa. et al., 2012).

Despite today's just-in-time (JIT) production mentality, with its efforts to eliminate warehouses and their inventory carrying costs, effective warehousing continues to play a critical bottom line role for companies worldwide. The primary purpose of a pharmaceutical warehouse is to receive, hold and dispatch pharmaceuticals. It ensures the physical integrity and safety of products and their packaging, throughout the various storage facilities, until they are dispensed to clients (PFSA, 2016).

Warehousing played a role in the storage and exchange of goods for centuries. Long term storage to provide product for future consumption has been a utility of warehousing both past and present. Warehousing operations contribute to the overall total cost of managing a supply chain and as such the trade-offs between warehousing costs and services to that of other critical functions of the firm must be evaluated. It is when warehousing contributes to reduced costs and improved service, flexibility, and responsiveness that warehouses become more valued to the organization and supply chain as a whole (Scott B. K. and Brain C. K., 2014).

While effective logistics systems should not be designed to hold inventory for extended times, there are occasions when inventory storage is justified on the basis of cost and service. Benefits realized from strategic warehousing are classified on the basis of cost and services. No warehouse functionality should be included in a logistical system unless it is fully justified on some combination of cost and service basis. Ideally a warehouse will simultaneously provide economic and service benefits. Once a warehouse mission is determined, managerial attention focuses on establishing the operation. A typical warehouse contains materials, parts and finished goods on the move. Warehouse operations consist of break-bulk, storage, and assembly procedures. The objective is to efficiently receive inventory, possibly store it until required by the market, assemble it into complete orders, and initiate movement to customer.

This emphasis on product flow renders a modern warehouse as a mixing facility. As such, a great deal of managerial attention concerns how to perform storage to facilitate efficient materials handling (Donald J. Bowersox, et al, 2002).

The warehouse is a key component of the supply chain for health commodities. This is especially true in resource poor environments where they act as buffers against uncertainties and breakdowns with in the supply chain. When properly managed and appropriately stocked, the warehouse provides a consistent supply of products as they are needed. For many years, the private sector has taken a professional, systematic approach to warehousing; recognizing its importance to overall cost, customer satisfaction, and performance of the business. In turn organizations involved in public health in the developing world have started to focus more attention on commodity warehousing, realizing its role as a critical resource for improving public health (USAID/Deliver, 2014).

Pharmaceutical warehousing practice covers operations or activities such as: the store should be divided into zones that provide a range of environmental conditions and degrees of security; there should be an appropriate zone to suit every item to be stored; stock should be arranged within each zone according to some orderly system; good housekeeping-cleaning and inspection, the disposal of expired and damaged stock, recording of stock movements, and the management of security-should be maintained; the management structure should be clearly defined; staff should be appropriately qualified, trained, disciplined, and rewarded; clearly written procedures and hand books should be available; staff should have good working conditions and facilities; and stock should be verified regularly and periodic audits should be conducted(MSH, 2012).

Proper storage facility for pharmaceuticals ensures the effectiveness, safety, strength, and quality of drugs. Unless the drugs are segregated from other non-pharmaceutical items and stored properly, long shelf life of the drugs are not guaranteed. Pharmaceuticals need to be stored to maintain the intended quality and prevent damages while handling until it reaches the customer (Kokilam. et al., 2015). The professional and systematic approach used by the private sector is directly applicable to the challenges public health warehousing face in countries around the world. Challenges such as the increase in variety of products in the health system or stock keeping units (SKUs), and the demand for reduced processing time can be addressed

by improving inventory management, and in some cases, using technologies such as automated data collection tools. The demand for increased customer service requirements-cost and value- and the call for improved product and information flows can be addressed by focusing management and the training of staff with in the warehouse as well as considering the implementation of a broader information system, including a warehouse management system that can link information to other point in supply chain (USAID/Deliver, 2014).

Nowadays in supply chain management, modern companies attempt to achieve high volume production and distribution, while keeping inventories low and delivering products with short response time. The changing demand market requirements on firm's warehouses have affected warehouse operations tremendously. In these circumstances warehouse managers have to react constantly to market changes because customers have been gaining more power to influence the market structure. Characteristics of demand driven organization are high product variety, small order sizes, and reliable short response times throughout the supply chain (Sprengers J., 2010).

1.2. Statement of the problem

A health commodities warehouse is much more than a building that provides space for storage. It must be designed to receive, store, and organize products efficiently and must provide effective distribution for life saving commodities. This requires adequate shipping/receiving docks, storage in appropriate conditions for the commodities, and adequate work space to assess and compile onward shipments for products going to regional or district warehouses or service delivery points (SDPs) (USAID/Deliver, 2014).

For the pharmaceuticals warehousing practice to be considered effective, it should ensure the physical integrity and safety of products and their packaging throughout the various storage facilities until they are dispensed to clients. The various activities that occur within a warehouse should be aligned so that products can be managed efficiently, and orders can be filled and distributed expeditiously. Requirements for good warehousing practices include:

1. A facility with adequate storage and working space as well as infrastructure components that will protect commodities from harmful environmental conditions.
2. Application of proper procedures so that commodities are always available, accessible, in good condition, and pose no risk of injury to workers.
3. Availability of timely and accurate inventory data for decision-making, and
4. Qualified human resources in sufficient quantity to meet operational needs (JSI, 2017).

In terms of such issues, the practice in PFSA warehouses has got gaps as there are signs of poor warehousing practices such as poor warehouse lay out, unorganized flow of products and possibility for mix up of ingoing and outgoing items in the warehouse; newly received items are stored in any space empty during put away that makes difficult to access the product during order picking activity; storage areas are not well utilized (some areas overfilled while others are underused), the aisle spaces in some warehouses are used for storing products that hinders free movement of pickers to collect customer orders in time. Besides, return of some items back to the center from the regional warehouses because of wrong item delivery is very common practice that increases unnecessary work load on the employees.

Besides, as PFSA is forecasting and quantifying, procuring & warehousing, and then distributing many variety of pharmaceuticals on need base to the public at national level, usually there is large quantity of inventory which is not well organized in the warehouse that lead to inappropriate

exploitation of working area, barrier of movement in the warehouses, and creating extended lead time of responding customer service that result to high losses. In addition, to the knowledge of the researcher, the warehousing practice is not empirically investigated in the case company so far. Thus, this study is designed to assess the warehousing practices of PFSA.

1.3. Research questions

Based on the above research background and problem statement, this study seeks to answer the following research questions:

- How is the receiving activity of new arrivals undertaken in terms of securing defined receiving area, preliminary physical inspection of new arrivals?
- What important activity tasks and procedures are performed in pharmaceuticals put-away?
- How is the storage of pharmaceuticals performed in terms of zoning of stocks in warehouse, stock location and physical arranging of stock within a zone?
- How is the order picking, and shipping of customer orders are carried out in the case company?

1.4. Objectives of the Study

1.4.1. General Objective

The general objective of this study is to assess the current Pharmaceuticals Warehousing Practices of the Pharmaceuticals Fund and Supply Agency, Ethiopia.

1.4.2. Specific Objectives

- To assess how the receiving activity of new arrivals is performed and its challenges in the case company.
- To evaluate the current warehousing practices of PFSA in terms of basic activities of put away.
- To identify the pharmaceuticals storage practice in terms of zoning of stocks in warehouse and stock location with in a zone.
- To identify basic activities carried out in warehousing operations of customer order picking and shipping of selected company?

1.5. Significances of the study

In general, the importance of any research work is either for the acquisition/addition of new knowledge or to solve problems. In this study, the researcher anticipated that the findings of this research may benefit the company to understand its warehousing practices and provides a base to reduce its costs that could be resulted due to poor warehousing practices. In addition, the findings and recommendations of the study will help the company in decision making related to its warehouse administration. Moreover, lack of research in pharmaceuticals warehousing practices showed that the area has not received attention that it deserves though having invaluable advantage. Thus, this study may possibly help to provide background material for future research in similar companies, and anyone can use the findings for reference purposes in future for related studies.

1.6. Scope of the study

This study concerned about assessing the existing pharmaceuticals warehousing practices of PFSA at central level. According to Nynek Faber (2015), the typical primary activities in warehouse are: the receiving which includes unloading products from the transport carrier at a receiving dock, identifying the products, verifying quantities, and randomly checking the quality of the products; put away activity involves transferring of incoming products to a location within the storage area; storage -binning the goods in good condition in their respective locations until picked to the customer orders; and order picking activity that involves obtaining the products requested by the customers from the storage area. The packing/shipping activity involves checking, packing, sorting, and staging customer orders in a designated dock door area ready to be loaded on the transport carrier and shipped to the customer.

PFSA central has 14 warehouses of different size in Addis Ababa that are in different sub cities. Thus, this research will assess all warehouses in Addis Ababa managed by PFSA central regarding the main warehousing practices: receiving, put-away, storage, order picking and packing/shipping as per the concept of the activities described.

1.7. Limitations of the study

Lack of related articles on pharmaceuticals warehousing practices in other companies to review and compare the findings of the study was one limitation to this study. In addition, the managers

of each warehouse took long time to respond on data collection as they were busy working for all Sven days in a week for their routine activities. Besides, limitations of finance and time was other ones.

1.8. Definition of terms

Pharmaceutical warehousing: the activities involving storage of pharmaceuticals on a large-scale in a systematic and orderly manner and making them available conveniently when needed. In other words, it is the physical movement of stock into, through and out of a medical store warehouse (MSH/SIAPS, 2014).

Warehouse: is a central hub in the supply chain, where inventory is received from venders/suppliers and stored until it's eventually distributed to customers.

1.9. Organization of the study

The study is organized in to five chapters. Chapter-one presented the introductory part comprising the background, statement of the problem along with the research questions and objectives. Chapter two dealt with the review of literature related to the topic while chapter three showed the design and methodological aspect employed. The analysis of the study data, presentation of the results, and corresponding discussions are comprised under chapter four. Finally, summary, conclusions and related recommendations based on the findings of the study are presented in chapter-five.

Chapter Two: Literature Review

2.1. Introduction

The concept of warehousing came from the evolution of this world and since from its very inception the human beings were used to store food and other raw materials for their survival such as storage of grain, vegetables, meat etc. which they needed to store food in case of emergency like famine. With the progress in trade all over the world the importance of warehouse has also increased, and the storage level of products increased because of the manufacturing and due to the purchasing power of the human beings. The trade from one part of the world to the other increased commercial warehousing and the warehouses were built mostly at ports. The gradual growth in warehouses operations now has led towards the well-equipped and multifunctional warehouse. Warehouse is that part of the firm's logistics system that sores products like raw material, goods in process, finished goods at and between points of origin and point of consumption (Younis N. et al.,2013).

According to Accorsi R. et al., (2014), warehouses play a pivotal role in the supply chain, and requirements for warehousing operations have significantly increased. Specifically, the customer needs in terms of the order accuracy and response time, order frequency, order quantity and order size have dramatically changed with the global economy and new demand trends. The main function of the warehousing systems is to receive products (from inbound and manufacturing lines), to store materials until they are requested, and then to extract products from inventory and ship them in response to the customer's orders.

2.2. The Role of Warehouse in Supply Chain

Warehousing is a key element of pharmaceutical supply chain management. It ensures the constant availability and flow of essential quality health commodities, in appropriate quantities, in a timely and cost-efficient manner, through the supply chain system (MSH/SIAPS, 2014).

Warehouses are crucial components of most modern supply chains. They are likely to be involved in various stages of the sourcing, production, and distribution of goods, from the handling of raw materials and work-in-progress through to finished products. As the dispatch point serving the next customer in the chain, they are critical to the provision of high customer service levels. Warehouses are an integral part of the supply chains in which they operate, and therefore recent trends, such as

increasing market volatility, product range proliferation and shortening customer lead times, all have an impact on the roles that warehouses are required to perform. Warehouses need to be designed and operated in line with the specific requirements of the supply chain as a whole. They are therefore justified where they are part of the least-cost supply chain that can be designed to meet the service levels that need to be provided to the customers. Owing to the nature of the facilities staff and equipment required, warehouses are often one of the most costly elements of the supply chain and therefore their successful management is critical in terms of both cost and service (Baker P., 2006).

The prime objective of most warehouse is to facilitate the movement of goods through the supply chain to the end customers. There are many techniques used to reduce the need to hold inventory, such as flexible manufacturing systems, supply chain visibility and express delivery, and many of these have been encompassed in a range of supply chain initiatives, for example just-in-time (JIT), efficient customer response (ECR) and collaborative planning, forecasting and replenishment (CPFR). However, as part of this movement, it is often necessary to hold inventory, particularly where the following two conditions apply:

- The demand for the product is continual; here, most goods are offered for sale on a continual basis and therefore they need to be pulled through the supply chain based on customer demand.
- The supply lead time is greater than the demand lead time; where goods are pulled through the supply chain, this can only be achieved without inventory where the supply can take place within the lead time offered to the customer. For example, if goods are offered to customers on a next-day-delivery lead time, it is often the case that materials cannot be sourced, goods manufactured, and transport undertaken within this timescale. In this situation, the goods must be supplied from inventory.

In addition, some warehouses have a specific objective of stocking goods and material against contingencies that it is hoped will never occur. Examples include emergency/disaster relief supplies. It must be said though that when such items are required speed is still the essence. There is in fact a wide range of reasons for holding inventory, including: to provide a buffer to smooth variations between supply and demand; to enable economies of long production runs in manufacturing; to provide a buffer between different manufacturing operations; to enable

procurement savings through large purchases; to allow cost trade-offs with the transport system (eg the use of full container loads); to cover for seasonal fluctuations and peaks; to provide a wide range of different products, from different suppliers, in one location; to cover for planned or breakdown production shutdowns.

The holding of inventory is just one of a variety of roles that a warehouse may perform. Thus, with the increasing on the movement of goods through the supply chain, many of the roles may be related to this aspect as well as to inventory holding. Some list of the common roles performed include: inventory holding point, consolidation center, cross-dock center, sortation center, assembly facility, trans-shipment point, and return goods center. Warehouses often fulfil a mix of these different roles, and it is important to be clear as to the precise roles being performed (Baker P., 2006). Key warehousing functions include receiving and storing stock, inventory management, and distribution management (MSH/SIAPS, 2014). This research focused primarily on warehousing, even though warehousing and distribution are highly interrelated, and the same entity is often responsible for both functions.

2.3. Basic Warehousing Operations

Every warehouse should be designed to meet the specific requirements of the supply chain of which it is a part. Nevertheless, there are certain operations that are common to most warehouses. These tend to apply whether the warehouse is manual in nature with fairly basic equipment or whether it is highly automated with sophisticated storage and handling systems.

According to Baker P., (2006), in an inventory holding warehouse, the basic processes are receiving, storing, put-away, picking/retrieving, and shipping goods. The shipping operation can also consist of many sub-tasks such as consolidation of goods if the batching, grouping, or zoning is applied, checking the order according to its completeness, packing and of course, shipping. The literature also mentions cross docking as especial warehouse operation.

Receiving: is the first operation in the warehouse that starts by notification of the arrival of goods, then begins process of unloading, counting, identifying, quality control and goods acceptance (in coming inspection) related to a type and quantity by unloading staff according to the company rules. When the goods are accepted, the receipt is issued (Karasek J. 2013). Receiving involves the physical unloading of incoming transport, checking and recording of receipts. It can also include such activities as unpacking and repacking in a format suitable for the subsequent

warehouse operations. Quality control checks may be under taken as part of this activity. From here, the goods are then put away in the warehouse (Baker P., 2006).

Put-away: Put away is the process of taking pharmaceutical from receiving area and placing it in the most appropriate final storage location**.** It also called stocking**.** In other words, it is the physical process of taking pharmaceutical from received area and placing them within the warehouse in the locations where they are to be stored. This process includes moving products from the unloading dock, or receiving area, after they are released for storage; and assigning them to their designated storage area (rack, shelf, floor, etc.). It is important that every product moved into or out of the racks, shelves, or any storage area must be correctly recorded on the stock keeping records; an inventory control system helps you manage them. Whether the process is manual or automated, the best practice is to put away products the same day they are received, because not doing so impacts space, causes congestion, increases transaction errors, and make item more susceptible to damage. Put away requires a strictly determined storage location. This is very important, because the information system has to know all the time what storage locations are available, what is the location of specific type of the goods and where each particular pallet is stored. This information is also used for an efficient design of a pick list (PFSA, 2016, Karasek J., 2013).

Storing: these operations consists of the distribution of goods to storage area (Karasek J., 2013), goods are normally taken to the reserve or back up storage area, which is the largest space user in many warehouse, this area holds the bulk of warehouse inventory in identifiable locations. When required, the goods are taken from reserve storage either directly to marshaling (if, for example, a full palate is required by a customer) or to replenish a picking location (Baker P., 2006).

Order-Picking: Order picking is the process of selecting products from storage area in the required quantities and at the required time to meet customer orders. The process of selecting products to ship, called order picking, is one of the most critical functions in warehousing, and represents an opportunity for error, damage, or loss if not properly managed. It can also be defined as the retrieval of stock keeping units (SKUs) from a warehouse according to a pick list generated from a customer order, prior to the dispatch of the completed order to the customer (PFSA, 2016).

It is a process which covers lots of issues. First, a pick list is given to an employee, then travelling, searching, extracting, and paper work. Picking can be of two types: homogeneous and heterogenous. Homogeneous picking is quite simple, the picker operates simply with a whole

pallet. In heterogeneous picking the picker is told where and what to pick, in what quantity and units. Due to customer needs, the heterogeneous picking is logically more frequent but has disadvantage of smaller unit means higher costs (Karasek J., 2013).

Goods are selected from order picking stock in the required quantity and at the required time to meet customer orders. Picking often involves break- bulk operations, when goods are received from suppliers in, say whole pallet quantities, but are ordered by customers in less than pallet quantities. Accurate order picking is important for achieving high levels of customer service. It traditionally also takes a high proportion of the total warehouse staff complement and is therefore expensive. The good design and management of picking systems and operations are consequently vital to effective warehouse performance (Baker P., 2006).

Pack/Ship: it refers to the process during which the order is packed into the correct sized box or boxes or onto a pallet in a manner to prevent damage during transit. It also refers to wrapping up of a single item into a casing or sealing loose cartons and box orders that have been picked so that pharmaceutical arrive in the target place or service delivery point in a beautiful manner. Packing of picked pharmaceutical in a master carton is the first step in a wider consolidation process of loads for transport. It greatly facilitates handling and increases handling efficiency during transportation. It also increases space utilization, facilitate ease of loading and receipt at destination. Proper packing protects pharmaceutical from light, damage, leakage, water and discourages theft during transport and unloading (PFSA, 2016). Packing ensures that the picked and consolidated goods, also checked for the completeness of an order, are packed for transportation, and given to the shipping department. Packing can also be ensured by an autonomous packing department in the warehouse, then the consolidation and checking are usually part of this department. Shipping ensures that the packed consignment is provided by transport destinations, assigned to the truck, and optimally loaded on the truck (Karasek J., 2013).

2.4. Types of Warehouses

The nature of warehouses with in supply chains may vary tremendously, and there are many different types of classification that can be adopted, for example: by the stage in supply chain; by geographic area; by product type; by ownership (Baker P., 2006).

Based on PFSA, (2016) in order to meet their requirement, various types of warehouses came into existence, which may be classified as follows.

1. **Private Warehouses:** These are warehouses owned and managed by the manufacturers or traders to store exclusively their own stock of goods. It is operated by the firm owning the product.
2. **Public Warehouses:** These are warehouses which are used to store goods of the general public. Anyone can store his goods in these warehouses on payment of rent. An individual, a partnership firm or a company may own these warehouses. To start such warehouses a license from the government is required. The government also regulates the functions and operations of these warehouses. Mostly these warehouses are used by manufacturers, wholesalers, exporters, importers, Government agencies, etc.
3. **Government Warehouses:** These are warehouses owned, managed, and controlled by central or state governments or public corporations or local authorities. Both government and private enterprises may use these warehouses to store their goods.
4. **Bonded Warehouses:** These are warehouses owned, managed, and controlled by government as well as private agencies. Private bonded warehouses must obtain license from the government. Bonded warehouses are used to store imported goods for which import duty is yet to be paid. In case of imported goods, the importers are not allowed to take away the goods from the bonded warehouses till such duty is paid. These warehouses are generally owned by dock authorities and found near the ports.
5. **Co-operative Warehouses:** These are warehouses owned, managed, and controlled by co-operative societies. They provide warehousing facilities at the most economical rates to the members of their society.

2.5. Characteristics of Good Warehousing

Good warehousing ensures the physical integrity and safety of products and their packaging throughout the various storage facilities until they are dispensed to clients. The various activities that occur within a warehouse should be aligned so that products can be managed efficiently, and orders can be filled and distributed expeditiously. Requirements for good warehousing practices include: a facility with adequate storage and working space as well as infrastructure components that will protect commodities from harmful environmental conditions; application of proper procedures so that commodities are always available, accessible, in good condition, and pose no risk of injury to workers; availability of timely and accurate inventory data for decision-making; and qualified human resources in sufficient quantity to meet operational needs. Regardless of storage facility size—from a small health center to a central warehouse—the main operational activities for storage are very similar. How complex these activities become varies based on the volume of products to be managed and storage facility size; as well as particular product handling requirements, such as cold storage (JSI, 2017).

In each of warehouses, need adequate arrangements to keep the goods in proper conditions. However, any warehouse is said to be an ideal warehouse if it possesses certain characteristics stated as: Warehouse should be located at a convenient place near highways, railway stations, airports, and seaports where goods can be loaded and unloaded easily. Also, mechanical appliances should be there to loading and unloading the goods. This reduces the wastages in handling and also minimizes handling costs.

Adequate space should be available inside the building to keep the goods in proper order and to have cold storage facilities for management of cold room items. Sufficient parking space should be available inside the premises to facilitate easy and quick loading and unloading of products. In addition, good warehousing needs proper arrangement of products to protect them from sunlight, rain, wind, dust, moisture and pests and proper security arrangement and fire-fighting equipment's to avoid theft and loss of products due to fire (Baker, F. Peter, 2007).

2.6. Warehouse Lay out Design

Warehouse layout is the frame work in which the overall storage space arrangement is developed. It is the complete floor plan that shows the actual way the gross space with in the storage area is used. In other words, the warehouse layout plan shows the division of the space to the storage, receiving, shipping areas, main aisles, cross aisles, fire aisles, and offices. It enables planning for the effective use of space and quick response (PFSA, 2016).

Appropriate warehousing infrastructure involves considerations of efficient layout, appropriate storage installations (e.g., pallets, shelving), good housekeeping, safety, quality control, and stock management. Proper product layout is key for effective and efficient warehouse/inventory management. Warehouses should be organized into sections or zones according to the intended function they will have, or the characteristics of the products that will be kept in them. For example, if products require cold storage or special security measures, the zone should be equipped to meet these needs. Products should be kept off the floor on pallets or shelving that maximizes the use of space. Careful consideration should be given to how products are arranged and labelled in the zone to maximize space utilization. An appropriate location numbering system should be used to make it easier to find a particular pallet; maximize the use of space in the warehouse; store faster-moving items closer to the location where orders are assembled and dispatched; and facilitate the use of electronic warehouse management systems. Numbering every pallet location in the warehouse allows for the reorganization of the warehouse based on volume dispatched criteria. This will make inventory management, including stock-taking, much easier, and prevents double-handling when specific areas of the warehouse are full. It may also facilitate the development and implementation of a fully computerized warehouse management system (MSH/SIAPS, 2014).

Regardless of the facility size, the design should maximize the usage of the available space by allowing for the greatest use of height on each floor. Warehouse design should also allow for straight product flow through the facility whether the items are stored or not. In general, this means that product should be received at one end of the building, stored in the middle, and then shipped from the other end to minimize congestion and confusion.

Warehouse layout planning is the discipline of assessing the space requirements of a warehouse or other storage facility and specifying how that space should be organized to facilitate identifiable warehouse activities. Warehouse layout will differ from one warehouse to another, depending up

on the available space, types of items stored, number of items, and nature of operations (Donald J. Bowresox and Donald J. Closs, 2002).

According to PFSA, (2016), the following are some of the points to be considered in normal situations in layout planning: receipt and issue sections should be closer to the main entrance as possible, to enable easy receipt and issue of materials outsides; inspection bay should be arranged near the receiving section; warehouse issue counter should be away from receiving and inspection area; there should be separate rooms for keeping the accepted materials, separately from the rejected materials that are to be returned to the suppliers or damaged; the office of the stores managers should be near the entrance to keep an eye on all the persons coming in and going out as well as on the incoming and outgoing materials; heavy and cumbersome items should be kept on the ground floor, which should have concrete flooring. This will require less effort and time in unloading and keeping the materials properly in the store; light materials should be stored in racks on upper floors; materials, which are likely to be affected by exposure to sun, humidity or rain, should be stored in a covered area; materials of attractive nature, which are prone to be pilferage or theft, should be kept in a more protected area, not with easy reach of any outside staff; there should be enough space for movement of materials and men in the storage area. The forklift trucks and trolleys should be able to move easily; the materials should be arranged in the storage area in such a way that minimum movement of the material is involved. The materials, which are received/ issued frequently, should be near to the receipt/ issue areas; whereas materials, which are received/ issued occasionally, should be stored away from receipt/ issue sections.

2.7. Warehouse Layout Options

There are different types of warehouse lay out design options. The following are possible and prominent designs for the general product flow through the warehouse facility: straight through flow, U-flow, and L-shaped flow.

- ***Straight Through –flow:*** Receipt area and dispatch area are located at opposite sides of the medical storage facility, each near an entrance. The through –flow has the advantage that incoming and outgoing goods are clearly separated and are not confused and mixed up. Cross- flows and congestion are also unlikely. Therefore, the through-flow layout should be preferred to U-flow layout. One disadvantage is that any item has to travel at least the entire distance from one entrance to the other from the time of receipt until

dispatch which may increase the overall travelling distance. The need for two entrances and doors, one at each of the opposite sides of warehouse, makes ensuring that only authorized staff enters the building, more difficult. However, the entrance used for loading and dispatch of consignments can be kept closed (and checked) unless loading is taking place. A through –flow layout is not possible if the building has only single entrance.

- ***U-flow:*** Receipt and dispatch area located at the same side of the medical storage facility. Ideally the building has two entrances on the same side but in some cases only a single entrance will be available. The U-flow warehouse allows the warehouse manager to oversee handling of incoming and outgoing goods simultaneously. Overall travel distances may be reduced because goods with a high turnover can be stored near the receipt area and goods with low turnover further away. A single entrance reduces the area required on the site. The main disadvantage of the U-flow layout is that the receipt and dispatch area are not as clearly separated and incoming and outgoing goods can easily be confused, especially when the warehouse has only one entrance. However, the receipt and dispatch area must be separated as much as possible, for example, by locating them at opposite sides of the entrance.

- ***L-shaped flow:*** Receipt and dispatch area located at L-shape. This will provide less interference between different modes of transportation. It also provides ease split inflow and outflow of physically different pharmaceutical.

Whether any of the mentioned layouts is selected, the different warehouse areas should be laid out adjacent to each other according to the flow of health care goods from receipt until dispatch. The layout of a warehouse should allow simultaneous receipt, put-away, order picking and packing of different warehouse staff without leading to cross-flows or congestion. Staff and materials handling equipment should not be getting in each other's way and as far as possible their paths should not cross each other.

The more staff working in the warehouse and the more materials handling equipment is employed, the more consideration should be given to the flow of goods and the possibility of congestion.

The area of receipt, inspection, quarantine, and repacking of goods must be located next to the entrance. This will avoid confusion of goods and reduces travel distances (PFSA, 2016).

2.8. Warehouse operations management

A warehouse has traditionally been viewed as a place to hold or store inventory. However, in contemporary logistical systems, warehouse functionality is more properly viewed as mixing and modifying inventory to meet customer requirements, where storage of products is ideally held to minimum (Bowersox et al., 2013). Warehouse management decisions are the outcomes of the planning and control, and shop floor optimization process which link operational resources (space, equipment and labor) with customer demand. Planning means taking the best decisions possible, in accordance with the predetermined objectives. Control means measuring the results, and possibly taking corrective actions when results are not in line with objectives. Shop floor optimization concentrates on the actual loading, sequencing, scheduling and routing problems in a warehouse.

In this research, warehouse management is defined as "warehouse management plans, controls, and optimizes the material flows and the use of the resources in a warehouse in an everyday context, with the objective of delivering goods in accordance with customer demands while minimizing operational costs that is eliminating unnecessary work and unnecessary movement of people and equipment. Warehouse management has been defined as the combination of planning, decision-making and controlling inbound, storage and outbound flows (Faber, 2013). Warehouses have always been paid a great deal of attention from managers due to the large potential impact it can have in creating customer value. Like most areas the key objectives for managing warehouses have changed over time to create additional competitiveness. The first objectives within warehousing related to maximizing the utilization of resources within the warehouse. The more expanded concept inventory control aimed to maximize profits while providing good customer service (Tompkins & Smith, 1998). The objective of present warehouse management is to efficiently and effectively organize the processes in a warehouse (Faber, 2013), i.e. it encompasses both the objectives of inventory control and warehousing.

Several sources imply that keeping good control over a corporation's warehouses is of great importance. As an example, the competitive power of an entire company as well as the complete supply chain may be derived from outstanding performance within the warehouse or distribution

center (Van Den Berg, 2012). In a broader context, a company's warehouse operations can influence the firm's corporate performance in manners such as logistics costs, customer service and business alignment (Van Den Berg, 2012). Warehousing is however a correlation between logistics cost and good customer service; the higher customer service a company aims for, the greater logistics costs one can expect, which is one of the greatest trade-offs companies face in warehouse management (Van Den Berg, 2012). Similar reasoning is presented by (Gwynee Richards, 2011) in his illustration of warehouse management trade-offs (as cited by Asmelash T., 2017).

2.9. Conceptual Framework

This part of the thesis shows the conceptual framework developed for the study which is formulated based on concepts identified in the literature review in this chapter. The purpose is to clearly show the conceptual logic and direction of the study. Since the aim of this research is assessing pharmaceuticals warehousing practices in the case company, it needs to discuss about the main warehousing activities.

The main activities that are included under warehousing are:

1. **Receiving:** is the process of identifying, visually inspecting, counting, and recording the receipt of all incoming materials. It is the receipt of stock at a warehouse or holding facility from any supplier. Receiving process need preparation and completing actual receipt activities after arrival. It is time consuming, requires much attention and should therefore be planned in advance. Any supplier should provide advance notice at least a few days before scheduled shipment. The same requirement applies to upstream Pharmaceutical distribution centers in the same Country. Advance shipping notice should be detailed including quantity and types of items. Based on the information received the warehouse manager need to plan for the staff, material handling equipment, warehouse space, yard space, time, pallets etc. needed for receiving as appropriate preparation helps to optimize utilization of those resources.

   Actual physical receipt starts after the arrival of the shipments. Incoming stock needs to be checked carefully, received correctly and stacked in a systematic way. The receiving of stock should be performed according to the Standard Operating Procedure for Receiving

of Stock which is compiled for use by the warehouse. Once the product is arrived, the warehouse manager needs to coordinate and complete the following receiving activities:

- ***Unloading-*** Planning unloading can improve efficiency of the warehouse operation. The warehouse manager should inspect the arriving vehicle and the way shipment has been packed in order to determine the most efficient way of unloading. Sufficient staff as well as storage equipment must be available for unloading.
- ***Checking stock against documentation-*** The package, quantities and condition or quality should be verified against the documentation. The documents used to verify the delivery are the original order and the invoice / packaging list that is attached to or included in the package. The supplier compiles this *packaging list* or *invoice* and it gives a detailed description of each item with delivery. Each item in the package is now checked by comparing it with the item ordered and the item reflected on the invoice/packaging list. Always ensure that the stock item complies with set specifications and standards.
- ***Check for any discrepancy-*** A discrepancy is simply a difference on what was physically received versus what was send as per delivery note. It could be product difference, quantity difference, quality difference, batch difference and expiry difference. Discrepancy must be followed and resolved shortly. Formal non-conformance report must be completed and communicated to the supplier. The report should include the details including product description, batch number and expiry, invoice number, date and time of receipt, transporter responsible for delivery, and nature of the discrepancy.
- ***Capture data of received stock-*** If all of the above checks have been done and everything received is correct and corresponds with both the order and the invoice and the quality is acceptable, the person responsible for receiving the order signs and dates the packaging slip or invoice. Products can now be accepted into the stock control system by entering them on your stock card (manual system), or by capturing them on the computerised stock control system where a “goods received note” will be generated.

2. **Put away:** is the process of taking pharmaceutical from receiving area and placing it in the most appropriate final storage location**.** Put away activity in the pharmaceutical warehouse includes: identification of product/pharmaceutical (segregating by item, batch, expiry etc.); identification of storage location (vacant spaces in the rack, in bulk area, pick face etc.); moving products (using forklift transport to the allocated space); and updating records.

Streamlining operations in the warehouse starts with product receipt and put away. The Put-away function affects everything that happens downstream in the order fulfillment process; it is difficult to fill orders if one cannot find the product. For this reason, implementing a zone-restricted put away strategy will yield immediate results during the pick, pack, and ship processes.

If several different line items are packed in one parcel, all items and each of their different batches need to be separated and placed in individual rack/shelves in the warehouse with a bin card. Large quantities of the same product which were not delivered on pallets may require palletizing before put-away. In principle, only a single batch of a product should be stored on any pallet and different products or different batches of the same product should not be mixed on the same pallet.

Every product must be put-away in the zone with the storage conditions recommended by the manufacturer and indicated on the packaging as well as according to the requirements by national drug legislation.

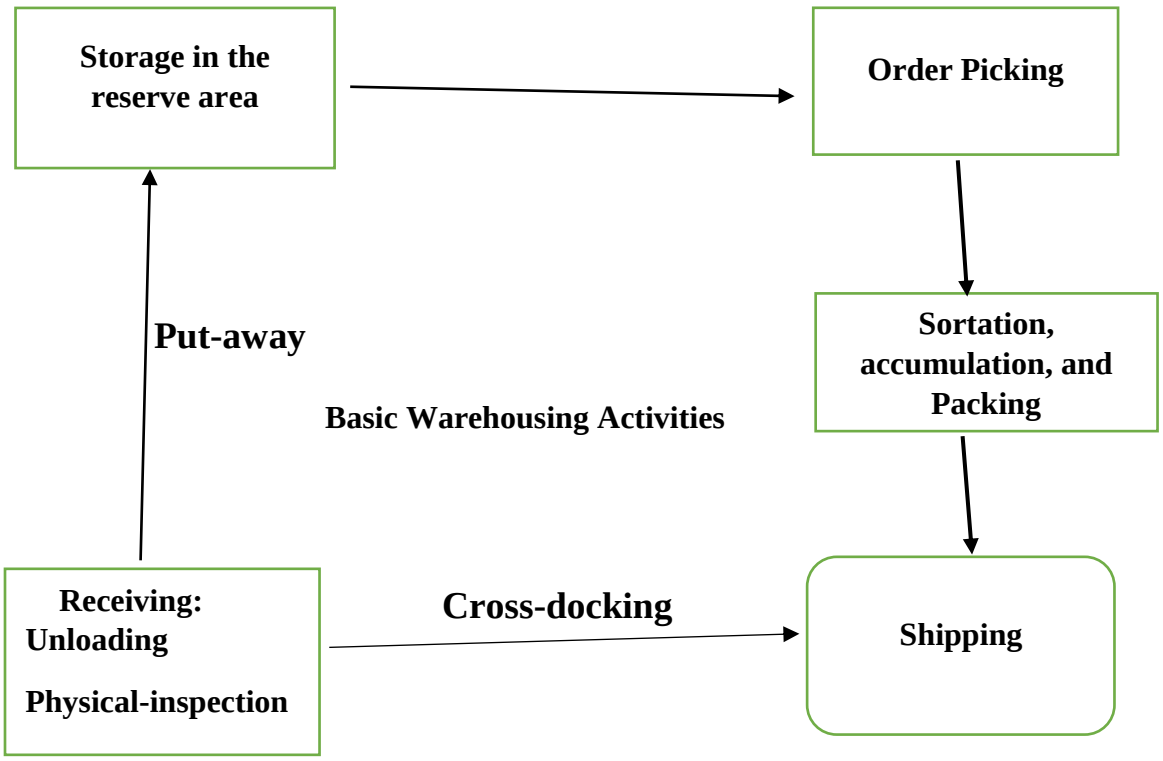
3. **Storage:** is the term used to describe the safe keeping of starting materials, packaging materials; components received semi-finished, in-process and finished products awaiting dispatch. The term is also applied for safe keeping of materials and drug products in drug stores, pharmacies, hospitals, etc., under the specified conditions.

4. **Order picking:** is the process of selecting products from storage area in the required quantities and at the required time to meet customer orders. Order picking efforts should be managed for maximum efficiency by attempting to reduce travel times, miss-picks and product damage while maximizing worker efficiency and reducing time spent on picking. Picking activity is becoming increasingly important in supply chain management. Any

underperformance in order picking can lead to unsatisfactory service and high operational costs for the warehouse, and the whole supply chain.

5. ***Packing/ Shipping****:* it refers to the process during which the order is packed into the correct sized box or boxes or onto a pallet in a manner to prevent damage during transit. The final stage of warehousing is the transportation facet of delivering and shipping pharmaceutical. Here, items being selected from warehouse and then marshaled, loaded, and are subsequently delivered to their destination.

Figure 2.1: Conceptual Framework



Source: Adopted with modifications from Ramma. et al., 2012 (2018)

Chapter Three: Research Methodology

The aim of this chapter is to present the method and study design applied to achieve the study objectives. Here the researcher aimed at explaining the methods and tools that were used to collect and analyze data to get proper information related to the pharmaceuticals warehousing practices of the case company. Besides; it includes description of the study area, research approach, target population and sample size determination, data collection procedures, ethical consideration procedures and data analysis plan.

3.1. Description of the study area

Effort to strengthen the public pharmaceutical supply chain management of the country began with the development of Pharmaceutical Logistics Master Plan (PLMP) in 2006. The PLMP proposed establishment of one government organization that will handle the public pharmaceutical supply chain management. Accordingly, Pharmaceuticals Fund and Supply Agency (PFSA) was established in 2007 by proclamation number 553/2007. It was envisaged that its establishment alleviates the deep rooted and multilateral problems in the pharmaceutical supply chain. Some of the major problems revealed during the country wide base-line assessment were shortage of essential pharmaceuticals, high wastage rate, inequitable access to pharmaceuticals and irrational use of medicines. Since its inception, the Agency has followed the Integrated Pharmaceutical Supply approach starting with rational selection, consumption based forecasting and pooled procurement and need-based distribution.

The Agency (PFSA) developed a national network of 17 regional warehouses that supply pharmaceuticals for more than 3,500 public health facilities of the country (PFSA, 2016) and all regional warehouses receives their products from central warehouses. Currently, the agency has 14 warehouses of different size in Addis Ababa for receiving and storing of all pharmaceuticals until distributed to the branch warehouses as per the consumption trend and request of the hubs at regional level and the focus of this research is to assess the warehousing practice at the central PFSA level.

3.2.Research Approach

Both quantitative and qualitative data were collected through questionnaires on warehousing practice of PFSA central in Addis Ababa. Both quantitative and qualitative research methods that is mixed approach were used for this study.

3.3.Research design

The researcher used descriptive research design to describe the existing warehousing practice situations and its challenges. The major purpose of descriptive research is to describe the state of affairs as it exists at present. Both quantitative and qualitative research methods were used in this study. Descriptive survey is considered appropriate for the study since it would help the researcher to describe the practices under study in its current existing state.

3.4.Population and Sample

According to (Holme and Solvage,1991), selecting respondents with the right knowledge about the research area is very critical. Since this study is limited to assess the existing pharmaceuticals warehousing practice of central PFSA, the population comprised warehouse managers, warehouse supervisors, storage and distribution officers and their coordinators.

Currently, there are 14 Warehouses administered by PFSA central in Addis Ababa and each warehouse is managed by two warehouse mangers. Besides, as information is gathered from the storage and distribution director, the total warehouses have three supervisors on a cluster basis that support and supervise the warehousing activities; and a total of 20 storage and distribution officers together with their coordinators. Thus, the target population for the study was all warehouse managers, supervisors, and officers working in storage and distribution directorate of central PFSA which was a total of 51 employees.

For some research projects, there will be only a small number of people within the research population, in which case it might be possible to contact everyone called a census. Because, the total population, 51 is finite and small (less than 100), the study covered all the total population of the study, so sampling technique was not applied.

3.5.Data sources and types

Data used for research work can be collected from various sources such as archival records, interviews, observations, physical artefacts, etc. And the collected data can be basically divided in to two different types: primary and secondary data. In this research, primary data is used for conducting this study.

Primary data is the information that the researcher finds out by himself regarding specific topic having the likely advantage that the date is collected with the researcher's purpose in mind whereby ensuring the resulting consistency of the information with the research questions and purpose.

3.6.Data Collection Procedures

The task of data collection began after a research problem has been defined and research design/plan wrote. Primary data were collected by using questioner.

The primary data was gathered through a well-developed questionnaire from the entire population of the agency. The questionnaire was designed in a way that enables to capture the demographic information of respondents, on the one hand, and their evaluation of warehouse practice, on the other hand. As far as the procedure of data collection is concerned, contacts were initially made to respondents to explain the purpose and nature of the study so as to achieve the desired response rate. Subsequently, the questionnaire was distributed to and collected physically from the potential respondents at their site by the researcher.

The layout of the questionnaire was kept very simple to encourage meaningful participation by the respondents. The questions were kept as concise as possible with care taken to the actual wording and phrasing of the questions. The reason for the appearance and layout of the questionnaire are of great importance in any study where the questionnaire is to be completed by the respondent.

Instrument Validity is the degree to which a test measures what it purports to measure (Creswell, 2009). Validity defined as the accuracy and meaningfulness of the inferences which are based on the research results. It is the degree to which results obtained from the analysis of the data actually represents the phenomena under study. He contends that the validity of the questionnaire data depends on a crucial way the ability and willingness of the respondents to provide the information requested.

A pilot study was conducted to refine the methodology and test instrument such as a questionnaire before administering the final phase. Questionnaires were tested on potential respondents to make the data collecting instruments objective, relevant, suitable to the problem and reliable. Issues that were raised by respondents were gathered and questionnaires were refined accordingly. Besides, proper detection by an advisor took to ensure the content validity of the instruments. Finally, the improved version of the questionnaire was printed, duplicated, and dispatched.

3.7.Data Analysis

In general, there are two types of data analysis techniques: qualitative and quantitative, and the choice of these methods depends on the type of information at hand. If most of the information that will be collected contains numerical, the analysis calls for quantitative tools and descriptive statistics can be used to characterize the data. Here, since the data is collected via questionnaire, the data collected was analyzed using descriptive statistical techniques such as percentages, frequencies, mean and standard deviation by using SPSS-20 and the analyzed data is presented in tables.

3.8.Ethical Considerations

To check the ethical clearance of the study, support letter from the logistics and supply chain management department of school of commerce, were received and submitted to PFSA central specifically to Warehousing and Distribution directorate to get their consent. Then, respondents were informed about the purpose of the study and their role in the data collection activity as it is to find answers for the research questions. The response that the participants gave is going to be analyzed without any change by the researcher. Furthermore, the entire research participants participated on voluntary basis and treated with respect.

Chapter Four: Data Analysis, Interpretation and Discussion

4.1. Introduction

The data analysis and discussion of the result were carried out based on the data collected by questionnaires from warehouse managers, storage and distribution officers, and coordinators of the case company. The collected data were analyzed quantitatively and qualitatively. Statistical tools like percentage, frequency, mean, and standard deviation were employed. The survey was conducted within two weeks period and a total of 49 questionnaires were used for analysis that showed response rate of 96.08%.

Table 4.1 Response Rate

Population	**Number**	**Percent**
Number of Questionnaires Distributed	51	100%
Returned Questionnaires	49	96.08%
Incomplete Questionnaires	0	0%
Useable Questionnaires	49	96.08%

Source: Survey Result, (2018)

The target population of this study comprised of 51 employees working in warehouse managing, storage and distribution, and individuals coordinating the warehousing operations of the case company. However, from the total 51 questionnaires distributed 49(96.08%) were returned and correctly filled.

4.2. Respondents' Demographic Information

The demographic profile of the respondents is analyzed and presented below. Here, the variables are age, sex, level of education, current working position, and service year in the position.

Table 4.2: Demographic Information of Respondents.

Variables	Choice	Frequency	Percent	Valid Percent	Cumulative Percent
Age	19 – 25	1	2.0	2.0	2.0
	26 – 35	32	65.3	65.3	67.3
	36 – 45	14	28.6	28.6	95.9
	Above 45 Years	2	4.1	4.1	100.0
	Total	***49***	***100.0***	***100.0***	
Sex	Male	39	79.6	79.6	79.6
	Female	10	20.4	20.4	100.0
	Total	***49***	***100.0***	***100.0***	
Level of Education	College Diploma	8	16.3	16.3	16.3
	First Degree	38	77.6	77.6	77.6
	Second Degree	3	6.1	6.1	100.0
	Total	***49***	***100.0***	***100.0***	
Working Title	WM	24	49.0	49.0	49.0
	SDO	24	49.0	49.0	98.0
	SDC	1	2.0	2.0	100.0
	Total	***49***	***100.0***	***100.0***	
Service year on the current position	Less than 2 years	7	14.3	14.3	14.3
	Between 2 to 5 years	12	24.5	24.5	38.8
	Above 5years	30	61.2	61.2	100.0
	Total	***49***	***100.0***	***100.0***	

Source: *Survey Result (2018)*

As presented in the above table (Table 4.2), there are a total of 49 respondents of which males are 39(79.6%) while females take the remaining 20.4%. As far as the respondents' age is concerned, many of the respondents (65.3%) were aged in the range of 26 to 35 years followed by the age categories of 36 to 45 years and above 45 years with percentage scores of 28.6% and 4.1% respectively.

Regarding level of education, significantly very highest percentage of the respondents (77.6%) were first degree holders while those with college diploma and post graduate stand second and third in the ladder of education accounting 16.3% and 6.1% of the total respondents respectively. On the other hand, being an important element of demographic information of respondents, the working position and service years in their current title were assessed. As a result, it has been revealed that those who are warehouse managers and storage and distribution officers score the higher value each with 49.0% and the remaining 2.0% of respondents is storage and distribution coordinator. The majority, 30 (61.2%) responded as they have more than 5 years working experience in their current position followed by those who have 2 to 5 years working experience that scored 12 (24.5%) of the total 49 respondents. Thus, from the above demographic information, one can easily understand and assume that almost all the respondents are able to understand and clearly identify the existing warehousing practices and its challenges. Besides, it implies that the respondents were knowledgeable and hence had better opportunity to understand and interpret the questions properly that increases the validity of the findings.

4.3. The warehousing Practices of PFSA

Based on the information gathered through questionnaires, an analysis was performed. Descriptive statistics was used in an effort to examine the mean scores and standard deviations of the survey.

4.3.1. Receiving Activity

PFSA warehouses receive products that are procured from two sources: International sources and Local sources. The inbound warehousing process begins with the arrival of the incoming transportation. Based on the warehousing contract, the incoming vehicle is unloaded either by the warehouse personnel (PFSA Warehouse workers) or daily wage contract workers (PFSA, 2015). Once the items are unloaded to the warehouse, the receiving activity follows.

Table 4.3. below shows the analysis result of the receiving activity as per the data collected and analyzed on the receiving indicators of this research.

Table 4.3: Analysis of Receiving Activity

	Receiving activity indicators	St. Disagree		Disagree		Neutral		Agree		St. Agree		Total		Mean	Std. deviation
		N	%	N	%	N	%	N	%	N	%	N	%		
1	In PFSA warehouses, there is SOP that provide instructions to receive pharmaceuticals properly.	5	10.2	10	20.4	7	14.3	19	38.8	8	16.3	49	100	3.31	1.262
2	Pre-notification of new arrivals to be received is mostly in place for warehouse managers.	4	8.2	10	20.4	9	18.4	19	38.8	7	14.3	49	100	3.31	1.194
3	Warehouse managers arrange storage space before the arrival of items as they received pre-arrival notifications.	2	4.1	8	16.3	15	30.6	18	36.7	6	12.2	49	100	3.37	1.035
4	There is clearly defined separated receiving area in PFSA Warehouses.	9	18.4	21	42.9	9	18.4	9	18.4	1	2	49	100	2.43	1.061
5	All members of the receiving team are well trained in the receiving procedures.	7	14.3	17	34.7	15	30.6	7	14.3	3	6.1	49	100	2.63	1.093
6	Incoming products are checked (preliminary physical inspection by using check list for quantity, quality, any damage, type, and expiry date).	1	2.0	3	6.1	15	30.6	24	49.0	6	12.2	49	100	3.63	0.859
7	Preliminary physical inspection results of new arrivals are reported to responsible ones.	2	4.1	2	4.1	16	32.7	22	44.9	7	14.3	49	100	3.61	0.931
8	A discrepancy report is filled in for all defective products received (integrity, short dated, expired, broken, leaking, damaged, short/over supply).	0	0	5	10.2	14	28.6	19	38.8	11	22.4	49	100	3.73	0.930
9	During receiving of cold chain items, the condition of cold boxes/refrigerated truck that contains the products is well checked to ensure the cold chain is maintained.	0	0	7	14.3	18	36.7	17	34.7	7	14.3	49	100	3.49	0.916

Source: Survey Result (2018)

The mean values of each of the items of receiving activity indicators were calculated between 2.43 and 3.73 and standard deviations that range between 0.86 and 1.26. The lowest mean value (2.43) is scored in the case of clearly defined separated receiving area availability in the warehouses of PFSA followed by the mean score (2.63) for training of all members of the receiving team for the pharmaceuticals receiving procedures. Here,18.4% and 42.9% of the total respondents strongly disagree and disagree respectively on the availability of clearly designated receiving area in PFSA warehouses that makes the total score 61.3% of the total.

Availability of receiving SOP which guides and standardizes the receiving activity in all warehouses is rated so that 10.2% strongly disagree, 20.4% disagree, 14.3% neutral, 38.8% agree and 16.3% strongly agree making a mean value of 3.31. Here, although the cumulative percent for agreed and strongly agreed respondents is 55.1%, the remaining respondents (neutral and below) is still significant showing that there will be a gap on distribution and awareness of the SOP to all members of the warehousing and distribution team that results in non-uniform practice of receiving procedures.

Regarding to pre-notifying of new arrivals to warehouse managers to plan and get ready for the receiving of items scored a mean value of 3.31, showing moderate practice. The pre-notification of new arrivals is very important to ensure availability of storage space in warehouses so that the incoming transport will be unloaded just after arrival instead of waiting for the searching of warehouse with storage space. It is expected that warehouse managers should arrange storage space and get pre-planned for the receiving of new arrivals. Thus, arranging storage space for newly arriving pharmaceuticals by warehouse managers after they receive pre-notification scored 38.8%, and 14.3% for agreed and strongly agreed respondents with the total mean vale of 3.31.

Preliminary physical inspection of incoming items for parameters (like quality, quantity, any damage, expiry date and batch) by using checklist; reporting findings of inspection to the responsible bodies; and documenting any discrepancy findings are other very important indicators in the receiving of pharmaceuticals which scored comparable mean values of 3.63, 3.61 and 3.73 respectively.

It is very important to give due attention in the management of cold chain pharmaceuticals as they are high temperature sensitive. During receiving of cold chain items, the condition of cold boxes/refrigerated truck that contains the products needs to be well checked to ensure the cold chain is maintained. In this regard, the respondents rated the practice in PFSA warehouses: 7(14.3%) disagree on the indicator and 18(36.7%) neutral making a total of 51% which is significant showing that there is a gap in monitoring the conditions of cold chain items during receiving activity.

The presented mean scores of the measured items of receiving indicators suggest that, respondents in PFSA believed that the Agency has made lower efforts to enhance the pharmaceuticals receiving activity except in the case of incoming products checking, discrepancy reporting and filing

findings on the preliminary physical inspection of new arrivals which scored moderate mean values suggesting that relatively moderate efforts have been exerted in performing the receiving activity.

In this research, respondents' response on the major challenges of PFSA warehousing practice was assessed on the five basic warehousing activities: Receiving, put-away, storage, order picking and shipping of the pharmaceutical products. Respondents were guided as they can have multiple responses of challenges related to each warehousing activities.

Based on the analysis result, among the receiving activity challenges listed, 30(61%) of respondents indicated absence of designated receiving area in warehouses is the number one challenge in performing the receiving activity followed by incomplete document for items arrived and training gap on receiving activity for members of the receiving team each with equal score value of 15(31%) of 49 respondents.

Table 4.4: Receiving Challenges Analysis

	Challenges Described	***Number of respondents***	***Percentage***
1	Incomplete document for items arrived	15	31%
2	Training gap on receiving	15	31%
3	No receiving SOP	13	27%
4	No designated receiving area	30	61%
5	Very long vehicle unloading time	11	22%

Source: Survey result (2018)

The other challenges indicated here in the receiving activity of warehousing practice are absence of receiving SOP and very long vehicle unloading time which scored 27% and 22% of the total respondents respectively.

These scores suggest that absence of separated receiving areas in PFSA warehouse may result in unorganized flow of products and possibility for mix up of ingoing and outgoing items in the warehouse. Incomplete document for items arrived results in delay of receiving new arrivals and making the items ready for distribution will be too late.

4.3.2. Put-Away Activity

After receiving the pharmaceuticals at each warehouse of PFSA, the put-away process starts to transfer the items into the spaces available in the storage areas. Analysis of warehousing practice in the case of put-away activity based on indicators used in this research showed that the mean value scored ranges from 2.67 to 3.45 with standard deviations that range between 0.855 and 1.335. The higher standard deviations show that there is inconsistency of respondents in rating the activities. The lowest mean value (2.67) is scored in the case of established well-structured put-away process practice existence, followed by product specific locations registration after put-away (2.73), and put-away of fast moving items in the most accessible locations with mean value 2.84.

To perform put-away operation effectively, warehouse personnel need to be skilled about the activities and familiar to different categories of pharmaceuticals. Here, on the indicator that identifies whether most of the warehouse employees are skilled to perform put-away, it is only 44.9% and 4.1% of the respondents rated agreed and strongly agreed respectively while 34.7%, 14.3% and 2.0%, rated neutral, disagree and strongly disagree respectively. In general, it scored 3.35 mean value.

Table 4.5: Analysis result of Put-away indicators.

	Put-away Indicators	**St. Disagree**		**Disagree**		**Neutral**		**Agree**		**St. Agree**		**Total**		**Mean**	**Std. deviation**
		N	%	N	%	N	%	N	%	N	%	N	%		
1	Most of Warehouse personnel are skilled to perform put away activities.	1	2.0	7	14.3	17	34.7	22	44.9	2	4.1	49	100	3.35	0.855
2	There is an established well-structured put-away process for all items received	7	14.3	16	32.7	13	26.5	12	24.5	1	2.0	49	100	2.67	1.068
3	Items received are placed on their preferred specific location that simplifies order picking.	4	8.2	17	34.7	12	24.5	14	28.6	2	4.1	49	100	2.86	1.061
4	Items are arranged by category, type, batch number, and expiry date before moves from receiving area to storage.	5	10.2	8	16.3	6	12.2	20	40.8	10	20.4	49	100	3.45	1.276

5	In PFSA, product specific locations are registered/recorded after put-away.	10	20.4	14	28.6	11	22.4	7	14.3	7	14.3	49	100	2.73	1.335
6	The transfer of cold room items to cold room is always done with in < 30 minutes from time of arrival.	5	10.2	13	26.5	16	32.7	11	22.4	4	8.2	49	100	2.92	1.115
7	Aisle space is not enough to move the workers/machinery while performing put away.	3	6.1	14	28.6	13	26.5	15	30.6	4	8.2	49	100	3.06	1.088
8	Fast moving items are put-away in the most accessible locations.	3	6.1	20	40.8	10	20.4	14	28.6	2	4.1	49	100	2.84	1.048

Source: Survey result (2018)

In effective put-away of pharmaceuticals, different category of items received need to be placed on their preferred specific locations. And for this, items need to be arranged by category, type, batch number, and expiry date before transferring to storage location. But, from the analysis result described in above table, 8.2% and 34.7% of the respondents strongly disagree and disagree respectively while 24.5%, 28.6% and 4.1% neutral, agree and strongly agree for placing of items received on their preferred specific location as per good storage practice to simplify the order picking activity that made the mean value scored 2.86 which is below the moderate value showing that newly arrived pharmaceuticals are placed in any empty space of the storage area. Regarding the arranging of items by category, type, batch number, and expiry date before moving from receiving area to storage area, 10.2% strongly disagreed, 16.3% disagreed, and 12.2% were neural while 40.8% and 20.4% rated as agreed and strongly agreed respectively.

Literatures recommend that the transfer of cold room items from receiving area to cold room need to be done with in less than 30 minutes from time of arrival. Regarding the practice of PFSA, 10.2% of the respondents strongly disagree and 26.5% disagree on the indicator while 32.7% of the respondents rated neutral. The remaining 22.4% and 8.2% rated agree and strongly agree.

For the effective performing of put-away operation in warehouses, the aisle space should be free and enough for the movement of workers and machinery. Here, 30.6% and 8.2% of the respondents rated agreed and strongly agree in this research on the availability of enough aisle space in PFSA warehouses.

Thus, from the overall score of warehousing practice in the case of Put-away activity, one can summarize as there is low effort to enhance the activity by the agency.

Regarding put-away activity, it is shortage of material handling equipment (MHE) for put away of items is the major challenge in PFSA warehouses. 35(71.4%) respondents of the total indicated this challenge followed by no system of structured put-away that scored 21(42.9%) of total respondents.

Table 4.6: Put-away Challenges Analysis

	Challenges Described	***Number of respondents***	***Percentage***
1	Aisle space is not enough for movement	18	36.7%
2	No enough material handling equipment	35	71.4%
3	Training gap/Skill gap of put-away	15	30.6%
4	Items are transferred to any empty space in warehouses.	16	32.7%
5	No structured put-away system.	21	42.9%

Source: Survey Result (2018)

The other challenges indicated by the respondents also include: inappropriate and narrow aisle space for movement during put away (36.7%), transferring of items received into any empty space in the warehouse (32.7%) due to lack of structured put-away system in place by the case company are the most ones. In addition, 30.6% of the respondents indicated training gap/skill gap of put-away among the warehouse workers is another challenge.

4.3.3. Storage Activity

The research survey has revealed that, 12(24.5%) and 1(2%) respondents, that is a total of 26.5% of respondents rated agree on the indicator which tries to identify whether location design of PFSA warehouse's storage space ensured maximum air circulation to avoid concentrations of fumes or gases to prevent condensation of moisture on products or walls with the mean value of 2.67.

The mean values of each of the items of storage activity indicators were calculated between 2.37 and 3.41 with almost comparable standard deviations that range between 0.789 and 1.185. The lowest mean value is registered in the case of storing large supplies of flammables in separate

location away from the main store room, followed by availability of access-controlled storage system for pharmaceuticals that need increased security.

Regarding the arrangement of shelves/racks/pallets in warehouses creating the adequate passage ways that facilitates put away and order picking activities, the respondents rated 34.7% disagree, 24.5% neutral, 28.6% agree and 12.2% strongly agreed. The mean value for this indicator is 3.18 with standard deviation 1.054 which showed there is non- uniformity in the warehouses.

To use the storage space efficiently, it is very important to separate non-useable pharmaceuticals (expired, damaged, or quality defect products) from useable inventory. In this regard, the practice in PFSA warehouses as per the respondents' rating scored; 24.5% disagree, 20.4% neutral, 40.8% agree, and this showed that there are storage spaces occupied by non-useable inventory in warehouses while the overall storage space is insufficient to allow orderly storage of the various categories of products that move through the warehouses.

According to Guidelines for the Storage of Essential Medicines and Other Health Commodities by JSI/Deliver (2003), some products need storage in an access-controlled environment. It is important to identify products that are at risk of theft or abuse or have the potential for addiction, and to provide increased security for those items. If you have products that need increased security, you must establish access-controlled storage. This will probably include storing the products in: a separate locked room, cabinet, or a locked wire cage within the storage facility. Ideally a warning light or bell will be activated if the products are accessed improperly. Entry to the location of the access-controlled products must be limited to the most senior storekeeper or pharmacist and one other staff member. Limit the number of keys made for the controlled location and keep a list of people who have keys. One of the questions here in storage practice assessment was to check availability of access-controlled storage for products that need increased security and respondents rated 18.4% strongly disagree, 42.9% disagree, 22.4% neutral and 12.2% agree with the mean value equals to 2.41.

Store large supplies of flammables in a separate location away from the main storeroom, preferably outside the main storeroom. Large supplies of flammables should never be stored in the same areas as medicines, but based on respondents of this research, 22.4% strongly disagree, 44.9% disagree, and 14.3% neutral for the question that states: large supplies of flammables are stored in separate

location away from the main store room. This showed that flammables and medicines are stored together in similar locations of storage space in PFSA warehouses.

It is very important to organize warehouse storage space into sections or zones based on the intended function or characteristics of the products to be kept in them, and for this activity, availability of the storage areas of sufficient capacity to allow storage of the varies categories of products that move through the warehouse is very important. But, the assessment result on the two indicators of storage activity revealed that the mean value is 2.65 and 2.96 which showed as there is no sufficient storage space to store pharmaceuticals as per their category or characteristics in PFSA warehouses.

So, this suggests that respondents are rating PFSA storage activity as moderate or a little bit below, as in the case of their evaluation regarding the design of the warehouse to access items, warehouse spaces availability in reducing damage of items and convenient of the warehouse spaces to load and unload item and the design of the warehouse (aisles and layout) to access item whereas regarding insufficient warehouse space between the stored items and utilizes warehouse spaces properly is a little bit lower effort is exerted.

Table 4.7: Storage Activity Analysis

	Storage Indicators	St. Disagree		Disagree		Neutral		Agree		St. Agree		Total		Mean	Std. deviation
		N	%	N	%	N	%	N	%	N	%	N	%		
1	Location design of PFSA warehouse's storage space ensures maximum air circulation.	6	12.2	18	36.7	12	24.5	12	24.5	1	2.0	49	100	2.67	1.049
2	Shelves/ racks/pallets are arranged in lines with the adequate passageways to facilitate put away and order picking.	0	0	17	34.7	12	24.5	14	28.6	6	12.2	49	100	3.18	1.054
3	Non-useable items are regularly separated from useable inventory.	2	4.1	12	24.5	10	20.4	20	40.8	5	10.2	49	100	3.29	1.080
4	The shelves/racks/Pallets in the warehouses are all adequate to store the products.	3	6.1	18	36.7	8	16.3	19	38.8	1	2.0	49	100	2.94	1.049
5	There is access controlled storage (eg. a separate locked room, cabinet, or locked wire cage with in the storage facility) for products that need increased security.	9	18.4	21	42.9	11	22.4	6	12.2	2	4.1	49	100	2.41	1.059

	Storage Indicators	St. Disagree		Disagree		Neutral		Agree		St. Agree		Total		Mean	Std. deviation
		N	%	N	%	N	%	N	%	N	%	N	%		
6	Large supplies of flammables are stored in separate location away from the main store room.	11	22.4	22	44.9	7	14.3	5	10.2	4	8.2	49	100	2.37	1.185
7	Always, pharmaceutical products are stored in a manner that facilitates the first-to-expire, first-out (FEFO) policy for stock mgt.	1	2.0	12	24.5	11	22.4	16	32.7	9	18.4	49	100	3.41	1.117
8	In PFSA warehouses, there is system of classifying/organizing items for which all Warehouse employees are familiar.	1	2.0	14	28.6	14	28.6	19	38.8	1	2.0	49	100	3.1	.918
9	Temperature of cold room is checked and recorded twice per day and reported for immediate action if it is outside the required range.	3	6.1	8	16.3	25	51.0	10	20.4	3	6.1	49	100	3.04	.935
10	The temperature recording device of the cold room is regularly validated to ensure proper performance.	2	4.1	6	12.2	31	63.3	8	16.3	2	4.1	49	100	3.04	.789
11	There is regular inspection and cleaning of storage areas.	1	2.0	16	32.7	15	30.6	11	22.4	6	12.2	49	100	3.10	1.065
12	Products are stored in such a manner to prevent contamination, mix-ups and cross-contamination.	1	2.0	16	32.7	14	28.6	12	24.5	6	12.2	49	100	3.12	1.073
13	Storage areas are of sufficient capacity for various categories of products that move through the warehouse.	2	4.1	21	42.9	9	18.4	11	22.4	6	12.2	49	100	2.96	1.154
14	Warehouses are organized into sections/zones according to the intended function/characteristics of the products kept in them.	3	6.1	24	49.0	11	22.4	9	18.4	2	4.1	49	100	2.65	.991

Source: Survey result (2018)

Warehouses capability can be improved either by constructing/renting additional stores or removing (disposing) non-useable items/unnecessary materials from the store. Thus, from the above analysis we can conclude that, PFSA were facing a huge warehouse space problem. It also indicates that the stores are not capable in holding all the incoming materials. The store room

capability can be improved either by constructing additional stores or removing (disposing) unnecessary materials from the store.

Regarding storage of cold chain pharmaceuticals, temperature of the cold room or refrigerator need to be checked and recorded twice per day (morning and at mid-day) and reported for immediate action if it is outside the required range. In the case of PFSA, the respondents rated: 6.1% strongly disagreed, 16.3% disagreed, 51.0% neutral, 20.4% agreed, and 6.1% strongly agreed with the average mean value 3.04. In addition, to ensure proper performance of the temperature recording device, regular validation of the instrument is important and, in this regard, 4.1% strongly disagree, 12.2% disagree, 63.3% neutral while 16.3% and 4.1% agree and strongly agree respectively.

On the regular inspection and cleaning of the storage areas, the finding indicated that 32.7% disagree, 30.6% neutral and 22.4% agree with the mean value 3.10 and standard deviation 1.065. This showed that there is non-uniform practice in warehouses of PFSA.

Authors such as Van Den Berg (2007), Berry (2009) and Tompkins et al. (1998), state that there are several common key factors which have to be taken into consideration in order to improve warehouse practices. One of the most common faults in optimizing warehouse resources is not sufficiently using cube utilization, which refers to the use of space within a storage area, which also includes using the storing space located high up near the ceiling. This space is too often forgotten and by not using the cube as a guideline when optimizing the warehouse resources, can lead to increased costs; costs which derive from excess storage space that might not be needed.

The major challenges of PFSA warehousing practice were assessed related to storage of pharmaceuticals until delivered to the customers. Here, lack of locating warehouse storage space for different category of products as per the items characteristics and other parameters is registered as the biggest challenge followed by lack of storage area of sufficient capacity to allow orderly storage of the various categories of products that move through the warehouse which scored 75.5%, 61.2% respectively. 34.7% of the total respondents indicated that items are not properly arranged in storage areas while 20.4% mentioned that there is no regular cleaning of storage area in PFSA warehouses.

Table 4.8: storing challenges Analysis

	Challenges Described	*Number of respondents*	*Percentage*
1	No enough space for incoming products	30	61.2
2	Storage space is not clearly located for different category of products	37	75.5
3	Items are not properly arranged in storage area.	17	34.7
4	Storage area is not regularly cleaned	10	20.4

Source: Survey Result (2018)

4.3.4. Order Picking Activity

The order picking activity begins when the items are requested by the regional PFSA hubs and the transfer voucher is delivered to the warehouse managers. The pickers travel to the storage areas and collects the requested items. Once all items on the order list have been collected, the warehouse managers cross check the picking accuracy.

The table below shows the survey result of the order picking activity of PFSA as per the respondents' scale of agreement on each indicator.

Table 4.9: Analysis of Order picking Activity

	Order Picking Indicators	**St. Disagree**		**Disagree**		**Neutral**		**Agree**		**St. Agree**		**Total**		**Mean**	**Std. deviation**
		N	%	N	%	N	%	N	%	N	%	N	%		
1	Most of the time, items are picked from the storage area as exactly mentioned on the picking slip/issue order.	1	2.0	7	14.3	12	24.5	22	44.9	7	14.3	49	100	3.55	.980
2	Picked items are arranged on dispatch area by category so that the responsible warehouse manager checks for picking accuracy.	0	0	5	10.2	6	12.2	28	57.1	10	20.4	49	100	3.88	.857
3	Whenever there are picking mistakes, the checker usually keeps a record of mistake to determine extra training.	4	8.2	18	36.7	16	32.7	9	18.4	2	4.1	49	100	2.73	.995
4	The design of the warehouse space is easy to pick items free from damage during order picking.	1	2.0	15	30.6	18	36.7	12	24.5	3	6.1	49	100	3.02	.946
5	In PFSA Warehouses, there are a designed picking system by considering product range/size of order, the picking equipment & container in to which orders are being picked.	6	12.2	23	46.9	12	24.5	6	12.2	2	4.1	49	100	2.49	1.003

Source: survey Result (2018)

The mean values of each of the items of response on order picking activity indicator were calculated between 2.49 and 3.88 with standard deviations that range between 0.857 and 1.003. The lowest mean value (2.49) is registered in the case of performing order picking in designed picking system by considering product range, size of order, the picking equipment, and the size of unit load or container into which orders are being picked. Here, 12.2% and 46.9% of the total respondents strongly disagree and disagree respectively on the existence of designed picking system in PFSA warehouses while 12.2% and 4.1% agree and strongly agree consecutively.

Keeping a record whenever there are picking errors to determine extra training for the pickers scored 18.4% agree, 32.7% neutral and 36.7% disagree with the mean value of 2.73. The appropriateness of the warehouse space design to pick customer orders free from damage during order picking scored 24.5% agree, 30.6% disagree and 36.7% neutral with the mean value of 3.02.

The scale of response on order picking activity indicators of picking items exactly as mentioned on picking slip/issue order and proper arranging of the picked items on dispatch area for checking of picking accuracy by warehouse managers each scored the mean values 3.55 and 3.88 as presented in the table above. And this suggests that the respondents rated PFSA order picking activity on these indicators as moderate or a little bit above as per their evaluation.

The noticeably represented mean scores of the items of order picking activity indicator suggest that respondents in the company believed that lower efforts have been made in the case company to enhance warehousing practices in the case of order picking activity except that the warehouse mangers' moderate effort to check picking accuracy and most of the time items are picked as exactly mentioned on the picking slip. This implies the fact that the attempts made by the company are not as such significant pertaining in performing picking activity manually via labor force, improve customer service and eliminate errors in order picking process, the company current inventory management and planning system should facilitate its order picking process, and warehouse shelves in facilitating order picking process.

The three most common challenges related to customer order picking activity of PFSA warehousing practice are: long searching time for items to be collected, training gap for the team members of the picking activity and frequent picking error. According to the assessment, the challenges scored 71%, 27% and 20% respectively as presented in the below table.

Table 4.10: Order picking challenges Analysis

	Challenges Described	***Number of respondents***	***Percentage***
1	Long Searching time	35	71%
2	Frequent Picking error	10	20%
3	Training gap for pickers	13	27%

Source: Survey Result (2018)

4.3.5. Packing/Shipping Activity

Table 4.11: Analysis of packing/shipping Activity

	Packing and Shipping Indicators	**St. Disagree**		**Disagree**		**Neutral**		**Agree**		**St. Agree**		**Total**		**Mean**	**Std. deviation**
		N	%	N	%	N	%	N	%	N	%	N	%		
1	Customer orders are packed into the correct sized boxes or onto a pallet in a manner to prevent damage and cross contamination during transit.	2	4.1	7	14.3	13	26.5	25	51.0	2	4.1	49	100	3.37	.929
2	The pharmaceuticals are properly packed so that it increases vehicle space utilization, facilitate ease of loading and receipt at destination.	1	2.0	10	20.4	19	38.8	16	32.7	3	6.1	49	100	3.20	.912
3	The vehicles are loaded carefully & systematically on a first out/ last in basis to save time when unloading and prevent physical damage.	0	0	11	22.4	12	24.5	22	44.9	4	8.2	49	100	3.39	.931

Source: Survey Result (2018)

The mean values of each of the items of response packing and shipping activity indicator were calculated between 3.20 and 3.39 with comparable standard deviations that range between 0.912 and 0.931. The lowest mean value (3.20) is registered in the case of packing customer orders properly to increase vehicle space utilization and facilitate ease of loading and receipt at destination. Here, 20.4% of the respondents disagree while 32.7% and 38.8% of the respondents agree and neutral respectively. Regarding packing of customer orders into the correct sized boxes or onto a pallet in a manner to prevent damage and cross contamination during transit scored 14.3% disagree, 26.5% neutral and 51% agree with the mean value 3.37. Besides, it is very important to load vehicles carefully and systematically on a first out/ last in basis to save time when unloading

and prevent physical damage; the practice in PFSA warehouses is rated as 22.4% disagree, 24.5% neutral and 44.9% agree with the mean value 3.39.

The scores of the scale of response shipping activity indicator suggest that respondents are rating PFSA packing and shipping activity as moderate or a little bit above. This shows that most of the time warehouse workforces have shown an excelled performance in delivering items to their customers.

Regarding challenges in relation to this activity, lack of standardized packing material is number one which scored 51% of the total respondents followed by inconvenient loading area that is unsafe for employees scored 49%.

Table 4.12: Packing/shipping challenges Analysis

	Challenges Described	***Number of respondents***	***Percentage***
1	No standard Packing material	25	51%
2	Loading area is not convenient	24	49%
3	Lack of separate packing or shipping area	18	37%

Source: Survey Result (2018)

Based on the challenges rated by the respondents in pharmaceuticals warehousing practices of PFSA warehouse, the researcher observes that further investigation of the root causes for the challenges by the case company and intervention is very mandatory since the todays customers are highly in need of quality service. But, if the challenges sustain for longer time this after, customers trust on the company will significantly decreased.

Chapter Five: Summary, Conclusions and Recommendations

This chapter provides the summary of major findings, conclusions, and recommendations of the study.

5.1. Summary

The purpose of this study was to assess the pharmaceuticals warehousing practices of Pharmaceuticals Fund and Supply Agency (PFSA) of Ethiopia in emphasis on the five main warehousing activities: receiving, put-away, storage, order picking and shipping of the pharmaceuticals. Descriptive research design was used to describe the findings by using mixed research approach. The study solely depended on the perception of the selected respondents from the company. Structured questionnaire was distributed for the selected company employees to rate the warehousing practices of the case company as per the indicators of each activity.

The target population of this study comprised of 51 employees working in warehouse managing, storage and distribution, and individuals coordinating the warehousing operations of the case company. However, from the total 51 questionnaires distributed 49(96.08%) were returned and correctly filled. In evaluating the case company's warehousing activities, the analyses result revealed that;

The mean values of each of the items of receiving activity indicator were calculated between 2.43 and 3.73 with standard deviations that range between 0.859 and 1.262. Availability of receiving SOP in all warehouses was rated so that it is only 38.8% agree and 16.3% strongly agree while the others rated below making a mean value of 3.31. Here, although the cumulative percent for agreed and strongly agreed respondents is 55.1%, the remaining respondents (neutral and below) is still significant showing that there will be a gap on distribution and awareness of the SOP to all members of the warehousing and distribution team that results in non-uniform practice of receiving procedures.

The lowest mean value (2.43) is scored in the case of clearly defined separated receiving area availability in the warehouses of PFSA followed by the mean score (2.63) for training of all members of the receiving team for the pharmaceuticals receiving procedures. Here,18.4% and 42.9% of the total respondents strongly disagree and disagree respectively on the availability of

clearly designated receiving area in PFSA warehouses that makes the total score 61.3% of the total score.

The noticeably represented mean scores of the items of receiving activity indicator suggest that respondents in the company believe as lower efforts have been made by PFSA to enhance warehousing practices in the case of receiving activity.

The scores of the scale of response for put-way activity indicators is with mean values of 2.67 to 3.45. The lowest mean value (2.67) is scored in the case of established well-structured put-away process practice existence, followed by product specific locations registration after put-away (2.73), and put-away of fast moving items in the most accessible locations with mean value 2.84.

To perform put-away operation effectively, warehouse personnel need to be skilled about the activities and familiar to different categories of pharmaceuticals. Here, on the indicator that identified whether most of the warehouse employees were skilled to perform put-away, it is only 44.9% and 4.1% of the respondents rated agreed and strongly agreed respectively while 34.7%, 14.3% and 2.0%, rated neutral, disagree and strongly disagree respectively. In general, it scored 3.35 mean value.

From the analysis result described on put-away of newly received items by category, type, batch number, and expiry date to their preferred specific locations, 8.2% and 34.7% of the respondents strongly disagree and disagree respectively while 24.5%, 28.6% and 4.1% neutral, agree and strongly agree for placing of items received on their preferred specific location as per good storage practice to simplify the order picking activity that made the mean value scored 2.86 which is below the moderate value showing that newly arrived pharmaceuticals are placed in any empty space of the storage area.

The mean values of each of the items of storage activity indicators were calculated between 2.37 and 3.41 with almost comparable standard deviations that range between 0.789 and 1.185. The lowest mean value is registered in the case of storing large supplies of flammables in separate location away from the main store room, followed by availability of access-controlled storage system for pharmaceuticals that need increased security.

The assessment result on the two indicators of storage activity: organizing storage space into sections or zones according to the intended function or characteristics of the products kept in them

and availability of storage area of sufficient capacity revealed that the mean values are 2.65 and 2.96 which showed as there is no sufficient storage space to store pharmaceuticals as per their category or characteristics in PFSA warehouses.

The scores of the scale of response order-picking activity indicators with comparable close mean values of 3.02, 3.55 and 3.88 suggests that respondents are rating the case company order-picking activity as moderate or a little bit above, there are still scores of lower value in this activity. Availability of designated picking system in place and recording of picking mistakes to determine extra training were the two indicators with the minimum mean values of 2.49 and 2.73 respectively.

The scores of the scale of packing and shipping activity indicators showed close mean values of 3.20, 3.37 and 3.39. This implies that respondents are rating the case company shipping activity as moderate or a little bit above.

The research also tried to identify the major challenges related to warehousing practices of the case company. As per the findings, lack of designated receiving area for new arrivals; Shortage of material handling equipment; Storage space limitation to locate for different category of products; Long Searching time to collect customer orders; and Lack of standard Packing materials are the most common once identified as per the respondents rating.

5.2.Conclusions

Based on the findings of the data analysis, the following conclusions are forwarded.

PFSA is the governmental organization under Ministry of Health which strives to meet the ever increasing health product demand since its establishment in 2007 GC, through expanding hubs, warehouse infrastructure, increase procurement volume, implementation of integrated pharmaceutical logistics system that were previously managed vertically, enhancement of direct delivery to health facilities, deployment of automated health commodities management system at all branches and at most of the high volume health facilities were some of the major achievements.

However, the data collected on its warehousing practices of receiving, put-away, storage, order picking and shipping activities of pharmaceuticals reflect that majority of the respondent in the company believe that lower efforts have been made by PFSA to enhance warehousing practices particularly in the case of receiving activity. Therefore, based on the above analysis the case company’s receiving activity is exposed to different challenges.

Analysis of warehousing practice in the case of put-away activity based on indicators used in this research showed that the mean value scored ranges from 2.67 to 3.45. Pharmaceuticals are transferred to any empty space available in the storage space. The finding also reflected that there is below moderate put-way activity in the company and to increase its operation the company must use sufficient materials handling equipment.

In evaluating the storage and order picking activity of the case company, the analysis result revealed that there is limited storage space for all incoming products so that the warehouse storage space is not clearly located for different category of pharmaceuticals. As a result, when customer order comes to the warehouse, order picking takes long time due to long searching of items from scattered locations.

5.3. Recommendations

PFSA is required to review its existing pharmaceuticals warehousing practice based on the five main warehousing activities and make the necessary modifications to enhance its service and product quality; and improve response time. Here are some of the recommendations forwarded based on the findings of the study.

- Standard operating procedures (SOPs) are very important to standardize and perform warehousing activities smoothly. So, PFSA should update its receiving SOPs and develop others as required and distribute to all warehouse managers. In addition, there should be a regular monitoring of the uniform implementation of activities in warehouses.
- Warehouses of PFSA do not have designated receiving area that will result in long waiting time for unloading and receiving of new arrivals if the area used in common is busy with the dispatching of customer orders. So, regardless of the warehouse size, the pharmaceuticals storage and distribution directorate of the case company in discussion with the warehouse managers should assign the receiving area in each warehouse to enhance the activity.
- The warehouse space need to be categorized into different zones so that the pharmaceuticals of different characteristics will be transferred to their specific locations with in the zone. Thus, will minimize cross contamination of products and significantly

decreases the long searching time of items for customer orders. So warehouse managers need to locate storage spaces in to different sections for better performance.

- PFSA storage and distribution team should assess the warehouse material handling equipment availability and functional status in each of its warehouses; and based on the findings, the non-functionals need to be maintained and shortages need to be fulfilled through purchase.
- Training gaps of the warehouse managers and warehouse workers need to be identified by the PFSA capacity building directorate and the skill gap need to be filled.
- The result of the assessment revealed that there are non-useable items either expired or damaged in the storage spaces of the warehouses. On the other hand, storage space is insufficient for all pharmaceuticals that come to the warehouses which is paradox. So, PFSA should have disposal plan for regularly separating and disposing of non-useable in each warehouse.
- PFSA higher management team would have a plane to visit the warehouses on a certain period interval and give directions on the gaps that will be identified.

5.4. Directions for Further Studies

This study does not comprehensively capture all aspects of pharmaceuticals warehousing practice rather it made emphasis in assessing warehousing practice in relation to the five activities. To benefit from a comprehensive assessment of the dimensions that truly assess the warehouse activities of the company, future studies shall consider more dimensions or key performance indicator of the warehouse performance that is not considered in this study. Besides, researches that will result in solving the identified warehousing challenges is another area of investigation.

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Annex I

QUESTIONNAIRE TO BE FILLED BY WAREHOUSE MANAGERS, STORAGE AND DISTRIBUTION COORDINATORS, OFFICERS & WAREHOUSE SUPPERVISORS OF CENTRAL PFSA.

ADDIS ABABA UNVERSITY

SCHOOL OF COMMERCE GRADUATE STUDIES

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Dear respondents,

I am a graduate student at Addis Ababa University School of Commerce in the Department of Logistics and Supply Chain Management. Currently, I am conducting a research entitled **"Assessment of Pharmaceuticals Warehousing Practice: the case of PFSA central"** as a partial requirement for the award of Master of Art Degree in Logistics and Supply Chain Management.

The purpose of this questionnaire is to gather data for the proposed study, and hence I kindly request you to assist the successful completion of the study by providing the necessary information.

Your participation is entirely voluntary, and I confirm you that the information you provide will stay confidential and used only for the academic purpose. Thus, it does not affect you in any way rather it may possibly help you in improving the warehouse practices of your company. So, your genuine, frank, and timely response is very important for the success of the study.

I thank you in advance for your kind cooperation and dedication of your precious time to fill this questionnaire.

Thank you in advance!

Habtamu Alene

Note:

- No need to write your name.
- If you need further explanation, please contact me through my phone *+251 913258057, e-mail: betrehabtamu @gmail.com*

Part I: Demographic Data

Please indicate your choice by putting check mark (x) in the box.

1. Age in years: 19-25 ☐ , 26-35 ☐ , 36-45 ☐ , Above 45 ☐
2. Sex: Male ☐, Female ☐
3. Educational Qualification: Below college diploma ☐ Collage diploma ☐

   First degree (BSc, BA) ☐ Second degree (MSc, MA) ☐
4. Your current working position: ----------
5. Years of service in your current position: less than 2 years ☐ , 2 to 5 years ☐,

   Above 5 years ☐

Part II: Please indicate your choice by putting check mark (X) on the appropriate cell.

where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

6. Please taking your key warehouse activities in mind, indicate the degree to which you agree with the following statements regarding the warehousing practices of PFSA Central.

No.	Warehouse Activity	Score				
Receiving Activity Indicators		**1**	**2**	**3**	**4**	**5**
6.1	In PFSA warehouses, there is SOP in place that provide instructions to receive pharmaceuticals properly.					
6.2	Pre-notification of new arrivals to be received is mostly in place for warehouse managers.					
6.3	Warehouse managers arrange storage space before the arrival of items as they received pre-arrival notifications.					
6.4	There is clearly defined separated receiving area in PFSA Warehouses.					

6.5	All members of the receiving team are well trained in the receiving procedures.					
6.6	Incoming products are checked (*preliminary physical inspection by using check list for quantity, quality, any damage, type, and expiry date*).					
6.7	Preliminary physical inspection results of new arrivals are reported to responsible ones.					
6.8	A discrepancy report is filled in for all defective products received (integrity, short dated, expired, broken, leaking, damaged, short/over supply).					
6.9	During receiving of cold chain items, the condition of cold boxes/refrigerated truck that contains the products is well checked to ensure the cold chain is maintained.					
	Put away Activity Indicators	**Score**				
		1	**2**	**3**	**4**	**5**
6.10	Most of Warehouse personnel are skilled to perform put away activities properly.					
6.11	There is an established well-structured put-away process for all items received into PFSA warehouses.					
6.12	All items received are placed on their preferred specific location as per good storage practice so that it simplifies order picking.					
6.13	Items are arranged by category, type, batch number, and expiry date before moves from receiving area to storage area.					
6.14	In PFSA warehouses, product specific locations are registered/recorded after put-away.					
6.15	The transfer of cold room items from receiving area to cold room is always done with in less than 30 minutes from time of arrival.					
6.16	Aisle space (space in warehouse for walking, shelving, to either side of shelves, pallet racks) is not enough to move the workers as well as machinery at the time of performing put away activity.					

6.17	Fast moving items are put-away in the most accessible locations.					
	Storage Activity Indicators	**1**	**2**	**3**	**4**	**5**
6.18	The location design of PFSA warehouse's storage space ensures maximum air circulation to avoid concentrations of fumes or gases to prevent condensation of moisture on products or walls.					
6.19	Shelves/ racks/pallets are arranged in lines with the adequate passageways to facilitate put away and order picking activities.					
6.20	Non-useable items (expired, damaged, quality defect products) are regularly separated from useable inventory to use storage space efficiently.					
6.21	The shelves/racks/Pallets in the warehouses are all adequate to store the products.					
6.22	There is access controlled storage (eg. a separate locked room, cabinet, or locked wire cage with in the storage facility) for products that need increased security.					
6.23	Large supplies of flammables are stored in separate location away from the main store room.					
6.24	Always, pharmaceutical products are stored in a manner that facilitates the first-to-expire, first-out (FEFO) policy for stock mgt.					
6.25	In PFSA warehouses, there is system of classifying or organizing pharmaceuticals for which all Warehouse employees are familiar.					
6.26	Temperature of cold room is checked and recorded twice per day and reported for immediate action if it is outside the required range.					
6.27	The temperature recording device of the cold room is regularly validated to insure proper performance.					
6.28	There is regular inspection and cleaning of storage areas.					
6.29	Pharmaceutical products are stored in such a manner to prevent contamination, mix-ups and cross-contamination.					

6.30	There are the storage areas of sufficient capacity to allow orderly storage of the various categories of products that move through the warehouse.					
6.31	Warehouses are organized into sections or zones according to the intended function or characteristics of the products kept in them.					
	Order Picking Activity Indicators	**1**	**2**	**3**	**4**	**5**
6.32	Most of the time, items are picked from the storage area as exactly mentioned on the picking slip/issue order (right items, in the right quantity, right expiry, right batch number, right manufacturer, from the right location of storage area).					
6.33	Picked items are arranged on dispatch area by category so that the responsible warehouse manager checks for picking accuracy.					
6.34	Whenever there are picking mistakes, the checker usually keeps a record of mistake to determine extra training.					
6.35	The design of the warehouse space (aisle and lay out) is easy to pick items free from damage during order picking activity.					
6.36	In PFSA Warehouses, there are a designed picking system in place by considering product range, size of order, the picking equipment, and the size of unit load or container in to which orders are being picked.					
	Packing/Shipping Activity indicators					
6.37	The customer orders are packed into the correct sized boxes or onto a pallet in a manner to prevent damage and cross contamination during transit.					
6.38	The pharmaceuticals are properly packed so that it increases vehicle space utilization, facilitate ease of loading and receipt at destination.					
6.39	The vehicles are loaded carefully and systematically on a first out/ last in basis to save time when unloading and prevent physical damage.					

Part III: Open ended questions:

Please select and circle the major challenges of PFSA pharmaceuticals warehousing practice related to the following activities:

1. What major challenges are there **while Receiving products** to PFSA warehouses?

A, Incomplete document for items arrived; D, No designated receiving area in warehouses

B, Training gap on receiving, E, Very long unloading time

C, No receiving SOP. F, Absence of pre-notifying new arrivals to get ready.

G, Other challenges, (specify)

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2. The Major challenges of **put-away activity** in PFSA warehouses:

A, Aisle space is not enough for movement C, Training gap/ skill gap

B, No enough material handling equipment D, Items are Put away to any empty space in warehouse.

for put away. E, No structured put-away system

F, Other challenges, specify

_____

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3. What are the major challenges of PFSA warehouses **related to storage** of pharmaceutical products?

A, No enough space for incoming products. C, Items are not properly arranged in storage area

B, warehouse space is not clearly located for different category of products.

D, storage area is not regularly cleaned.

E, others specify

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4. Most common Challenges related to **Order picking** to deliver customer requests?

A, Long searching time B, Frequent picking error, C, training gap for pickers, D, other challenges,spcify,_____

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5. Challenges related to **packing and shipping** of customer orders in PFSA warehouses?

A, No standardized packing materials, B, Loading area is not convenient and safe for employees.

C, No separated packing /shipping area,

D, Other challenges, specify

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6. Write if you have any additional comments or ideas about PFSA pharmaceuticals warehousing practice:

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