Addis Ababa University School of Commerce

Department of Logistics and Supply Chain Management

Assessment on Warehouse Management Practice:

The Case of Ethiopian Industrial Inputs Development Enterprise (EIIDE)

By

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Assessment on Warehouse Management Practice: The Case of Ethiopian Industrial Inputs Development Enterprise /EIIDE/

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Statement of declaration

I declare that the thesis entitled "assessment on warehouse management practice in the case of Ethiopian industrial inputs development enterprise" submitted for the partial fulfillment of the master of Arts (M.A) degree in logistics and supply chain management at school of commerce Addis Ababa university is my original work and it hasn't been presented for the award of any other degree, diploma or other similar titles at this or any other university or institution and that all sources of materials used for the thesis have been duly acknowledged.

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I certify that the thesis entitled "Assessment on warehouse management practice; the case of Ethiopian Industrial Inputs Development Enterprise" is the work of Ato Tesfaleul Tufa. He carried out the research under my guidance and I certified that, the thesis is correct to the best of my knowledge, the work reported here in does not form part of any other project report or dissertation on the bases of which a degree or other award was conferred on an earlier occasion on this or any other candidate.

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External Examiner: Reta Megersa (PhD) Signature _____

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This is to certify that the thesis carried out by Tesfaleul Tufa Kumbite entitled: "Assessment on warehouse management practice; the case of Ethiopian Industrial Inputs Development Enterprise" and submitted in partial fulfillment of the requirements of the degree of Masters 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 AND ABREVIATIONS

AS: Automatic Storage
CEO: Chief Executive Officer
CIS: Corrugated Iron Sheet
EIIDE: Ethiopian Industrial Inputs Development Enterprise
EDDC: Ethiopian Domestic products Distribution Corporation
ERP: Enterprise Resources Planning
HCB: Hollow Concrete Blocks
KPI: Key Performance Indicators
LSCM: Logistics and Supply Chain Management
PVC: poly vinyl chloride
RS: Retrieval System
SCM: Supply Chain Management
SD: Standard deviation
SKU: Stock keeping Unit
SPSS: Statistical Package for Social Science
TMS: Transportation Management System
WHM: Warehouse Management
WHMS: Warehouse Management System

ABSTRACT

Government of Ethiopia is focusing on to support and makes avail different inputs to manufacturing industries at an affordable price, accessible to all citizens through Ethiopian Industrial Inputs Development Enterprise (EIIDE).

The objective of this study was to assess the warehouse management practices at EIIDE. The study employed both quantitative and qualitative study approaches. Quantitative data was collected from 66 employees using self-administered questionnaires, whereas, interview questions were also used to collect qualitative data from the two directors and three team leaders. Descriptive data analysis method through the use of Statistical packages for social science (SPSS) version 20 software was used to analyze the data.

Findings of the study showed that most of the employees perceived the following; warehousing management functions like receiving, put away, and storage are moderately practiced. However, computerized system for inventory and stock control goods and products was not fully implemented in the warehouses. Availability of adequate machineries and equipment's are very low. Perception of respondents regarding availability of adequate stock at all time and its controlling system was not in place The perception of respondents to rate the level of order accuracy and delivery of orders to customer on time in the area of warehouse was neutral. Employees believed that adequate shelves and pallets for handling and storing are rated as low. Respondents in the quantitative study believe that adequate numbers of items received and moved at full capacity are rated neutral.

The study recommends that Enterprise shall fully implement computerized system and use of machines and equipment in the warehouses. The study advocated that a lot of emphasis need to be directed to warehouse management practice and warehouse function measurement based on key indicators and the enterprise should maintain the effort made on receiving, put away and storage functions in enhancing operations of their warehouse which is still need to be improved in terms of machinery and equipment used and availability of adequate shelves and pallets needed for handling goods and products. The other attention area to be emphasized is computerized system used to facilitate the operation process in the warehouses.

***Key words**: Warehousing management practices and storage, Receiving and put away, order picking and packing, Marshall shipping management, logistics and supply chain management.*

CHAPTER ONE

1. INTRODUCTION

1.1.Background of the study

Warehousing is one of the oldest activities in history which can be linked to ancient agriculture and trade. In early days man used to store excess food and keeping animals for emergency surplus. The root of the warehousing concept goes back to the creation of granaries to store food, which was historically available for purchase in the conditions of emergency such as famine, drought etc. while, rich merchants' stored large amount of produce in warehouses for subsequent use to other parts of the world. Warehousing has become an important enabler of globalized production networks, and quite often short lead times, volume and mix flexibility, postponed customizing in terms of assembly and packaging, as well as corporate profitability, is being achieved through warehousing outlets serving some particular trade area (Christopher et al, 2006; Baker 2007; Koskinen and Hilmola 2008; Hiletofth 2009).

Warehouse management has been defined as the combination of planning, decision-making and controlling inbound, storage and outbound flows (Faber, 2013). While this thesis essentially focuses on the control and the decision making aspects of warehousing, one can find more relevant research about planning in N. Faber's dissertation.

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.

Logistics belongs to the most common part of almost every company. By effective logistics, the management of a company can achieve lower costs, shorten to delivery and, moreover, improve the entire fluent function of the company. Logistics is not only dealing with issues related to transportation, but it consists of many elements integrated in supply chain. One invisible part of supply chain is a warehouse. The key role of warehousing in the supply chain is receiving/issuing

goods, storage, packaging or assemblage. In supply chain management, modern warehousing and distribution centers are overwhelmed with information related to the flows and storage of goods and services. Warehouse operations tend to be labor intensive and require large space for facilities and appropriate locations. Large buildings are needed to store the item assortment in racks, to move the stock, to load and unload trailers and containers, to inspect picked orders, and allow trucks to maneuver in the yard and to dock them. The reason why companies should focus on warehousing is simple- warehousing costs present significant share of companies' operational costs. They can account for around 22% off all logistics. (Richards;2014).

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 structure is the blueprint specifying the way in which Warehouse Management processes are organized. These processes consist of planning, controlling, and optimizing. In the optimizing process, inbound and outbound decision rules are used. The main idea of effective inventory management is to keep the level of stock as low as possible and provide sufficient amount of products for customers at the same time. The effectiveness and efficiency in inventory management will reflect in noticeable logistics costs savings (Lai and Cheng; 2009).

All in all, warehouses are facing ever-increasing demands with respect to costs, productivity, and customer service as they become vital for the success of many companies, and simultaneously warehouse processes are becoming more complex due to developments such as value added services, e-commerce, and up-scaling warehouses. Consequently, planning and controlling warehouse processes, also referred to as warehouse management, have become a challenging task. Warehouse management operates within a framework which is defined by decisions on warehouse location and facility design (size, handling systems and lay-out). Research is needed on how to structure warehouse management in order to achieve high performance and to identify related information requirements (Nynke Faber; 2015).

In general, Warehouse Management has limited control over the external requirements (like timing, content, and required services of customer orders) imposed on the warehouse. Warehouses are often a part of a larger supply chain or network and as a member of the supply chain or network, the number of shipments demanded from a warehouse and the number of replenishments received at a warehouse are often affected or even controlled by supply chain

coordination. Instead, Warehouse Management coordinates the material flow and the utilization of the resources to satisfy these requirements. (Nynke Faber; 2015).

Different study's shows that in recent years, Warehouse Management has been increasingly supported by computerized information processing systems, called Warehouse Management Systems. A warehouse management system is a complex software package that helps manage inventory, storage locations, and the workforce, to ensure that customer orders are picked quickly, packed, and shipped (Bartholdi and Hackman, 2014).

A Warehouse management system focuses on coordinating the processes within the warehouse. It supports the day-to-day operations in a warehouse (Verwijmeren; 2004).

The primary aim of a Warehouse Management System is to meet the objectives of Warehouse Management: which include to deliver high service levels and to maximize the use of space, equipment, and labor. It manages the flow of orders and processes by providing inventory and location control, and by directing labor (Mentzer; 2002). The system knows which goods are to be received and shipped, and supports management in determining which tasks need to be performed to process goods. Based on these decisions, it sends commands to human operators and automated material handling systems to execute these tasks (Ramaa *et al.*, 2012; Van den Berg, 2012). Furthermore, the system captures relevant data on orders, shipments, inventory, warehouse lay-out, warehouse staff, vehicles, customers, suppliers, and activities in the warehouse. This allows goods to be tracked and traced, and ensures the quality of warehouse activities (Van den Berg, 2012). Over the last decades, paperless storing and picking has become increasingly popular. In developed economies, new technologies such as radio frequency communication, order picking by voice, and pick-to- light systems have largely replaced paper picking lists (Connolly, 2008). These technologies enable real-time communication between the operator and the WMS, which has two major benefits for warehouse management system applications. Firstly, these applications register all activities in greater detail and offer useful management information from available data, or use the data as input for planning and control policies.

Secondly, they support decision- making based on the current situation (Van den Berg, 2012). The application packages can be divided into integrated systems that provide various functions (example, ERP) and best-of-breed systems that are each more specialized in a single function, such as a Warehouse Management System (WMS) or a TMS (Transport Management System). If a company chooses best-of-breed systems, it must integrate the separate systems via

interfaces, which can be a complex and expensive task. In general, best-of-breed WMSs offer more sophisticated functions, although some ERP-vendors have been developing more sophisticated systems in recent years (Van den Berg; 2009; Gartner, 2013).

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 (Gwynne Richards, 2011) in his illustration of warehouse management trade-offs.

1.2. Statement of the problem.

Warehouse processes are one of the key elements of material flow efficiency along the supply chain. Warehouse process can focus on ensuring flow continuity of the production or distribution process. A warehouse functions and processes have 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 a minimum (Bowersox *et al.*, 2013).

Storage has always been an important aspect of economic development. In the pre-industrial era, storage was performed by individual households forced to function as self-sufficient economic units. The need to deliver product assortments was limited. Labor productivity, material handling efficiency and inventory turnover, were not major concerns during this early era. Because labor was relatively inexpensive, human resources were used freely. Little consideration was given to efficiency in space utilization, work methods or material handlings. Despite such shortcomings, initial warehouses provided a necessary bridge between production and marketing. Following World War second, managerial attention shifted towards strategic storage by questioning the need for vast warehouse networks. (Sakil I. Sayeed; 2013). In the distributive industries like that of Ethiopian Industrial Inputs Development Enterprise (EIIDE) engaged in wholesales and retailing by considering best practice to dedicate a warehouse containing a full assortment of inventory to every sales territory.

According to (Grant et al., 2006) the warehousing of products occurs for one or more of the following reasons, achieving transportation and production economies, taking advantage of quantity purchase discounts and forward buys Maintaining a source of supply, supporting the firm's customer service policies, meeting changing market conditions, overcoming the time and space differentials that exist between producers and consumers, accomplishing least total cost logistics commensurate with a desired level of customer service, supporting the just-in-time programs of suppliers and customer, providing customers with a mix of products instead of a single product on each order, Providing temporary storage of materials to be disposed of or recycled.

Warehouse operations tend to be labor intensive and require large space for facilities, large buildings are needed to store the item assortment in racks, to move stocks, to unload and load trailers and containers, to inspect picked orders, and to allow trucks to maneuver in the yard and to dock them (Azadeh K.; and R. De. Koster; 2016)

The government of established the Ethiopian Industrial Input Development Enterprise (EIIDE) in 2015 with proclamation number 328/006 to alleviate the short supply of industrial inputs through the implantation of effective, sustainable and efficient systems to ensure the development of manufacturing industry sectors. The main reason for the establishment of the enterprise is due to inefficient operation of manufacturing industry sectors. Before coming up with this decision, deep assessment was made and critical issues and drawbacks were identified and remedial actions were proposed. Accordingly, taking these drawbacks and weaknesses of the manufacturing industry sectors, it is vital and mandatory to have an outstanding firm that manages the production and import of industrial inputs. The manufacturing industrial sector including agro processing industries are facing great impediments that may endanger the sector seriously particularly shortage of industrial inputs is the main problem that should be solved. To solve the mentioned problem the Ethiopian Industrial Inputs Development Enterprise (EIIDE) was established with the following objectives:

- To establish, administer and transfer, whenever necessary, enterprises which ensure supply of industrial inputs;
- To supply industrial inputs by manufacturing domestically and abroad;
- To supply industrial inputs by purchasing from the local and international markets;
- To export industrial inputs which are in excess of the domestic industries consumptions;
- To work jointly with enterprises which are engaged in producing and supplying industrial inputs and raw materials;
- To implement strong supply chain management to ensure dynamic and efficient industrial inputs delivery;
- To work in collaboration with local and international governmental and non-governmental institutions having similar objectives;
- In line with the directives and policy guidelines issued by ministry of finance and economic development to sell and pledge bonds to negotiate and sign loan agreements with local and international finance sources;
- To engage in any other related objectives necessary for the attainment of its purpose;

In order to realize the development objectives and to ensure the enterprise's vision come true, a coordinated and concerted effort on innovative warehouse management system is critical to aspire beyond what is required by the strategic plan of the Enterprise as well as the transformational plan at manufacturing industry sectors. According to five years strategic plan of the organization (2018 – 2022) the following problems have been identified. The problem associated with warehouse management systems which are observed in the enterprise can be illustrated hereunder as follows:-

- Inefficient utilization of warehouse capacities, space and equipment.
- Inadequate warehouse receiving efficiency
- In adequate order fulfillment accuracy of warehouse management systems.
- Lack of coordinated and integrated picking and packing cost accuracy of warehouses.
- Inadequate understanding of inventory turnover and carrying cost while in storage, packaging transporting.
- Lack of organization and management tools requires for warehouse safety management system.

Ethiopian Industrial Inputs Development Enterprise has 85 active branches, strategically cited all over Ethiopia. Out of these branches 15 are in the capital Addis Ababa and 70 are outside of Addis Ababa. The branches have well organized with warehouses having different typologies along with offices which facilitate the sales operation effectively and efficiently. The storage capacity of the Warehouses, range from 3,460-60,000 quintals. The total numbers of warehouses are about **152** in all over the country and needs appropriate management system for the enterprise to effective and efficient. To this end assessment of their management practice is needed in order to take appropriate measures, (Information from the strategic plan of the enterprise; 2018 and Reports, 2019). Based on the above information and practical problems indicated above, it is important to conduct case study on warehouse management practice in the enterprise which owned huge storage capacity in every part of the country.

1.3. Research Questions

The basic research questions to be addressed in this descriptive research paper will be indicated as follows:

1. What is the status of Warehouse functions in the Enterprise?
2. What activities are undertaken by warehouses in Enterprise?
3. What is the efficiency of warehouse functions in the enterprise?
4. What types & sizes of warehouses are used in the enterprise?
5. What are the capacities used in terms of space and equipment utilized by the Enterprise?
6. To what extent warehouse depots and storages deliver a quality services to the customers? At what level of empathy does the Enterprise deliver services to customers?

1.4. Objectives of the study

1.4.1. General Objective of the study

The main objective of this study is to assess the practice of warehouse management in Ethiopian industrial inputs development Enterprise.

1.4.2. Specific Objectives of the study

The specific objective of the study can be stated as follows hereunder.

- To assess the status of warehouse management functions in the Enterprise.
- To identify the level of the main functions and activities undertaken in the enterprise.
- To identify the efficiency and effectiveness of warehouse management in the enterprise.
- To identify the types and sizes of warehouses to be considered in warehouse management of the enterprise.
- To assess the current situation of warehouse capacity in terms of space and equipment utilization of the enterprise.
- To assess the extent of warehouse and storage in delivering quality services on time to customers.

1.5. Significance of the study

The stakeholders of this research would be manufacturing enterprises, government institutions, wholesalers and retailers, and entrepreneurs. The result of this study could be taken as a necessary device for stakeholders in sector to accelerate import export development. In addition, the result of this study could provide the company to make some changes based on findings. The findings of this research will serve as inputs to develop good and efficient warehouse management system. It will serve as a piece of contribution to the current knowledge of warehouse carrying cost, order picking cost, inventory turnover and management of warehousing services in the merchandising Enterprises. It also helps for the future improvement in the area. In addition, it will invite for further research of warehouse management and warehouse impact in logistics and supply chain management. In this paper, warehouse management system will be investigated in relation to their contribution to the growth of merchandising enterprises. Moreover, it helps as a spring board for other researchers who conduct a research in similar topics.

1.6. Scope of the study

There is a great potential of using warehousing and storage services and marshalling goods and products in the country. This study is meant to assess the status/ the extent of warehouse management practice of the Enterprise. However, due to time constraints this paper is delimited to the assessment on warehouse management practice and the data that is obtained from only sample warehouses and depot storage and organization guidelines and manuals, asset valuation report of 2019, and annual booklets of the Enterprise. In this paper, moreover, physical observations of warehouses, information gathered through questionnaire are investigated in relation to warehouse key activities and function indicators (KPI) such as receiving, storing, order picking, and marshalling. Geographically, this case study is conducted in different regions by selecting sample warehouses. The enterprise is assumed appropriate and selected for this study because it owns more than **150** warehouses. This case study is delimited to different warehouse located at different regions owned by the Enterprise only. Lastly, the study also does not include other merchandising enterprises in relation to their storage systems. This research paper will include also all variables and effects of organizational and administrative factors affecting the practices, cost, performance and efficiency of optimal warehouse management. As

such the finding of this particular case study will be generalized Ethiopian industrial inputs development enterprise corresponding to the study period.

1.7. Limitation of the study

Like many research works, this particular study is also subjected to some limitations. First and for most, this study does not comprehensively capture all aspects of supply chain management practices as applicable to warehouse management practice, rather it made emphasis in assessing warehouse management practice of the Ethiopian Industrial Inputs Development Enterprise.

The other most important limitation of the study is the fact that though the unit of analysis was only warehouses management of the enterprise, the study was purely conducted on the basis of the responses obtained from the employees of the enterprise since it assumed the enterprise perspective. To have a holistic insight, one need to have more other similar company perspective in order to consider it as an industry level or as a sectorial level.

In order to benefit from a comprehensive assessment of the dimensions that truly measure the management practice of the enterprise, future studies shall consider more dimensions or key warehouse functions that haven't been considered in this particular study and as it is suggested by (Edward Frazelle, 2001) in his study.

1.8. Definition of Terms

a) **Warehouse:** is a facility in the supply chain to consolidate products to reduce transportation cost, achieve economies of scale in manufacturing or in purchasing. Warehouse has also been recognized as one of the main operations where companies can provide tailored services for their customers and gain competitive advantage (Bartholdi iii JJ, Hackman ST (2006).

b) **Warehouse Management:** the process of coordinating the incoming goods, the subsequent storage and tracking of goods, and finally, the distribution of the goods to the proper destination. It is the act of organizing and controlling everything in the warehouse and making sure it all runs in cost effective and efficient way (Donald J. Bowersox; David J. Closs and M. Bixby Cooper; 2002).

c) **Warehouse layout:** is planning the layout of warehouse that should be centered on balancing two things that is on providing enough storage space and working space for staff to move around and complete their tasks.(A complete guide for retailers; www.veeqo.com)

d) **Labeling:** sticking with simple alphanumeric combinations makes it easier for pickers to understand the locations, labeling depends on the size and complexity of warehouse operations. (A complete guide for retailers; www.veeqo.com)

e) **Logistics**: are "the management of all activities which facilitates movement and the coordination of supply and demand in the creation of time and place utility" (Heskett el. Al). It is part of the supply chain process that plans, implements, and controls the effective forward and reverse flow and storages of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements, (Council of logistics management, 1991)c

f) **Supply Chain**: "Supply chain is the alignment of firms that bring products or services to market" (Lambert, Stock and Ellram 1998). "Supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformations of these materials into intermediate and finished products, and the distribution of these finished products to customers" (Ganeshan R. and Terry p.).

g) **Integration**: legally separated firms collaborating in the generation of a product or service with the aim of improving the competitiveness of the supply chain. (Hartmut Stadtler and Christopher Kilger;2004)

h) **Storage Facilities**: are warehouses or distribution centers or simply the stock rooms that facilitate product flow. (Bowersox and Closss;2002)

i) **Coordination**: coordination of information, materials and financial flows, the state of knowledge in the marketing, physical distribution and systems thinking. (Bowersox; 1969).

J) **Inventory**: the amount of stock that has to be held for each product and the location of this stock to meet the demand changes. It is the amount needed to satisfy demand for the product in the period between purchases of the products. (Donald J. Bowersox; David J. Closs and M.Bixby Cooper; 2002)

K) **Distributors:** are companies that take inventory in bulk from producers and delivers a bundle of related product lines to customers. (Hartmut Stadtler; Christopher Kilger;2004)

1.9. Organization of the study

This paper is organized into five chapters. The first chapter of the paper deals with the introduction and back ground of the study. Chapter two, deals with both theoretical and empirical review of related literatures. Chapter three of the paper deals with Methodology, data presentation, analysis and interpretation, the status of warehouse and operations. The fourth chapter will summarize and discuss the findings of the study of warehouse management practice, warehouse conditions and its performance in the organization. In the fifth chapter of the paper, the main findings of the study will be summarized and conclusions will be drawn based on the results and at the last, the paper will forward appropriate recommendations and policy implications. At the last, this paper contains references and appendixes.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Theoretical Literature Review

Warehouse operation can be stated as that part of the logistics that involves the receipt, put away, storage retrieval, picking, preparation and / or shipping of goods from physical site in a warehouse network. Specific types of warehouse differ by industry, business model and company strategy, and be driven by the types of product being handled, as well as the distribution/ inventory management strategy that is in place. Business model strategy, inventory policies, and product type also dictate the number of facilities in warehouse network, the size of buildings, their layout and number of employees. Ideally, warehouse operations are linked to other system and operation functions via cloud based technologies that maximize supply chain visibility and optimize operational efficiencies; (Dan Gardner, April 2015). Although the role of warehouse has slightly changed in the past few years, it is still considered as one of the major parts of the supply chain. Previous perception of a warehouse was a necessary evil and a cost center. The changes in customers demand have altered the perception of a modern warehouse and its operations. The view of a warehouse has moved from a direct linkage between two points of the supply chain to significant node of a complex supply chain network. Current best in class warehouses can serve as a source of company's differentiation advantage, which increases profits and allows the growth of the entire company. Among the basic responsibilities of warehouse management are cost and inventory reductions, efficiency, accuracy and productivity improvements and the enhancement of the customer service at the same time. (Richards; 2014). Companies can achieve more storage by wise planning of warehouse layout and efficient utilization of space. The design of warehouse should be considered when building complete new warehouse, redesigning existing one or moving to different place. Although every company has different demands and requirements, there are some essentials that need to be followed. These are the factors that company should take into account when designing a warehouse. (Richards. G.; 2014). According to the above statement data collection, future plan of the company, cubic capacity of the store, health and safety of employees, standardized packaging are the main things to be considered. The primary functions of a warehouse are receiving goods from a source, storing them until they are required, picking them when they are required, and shipping them to the appropriate user. Over the years, warehouse has developed from a relatively minor facet of a firm's logistics system to one of its most

important functions (Grant *et al*., 2006). Bowersox in his study stated that, facing the challenge of providing customers with an increasing assortment of products and reducing holding time of materials and parts, the focus of warehousing has shifted from passive storage towards strategically located warehouses providing timely and economical inventory replenishment for customers (Bowersox *et al.*, 2013). Warehousing plays a vital role in the supply chain in providing a desired level of customer service at the lowest possible total cost (Grant *et al.*, 2006). Today's warehouses are expected to be more responsive to customer demands than ever before, for example, by providing value-added services such as last minute customization, small-scale assembly, labeling, kitting, and special packaging. With the growing success of e-commerce, warehouses increasingly have to process large numbers of small orders which have to be picked within tight time windows, which further complicates warehouse processes. In response to these developments and in particular to supply chain management initiatives, companies have either concentrated their warehouse operations in one or a few large centralized warehouse(s) with high throughputs, or have decided to outsource their warehouse activities to emergent specialized logistics companies, logistics service providers.

Inventory management strikes equilibrium in the midst of deficit stock and surplus stock (Gupta & Gupta, 2012). Inventory is made up of huge numbers of quick/liquid assets especially in firms mainly dealing in retail trading and manufacturing. With the view to sustain these stock levels of such enormity, large financial resources are invested to the firms (Mittal, 2014). Inventory management performance is a huge determinant for the prosperity or downfall of a business. According to Gupta & Gupta, 2012) the overall calculated business objective should be inventory management since it has a remarkable capacity on profitability.

There are certain rules for warehouse operations that help to make operations more efficient and effective. Bartholdi and Hackman; (2008) in their study indicated that the flow of goods should be continuous and double handling should be avoided. With unnecessary double handling the costs are considerably increasing. In order to achieve good visibility of material movement inside the warehouse, all products should be scanned between each process steps.

Bowersox *et al.* (2013) and Grant *et al.* (2006) in his study distinguishes four basic warehouse functions that add value to the supply chain. The ***break bulk*** function allows for products to arrive in large quantities and then to be_shipped in small quantities tailored to the needs of many customers. This adds value as it reduces production costs, purchasing costs, and transport costs upstream in the supply chain. The ***storage*** function adds value since it allows larger quantities

to be produced and transported which is more efficient. It also enables orders to be quickly delivered to customers, which provides a better service level and prevents lost sales. The ***consolidation*** function implies that the warehouse holds products from various sources, so that customers can order a large product range from a single source. The ***customization*** function adds value by postponing customized services until the end of the supply chain, reducing upstream inventories. In summary, warehouses store and cross dock inventory in the logistics pipeline and coordinate product supply and consumer demand according to (Bowersox *et al.*, 2013). In cross docking, received goods have a destination upon receipt, implying they can be sent directly from the receiving docks to the shipping docks. **Receiving** begins with the arrival of goods into warehouse. A receipt should be made out and the goods must be unloaded and scanned into system. The *receiving* activity includes unloading products from the transport carrier at a receiving dock, identifying the products, verifying quantities, and randomly checking the quality of the products. According to (Bartholdi and Hackman; 2008) the inspection should be made to detect possible damages, incorrect amounts or other problems.

The *direct put-away* activity involves transferring of incoming products to a location within the storage area. The first step is to determine the location of storage for goods. The location is important for further quicker response when picking the goods. After the location is chosen, the goods can be put away and again, the location of goods should be scanned. (Bartholdi and Hackman; 2008). A product kept in stock is also called a stock keeping unit (SKU). Each product or SKU has an identification code that allows it to be tracked for inventory purposes. During the course of a year, the entire inventory of a product or SKU can be replenished multiple times. The storage area of a warehouse may consist of two parts: a reserve area, where products are stored in the most economical way, and a forward area where products are stored for easy retrieval. A forward storage area is replenished from a reserve storage area. A wide range of systems can be used to store products, varying from shelf racks to automated storage systems. (Frazelle; 2002).

Order picking (pallet/case/broken case) involves obtaining the products requested by a customer order from the storage area. Customer orders consist of order lines, each line for a unique SKU in a certain quantity. When the requested quantity of a SKU is less than the quantity contained within a case for that SKU, it is considered broken case picking. If the order requests a quantity of a SKU which is equal to or multiple of the quantity within a case, it is considered *(full) case picking*. Pallet picking involves retrieving full pallet loads for customers requesting full pallet quantities. Picking can either be manually or (partly) automated, and it is generally recognized as the most

expensive warehouse operation, because it tends to be very labor intensive or very capital intensive.(Frazelle;2002; Tompkins *et al.*, 2010). Many different order-picking system types can be found in warehouses.

The ***accumulation/sortation*** of picked products into customer orders is a necessary activity if the orders are picked in batches or come from different storage areas. Value- adding services, such as labeling, sampling, kitting, testing, and repacking may be offered to customize products to customer requirements. The packing activity includes checking, packing, and preparing a customer order for shipping. The cross-docking activity bypasses the storage and picking activities by transferring incoming products directly from the receiving docks to the shipping docks. The shipping activity involves sorting and staging customer orders in a designated dock door area ready to be loaded to the transport carrier and shipped to the customer. Cross docking seeks to eliminate the expensive functions of inventory handling and order picking from modern distribution centers by taking advantage of the information system infrastructure in modern supply chain. Hence, at a cross dock, in coming material is already assigned to a destination, and therefore, the only required functions are consolidation and shipping.

Although warehouses share these typical warehouse activities and a general pattern of material flow, various types of warehouses can focus on different activities or requirements. The literature often distinguishes two types of warehouses based on their prime customers: distribution centers and production warehouses (Ghiani *et al*; 2004; Roodbergen, 2001; and Van den Berg, 2012). A distribution center is a warehouse in which products from one or more suppliers are collected for delivery to a number of customers. Customer orders are typically composed of multiple order lines. The number of SKUs may be large, while the quantities per order line may be small, which often results in a complex and relatively costly order-picking process. In distribution centers, the focus is often on optimizing picking processes. A production warehouse holds raw materials, semi-finished products, and finished products. Raw materials and semi-finished goods are delivered to a nearby production plant, and finished goods are received from this plant and can be directly delivered from the warehouse to customers or to other warehouses. In production warehouses, products may be stored for long periods. This occurs, for example, when the procurement batch of incoming parts is much larger than the production batch, or when the production batch exceeds the customer order quantity of finished products. If a production warehouse holds finished goods for customers, typically the assortment is limited compared to an average distribution center. (Ghiani *et al*. 2004) also classify warehouses by their ownership. A private warehouse is operated

by the owner of the goods. A third- party warehouse is operated by a third-party logistics service provider (LSP) on behalf of one (dedicated warehouse) or multiple clients (public warehouse). A specific type of public warehouse is a self-storage warehouse that provides temporary storage at a centrally located facility for both private persons and small businesses (Gong *et al*., 2013).

In general, warehouses aim at simultaneously reducing cost, increasing productivity, and improving customer responsiveness. Measuring warehouse performance provides feedback about how the warehouse performs compared to the requirements, or compared to industry peers. As such, it can also provide feedback on the adequacy and effectiveness of an implemented Warehouse Management structure.

(Johnson and McGinnis 2011) discuss two types of warehouse operations performance criteria: financial (i.e., revenue related to cost) and technical (i.e., outputs related to inputs). They argue that technical criteria - based on output generated and resources consumed - tend to give a clearer picture of a warehouse's operational performance than financial measures, because warehouses typically do not generate revenues. The function of warehouses is to support the supply chain. As warehouses are often part of a larger supply chain or network, traditional operational performance objectives such as productivity, quality, delivery, and flexibility (Boyer and Lewis, 2002; Schmenner and Swink, 1998) are more applicable. Technical performance measurement in the warehouse industry includes cases or order lines picked per person per hour, picking or shipment errors rates, order throughput times, and percentage of orders with special requests as indicated by (Forger, 1998; Van Goor*etal*.,2003).

Approaches for performance evaluation include simulation, analytical models, and benchmarking (Gu *et al*., 2010). Simulation models evaluate the performance of the warehouse operation over time. They greatly depend on implementation details, and are less amenable to generalization. Analytical models are theoretical models of the existing situation and provide insights into the behavior of warehouse operations, such as throughput, average response time, fill rate, costs, and utilization of space, equipment, and human resources. Benchmarking stems from the search for industry best practices which lead to superior performance (Camp, 1989). Benchmarking forces a warehouse to evaluate and compare its performance to similar warehouses.

2.2. Empirical Literature Review

Warehouses are seen as an opportunity to improve operation optimization and information flows, to reduce inventory levels and to enable more agile distribution (Vrijhoef et Koselka, 2000). The successful performance of a warehouse depends on appropriate storage, layout, warehouse operations and material handling systems (Lehrer et al; 2010).

According to (Ilies, Liviu, Turdean Ana-Maria and Crisan Emil Babes, 2009), the case study on warehouse performance measurement states that companies could gain cost advantage using their logistics area of the business. Warehouse management is a possible source of improvements from logistics that companies could use. In their case study they puts best practice used in warehouse performance measurement which lead to performance improvements and also answers questions like what are the warehouse performance indicators? How are they calculated and how are they interpreted? How can a manager use them in order to improve the warehouse performance? And their solution was warehouse performance measurement refers to the measurement of optimal use of storage space, customer relations activity, quality level, assets usage and costs. Moreover, in their study, setting an indicator system for warehousing activity is the key performance improvements. They presented some key indicators that are used around the world to measure warehouse performance.

Several types of performance indicators have been developed to measure many supply chain and logistics activities. Choosing the type of indicator to measure can be daunting, and could be dangerous to simply focus attention on one area. Focusing only on cost containment could improve one area but not affect the overall performance of the supply chain.(Edward Frazelle, 2011).

(Colson and Dorigo, 2004) present a software tool which allows selecting public warehouses according to the following criteria: storage surface and volume, dangerous items, possibility for temperature control, separation of storage areas, geographical distance high way connection, train, waterways, certification, opening hours, assistance with customs, use of technology, handling equipment, number and characteristics of docks.

(Krauth, et al; 2005) classify around 130 indicators used for assessing warehouse performance, such as storage, storage volume, storage racks, number and characteristics of docks, pallets per square meter, opening hours, and assistance with customs.

More recent work include (Collins, et al; 2006) which described the collection of warehouse metrics i.e. picking and inventory accuracy, storage speed, and order cycle time.

(John M. Hill, 2007) uses three types of indicators: order fulfilment, inventory management, and warehouse performance, some of the indicators proposed by John M.

According to (Gu et al; (2010), warehouse design problems involve five groups of decisions; determination of the general structure of the warehouse (conceptual design), its sizing, layout calculation, warehousing equipment selection, and selection of its operational strategy. In addition, a warehouse project must also include definitions of policies about order fulfilment/picking, stocking, and stock rotation (Koster et al; 2007, Chan et al; 2011).

Performance measurement in the warehouse industry traditionally employs a set of single factor productivity measures that compare one out puts to one source (or input). This is sometimes called the ratio method, (Tompkins et al; 2003, Chen and McGinnis 2007). However, using a set of ratio measures can lead to confusion if some measures are good and some are poor. Is the warehouse performing well? Thus it is more useful to employ a measure that considers simultaneously all of the significant inputs and outputs. Warehouse performance has been measured with each indicator separately, however, this traditional measurement has some limitations that it cannot compare the performance over time regarding the unknown relative values between indicators (McGinnis et al; 2002). Typically, there are two main categories of costs-variable and fixed.

The variable costs are related to some activity- the variable costs are growing with increased activity. While fixed costs, as the name indicates, are constant despite of any activity. Order picking is the most labor intensive activity. Before actual picking, the warehouse has to check availability of the goods, produce the documentation and make the schedule for picking and shipping. Great dealing of order picking process is carried out by warehouse management system, but even though the order picking costs accounts for approximately 55% of operational costs. (Bartholdi & Hackman; 2008).

In present day supply chain, holding and warehousing inventory is an important role for a firm. Logistic costs survey in Europe identified the inventory cost to be 13% of the entire logistic costs, 24% was accounted for warehousing, Bake, (2007). Nonetheless, to determine inventory costs and to control purchase in most instances may not be able to curb purchasing costs in a similar manner to the industry which is competitive. Inventory management provides great potential for firms to reduce costs and improve customer service performance, Jeffrey et al;

2008). JIT as an inventory management practice has been found, several studies, to have a favorable effect on firms' performance. The JIT techniques, was supported by a study made by Fullerton et al; 2003) which shows that firms which outshine their counterparts execute a large standard of JIT inventory practice than those who didn't apply the JIT practice. As so, reduction of waste through some practices implemented such as preventive maintenance programs set up time reduction and uniform workloads and as well the firms become more profitable than competitors due to the application.

2.3. Types of Warehouses and their Typologies in the Enterprise

2.3.1. Warehouse Design and Layout

Designing warehouses is challenging because it involves so many trade-off decisions. Each warehousing function needs to be carefully implemented in order to achieve operational targets. These targets are often expressed by Baker and Canessa; (2009) in terms of capacity, throughput, and customer service levels.

A typical structured approach of warehouse designing could be as follows:

a). Determining the overall space requirements for all warehouse processes

b) Specify a U-shape, straight-thru, or modular overall flow design

c) Locate functions with high adjacency requirements close to one another

d) Assign processes with high storage requirements to high-bay space and labor intensive processes in low-bay space

e) Document expansion and contraction strategies for each warehouse process

Design and layout principles of warehouses

Baker & Canessa; (2009) in their article of warehouse design state some principles of warehouses as follows:

- Use a one-storey building wherever possible.
- Use straight-line or direct flow of goods in and out of the warehouse with goods being delivered at one end, held, and ranked according to ABC analysis.
- Utilize an effective storage plan to maximize warehouse operations and to avoid inefficiencies.

- Use efficient materials handling equipment.
- Minimize aisle space within the constraints of the size, type and turning circle of materials handling equipment.
- Maximize use of the building's height to use the cubic capacity fully.
- Use an efficient system of product identification.
- Plan for growth.
- Ensure full attention is given to health and safety issues.

According to Baker & Canessa (2009) in their article "Warehouse design: A structured approach" has acknowledges that the warehouse design process is highly complex. The authors often seem to tackle this complexity by describing sequenced procedures for creating an appropriate warehousing solution. However, because there are a high number of decision variables, it may not be possible to identify an "optimal" solution. As a result, steps in the design process are typically interrelated and reiterative decision-making methods are needed during the process.

According to (Tompkins et al. 1996); in designing warehousing systems it is desirable to maximize:

- space utilization;
- equipment utilization;
- labor utilization;
- accessibility of all materials;
- Protection of all materials.

Storing goods in adequate space, with the proper equipment, by well trained personnel in a properly planned layout, results in maximum protection of items.

Types of Warehouse Layout are:

- The through flow system
- Inverted "T" flow
- Cross flow system
- Corner flow system

The Enterprise has a total of **152** warehouses at Addis Ababa & at different branch offices in different regional states. However, out of the total number of warehouses 22 of them are managed by the third parties logistics providers. Some of the store buildings are under construction or not fully completed to provide proper warehousing functions. As it has been observed during site observation, the construction of six branch Stores & office buildings were commenced before 28 years & partially executed but not yet completed due to different reasons. The condition of buildings observed that some of them were remain with the activities of finishing, roofing works, metal works, site development works & site works.

2.3.2. Construction Details of Buildings and Civil Works

According to data collected during asset valuation and the survey and observation made, almost all existing warehouse and office buildings of the Enterprise, Architectural, Structural design & detail of drawings have been done by government consulting firm named Building Design Enterprise (BDE) and the construction of warehouse buildings have been executed by different eligible local contractors in Ethiopia.

a) Stores

The structural parts of the store are reinforcement concrete structures, dressed stone masonry wall, HCB wall, steel structure & Eucalyptus truss covered with durable Egga sheet & G-28 CIS. The spacing of reinforced concrete columns are c/c 600 cm and tied together with Grade beam, Intermediate beams & top tie beams. The height of the building up to under eve is average 850 cm. With Cement screed floor finsh , the vertical wall plastered with cement sand mortor , ponted and internally painted at varanda wall and ceilling . Some of the stores building structures are constructed fully with timber and others are with CIS walling .

Figure 1: Typology -I

Figure 2: Typology -II

Figure 3: Typology –III

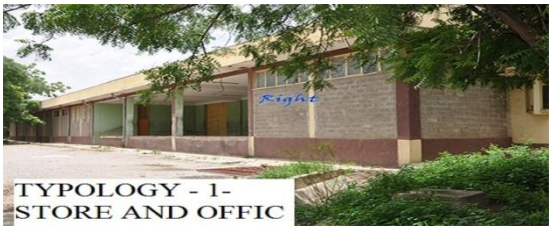
Figure 4: Typology -IV Store

Source: Survey data and existing data of the Warehouse buildings (2020)

b) Branch Office buildings

The office buildings of branches were built in the same style with that of warehouses and they were constructed with reinforced concrete, stone masonry, and HCB wall with, cement, sand plastering finish. The floorings are terrazzo tiles, PVC tiles and cement screed. The roofing trusses are constructed with Eucalyptus tree & timber, the cover of roof is G-28 CIS fixed to timber & zigiba purlin. The doors are wooden & windows are Metal with 4mm thick glazing. The ceiling of the rooms were constructed with 8mm thick chip wood and painted. Also the external rendered part of HCB wall and internal vertical face of the wall is painted. As it was observed on the Site, the Architectural & Structural design of the branch office buildings and the construction of super

structure are typical. Substructure and superstructure of the existing buildings are in a good condition, but require maintenance and improvement.



Typology –I

Typology -II

Typology –III

Typology -IV

Figure 5: Typology I, II, III & IV

Source: Survey data of the existing buildings (2020)

c) Head quarter buildings

The head office of the company is located at the center of capital city Addis Ababa around Piazza. According the data exist, the Enterprise used the existing buildings as head quarter offices and stores for more than seventy years. The super structure of the existing buildings are very durable constructed with composite material such as reinforced concrete , stone masonry, hollow concrete block walling , Timber , CIS , Steel structure .The roofing trusses are constructed with thick timbers & Eucalyptus tree.

There were basement floor using for stores. The floor finish of office building is composite of material such as Terrazzo tile, PVC tiles, Cement screed with floor curtain, Timber joist. The ceilings are PVC tiles, plastered concrete slab & chip wood material. The meeting hall floor finish totally timber joist and the ceiling material is chip wood. The underground Store floor finish is cement screed & cover big area.

The existing office, which is G+1 building currently using for the Chief Executive Officer (CEO) & for other Staff works. The Structure of this block observed that strong & durable. The slab of this building is Reinforced concrete and partly wooden timber. The average height of the building up to first floor ceiling is 10 meter. Continuous preventive maintenance & improvement renewal were made last year from 12 / 09/ 2018 – 23/02/2019.

Figure 6: Partial pictures (Photo) of head office building

Source: Survey data of the existing buildings (2020)

2.3.3. Types of Warehouse

Johansson and Olhage; (2004) in their articles of international journal state that Physical handling of customer orders is a key element in the order fulfillment process. Order processing is the term generally used to describe the process or the work flow associated with the picking, packing and delivery of the packed items to a shipping carrier. The specific process and operational procedures are determined by many factors. Because each warehouse typically has its own unique requirements and priorities, a common notion has been that there is no single process that universally provides an optimized solution. Instead, the specific process flow of a warehouse is determined by factors such as the nature of the products and the number of differing items requested in each order. Types of warehouse are one of the determinants and hereunder we can see different categories of storage.

Stores facilities can be broadly broken in to two categories; stores buildings and stockyards. There are different kinds of warehouses and the classification of warehouses can be made from the following viewpoints:

- On the basis of structure
- On the basis of ownership
- On the basis of service rendered

Below we discuss various types of warehouses:

1. **Raw material and component warehouses:** It hold raw materials and always in a position to induct raw materials onto a manufacturing or assembly process.
2. **Work-in-process warehouses:** This warehouses hold partially completed products and assemblies at various points along production line or an assembly line.
3. **Finished goods warehouses:** It holds inventory usually to balance the variation between production schedules and market demand. Normally these warehouses are situated near manufacturing plant, and it is characterized by the flow of full pallets in and full pallets out, assuming the product size and volume authorizes pallet-sized loads.
4. **Distribution warehouse and distribution centers:** Distribution warehouses accumulate products from various manufacturing points for combined shipment to the common customer. Normally, the warehouses are located central to either the production locations or the customer base. Product movement represented by full pallets or cases in and full case or broken case quantities out.
5. **Fulfillment warehouses and fulfillment centers:** It receives, pick, and ship small orders for individual consumers.
6. **Local Warehouses:** These warehouses mainly for the purpose of responding to the customer demand. Frequently, single items are picked, and the same item is shipped to the customer every day.
7. **Value-added service warehouses:** Key product customization activities takes place like packaging, labeling, marking, pricing, and returns processing. There is also one more classification of warehouses according to which geographical area they cater to:
   - Centralized warehouse
   - De-centralized warehouse
8. **Centralized warehouse:** Centralization generally refers to the allocation of the warehousing services to one particular business unit which provides services to the whole firm. The decisions are made at the central location for the entire network. The main characteristics of a centralized approach are control, efficiency and good economy. The followings are some

benefits of centralized warehouses indicated below:

- Improvement in productivity through balancing
- Increase in available knowledge
- Bundling of product flows
- Combined use of production flows
- Control on the system and improved efficiency
- Uniformity in the processes

Some of the limitations can depicted below as follows:

- Customer desire of self-pickup cannot be provided
- Problem of concentration of customers in only certain markets and inhomogeneous customer structure
- Long internal transport paths in large central warehouses and higher costs for the infrastructure
- Slow process of decision making, less flexibility
- High initial costs and inflexibility
- Bureaucracy in the system
- Dependent systems

9. **De-centralized warehouse:** Decentralization approach gives the individual business units autonomy and independency over their own resources without any major considerations over the remaining units unless there is a necessity for the overall organization policy. In this approach each facility identifies its most effective strategy without considering the impact on the remaining facilities in the network and this leads to the local optimization. The main characteristics of the decentralized approach are empowerment of individual business units, flexibility, and service orientation. They provide as good service as the centralized Warehouses in terms of customer service level. Some of the benefits can be indicated as follows:

- Rapid adjustment to the changes
- Flexibility
- Quality and innovation
- Increase in timely responsiveness
- Low startup costs

- Customization and catering to individual needs is possible
- Improvement in reliability

Some of the limitations can be addressed as follows:

- Increase in the cost of warehouse
- Extensive use of effort and expertise
- Lack of centralized control
- Duplication of resources

2.4. Conceptual framework

Conceptual framework On the basis of the above arguments pertaining to the claimed the dimensions/factors of warehouse management practice, and with reference to the suggestions of the extant literature, this study spelled out the following conceptual framework that it would pursue in the course of the preceding parts. The conceptual framework is a combined modification of the conceptual frameworks developed by prior studies (i.e. Aronovich, Dana, Marie Tien, Ethan Collins, Adriano Sommerlatte, and Linda Allain. 2010).

In order for the reader to get an insight of this thesis area of research, following will describe basics behind warehouse activities. The theory in this section follows general warehouse philosophy and is similar to several renowned publications in the field of warehousing, both old and new. (Bartholdi & Hackman, 2011) illustrates the normal physical activities and flows in a warehouse. The inbound processes are represented by receiving and put-away whilst the outbound processes include picking, packing and shipping. In the following section, brief descriptions of (Bartholdi & Hackman's, 2011) different activities in the inbound and outbound processes are presented, as well as other descriptions that are relevant to the topic.

2.4.1. Warehouse functions and activities

The way, in which various warehousing functions are arranged, depends on many issues. Firstly, the physical quality of the warehouse facility may set certain restrictions. For example, receiving and shipping functions should normally be located near the facility input and output points. On the other hand the facility may have some fixed obstacles that hinder entering and performing work tasks in certain areas. Second, management typically wants to balance the flow patterns

between various activities and minimize the travel distances for stock movement. This can be achieved through systematic identification of stock locations and adjacency requirements between different warehouse activities. Finally, product attributes may require certain kind of handling procedures. Some items, for example, may be temperature sensitive which requires processing them in a climate controlled location.

As it is identified by Tompkins et al (1984) in his article, warehouse functions include: receiving Identifying and sorting, dispatching to storage, pacing in storage, storage, retrieval from storage, order accumulation, packing, shipping, record keeping etc.

1. **Receiving:** Receiving is the first activity that is managed in a warehouse. The activity may start with a notification of incoming goods, which allows the workers to arrange coordinated unloading of the incoming goods. Normally the goods is also scanned and registered in the company's Warehouse management system. Receiving represents about ten percent (10 %) of the cost in a normal warehouse. Receiving activity identifies the most incoming materials and notifies the arrival and condition of the material. Upon arrival of the materials and equipment at warehouse premises post-delivery inspection and testing for both the local and foreign procurement is carried out to ensure conformity of the materials with the specification document. The first set of Warehouse management Key Performance Indicators supply chain executives need to understand revolve around receiving and put away rates in a warehouse. Incoming freights employee per hour, cost of receiving per receiving line, dock door utilization, receiving productivity and receiving accuracy. Manager should also track the cost per line item, the accuracy and time lines of inbound freight and the labor costs associated with receiving. These key indicator can be leveraged to improve vendor relationships and increase productivity among your staff.

   In this warehouse function one can consider the following issues

   - Workforce utilization
   - Volume per employee
   - Cost per Item
   - Accuracy and timeliness of delivery
   - Labor costs
   - Back order rate

2. **Put away:** Prior to the put-away of a stock keeping unit (SKU) is being made, it's important that a (convenient) storage location is selected for storage. The reason for this is because the storage location many times reflects how quickly and how cost-efficient it later on will be retrieved for a customer. To do this, the warehouse staff needs to be able to control the inventory, i.e. the storage locations. Workers and managers need support to able to quickly access information about available storage locations, things to consider can be, how much weight a storage location tolerate, how spacious they are, how easily they are accessed etc. The put-away can then be realized with the help of various equipment's such as forklifts, roll trolleys or conveyers. Put-away usually corresponds to about 15 % of warehousing operating payments.

   Put away: is the expenses incurred for putting away stock per line.

   - Put away cost per line
   - Put away productivity is volume of stock put away per warehouse clerk per hour.
   - Put away accuracy is percentage of number of items put away accurately at the designated location.
   - Labor and equipment utilization is percentage of the labor and material handling equipment utilized during the put away process.
   - Put away cycle time is total time taken during the entire process of each put away task.

3. **Storage:** There are two main storage types, dedicated storage and shared storage. In general, a unique address is assigned to every single location in a warehouse, regardless if it's dedicated or shared location. A dedicated location is a storage, which is reserved for a specific and allocated SKU. High frequent SKUs are assigned to more convenient locations, which streamlines order picking. However, a consequent of dedicated storage is often that volume utilization becomes insufficient.

   The other type of storage, shared storage, can on the other hand be used to improve space utilization. Here, SKUs can be assigned to several locations. Once such a location becomes empty, another SKU can be assigned to this specific location. Consequently, the utilization of the inventory will be higher, the tradeoff is of course that a SKU can be located in many different locations and can thus be harder to find without good systems in place. The simplest warehouse management key performance indicators are based on storage. Whether your warehouse is dependent on storing goods manually or uses AS/RS Automatic storage or

Retrieval system you need to monitor inventory turn over the carrying cost of inventory and the average inventory value. The dependent values in the key performance indicators are derived from the following formulas.

- Inventory Turn Over- the cost of Total goods stored during a period per average inventory.
- Carrying cost of Inventory- the cost of storage over a particular span of time, including the cost of inventory, capital costs, service costs, and cost of obsolescence. Inventory carrying rate * average inventory value. (How long a product stays in the warehouse?) The longer the stock stays in storage, the higher the cost of the warehouse.
- Storage productivity- volume of inventory stored per square foot.
- Space utilization- percentage of space occupied by inventory out of the total space available for storage.

4. **Picking:** is the process of retrieving items from their storage locations and transporting them either to storage process or straight to the shipping area**.** Greater accuracy in picking means shorter lead time. Picking in the right order decreases the rate of order return and increase customer satisfaction. Picking Key Performance Indicators include the average number of items picked per employee, the total value of picks and their average, the cost per line items, labor and equipment utilization costs, the cost of order cycle times. Normally, order-picking (retrieving a SKU from storage location) represents about 55 % of total warehouse operating costs. But it can also be further broken down to traveling, searching, extracting and paperwork and other activities. As a mean to get the right information to the order pickers, pick-lines are used, which contain instructions on what to pick, in what quantity and in what units of measure. Each pick-line corresponds to a specific location in the warehouse. It should further be notable that a pick-line may consist of several picks from the same location. Of course picking have been of large interest for automating due to high operating cost and manual handling.(Bartholdi & Hackman's;2011)
5. **Packing:** Packing is also a quite labor-intensive activity because of the magnitude of orders stock keeping units (and SKUs) that are handled; often inspections take place at this stage as well. The inspections are performed to control that the orders are complete and accurate, order accuracy is a crucial measure and important to create good service to customers. Packaging the merchandise in appropriate shipping containers, and attaching the necessary documents/labels. Inaccurate orders can generate both expensive returns and poor reputation.

In general, the numbers of units that are handled in the shipping dock are lower compared to that of picking. The reason for this is because customers' ask for consolidated shipments, which means that orders are packed together on a single carrier (e.g. pallet or case), which enables economics of scale benefits due to lowered shipping and handling expenses. In the packing process packing cost, labeling and stacking costs must be considered seriously.

6. **Shipping:** is the final movement process occurs at the shipping operation. Shipping process involves inspecting, packing, palletizing, and loading items into a carrier for further delivery. Shipping Key Performance Indicators are comparable to picking and packing key performance indicators. However, they focus on the total number of items shipped versus the projected number of items shipped. For example, if you ship 100 items, and 150 times were scheduled to be shipped, you have a difficult Key performance Indicators, indicating delays or possible issues within the Warehouse. This Key performance indicator is derived by dividing the total numbers of shipped orders by the number of planned shipments. An ideal result is one. As the result increases, it represents increased operations; decreasing results indicate problems and decreased productivity. Cross docking is referred to the activity when goods are not stored in the warehouse. It is instead directly transferred, after receipt in receiving, to the shipping dock where an aggregation with other goods will be coordinated into a truck. Cross docking seeks to eliminate the expensive functions of inventory holding and order picking from modern distribution centers by taking advantage of the information system infrastructure in modern supply chain. In coming materials are already assigned to a destination, the required functions are consolidation and shipping. (Van Den Berg, 2012).
7. **Reverse Logistics:** Reverse logistics key performance indicators, are those revolving around returns and recycled products coming back from consumers. Although several reverse key performance indicators exist, the most important one is the rate of return. It is calculated by dividing the number of units returned by the total number of units sold. As the result increases, it alludes to a possible problem with a product. The return flow is the reversed movement in warehousing, and as e-commerce is growing (Kripashankar et al., 2013), returns will likely become a larger function in most warehouses. In general, the amount of returns in the e-commerce industry is about 25-30 % states (Bartholdi & Hackman, 2011).
8. **Inventory Accuracy:** inventory is the amount of stock that has to be held for each product and the location of this stock to meet the demand changes. It is the amount needed to satisfy demand for the product in the period between purchases of the products. Inventory Accuracy

is a measure of database inventory versus actual inventory. It is calculated by divided the database inventory count by physical inventory count. If both counts are accurate and identical the result should be one.

9. Equipment Indicator:

The recent development in marketing field, have led to the development of warehouse designing style, where the same warehouse is used for warehousing. These warehousing are equipped with tall heavy duty industrial racks, with the items, which are ready for sale, are placed in the bottom parts of the racks and the palletized and wrapped inventory items being usually placed in the top parts. There are many types of special equipment that have been designed to reduce labor cost and/or increase space utilization. According to Iskandar Makhmudov; on his research paper at Royal institute of technology Stockholm Sweden (2011) storage and retrieval equipment can reduce labor cost by:

- Allowing many SKU to be on the pick face, which increases pick density and so reduces per pick.
- Facilitating efficient picking and/or restocking by making the product easier to handle.
- Moving the product from receiving to storage; or from storage to shipping. Increase space utilization by;
- Partitioning space into sub regions that can be loaded with similarly sized SKU.
- Making it possible to store product high feet.

Any warehouse manager understands the value of working equipment. Equipment should be tracked for adherence to maintenance and uptime until the next scheduled maintenance. This is calculated by dividing the current time used since last maintenance by the average time between maintenance. The result shows managers how long existing equipment can function before maintenance is required. An average of all such key performance indicators revolving around equipment provides insight into overall predicted up time for equipment asserts.

Today's warehouse equipment are execute, handle and store more items, provide more products and service customization, offer more value added services, receive & ship more international orders as well as process more return. At the same time less time to process an order, less margin for error, and less warehouse management system capability (Tompkins, Smith, 1998).

10. **Distribution:** is defined as the activities which facilitate the movement of goods and services so as to create time, place and acquisition (possession) utility, and ensure the right kinds of products are available at the right time and the right place. There are some warehouses where product storage is considered a very temporary activity. These warehouses serve as points in the distribution system at which products are received from many suppliers and quickly shipped out to many customers. In some cases, such as with distribution centers handling perishable food (e.g., produce), most of the product enters in the early morning and is distributed by the end of the day. As the roles and responsibilities of warehouses expand with the growth of always on supply chain, the added function of distribution exerts additional pressure on warehouse management. Here are some key elements relevant to distribution that can be considered.
    - Order lead time: the average time taken by an order to reach the customer once the order has been placed.
    - Perfect order rate: number of orders the warehouse delivered without error. It includes success rate of the warehouse/distribution center.
    - Back order rate: the rate which orders are coming in for items that is out of stock. There are solutions where in unexpected ship in demand causes this. However, if this rate is consistently high, it is an indication that there are lapses in planning and forecasting.
    - Rate of return: number of items returned back by the customer.

2.4.2. Warehouse process

The basic function and processes of a warehouse is to receive customer orders, store or keep goods, retrieving required items, and finally prepare and ship those items to their destination. There are many ways to organize these operations but the overall process in most warehouses shares the following common phases. Therefore, the main functions of warehouse include movement, storage and information transfer. According to (Alan et al 2010) typical warehouse functions and material flows depicted as follows:

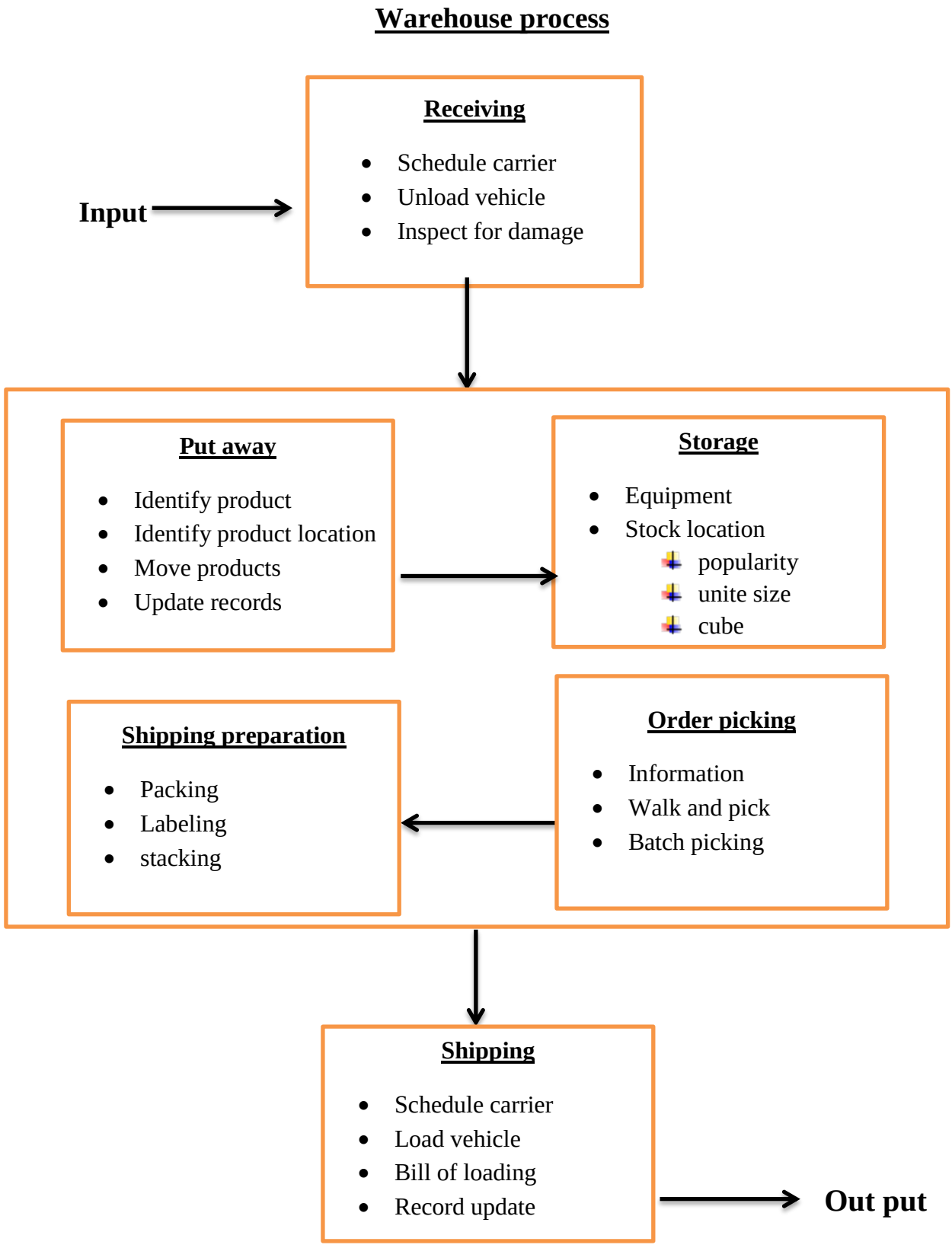


Table 1: WH Process and material flows

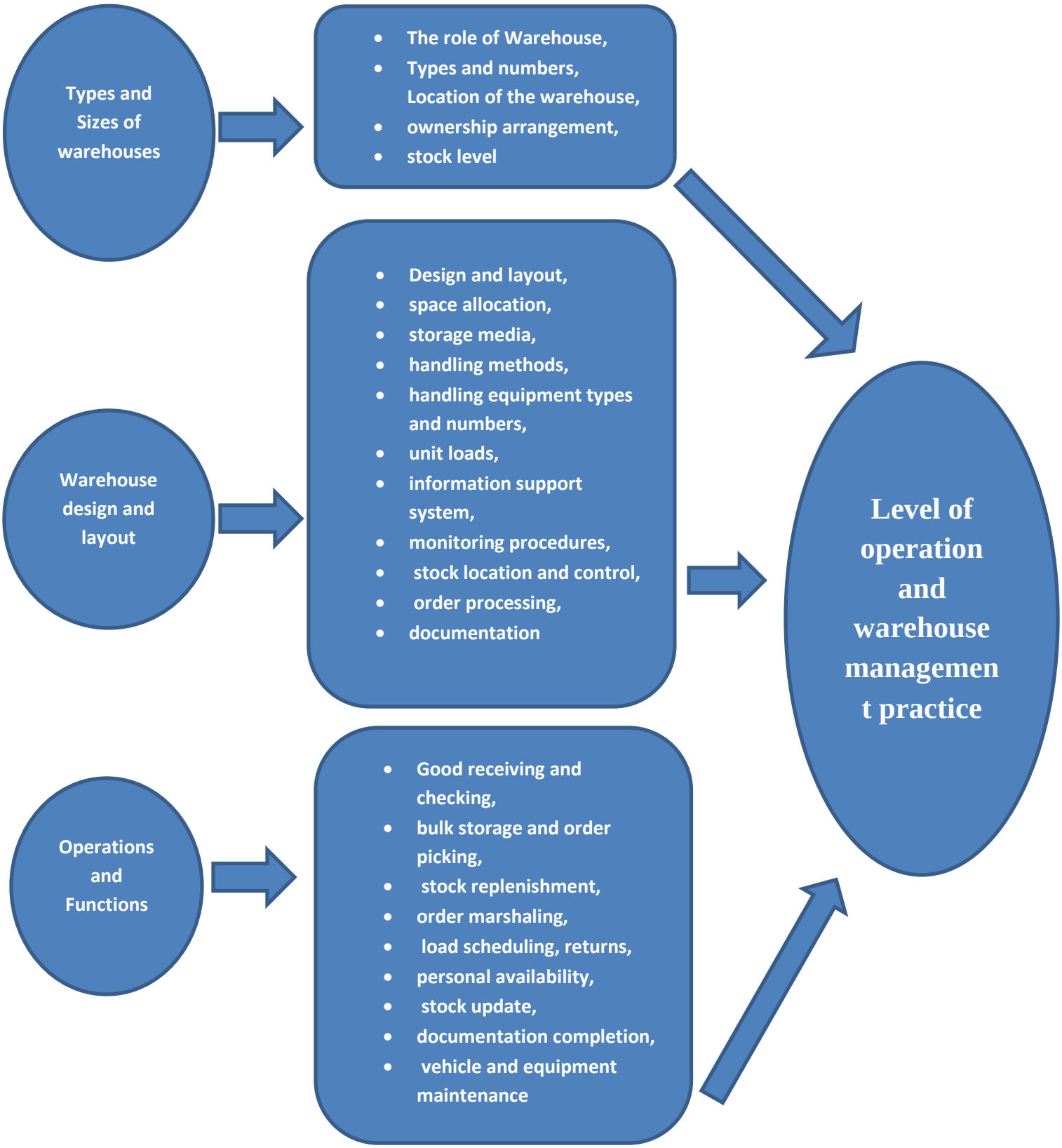


Figure 7: Conceptual frameworks (Own Model) (a modified adoption from Aronovich, Dana, Marie Tien, Ethan Collins, Adriano Sommerlatte, and Linda Allain. 2010

CHAPTER THREE

3. RESEARCH METHODOLOGY

The research design for this study is a descriptive and interpretive case study that is analyzed through qualitative and quantitative methods. The research with respect to this project is an applied one, but not new. Rather numerous pieces of previous academic research exist regarding the practice of warehouse management. The proposed research will take the form of a new research but on an existing subject. This study is focused on the assessment on the warehouse management practice, activities of warehouse, capacity utilization and the performance of warehouse at Ethiopian Industrial Inputs Development Enterprise (EIIDE).

3.1.Background of the organization and Description of the study area

3.1.1 Background of the Organization

The study area of this proposal is Ethiopian Industrial Inputs Development Enterprise located in Addis Ababa around Piaza Atikilit Tera. To know about the present Ethiopian Industrial Inputs Development Enterprise one should trace some points about its predecessors as they formulate its foundation. According to the information from the enterprise:

- **A.besse and his company Ethiopian Limited (1936-1975)** is believed to be pioneer of modern merchandising in Ethiopia as it had been involved in importing and exporting as well as running wholesale and retail merchandising of industrial products before and after the Italian invasion. If had continued up to 1975 and was confiscated by the Derg Regime. The commodities which had been imported from abroad and distributed by the company were broadly classified as building materials, food Item, automobiles, general merchandising products, medicines etc. Besides importing and distributing of commodities, the company also has been involved in the export of agricultural products such as coffee.
- The nationalization of the former **A.besses** and affiliated companies and other small private companies in 1975 becomes the foundation of the Ethiopian Domestic Distribution Corporation (EDDC) 1975-1993 by the legal notice No. 13/1975 dated July 21, 1975. At the time of its formation EDDC look over 19 distribution outlets of the nationalized Birr 10 million capitals, with 19 branches and 338 man power. This Organization, being the only public merchandise local and abroad and distribute to the society. With then command

Economic policy, EDDC had monopolized and controlled the market in the absence of competitors. Furthermore, by 1991, **EDDC** had expanded its operation throughout the country by establishing eight regional distribution bureaus and over 90 branches.

- Merchandise Wholesale & Import Trade Enterprise was established in 1993 by the council of Ministers regulation NO.103/1985 as public enterprise merging the former trading corporation-**EDDC & ETIMEX.** When it was established it was given the following objectives to engage in merchandise wholesale trade by purchasing commodities within Ethiopia or import from abroad; to engage in consignment and commercial representation trade activities and render transit service to domestic and foreign producers and suppliers, and to Stabilize consumer markets by purchasing commodities within Ethiopia or from abroad;

EIIDE has 85 active branches, strategically cited all over Ethiopia. Out of these branches 15 are in the capital Addis Ababa and 70 are out of Addis. The branches have well organized warehouses having different typologies along with offices which facilitate the sales operation effectively and efficiently. The Capacity of the Warehouses, range from 3,460-60,000 quintals. There are two huge depots having storage capacity of 140,000 and above located at Kombolcha and Diredewa town. The total number of warehouses owned by the Enterprise located at different areas in the country is about 152 which needs appropriate management systems.

- **Ethiopian Industrial Inputs Development Enterprise**

The government, with the aim to manage and accomplish better results in the manufacturing industry sector since the Implementation five years Growth and transformation plan (GTP), various encouraging incentives scheme such as tax relief, Capacity building and loan facilitation provision have been provided for manufacturing industry. However, for the last three years the result accomplished in the sector was below 50%. The main reasons for this result are Shortage of supply of inputs for the industries and inability to produce inputs with in the country. These factors have made most of the industries not to manufacture sufficient products with their full capacity.

Among the various problems observed in the manufacturing sectors are most of the industries are obsolete and their products are also low in quality, not efficient in productivity, not getting sufficient and standardized inputs with reasonable price, extended and prolonged bureaucratic procedure in getting industrial inputs from abroad and export products as well a bottleneck in the

sector, high transportation cost, and lack of proper logistics system and inefficient financial service are the major problems in the manufacturing industry sector.

Accordingly taking these drawbacks and weaknesses of the manufacturing industry sector, it is vital and mandatory to have on outstanding firm that manages the production and import of industrial inputs. If possible export inputs excess of local consumption is considered. According to the assessment made the manufacturing industrial sector including agro processing industries are facing great impediments that may endanger the sector seriously particularly shortage of industrial inputs is the main problem that should be solved. Taking this into account the government established the Ethiopian Industrial Input Development Enterprise **(EIIDE**) in 2015 with proclamation number 328/006 to alleviate the short supply of industrial inputs through the implantation of effective, sustainable and efficient systems to ensure the development of the sector.

3.1.2. Description of the study area

This study was conducted on warehouse management practice in Ethiopian Industrial Inputs Development Enterprise (EIIDE). The study engaged in identifying employees' perceptions regarding warehouses owned by the enterprise located at different regions. The study identifies factors which influence the warehouse management of the enterprise. To assess and identify those factors data is collected from warehouse heads, branch managers, senior sales and procurement experts, and procurement and sales directors of the enterprise.

3.2.Research Approach

The research approach that is used for the purpose of this research project is qualitative and quantitative one. According to this approach, the activity will begin with specific physical observation of different warehouses found at different location of the Enterprise. The research design for this case study is a descriptive one which was analyzed through qualitative and quantitative methods. Questionnaires were used to evaluate warehouses and determine their level of operational efficiency and effectiveness at the end of the case study. A descriptive statistical method was used to analyze warehouse practice in the enterprise. Physical observation of warehouses, face to face interviews, and questionnaires was used as data collection methods. Moreover, justification for each of the data collection methods that were used in the study is discussed. Finally, appropriate criteria for qualitative research was addressed so as to come up with recommendations and conclusions drawn from the research findings.

3.3.Research Design

Research design can be thought of as the logic or master plan of a research that throws light on how the study is to be conducted. It shows how all of the major parts of the research are done. The current study design is non-experimental, survey type, descriptive and comparative research. The study will utilize quantitative and qualitative design to give answers the research questions. Close ended questionnaires will be used for collecting quantitative data and open ended questionnaires' are used for collecting qualitative data. The descriptive research design method will be used to meet research objectives and in order to test the hypothesis proposed. Questionnaires survey will be used to collect pertinent information.

3.4.Population and Sample

For this research I intended to involve primary data of different warehouses located at Addis Ababa and warehouses found at different branches outside of Addis Ababa. The sample was drawn from the total population of 152 warehouses owned by the Ethiopian Industrial Inputs Development Enterprise (EIIDE) using a probability sampling procedure in which random subsamples are drawn from within different strata (proportionate stratified sampling) that are more or less equal on some characteristics. The total population of 152 warehouses are categorized in to three groups depending on their types, capacities and sizes that is large, medium and small warehouses. The numbers in each stratum are identified and the number of sampling units drawn from each stratum is using random subsamples in proportion to the population size of that stratum. So, the following sampling design and strategies will be adopted.

Sampling Design and Strategies: in the enterprise depending on the type, size and capacity, we can categorize warehouses into three groups that is large, medium and small warehouses and by using the formula indicated below through proportionate stratified sampling the required sample size for this study is 60. The detail steps can be indicated below. By using the following symbols and notations:

N= population size

K=Number of strata

Ni=Number of sampling units in the i^{th} strata

$$N = \sum_{i=1}^{k} Ni$$

ni =Number of sampling units to be drawn from i^{th} stratum

$$n = \sum_{i=1}^{k} ni$$ total sample size

ni = (n/N)Ni Assume that the required sample is 60

Then, S = n1+n2+n3 which is 13+33+14 = 60

S/No	Warehouse size	Number of warehouses	Percentage of stores	Number of warehouses selected as a sample (proportionate sampling)
1	Large warehouses with storage capacity of more than 30,000 quintals.	34	22.40	13
2	Medium warehouses with storage capacity of more than 10,000 up to 30,000 quintals	83	54.60	33
3	Small stores with the holding capacity of 10,000 and below 10,000 quintals	35	23	14
	Total number of warehouses	152	100	60

Table 2: Categories of Warehouses in the Enterprise

Source – From data surveyed by the Enterprise & Existing former data's of the organization.

S = n/N *n1 whereas S is the sample size of stratum, **n1** is the population size of the stratum

n = n1+n2+……+nk is the total sample size

N= N1+N2+……+KN is the total population size.

Allocate equal sample size to each stratum.

- For Large warehouses

  S = n/N*60 34/152*60

  S =13 Warehouses
- For Medium warehouses by using the same formula will be

  S = 33 Warehouses
- For Small warehouses by using the same formula will be

  S = 14 Warehouses

So, the sample size that will be used for this study is 60 warehouses. In addition secondary data from annual reports and guidelines of the organization and review of different literatures will be included. For the interview case, industrial products sales, stock and distribution directorate director, the team leaders, sales and procurement senior officer and senior warehouses heads which have more than 10 years' experience will be included. Accordingly, 75 questionnaires were distributed and administered from those who actively participate in the warehouse management. In addition secondary data from annual reports and guidelines of the organization and review of different literatures will be included.

3.5.Data source and Types

Evaluation is the process of systematically collecting data that represents the opinion and experience of its participants. The primary data sources for this research include direct physical observation of warehouses, information collected through questionnaires and interviews, and secondary data source include the organization strategic plan (five years plan), the review of annual reports, organization guidelines and from the review of different literatures.

3.6.Sampling Design:

The study was having a population group of warehouses having different typologies located at head quarter in Addis Ababa and at different branches outside of the capital. Therefore, using proportionate stratified sampling 60 samples of warehouses will be drawn from 152 warehouses of the population groups. For quantitative and qualitative data collection, warehouses at headquarter depots and warehouses located at branches are sampled and the data will be collected within one month.

3.7.Sampling Method

As the aim of this research is to describe and investigate warehouse management practice in Ethiopian Industrial Inputs Development (EIIDE) the target customers are logistics department and branch offices of the enterprise, government institutions, private investors and businessmen. In order to get better accesses depot warehouses with different holding capacities at different branches located in different regional states which are involved in merchandising activities will be selected. In order to gather pertinent information with respect to warehouse activities questionnaires will be distributed to different branches of the company and the quarter of the enterprise. The questionnaire consists of closed choice or fixed questions and open ended questions. The sample method taken into consideration will be proportionate stratified sampling in which the number of sampling units drawn from each stratum is in proportion to the population size of that stratum. It is a probability sampling procedure in which simple random subsamples are drawn from different strata. The population size, the sample size, and the level of precision will be determined. Different instrument will be used to assure validity and reliability of the data collected.

3.8. Methods of Data collection (procedures)

The preferred instrument for primary data collection in the study used self-administered questionnaires. This is because primarily it provides relatively simple and straight forward approach for investigation. It allows respondents relative freedom and it is efficient in providing large amount of data at relatively low cost. Structured questionnaires, whose reliability and validity, in same title already tested by (Yusuf. T.Gbadamosi. A and Hamadu .D 2009) will be used with some context of modification to all selected sample data. In addition to questionnaires, direct observation and interviews of some of the target department head of the organization will be conducted.

3.9.Ethical Considerations:

Ethics are norms or standards of behavior that guide moral choices about our behavior and our relationships with others. The ultimate goal of ethics in the research is to ensure that no one is suffers adverse consequences or harmed from the research activities undertaken. It is known that three parties are involved i.e. the researcher, the client and the respondent (subject). In conducting this research, we often think first about protecting the rights of participants, respondents (subject).

Whether data are gathered in an experiment, interview, questionnaires, observation or survey, the respondent has many rights to be safeguarded.one of normally unexpected concerns relating to ethical issues is the cultural sensitivity. Silverman (2001) argues that the relationship between the researcher and the subject during an interview needs to be considered in terms of the values of the researcher and cultural aspects. So, appropriate steps should be taken to adhere to strict ethical guidelines in order to uphold participants' privacy, confidentiality, dignity, rights, and anonymity. Therefore, this research document is designed by taking in to account the following issues:

a) A respondent does not suffer physical harm, discomfort, pain, embarrassment, or loss of privacy.
b) Protect the confidentiality of third party.
c) Securing informed consent from respondent
d) Remain to be the issues of non-disclosure agreement
e) Perform what ought to done under local norms circumstances
f) Avoid misinterpretations, misrepresenting results, violating non-disclosure agreement, deceiving people, invoicing irregularities and avoiding legal liabilities.
g) Prevent biasing the respondents.

3.10. Data Analysis

An important aspect of data analysis in qualitative case study is the search for meaning through direct interpretation of what is observed as well as what is experienced and reported by the subjects. Interpretive research attempted to derive the data through direct interactions with the phenomenon being studied. According to Bogdan and Biklen (2003) data analysis can be defined as working with the data, organizing them, breaking them into manageable units, coding them, synthesizing them, and searching for patterns. The aim of analysis of qualitative data is to discover patterns, concepts, themes, and meanings. The case study made by Yin (2003) discusses the need for searching the data for patterns which may explain or identify casual links in the data base. Categorization helps to make comparisons and contrasts between patterns, to reflect on certain patterns and complex threads of the data deeply and make sense of them.

The process of data analysis begins with the categorization and organization of data in search of patterns, critical themes and meanings that emerge from the data. A process sometimes referred to as open coding (Strauss and Corbin, 1990) is commonly employed whereby the researchers

identifies and tentatively names the conceptual categories into which the phenomena observed would be grouped.

To analyze the data this study will be used descriptive statistics. According to the article of Marczyk et.al.;2000), descriptive statistical procedures allow researchers to describe groups of individuals and events, examine the relationships between different variables, measure differences between groups and conditions, and examine and generalize results obtained from a sample back to the population from which the was drawn. Furthermore, descriptive statistics of frequency table are used to describe the data collected in research studies and to accurately characterize the variables under observation within a specific sample. A couple of open ended questions will be posed to which head of warehouses branch heads and department heads will be required to respond in writing. In these processes useful information that may be closely related to their experiences can emerge. The individual responses will be analyzed, compared and categorized with the results of transcription of the focus group interview, and subsequently triangulated and interpreted to draw conclusions. In this study, the analysis will be done with the help of Statistical package for social science (SPSS) and Microsoft Excel to manipulate qualitative data. The responses in the questionnaire will be coded and transcribed into common themes to facilitate analysis. In the analysis substantial follow up and identification of respondents return and non-return on questionnaires will be made and analyzed to see the actual collected number of respondents. Data will be presented in descriptive form supported by tables, frequency distributions, graphs and percentages.

3.11. Reliability and validity

The reliability and validity of qualitative studies are usually not based upon standardized instruments and they often utilize smaller non-random samples. Assessing the accuracy of qualitative findings is not an easy task. However, there are several possible strategies and criteria that can be used to enhance the trustworthiness of qualitative research findings. The trustworthiness is corresponding term used in qualitative research as a measure of the quality of research. It is the extent to which the data and data analysis are believable and trustworthy. As this study entails the use of both quantitative and qualitative research data, the concepts used to express validity and reliability are broader than those traditionally associated with quantitative research. Guba and Lincoln (1981), Kreftin (1991), and Creswell (1998) suggest that the trustworthiness of qualitative research can be established by using four strategies, credibility, transferability, dependability and

conformability, and are constructed parallel to the analogous quantitative criteria of internal and external validity, reliability and neutrality. When with qualitative data, the concepts of trustworthiness, dependability, transferability, credibility are also used. According to Macmillan and Schumacher (2001:407) validity is the degree to which the interpretations and concepts have mutual meanings between the participants and the researcher. According to Silverman (2004: 285) reliability, on the other hand, is the degree to which the findings of the research are independent of accidental circumstances. It is closely related to assuring the quality of field notes and guaranteeing the public access to the process of publication of the research results. According to Juppe (2001:1) reliability defined as the extent to which results are consistent overtime, and are an accurate representation of the total population under study. If the result of the study can be reproduced under similar methodology, then the instrument is considered to be reliable.

Therefore, to ensure the validity and reliability of the study depot warehouses and storages located at different regions was observed, questionnaires and interview results thoroughly reviewed by using statistical tools.

CHAPTER FOUR

4. DATA ANALYSIS, RESULT AND DISSCUSION

4.1 Introduction

The data analysis, presentation and discussion mainly focused on finding the answers to the research questions and following statistical procedures, emphasis was therefore put on Three things, First demographic information of respondents followed by presentation of descriptive statistics to answer the first two research questions and analysis of the closed ended warehouse management practice and warehouse functions questions and to answer the last three open ended research questions and finally a summary of the analysis will be presented.

4.2. Demographic Information of Respondents'

As inferred in the preceding part of this study, the entire population of the enterprise in Ethiopia was considered in the study. Including all the stakeholders of the phenomena, the total number of respondent which was provided with questionnaires is 75. However, only 66 respondents have filled and returned the questionnaire, which essentially made the response rate about 88%. The demographic information of the respondents who have filled and returned the questionnaire is presented on Table 4.1.

As depicted on the table below, males dominate the respondents' list registering about 78.79% of the total respondent with females taking the remaining 21.21% of the respondents. As far as respondents' age is concerned, the majority of the respondents (39.4%) were aged between 26 to 35 years followed by the age categories of above 45 years, 36 to 45 years and 18 to 25 years respectively with percentage scores of 34.85%, 18.2% and 7.6% in that order.

With regard to educational qualification, significantly higher percentage of the respondents (74.24%) were first degree holders, whereas those having diploma and post graduate degree stand second and third in the ladder of educational qualification accounting for 13.64% and 10.60% of the total number of respondents and below college diploma of 1.52% . On the other hand, being an important element of the profile of the respondents, years of service under the relevant job positions was also assessed and it has been revealed that those who have served from 1 to 5 years dominate the list by taking 48.5% of the entire respondents. Those who have served above 10 years on the positions of concern came second on the ladder followed by the category of

respondents who have served 6 to 10 years respectively with the corresponding percentage scores of about 25.76 % and 19.7%. Considering the fact that respondents' relative work experience in the job positions of concern has a direct bearing on the quality of response that might be provided, it seems very desirable to have the lines share of respondents (68.2%) having served 1 to 10 years on the positions of concern as a youngest enterprise aged only above five years.

Table 4.1 Respondents demographic information

Variable	Choice	Frequency	Percent	Valid %	Cumulative %
Gender	Female	14	21.21	21.21	21.21
	Male	52	78.79	78.79	100
	Total	***66***	***100.00***	***100***	
Age	18-25 Years				
	26-35 Years	26	39.4	39.4	47.0
	36-45 Years	12	18.2	18.2	65.2
	Above 45 Years	3	34.8	34.8	100.0
	Total	***66***	***100.0***		
Educational	Below college diploma	1	1.52	1.52	1.52
	College Diploma	9	13.64	13.64	15.16
	First Degree (BSc, BA)	49	74.24	74.24	89.4
	Second Degree (MSc, MA)	7	10.61	10.61	100.0
	Total	***66***	***100.0***		
Service Year on the Current Position	Below one year	4	6.1	6.1	6.1
	1 to 5 years	32	48.5	48.5	54.6
	6 to 10 years	13	19.7	19.7	74.30
	Above 10 years	17	25.8	25.7	100.0
	Total	***66***	***100.0***		
Job position	Director	2	3.03	3.03	3.03
	Team leader	8	12.12	12.12	15.15
	Branch manager	16	24.24	24.24	39.40
	Warehouse head	26	39.4	39.4	78.8
	Senior expert	14	21.2	21.2	100
	Total	***66***			

***Source**: Survey Result, 2020*

4.3. Descriptive Analysis

Descriptive statistics was assessed in an effort to examine the mean scores and the corresponding standard deviations under the respective scales of each of the measurement items of the dimensions. Hence, this particular attempt has the importance of answering some of the research questions on the basis of the perceptions of the respondents on the level of warehouse management practice of their company and also to answer on which key functions of the warehouse the company uses better.

4.3.1 The First Research Question

What is the warehouse management practice of the company with regard to different key warehouse functions? To understand the perception of company employees 16 questionnaires were designed and distributed.

4.3.2. Respondents' Perception on Warehouse Management practice in the enterprise.

The mean values and standard deviation of the warehouse management practice measurement items like the effort to receive, put away and storage under appropriate protection, accessibility to customer and checking for quality and quantity received, skilled and professional manpower, accessibility of warehouse, availability of machinery and equipment which are the main function of warehousing were calculated and found hereunder in the table 4.

The mean values and standard deviation of each of the scales of warehouse management practice such as the effort to receive, put away and retrieve, accessibility to customer, skilled & professional manpower, checking against orders & bill of lading and comfortable to accommodate customers were calculated between 2.48 and 3.80 with almost comparable standard deviations that range between 0.989 and 1.327. The lowest mean value is registered in the case of computerized system to facilitate the process followed by the mean score for the effort to receive, put away and retrieval; while enough skilled & professional manpower and accessibility to customer scored comparably close mean values of 2.88 and 2.89 respectively.

The mean score of the scale of warehouse Management practice in the case of comfortable to accommodate customer; checking against order and bill of lading and accessibility to customer has a close mean value 3.80, 3.30 and 2.89 as depicted hereunder on the aforementioned table with the highest standard deviation. This score is very marginally higher relative to the mean scores of the other dimensions. However, the fact that the composite mean score is higher which suggests that respondents are rating their enterprise warehouse management function as moderate and a little bit above as measured by this key warehouse functions. The same is true in the case of checking the quantity received against bill of lading, which is also in a moderate level. The lowest mean value registered regarding computerized system used to facilitate the process suggests that the respondents rating their enterprise low effort have been exerted and low attention has been given by the enterprise. So they suggests that respondents are rating their respective enterprise warehouse management practice as high or better above, as in the case of their evaluation regarding comfortable condition to accommodate customers and checking orders against bill of lading whereas computerized system and the effort to receiving goods at full capacity is a little bit low and need effort to be exerted. This implies the fact that the attempts made by the enterprise are not as such substantial pertaining to use computerized system in the warehouse.

Table 4.2 Warehouse management practice measurement items mean and standard deviation

Measurement items on WHM Practice	Very low	Low	Moderate	High	Very high	Mean	Standard deviation
The effort to receive, put away, and retrieve goods and product is minimal	8	17	23	18	0	2.77	.989
Materials are readily accessible to customers at all time	8	16	25	9	8	2.89	1.165
There is enough skilled and professional manpower in the warehouse	13	11	20	15	7	2.88	1.271
Damage and unusable goods and products are separated and stored differently.	8	13	13	20	12	3.23	1.298
There is accurate and up to date information in the warehouse.	8	14	15	15	14	3.20	1.327
In the warehouse there is checking the goods and products quantity against an order and the bill of loading.	2	12	25	18	9	3.30	1.022
The warehouse area is comfortable to accommodate customers and for load and unload goods and products.	1	6	13	28	17	3.80	.996
There is computerized system that facilitates receiving, storing and picking the required goods and products.	20	16	12	14	4	2.48	1.292

Source: Survey Result, 2020

The noticeably represented mean scores of the measurement items of inventory visibility & availability, physical inventory count and discrepancies occur, damage percentage of inventory value, inventory safety and security, storage under proper protection until needed, and record of stock and quantity received mean and standard deviation were calculated between 2.89 and 3.56 with almost comparable standard deviations that range between 1.004 and 1.254. The lower mean value is registered in the case of percentage of the damage of inventory value (mean = 2.89) followed by inventory safety and security storage place (mean= 2.98) dedicated for storing and handling goods.

The scores of the scale of record of stock and quantity received, physical count and discrepancy occur, inventory visibility & availability, and storage under proper protection until needed which has very comparably close mean values of 3.56, 3.45, 3.38 and 3.32 as depicted on the aforementioned table were the highest. So they suggests that respondents are rating their respective enterprise warehouse management practice as high or better above, as in the case of their evaluation regarding stock and quantity received records, physical count & discrepancy occur and inventory visibility whereas the effort to damage percentage of inventory value and inventory safety and security is a little bit lower and need effort to be exerted.

This implies the fact that the attempts made by the enterprise are not as such substantial pertaining to protecting accidents in the warehouse, maintaining items in the warehouse in good conditions, holding or storing items in their right place so as to minimize damages of inventory value in the warehouse. Concerning standard deviation of values of each of the measurement items of receiving function, as well as other functions indicates that the perception of the respondents' on the issue are moderate and a little bit above in all of the cases.

The mean values and standard deviation of the warehouse management practice measurement items like inventory visibility and storage under appropriate protection until stock needed and quantity received record, selected storage location, goods transferred storage location, accessibility of warehouse, availability of machinery and equipment and storage safety security which are the main function of warehousing were calculated and found hereunder in the table 4.3

T**able 4.3 Warehouse management practice measurement items mean and standard deviation**

Measurement items on WHM Practice	Very low	Low	Moderate	High	Very high	Mean	Standard deviation
Inventory visibility that is the time from physical receipt to customer service notice of availability is acceptable.	2	12	18	27	7	3.38	**1.004**
No discrepancies occur between physical inventory count and items on the Stock cards.	3	11	23	11	18	3.45	**1.192**
The damage as percentage of inventory value is acceptable	10	17	17	14	8	2.89	**1.254**
Inventory is kept in a safe, secure place with limited general access.	5	17	23	16	5	2.98	**1.060**
The space between shelves and pallets is enough for movement of staffs and customers.	5	16	13	24	8	3.21	**1.170**
The warehouse has enough space to store goods and products.	1	8	10	29	18	3.83	**1.017**
Items are identified with appropriate stock keeping unit number and the quantity received recorded.	7	4	16	23	16	3.56	**1.229**
Goods are stored, put away and kept in storage under proper protection until needed.	4	14	19	15	14	3.32	**1.205**

Source: Survey Result, 2020

4.3.2.1. Response on respondents' perception on receiving function measurement items mean and standard deviation

The mean values and standard deviation of receiving functions measurement items like identification and notification of incoming goods, the effort to receive goods, maintaining records of all received items and reasonable warehouse space utilization which are the main receiving function of warehousing were calculated and found hereunder in the tables 4.4

Table 4.4 Warehouse management receiving functions measurement items mean and standard deviation

Warehouse receiving functions	Strongly disagree, (freq./%)	Disagree (freq./%)	Neutral (freq./%)	Agree (freq./%)	Strongly Agree (freq./%)	mean	SD
Most of the time, the incoming goods are identified and notified to the concerned departments.	2(3.0)	9(13.6)	16(24.2)	23(34.8)	16(24.2)	3.64	1.002
Most of the time, our warehouse utilizes a reasonable warehouse spaces for handling goods (for receiving, unloading, picking, loading and dispatching).	3(4.5)	8(12.1)	19(28.8)	27(40.9)	9(13.6)	3.47	1.026
In our warehouse, the effort to receive goods and products are minimal and acceptable	9(13.6)	13(19.7)	16(24.2)	25(37.9)	3(4.5)	3.00	1.150
The records of all received goods maintained for each item in stock showing the quantity received, quantity on hand and quantity issued.	1(1.51)	6(9.1)	15(22.7)	27(40.9)	17(25.8)	3.80	.980

Source: *Survey Result, 2020*

The mean values of each of the measurement items of receiving function like receiving effort, maintaining records, identifying and notifying of incoming items were calculated between 3.00 and 3.80 with almost comparable standard deviations that range between .980 and 1.150. The lower mean value is registered in the case of percentage of the effort to receive goods and products followed by reasonable warehouse space utilization dedicated for handling goods.

The scores of the scale of receiving function for incoming goods identification, maintaining all records for received items and reasonable warehouse space utilization which has very comparably close mean values of 3.64, 3.80, and 3.47 as depicted on the aforementioned table were the highest. So they suggests that respondents are rating their respective enterprise warehouse management practice as high or better above, as in the case of their evaluation regarding maintaining records and identifying and notifying incoming goods whereas the effort to receiving goods at full capacity is a little bit low and need effort to be exerted.

The mean values and standard deviation of receiving functions measurement items like checking against orders and bill of lading, checking for quality and quantity, receiving accuracy, checking for damages, identification for wrong and incorrect description and number of units received and moved which are the main function of warehousing were calculated and found hereunder in the table 4.5

Table 4.5 Warehouse management receiving functions measurement items mean and standard deviation

Warehouse receiving functions	Strongly disagree, (freq./%)	Disagree (freq./%)	Neutral (freq./%)	Agree (freq./%)	Strongly Agree (freq./%)	mean	SD
Goods are checked against an order and the bill of loading	0	13(19.7)	9(13.6)	38(57.6)	6(9.1)	3.56	.914
Goods are checked for quantity and inspect for quality conformation	1(1.5)	8(12.1)	20(30.3)	23(34.8)	14(21.2)	3.62	1.004
Most of the time, in our warehouse receiving accuracy is reasonable and acceptable.	5(7.6)	11(16.7)	17(25.8)	20(30.3)	13(19.7)	3.38	1.200
Most of the time, goods are checked for damages	3(4.5)	13(19.7)	14(21.2)	31(47.0)	5(7.6)	3.33	1.028
Most of the time, goods are identified for wrong description and incorrect count.	10(15.2)	12(18.2)	12(18.2)	18(27.3)	14(21.2)	3.21	1.376
Most of the time, our warehouse daily laborer are not idle. The total number of units or weight moved during a defined period of time is acceptable.	5(7.6)	16(24.2)	29(43.9)	12(18.2)	4(6.1)	2.91	.988

Source: *Survey Result, 2020*

The mean values of each of the measurement items of receiving function like checking against orders and bill of lading, checking for quality and quantity, receiving accuracy, checking for damages, identification for wrong and incorrect description were calculated between 2.91 and 3.62 with almost comparable standard deviations that range between .914 and 1.376. The lower mean value is registered in the case of percentage of the number of units received and moved followed by identification for wrong description and incorrect count.

The scores of the scale of receiving function for checking orders against bill of lading, checking for quality and quantity, receiving accuracy, and checking for damages which has very comparably close mean values of 3.62, 3.56, 3.38 and 3.33 as depicted on the aforementioned table were the highest. So they suggests that respondents are rating their respective enterprise warehouse management practice as high or better above, as in the case of their evaluation regarding checking for quality and quantity and checking against orders and bill of loading whereas the number of items received and moved at full capacity is a little bit lower and need effort to be exerted.

4.3.2.2 Respondents' Perception on put away function

The mean values and standard deviation of the put away functions measurement items like appropriate stock and quantity received record, selected storage location, goods transferred storage location, accessibility of warehouse, availability of machinery and equipment and storage safety security which are the main function of warehousing were calculated and found hereunder in the table 4.6

Table 4.6 put away function measurement items mean and standard deviation

Put away functions	Strongly agree, (freq./%)	Disagree (freq./%)	Neutral (freq./%)	Agree (freq./%)	Strongly Agree (freq./%)	mean	SD
Most of the times, in our warehouse items are identified with appropriate stock keeping units and the quantity received recorded.	1(1.51)	13(19.7)	15(22.7)	22(33.3)	15(22.7)	3.56	1.097
Most of the time, for goods and products convenient storage location is selected	1(1.51)	10(15.2)	17(25.8)	25(37.9)	13(19.7)	3.59	1.022
Most of the time, goods and products are transferred to the specific storage location to wait for demand.	5(7.6)	13(19.7)	20(30.3)	19(28.8)	8(12.1)	3.18	1.130
Most of the times, in our organization warehouses are easily accessible.	2(3.0)	8(12.1)	13(19.7)	32(48.5)	11(16.7)	3.64	1.002
Machines and equipment are available for moving and put away goods and products at storage place.	12(18.2)	23(34.8)	13(19.7)	15(22.7)	3(4.5)	2.61	1.162
Goods and products are stored in safe, secured place and appropriate space	5(7.6)	7(10.6)	8(12.1)	34()	11(16.67)	4.03	3.671
Most of the time, in our warehouse there is accurate and up to date information	7(10.6)	12(18.2)	15(22.7)	16(24.24)	15(22.7)	3.76	3.879
Most of the time, in the warehouse there is improved labor productivity.	8(12.1)	13(19.7)	20(30.3)	20(30.3)	5(7.6)	3.02	1.143

Source: *Survey Result, 2020*

The mean values of each of the measurement items of put away function were calculated between 2.61 and 4.03 with almost comparable standard deviations that range between 1.002 and 3.879. The lowest mean value is registered in the case of percentage of machines and equipment used for moving and lifting goods and products followed by improved labor productivity dedicated for moving and handling of goods and then mean score for goods and products transferred to specific storage location.

The scores of the scale of put away function for stored safely and secured, easily accessibility, appropriate stock and quantity received, convenient storage location and accurate and up to date information which has very comparably close mean values of 4.03, 3.76, 3.64 and 3.59 as depicted on the aforementioned table were the highest. So they suggests that respondents are rating their respective enterprise warehouse management practice as moderate or better above, as in the case of their evaluation regarding safety and secured storage place and easily accessibility and convenient storage location whereas availability of machinery and equipment actually used for handling goods and products is a little bit low and need effort to be exerted.

4.3.2.3 Respondents' Perception on storage function

The mean values standard deviation of the measurement items like enough space, space footage, storage space actually used, loading unloading, and free space between shelves for movement which are the main function of warehousing were calculated and found hereunder in the table 4.7

Table 4.7 Storage function measurement items mean and standard deviation

Storage functions	Strongly disagree, (freq./%)	Disagree (freq./%)	Neutral (freq./%)	Agree (freq./%)	Strongly Agree (freq./%)	mean	SD
Most of the time, in our warehouse there is enough space for storing and handling products and goods.	1(1.5)	4(6.1)	12(18.2)	28(42.4)	21(31.8)	3.97	.944
In our warehouse the Occupied space (square footage) as a percentage of storage capacity or storage utilization is reasonable and acceptable.	5(7.6)	4(6.1)	22(33.3)	28(42.4)	7(10.6)	3.42	1.024
Most of the time, our warehouse use spaces properly, which the storage space is actually being used out of the total storage space available.	4(6.1)	18(27.3)	18(27.3)	24(36.4)	2(3.0)	3.03	1.007
The space between the shelves is enough for free movement of personnel and goods.	4(6.1)	17(25.8)	12(18.2)	18(27.3)	15(22.7)	3.35	1.259
Our warehouse utilizes a reasonable warehouse spaces for handling goods (for receiving, unloading, picking, loading and dispatching).	3(4.5)	15(22.7)	14(21.2)	27(40.9)	7(10.6)	3.30	1.081
The warehouse area is comfortable to load and unload the goods to and from trucks and trailers.	0	5(7.6)	19(28.8)	20(30.3	22(33.3)	3.89	.963

Source: *Survey Result, 2020*

The mean values of each of the measurement items of storage space function were calculated between 3.03 and 3.97 with almost comparable standard deviations that range between .963 and 1.259. The lowest mean value is registered in the case of percentage of storage space actually used dedicated for handling goods followed by reasonable space for handling and then mean score for space between shelves for free movement.

The scores of the scale of storage function for enough space for storing goods, occupied space utilization, and comfortable store for loading unloading which has very comparably close mean values of 3.97, 3.42 and 3.89 as depicted on the aforementioned table were the highest. So they

suggests that respondents are rating their respective enterprise warehouse management as moderate or a little bit above, as in the case of their evaluation regarding enough space for storing and comfortable for loading and unloading whereas regarding storage space actually used for handling goods and products is a little bit low and need effort to be exerted.

The mean values standard deviation of the measurement items like availability of adequate shelves, replenishment of stock, physical count of inventory, appropriate inventory level, and availability of stock which are the main function of warehousing were calculated and found hereunder in the table 4.8

Table 4.8 Storage function measurement items mean and standard deviation

Storage functions	Strongly disagree, (freq./%)	Disagree (freq./%)	Neutral (freq./%)	Agree (freq./%)	Strongly Agree (freq./%)	mean	SD
The shelves and pallets in the warehouse are adequate for handling and moving goods and products.	12(18.2)	17(25.8)	18(27.3)	11(16.7)	8(12.1)	2.79	1.271
In our organization, we are successful in minimizing the total carrying and holding cost	7(10.6)	19(28.8)	24(36.4)	15(22.7)	1(1.5)	2.76	.978
In our organization there is more efficient use of available warehouse space	12(18.2)	17(25.8)	20(30.3)	11(16.7)	6(9.1)	3.11	1.254
Most of the times, in our organization carry out replenishment of stock and carry out inventory tracking is applicable.	2(3.0)	11(16.7)	27(40.9)	24(36.4)	2(3.0)	3.20	.863
Determination of appropriate maximum and minimum inventory levels is reasonable and acceptable.	10(15.2)	8(12.1)	17(25.8)	24(36.4)	7(10.6)	3.15	1.231
Most of the time in our warehouse, there is availability of adequate stock at all time.	12(18.2)	17(25.8)	20(30.3)	11(16.7)	6(9.1)	2.73	1.210
In most cases, in our warehouse no discrepancies occur between physical inventory count and items on the bin cards.	2(3.0)	11(16.7)	23(34.8)	17(25.8)	13(19.7)	3.42	1.082

Source: *Survey Result, 2020*

The mean values of each of the measurement items of storage function with regard to the presence of adequate shelves and pallets, inventory and stock management were calculated between 2.73 and 3.42 with almost comparable standard deviations that range between .863 and 1.271. The lowest mean value is registered in the case of percentage of availability of adequate stock at all-time followed by availability of adequate shelves and pallets in the warehouse and then mean score for appropriate maximum and minimum inventory level.

The scores of the scale of storage function for no discrepancies occur between physical count and items on the bin card and replenishment of stock and carrying out inventory which has very comparably close mean values of 3.42 and 3.20 as depicted on the aforementioned table were the highest. So they suggests that respondents are rating their respective enterprise warehouse management as moderate or a little bit better, as in the case of their evaluation regarding physical count and replenishment of stock whereas regarding adequate shelves and pallets used for handling goods and products is a little bit low and need effort to be exerted.

4.3.2.4 Respondents' Perception on order picking function

The mean values of each of the measurement items of order picking function were calculated between 2.61 and 3.30 with almost comparable standard deviations that range between .937 and 1.239. The lowest mean value is registered in the case of percentage of computerized system dedicated for handling the process of order picking and followed by order delivered to customers and then mean score for orders delivered on time.

The scores of the scale of order picking function for order filled with out damage and order lines picked accurately, Which has very comparably close mean values of 3.21 and 3.30 as depicted on the aforementioned table were the highest. So they suggests that respondents are rating their respective enterprise warehouse management as moderate or a little bit above, as in the case of their evaluation regarding order filling and picking without damage whereas regarding order delivery to customer on time and computerized system used for handling products is a little bit lower effort is exerted.

Table 4.9 Order picking function measurement items mean and standard deviation

Order picking functions	Strongly agree, (freq./%)	Disagree (freq./%)	Neutral (freq./%)	Agree (freq./%)	Strongly Agree (freq./%)	mean	SD
We are successful in minimizing total damages of goods in the warehouse like deterioration, leakage, breakage etc.	5(7.6)	18(27.3)	19(28.8)	11(16.7)	13(19.7)	3.14	1.239
Orders filled completely and perfectly	7(10.6)	12(18.2)	23(34.8)	15(22.7))	9(13.6)	3.11	1.178
Orders will be delivered to customers as per their request on time	7(10.6)	22(33.3)	14(21.2)	19(28.8)	4(6.1)	2.86	1.135
Orders will fill perfectly without changes.	5(7.6)	15(22.7)	24(36.4)	15(22.7)	7(10.6)	3.06	1.094
Orders will fill perfectly without invoice error.	6(9.1)	12(18.2)	23(34.8)	20(30.3)	5(7.6)	3.09	1.077
Orders will fill perfectly without damages	1(1.5)	15(22.7)	24(36.4)	21(31.8)	5(7.6)	3.21	.937
Most of the time in our warehouse items ordered or lines are picked accurately	3(4.5)	16(24.2)	13(19.7)	26(39.4)	8(12.1)	3.30	1.109
The length of time from order placement to shipment is acceptable and reasonable.	4(6.1)	20(30.3)	21(31.8)	12(18.2)	9(13.6)	3.03	1.136
Orders are delivered on time, accurately and perfectly.	8(12.1)	22(33.3)	13(19.7)	14(21.2)	9(13.6)	2.91	1.262
There is computerized system that facilitates picking the required goods and products.	13(19.7)	19(28.8)	21(31.8)	7(10.6)	6(9.1)	2.61	1.188

Source: *Survey Result, 2020*

4.3.2.5. Respondents' Perception on order packing function

The mean values of each of the measurement items of order picked and packed perfectly were calculated between 3.09 and 3.23 with almost comparable standard deviations that range between .991 and 1.160. The lowest mean value is registered in the case of percentage of order checking, packing and labelling goods and products without delay and followed by the mean score for the amount of goods picked and packed per person.

The scores of the scale of order packing function for units moved for picking and packing, checking and labelling, Which has very comparably close mean values of 3.23 and 3.09 as depicted on the aforementioned table. So they suggests that respondents are rating their respective enterprise warehouse management practice as moderate or a little bit above, as in the case of their evaluation regarding the warehouse order picking and packing.

Table 4.10 Order packing function measurement items mean and standard deviation

Order packing functions	Strongly agree, (freq./%)	Disagree (freq./%)	Neutral (freq./%)	Agree (freq./%)	Strongly Agree (freq./%)	mean	SD
Most of the time, in our warehouse Orders are picked and packed perfectly	3(4.5)	17(25.8)	18(27.3)	18(27.30	10(15.2)	3.23	1.134
In our organization, average number of orders picked and packed per person is	4(6.1)	10(15.2)	27(40.9)	20(30.3)	5(7.6)	3.18	.991
Most of the time, in our warehouse orders are checked, packaged, and labelled on	4(6.1)	21(31.8)	14(21.2)	19(28.80	8(12.1)	3.09	1.160

Source: *Survey Result, 2020*

4.3.2.6. Respondents' Perception on shipping function

The mean values of each of the measurement items of shipping function were calculated between 2.80 and 3.26 with almost comparable standard deviations that range between .994 and 1.255. The lowest mean value is registered in the case of percentage of availability of machinery and necessary equipment dedicated for handling, moving and lifting up goods and for loading and unloading products followed by the length of time from order picking to shipping and then mean score for loading on trucks and trailers on time.

The scores of the scale of shipping function for units moved per person hour and Storage Space Utilization, Which has very comparably close mean values of 3.11 and 3.26 as depicted on the aforementioned table. So they suggests that respondents are rating their respective enterprise warehouse management practice as moderate or a little bit above, as in the case of their evaluation regarding order filling on the first shipment, shipping document preparation, and loading unloading as well as length of order picking and packing. Whereas regarding machinery and equipment utilization for product handling is a little bit lower effort is exerted.

Table 4.11 Warehouse shipping measurement items mean and standard deviation

shipping functions	Strongly agree, (freq./%)	Disagree (freq./%)	Neutral (freq./%)	Agree (freq./%)	Strongly Agree (freq./%)	mean	SD
Most of the times, in our warehouse orders are filled completely on first shipment without delay.	2(3.0)	18(27.3)	22(33.3)	19(28.8)	5(7.6)	3.11	.994
Most of the time, goods are sorted or accumulated according to customer orders.	7(10.6)	13(19.7)	18(27.3)	16(24.2)	12(18.2)	3.20	1.255
Machines and equipment are available for loading and unloading goods and products at storage place.	10(15.2)	16(24.2)	21(31.8)	15(22.7)	4(6.1)	2.80	1.140
Most of the time, orders are packaged, labeled and stacked as well as shipping documents are prepared on time.	6(9.1)	8(12.1)	25(37.9)	17(25.8)	10(15.2)	3.26	1.141
Most of the time, goods and products are loaded on the trucks and trailers on time.	4(6.1)	19(28.8)	17(25.8)	18(27.3)	8(12.1)	3.11	1.139
Most of the time, the length of time from order picking to the final movement of goods to shipping is acceptable	3(4.5)	18(27.3)	24(36.4)	12(18.2)	9(13.6)	3.09	1.092

Source: *Survey Result, 2020*

4.3.3. Multiple choice Research Questions

To begin analyze the survey, Respondents were select their choice for each of the dimensions on the question by taking their knowledge and actual situation in mind. And their choice were summarized in excel-sheets and an excel-commando "filter" was used for analyzed the closed (qualitative) questions. In order to answer what is the perception of the employees of the enterprise on the key warehouse functions that can heavily contributed to the overall management of the warehouse, their choice was first summarized in table, which can be found below Tables, showed how many of the respondents that answered to the closed questions regarding the question that were asked for in the questionnaire.

- **The first multiple choice question is addressed hereunder as follows. What key warehouse functions and activities do you believe that can mainly contribute to the overall warehouse practice the company uses better?**

The Composite scores of mean and standard deviation were also calculated for the six scales of warehouse functions key indicators (dimensions), namely receiving, put away, storage, order picking, order packing and shipping function. The resulting composite scores of mean and standard deviation are presented on Table 4.12 as follows.

Table 4.12 Analysis of respondents' choice regards to the first qualitative question

Choice	No. of Respondents	% of Respondents	Valid%	Cumulative %
Receiving and put away function	9	13.64 %	13.64	13.6
Storage function	6	9.1%	9.1	22.74
Order picking and packing function	3	4.54 %	4.54	27.28
Storage function	1	1.51 %	1.51	28.79
All	43	65.15%	65.15	93.94
Total	**66**	**100.00**		

Source: *Survey Result, 2020*

All respondents choose all warehouse functions and had the highest percentage with its 65.15%, then receiving and put away with 13.64 % and followed by a comparable percentage of respondent's 9.1 % storage functions whereas only 4.54 % of the respondents were select order picking and packing functions and 1.51 % of them for shipping. This implies that most respondents believed that all function of warehouse seems to be most valuable and should be given with high emphasis and receiving and storage functions also important. However their expectation for shipping function is less.

4.3.4 The Research Questions for the second multiple choice

- **Based on the experience what is the perception of the employees of the enterprise regarding types of the warehouse which better enhance management practice and operation of warehouse?**

To begin analyzing the survey, Respondents were select their choice for each of the dimensions on the question by taking their knowledge and actual situation in mind. And their choice were summarized in excel-sheets and an excel-commando "filter" was used for analyzed the closed (qualitative) questions. Their choice was first summarized in table, which can be found below Table 4.13, showed how many of the respondents that answered to the closed questions regarding the question that were asked for in the questionnaire. In order to answer what is the perception of the employees of the enterprise regarding the warehouse management practice implication of capacity of warehouse? Respondents Choice were summarized in tables as shown below (Table 4.13)

Table 4.13 Analysis of respondents' choice regards to the second qualitative question (Type of Warehouse)

Choice	No. of Respondents	% of Respondents	Valid %	Cumulative %
Public Warehouse	9	13.6	13.6	13.64 %
Automated Warehouse	22	33.33	33.33	46.97 %
Private Warehouse	7	10.6	10.6	57.57%
Climate-Controlled Warehouse	3	4.54	4.54	62.11 %
Distribution Center	5	7.57	7.57	69.68 %
Based on situation	16	24.24	24.24	93.92 %
Total	**66**			**93.92%**

Source: *Survey Result, 2020*

Respondents were select their choice for each of the dimensions on the question by taking their knowledge and actual situation in mind. As depicted in the above table most of the respondents are concentrated on the automated warehouse (33.33%) choice regards the implication of the type of the warehouse on management practice, and some of them believed that situation based warehouses (24.24%) and private warehouses (10.6%) are important in enhancing operations. The rest of the respondents were equivalently selects the other choices.

- **What is the perception of the employees of the enterprise on the size of warehouse that can better enhance the management of warehouse?**

In order to address the perception of respondents regarding the size of warehouse that better enhance the management of warehouse in the enterprise respondents' choice were summarized in excel-sheets and an excel-commando "filter" was used for analyzed the closed (qualitative) questions. Their choice was first summarized in table, which can be found below Table 4.15,

showed how many of the respondents that answered to the closed questions regarding the question that were asked for in the questionnaire. In order to answer what is the perception of the employees of the enterprise regarding the warehouse management practice implication of capacity of warehouse? Respondents Choice were summarized in tables as shown below (Table 4.14)

Table 4.14 Analysis of respondents' choice regards to the third qualitative question (Size of warehouse)

Choice	No. of Respondents	% of Respondents	Valid%	Cumulative%
Small	4	6.1	6.1	6.1
Medium	9	13.64	13.64	19.74
Large	16	24.24	24.24	43.98
Based on situation	37	56.06	56.06	100.0
Total	66	93.98	100.0	

Source: *Survey Result, 2020*

The same attitude of respondents were snatched for the implication of size of warehouse on the enhancement of management practice even more 56.06%, it is based on situation as depicted from the above table. About 24.24% have chosen large size of warehouse and very few respondents were select the rest of the choice.

Analysis of interview questions

In analyzing the response given during the interview to assess warehouse management practice in the Ethiopian industrial Inputs Development Enterprise 10 interview questions were prepared, and the Interview response data was collected from all respondents. These data have been analyzed by segmenting the questions into six categories. All responses have been collected from two directorates (sales & distribution directorate and Industrial products procurement directorate), three team leaders from the same departments and five branch and store heads perceptions were analyzed.

INTERVIEW RESPONSES

Interview results collection from directors and team leaders on assessment of warehouse management practice in the Ethiopian industrial Inputs Development

1. **Warehouse management system in the Enterprise**

Majority of the team leaders and warehouse heads did believe that warehouse functions are fully practiced and computerization of stock is not available and applied. This result is similar to the perception of respondents who was engaged in the quantitative study. All of the respondents responded there is good communication between branches and sales distribution directorate however when they need goods and products for their branches they will not get goods on time.

2. **What are the major problems and challenges in the warehouse management?**

According to the response given from branch managers and warehouse heads, Problems faced during warehouse operation, receiving, storing, order processing and dispatching is lack of adequate shelves in the store and communication system which is used to communicate general service or distribution unit. Main Problems mentioned during distribution of goods includes; Traffic polices stop in different locations and ask drivers why they carry these goods and products. This implies that these merchandising goods should be properly dispatched and handled by drivers or transporters and proper communication is needed.

Respondents (especially by directors) also mentioned there are problems during unloading of goods and products at branch. The problem is higher where there is inadequate machines and equipment to move and store products at proper storage place.

Some of the problems mentioned are;

- warehouse managers may not available in the work station
- sometimes the product and delivery invoice will not match so branches/ health facilities may not receive the remaining products easily
- Less human power to unload products especially at branch level.
- Unable to give receiving document
- Knowledge gap to separately deliver each type of products as per the delivery invoice However, when these problems are happened there is no easy way of communication with responsible body at Enterprise level to solve such problems.

3. **What are the main activities and functions of the warehouse in the organization**?

Receiving activity identifies the most incoming materials and notifies the arrival and condition of the material. Upon arrival of the materials and equipment at warehouse premises post-delivery inspection and testing for both the local and foreign procurement carried out to ensure conformity of the materials with the specification document. Picking an order from store is the process of retrieving items from their storage locations and transporting them either to storage process or straight to the shipping area. The final movement process occurs at the shipping operation. Shipping process involves inspecting, packing, palletizing, and loading items into a carrier for further delivery

4. **How do you describe merchandising supply chain network management in the enterprise**?

   Regarding the above question, the perception of the respondents is very low or null. Although few directors and team leaders tried to respond the issue it is not satisfactory.

5. **Delay in the Distribution of goods and Loading of goods in the warehouses**

Most of branch manager and warehouse heads respond that they do not wait longer time to pick their products from the warehouses to load it. However they will invest longer time by waiting for the arrival of the products since it rotating through different warehouses to pick the products. The result strongly supports the perception of respondents in quantitative study.

6. **What is your perception about warehousing and storage condition Practices in the enterprise?**

Majority of the respondents' perception to the above question is perceived a space of the warehouse and its condition. Among the respondents' especially branch managers and store heads perception was related to the condition of warehouses and their maintenance issues. Whatever the condition of storage, the inventory must be recorded and reported along the condition exist. However, it takes to long time to decide on the modality of its disposal. Whether the warehouse is dependent on storing goods manually or uses AS/RS Automatic storage or Retrieval system you need to monitor inventory turn over the carrying cost of inventory and the average inventory value.

CHAPTER FIVE

5. SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary Findings

The results of the study provide important insights on warehouse management practice at Ethiopian Industrial Inputs Development Enterprise. Summary findings of this research are as follows:

- Employees believe warehousing management regarding receiving, put away and storage practices are moderately applied (mean=2.99, SD=0.5). However, respondents perceived that the computerized inventory monitoring system is not applied fully. (Mean = 2.61, SD = 1.188). Qualitative results also support this. They believed that there is moderate amount of skilled and professional human resource available in the warehouses (mean=2.88, SD=1.271).
- Results from quantitative study shows most of the respondents perceived that availability of adequate machines and equipment's in the warehouses is low. (mean = 2.61, SD =1.162) Qualitative data collected from directors also supports this.
- The perception of respondents to rate the level of order accuracy and delivery of orders to customer on time in the area of warehouse was neutral with mean score and standard deviation of 2.91 and 1.262 respectively. Perception of respondents regarding availability of adequate stock at all time and its controlling system was not in place (mean= 2.73, SD=1.210) Qualitative results also support this.
- Respondents in the quantitative study believe that adequate numbers of items received and moved at full capacity are rated neutral. (Mean=2.91, SD=0.988). However directors and branch managers perceived that there is shortage of demand.
- Employees believed that adequate shelves and pallets for handling and storing are rated low. (Mean = 2.79, SD =1.271).Qualitative results also support this.
- Employee believed that damage as percentage of inventory value is moderately acceptable because rating score mean 2.89 and SD 1.254. 40.91% of respondents did not agree that damage as percentage of inventory value was in an acceptable range, only 33.33 % agree on the practice.
- Regarding the success in minimizing the volume inventory and total carrying and

handling cost of goods in the warehouse, respondents believed that it is rated low. (Mean = 2.76, SD = .978). Qualitative results also support this.

- The main Challenges mentioned by directors in the warehouse distribution system are; inaccurate request from branches, Shortage of vehicles, Emergency requests, Shortage of some items required, long distance among of warehouses since it is located at different regional states throughout the country.
- The main reasons for delayed delivery of goods and products were; shortage of trucks, truck maintenance problems, road and climate problems, and distance among warehouses are some of the problems.
- Main Problems mentioned by branch manager during physical observation includes; maintenance of warehouse did not handled properly and there were some idle warehouses without function, low mechanism of communication with the head quarter sales, distribution or general service unit. Management information system has not properly applied for distribution of goods and products as per customer requirements.

5.2. Conclusions

This research was conducted in an attempt to reveal the status of warehouse management practice in Ethiopian Industrial Inputs Development Enterprise (EIIDE) by making particular emphasis to the measurement of the level of warehouse function.

The following conclusions have been drawn on the bases of the findings of the data analysis effort.

A total of 66 respondents have filled and returned the survey questionnaire making the response rate about 88%. About 78.79% of the respondents are males, while females constituting the remaining 21.21% of the total respondents. About 94% of the respondents have served one years and above in their current position as a youngest enterprise implying that the major portion of the response is obtained from respondents who had relatively better information regarding the warehouse practices of their respective company have with a knowledge of their warehouse management practice.

The composite mean scores of the scales of the warehousing functions and activities dimensions, namely availability of machinery and equipment for handling goods and products, on time order delivery to customer, computerized system used to facilitate the process, adequate shelves and pallets in the warehouse, storage space actually used and number of items received and moved at full capacity, revealed that the respondents perceive that Enterprise exert relatively lower efforts or exert insignificant attention to warehouse management practice, whereas their perceived evaluation of the respective organizations' endeavor, as expressed by the composite mean values, suggested that only moderate or a little bit better efforts have been exerted by enterprise in enhancing warehouse management practice, the respondents' perceived evaluation implies that the warehouse management functions like receiving, put away, storage and order picking were at best rated as moderate and a little bit above in improving management of their warehouse.

Generally, the study findings have suggested that the practice of warehouse management is moderate in the case of Ethiopian Industrial Inputs Development Enterprise regarding the assessment made taking six key warehouse functions as the perceived evaluation of the

respondents imply. It has also revealed that, though assessment of the warehouse management practice based on the functions and activities of warehousing receiving and put away functions are comparatively in a better position. Respondents also implied that warehouse management implication of capacity of warehouse is based on the situation and they all have different point of view among the six key warehouse functions that can heavily contributed to the overall management practice of a warehouse.

5.3. Recommendations

The studied revealed that the enterprise required to review its existing warehouse management practice based on the six key warehouse functions and make the necessary assessment and physical observations in order to indicate the actual practice and identify the gap so as to propose the system for improvement in terms of major receiving, put away, order picking & packing as well as marshal shipping functions. Here, some suggestions are forwarded on the basis of the findings of the study.

5.3.1 Recommendations for the enterprise

As revealed from the findings of the study, or from the assessment made warehouse management practice at the disposal of enterprise is approximately rated as moderate.

So, hence Ethiopian Industrial Inputs Development Enterprise (EIIDE) shall give special emphasis in the improvement of warehouse operations in line with its corporate and functional strategies and objectives in order to operate according to international best practices and consistently offering quality products at affordable prices to the community on time.

The study advocated that a lot of emphasis need to be directed to warehouse management practice and warehouse function measurement based on key indicators and the enterprise should maintain the effort made on receiving, put away and storage functions in enhancing operations of their warehouse which is still need to be improved in terms of machinery and equipment used and availability of adequate shelves and pallets needed for handling goods and products.. Hence, computerized system improves warehousing and storage practice the enterprise should procure a full computerized logistics management system in the warehouse. The availability of machines and equipment is low, so the enterprise should buy additional pallets and handling equipment like trolleys, ladders, lifting machines, packaging, stacker, packing and wrapping benches and strapping machines.

The other attention area to be emphasized is computerized system used to facilitate the operation process in the warehouse. Also the warehouse manager of the enterprise should know the level of efficiency in the warehouse and makes sufficient amount of effort in delivering goods and products to customers on time.

The study advocated that a lot of emphasis need to be directed to storage space actually used and number of items moved at full capacity in order to serve significant number of customers on time. So, space utilization should be properly managed.

The enterprise should give ranked emphasis to each of the warehouse functions to identify which dimension contributed a lot in enhancing its management practice.

The enterprise should assure quality aspects through each and every warehouse functions and activities of the warehouse like receiving, storing and marinating good quality procedure manual, inventory accuracies by placing products in their designated place, picking or loading accurately and reducing accidents.

The enterprise should exert a tangible effort in procuring machineries or in making avail adequate machinery and equipment used in the warehouse (carrying & holding or moving goods).

The enterprise should also give emphasis for storage space utilization including material handling space through the use of automated material handling equipment in order to improve its management practice. The enterprise should undertake timely maintenance of warehouse at different regions in order to avoid leakage and product damage and obsolescence.

The enterprise should consider the capacity implication on the huge warehouses located in different regional states especially in the case of size of the warehouses

Finally the enterprise should assure the level of satisfaction of warehouse customers (Suppliers and internal customers) by providing adequate services on time.

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APPENDIX: 1

QUESTIONAIRE

ADDIS ABABA UNIVERSITY 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 on warehouse management practice: a case study of Ethiopian Industrial Inputs Development Enterprise (EIIDE) as a partial fulfillment for the award of the degree of Masters of art in logistics and supply chain management.

The purpose of this questionnaire is to gather data for the proposed study, and hence you are kindly, requested to assist the successful completion of the study by providing the necessary information. Your participation is entirely voluntary and the questionnaire is completely anonymous. I confirm you that the information you share will stay confidential and only used for the aforementioned academic purpose, thus not affects you in any way rather it may help you in improving the performance of your company warehouse. So, your genuine, frank and timely response is vital for the success of the case study. I want to thank you in advance for your kind and unreserved cooperation and dedication of your precious time to fill this questionnaire.

Thanks

Tesfaleul Tufa

Note:

1. No need of writing your name.
2. Indicate your answer with a check mark (x) on the appropriate cell for part one, part two and part three questions and also circle your choice for question 4, 5 & 6.
3. If you need further explanation please do not hesitate to contact me through my personal cell phone number +251923 93 26 45 or +251911 560138 or in person.

Part I: Respondents profile:

1. Age: 18-25 years ☐ 26-35 years ☐ 36- 45 years ☐ above 45 years ☐
2. Sex: male ☐ Female ☐
3. Educational qualification
   Below college diploma ☐
   College diploma ☐
   First degree (BA, BSC) ☐
   Second degree (MA, MSC) ☐
   PHD and above ☐
4. Current job position……
5. Year of service in the organization with the current position……
   Below one year ☐ 1 to 5 years ☐ 6 to 10 years ☐ above 10 years ☐

Part II: Warehouse management and storage practice:

Please rate to what degree on the following warehousing and material handling practices in the enterprise.

Rating scale: 1 = very low

2 = Low

3 = Moderate

4 = High

5 = Very high

S/NO.	Measurement Items	Score				
		1	2	3	4	5
Warehousing Management practice question items						
2.1	The effort to receive, put away, and retrieve goods and product is minimal.					
2.2	Materials are readily accessible to customers at all time					
2,3	There is enough skilled and professional manpower in the warehouse.					
2.4	Damage and unusable goods and products are separated and stored differently.					
2.5	Inventory visibility that is the time from physical receipt to customer service notice of availability is acceptable.					
2.6	No discrepancies occur between physical inventory count and items on the Stock cards.					
2.7.	The damage as percentage of inventory value is acceptable					
2.8.	Inventory is kept in a safe, secure place with limited general access.					
2.9.	The space between shelves and pallets is enough for movement of staffs and customers.					
2.10.	The warehouse has enough space to store goods and products.					
2.11.	There is accurate and up to date information in the warehouse.					

2.12.	In the warehouse there is checking the goods and products quantity against an order and the bill of loading.					
2.13.	The warehouse area is comfortable to accommodate customers and for load and unload goods and products.					
2.14.	Items are identified with appropriate stock keeping unit number and the quantity received recorded.					
2.15.	Goods are stored, put away and kept in storage under proper protection until needed.					
2.16.	There is computerized system that facilitates receiving, storing and picking the required goods and products.					

Part III: please indicate your choice by putting the check mark **(x)** on the appropriate cell.

Where, 1 = strongly disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = strongly agree

3. Please indicate the degree to which you agree with the following statements regarding the indicators of Warehouse management practice in your company. (Please take your key Warehouse activities in mind while rating the statements)

NO.	Measurement Items	Score				
		1	2	3	4	5
Receiving functions question items						
3.17.	Most of the time, the incoming goods are identified and notified to the concerned departments.					
3.18.	Goods are checked against an order and the bill of loading					
3.19.	Goods are checked for quantity and inspect for quality conformation.					
3.20.	Most of the time, in our warehouse receiving accuracy is reasonable and acceptable.					
3.21.	Most of the time, goods are checked for damages					
3.22.	Most of the time, goods are identified for wrong description and incorrect count.					
3.23.	Most of the time, our warehouse daily laborer are not idle. The total number of units or weight moved during a defined period of time is acceptable.					
3.24.	Most of the time, our warehouse utilizes a reasonable warehouse spaces for handling goods (for receiving, unloading, picking, loading and dispatching).					

3.25.	In our warehouse, the effort to receive goods and products are minimal and acceptable.					
3.26.	The records of all received goods maintained for each item in stock showing the quantity received, quantity on hand and quantity issued.					
Put away functions question items						
3.27.	Most of the time, in our warehouse items are identified with appropriate stock keeping units and the quantity received recorded.					
3.28.	Most of the time, for goods and products convenient storage location is selected.					
3.29.	Most of the time, goods and products are transferred to the specific storage location to wait for demand.					
3.30.	In our organization warehouses are easily accessible.					
3.31.	Machines and equipment are available for moving and put away goods and products at storage place.					
3.32.	Goods and products are stored in safe, secured place and appropriate space.					
3.33.	Most of the time, in our warehouse there is accurate and up to date information.					
3.34.	Most of the time in the warehouse there is improved labor productivity.					

Storage functions question items						
3.35.	The warehouse has enough space to store the goods.					
3.36.	Occupied space (square footage) as a percentage of storage capacity or storage utilization reasonable and acceptable					
3.37.	The shelves and pallets in the warehouse are adequate.					
3.38.	In our organization, we are successful in minimizing the total carrying and holding cost.					
3.39.	In our organization there is more efficient use of available warehouse space					
3.40.	Most of the time, our warehouse use spaces properly, which the storage space is actually being used out of the total storage space available.					
3.41.	Carry out replenishment of stock and carry out inventory tracking.					
3.42.	Determination of appropriate maximum and minimum inventory levels is reasonable					
3.43.	The space between the shelves is enough for free movement of personnel and goods.					
3.44.	Our warehouse utilizes a reasonable warehouse spaces for handling goods (for receiving, unloading, picking, loading and dispatching).					

3.45.	In our warehouse, there is availability of adequate stock at all time.					
3.46.	In most cases, in our warehouse no discrepancies occur between physical inventory count and items on the bin cards.					
3.47.	The warehouse area is comfortable to load and unload the goods to and from trucks and trailers.					
Order picking question items						
3.48.	We are successful in minimizing total damages of goods in the warehouse like deterioration, leakage, breakage etc.					
3.49.	Orders filled completely and perfectly					
3.50.	Orders will be delivered to customers as per their request on time.					
3.51.	Orders will fill perfectly without changes.					
3.52.	Orders will fill perfectly without invoice error.					
3.53.	Orders will fill perfectly without damages.					
3.54.	Most of the time in our warehouse items ordered or lines are picked accurately.					
3.55.	The length of time from order placement to shipment is acceptable and reasonable.					
3.56.	Orders are delivered on time, accurately and perfectly.					

3.57.	There is computerized system that facilitates picking the required goods and products.					
Order packing question items						
3.58.	Most of the time, in our warehouse Orders are picked and packed perfectly					
3.59.	In our organization, average number of orders picked and packed per person is acceptable.					
3.60.	Orders are checked, packaged, and labelled on time without delay.					
Shipping question items						
3.61.	Most of the time, in our warehouse orders are filled completely on first shipment without delay.					
3.62.	Most of the time, goods are sorted or accumulated according to customer orders.					
3.63.	Machines and equipment are available for loading and unloading goods and products at storage place.					
3.64.	Orders are packaged, labeled and stacked as well as shipping documents are prepared on time.					
3.65.	Goods and products are loaded on the trucks and trailers on time.					
3.66.	The length of time from order picking to the final movement of goods to shipping is acceptable					

4. What key warehouse functions do you believe that can mainly contribute to the overall performance of a warehouse?

a) Receiving and put away b) Storage c) Order picking &packing d)Shipping e) All

5. Based on your experience what type of warehouse better enhance warehouse management functions?

a) Public warehouse b) Automated warehouse c) Private warehouse d) Climate controlled e) Distribution center f) Based on situation

6. Based on your experience what size of warehouse better enhance warehouse management practices?

a) Small b) Medium c)Large d) Based on situation

<u>Part IV:</u> Please, answer the following open ended questions mentioned hereunder

4.1. Mention the process of warehousing used in your organization.

4.2. Explain the use of efficient material handling and the benefit of maximum height of Warehouse building.

4.3 In your organization during the movement of goods or Marshall Shipment what activities undertaken?

APPENDIX: 2

ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE GRADUATE STUDIES

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT.

Interview question items

Interview questions for directors and team leaders of the enterprise

1. How do you define warehouse management system based on the context of your organization?
2. What are the major challenges in the warehouse management?
3. What interface and relationship do you have with other directorates?
4. How your directorate communicates, coordinates, and integrates with external organizations like customs authority, Ethiopian trading corporation and other suppliers?
5. How do you describe merchandising supply chain network of the enterprise?
6. What are the main activities and functions of the warehouse in your organization?
7. What is your perception about warehouse and storage conditions practice in the enterprise?
8. Do you believe that there is a dalliance in the distribution of goods to different branches? Why?
9. What delivery method do you apply? Push or pull?
10. What mechanism would you suggest to improve warehousing practice?

APPENDIX: 3

ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE GRADUATE STUDIES

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Observation checklist

1. **Location of warehouses**: proximity to vendors and customers
2. **Accessibility of warehouse**
3. **Warehouse network structure: regional distribution center, satellite warehouse**
4. **Supporting logistics infrastructures**: ports/airports, highway/railways
5. **Product types**: finished goods, spare parts, perishables, high value.
6. **Purpose**: long term storage, fulfillment center, cross docking, deconsolidation center.
7. **Building layout**: office space, dock doors, trailer patio, racks, bins, security cage, kitting and packaging area.
8. **Material handling and automation equipment**
9. **Technology:** warehouse management system, connectivity to other system, links to partners system.
10. **Operating profile**: process of receiving, put away, storage, picking unitizing
11. **Security profile**
12. **Labor pool: union and non-union, shifts, hours of operation**

Appendix: 4 List of Warehouse in the Enterprise

List of warehouses and their storage capacities in the Enterprise

S/n	**Name of warehouse**	location of warehouse	Region/State	Built up Area With Certificate (m^2)	Storage capacity in quintals
1	Baretolo(Berbere Tera	Addis Ababa	Addis Ababa city	1224	36,800
2	Commodity store no. 5(b)	Addis Ababa	Addis Ababa city	466	14,234
3	Food staff store no.1	Addis Ababa	Addis Ababa city	2298	75,820
4	Oil & Food staff store no.2	Addis Ababa	Addis Ababa city	598	18.632
5	Salt & Soap store no.3	Addis Ababa	Addis Ababa city	1374	42,848
6	Addis tyre & Canvas store no.4	Addis Ababa	Addis Ababa city	1220	41,452
7	Addis tyre store no.5	Addis Ababa	Addis Ababa city	376	12,218
8	Food staff store no.6	Addis Ababa	Addis Ababa city	1398	48,000
9	Woreda 4 store	Addis Ababa	Addis Ababa	1170	25,082
10	Woreda 12 store	Addis Ababa	Addis Ababa city	1170	25,082
11	Woreda 24 store	Addis Ababa	Addis Ababa city	1170	25,082
12	Kaliti Zone Store no.1	Addis Ababa	Addis Ababa city	3000	60,000

S/n	**Name of warehouse**	location of warehouse	Region/State	Built up Area With Certificate (m^2)	Storage capacity in quintals
13	Kaliti Zone Store no.2	Addis Ababa	Addis Ababa city	3000	60,000
14	Kaliti Zone Store no.3	Addis Ababa	Addis Ababa city	3000	60,000
15	Kaliti sanitary Store no.1	Addis Ababa	Addis Ababa city	1566	60,000
16	Kaliti building ,lamera & electrodes Store no.2	Addis Ababa	Addis Ababa city	1268	40,000
17	Kaliti building electroide Store no.3	Addis Ababa	Addis Ababa city	1244	40,000
18	Kaliti corrugated sheets Store no.4	Addis Ababa	Addis Ababa city	930	25,000
19	Kaliti building paints Store no.5	Addis Ababa	Addis Ababa city	944	25,000
20	Kaliti building, plastic & glass Store no.6	Addis Ababa	Addis Ababa city	1000	30,000
21	Ethio sider paint store no.1	Addis Ababa	Addis Ababa city	396	8,182
22	Ethio sider store	Addis Ababa	Addis Ababa city	218	4,800
23	Ethio sider electric wire	Addis Ababa	Addis Ababa city	142	3,164

S/n	**Name of warehouse**	location of warehouse	Region/State	Built up Area With Certificate (m^2)	Storage capacity in quintals
	store no.3				
24	Ethio sider electric wire store no.4	Addis Ababa	Addis Ababa city	156	3,436
25	Kolfie store no.1	Addis Ababa	Addis Ababa city	1106	35,274
26	Kolfie store no.2	Addis Ababa	Addis Ababa city	432	7,000
27	Merkato store no.10	Addis Ababa	Addis Ababa city		32,200
28	Sumale Tera store	Addis Ababa	Addis Ababa city	156	3,470
29	Amanuel store	Addis Ababa	Addis Ababa city	424	7,514
30	Arat kilo store	Addis Ababa	Addis Ababa city	156	3,470
31	Bis printing paper store no.5	Addis Ababa	Addis Ababa city	1398	48,000
32	Bis salt store	Addis Ababa	Addis Ababa city	598	18,632
33	Bis sponge mattress store	Addis Ababa	Addis Ababa city	1202	12,218
34	Bis main store	Addis Ababa	Addis Ababa city		75,820
35	Diredawa depot	Dire dewa city (Sabian)	Dire dewa city administration	6223	151,731

S/n	**Name of warehouse**	location of warehouse	Region/State	Built up Area With Certificate (m^2)	Storage capacity in quintals
36	Diredawa store no.4	Diredawa city		1775	34,390
37	Dubti store	Dubti town	Afar	636	18,666
38	Asayita store	Asayita town	Afar	494	11366
39	Sidhafaga store	Awash town	Afar	634	18,666
40	Mekele store	Mekele city	Tigray	1088	32,200
41	Adewa store	Adewa town	Tigray	299	10,000
42	Adigrat store	Adigrat town	Tigray	450	20,000
43	Shire Endasilassie store	Shire town	Tigray	300	5,000
44	Jigjiga store no.1	Jigjiga city	Sumale region	504	14,852
45	Jigjiga store no.2	Jigjiga city	Sumale region	504	14,852
46	Degahabur store	Degahabur town	Sumale region	784	15,000
47	Kebrehdehar store	Kebredehar town	Sumale region	784	15,000
48	Kelafo store	Kelafo town	Sumale region	784	15,000
49	Warder Store	Wareder town	Sumale region	784	15,000
50	Godie store	Godie town	Sumale region	784	15,000
51	Harar store	Harar city	Harari region	634	18,666
52	Hirna store	Hirna town	Harari region	634	18,666

S/n	**Name of warehouse**	location of warehouse	Region/State	Built up Area With Certificate (m^2)	Storage capacity in quintals
53	Girawa store	Girawa town	Harari region	634	18,666
54	Asossa store	Asossa town	Benishangul Gumuzi region	492	14,714
55	Gambela store	Gambela town	Gambela region	634	18,666
56	Akaki store	Akaki town	Oromiya region	634	18,666
57	Bishofu store	Bishoftu town	Oromiya region	634	18,666
58	Adama store	Adama city	Oromiya region	1265	30,000
59	Batu store	Batu town	Oromiya region	504	14,852
60	Asela store	Asela town	Oromiya region	1088	32,200
61	Ambo store	Ambo town	Oromiya region	414	10,496
62	Wolliso store	Wolliso town	Oromiya region	1454	47,418
63	Shambu store	Shambu town	Oromiya region	486	17,488
64	Neqemte store	Neqemte town	Oromiya region	1102	30,948
65	Beddele store	Bedelle town	Oromiya region	488	17,488
66	Dembdolo store	Dembdolo	Oromiya	488	17,488

S/n	**Name of warehouse**	location of warehouse	Region/State	Built up Area With Certificate (m^2)	Storage capacity in quintals
		town	region		
67	Metu store no.1	Metu town	Oromiya region	504	14,852
68	Metu store no.2	Metu town	Oromiya region	250	3,460
69	Abomsa store	Abomsa town	Oromiya region	634	18,666
70	Arsi robe	Robe town	Oromiya region	634	18,666
71	Jimma store no.1	Jimma city	Oromiya region	240	6,960
72	Jimma store no.2	Jimma city	Oromiya region	488	17,488
73	Shashemane store no.5	Shashemane city	Oromiya region	1475	40,000
74	Goba store	Goba town	Oromiya region	1088	32,200
75	Adola store	Adola town	Oromiya region	504	14,852
76	Chiro store no.1	Chiro town	Oromiya region	244	4,040
77	Chiro store no.2	Chiro town	Oromiya region	202	3,740
78	Chiro store no.3	Chiro town	Oromiya region	180	3,740
79	Yabello store	Yabello town	Oromiya region	504	14,852

S/n	**Name of warehouse**	location of warehouse	Region/State	Built up Area With Certificate (m^2)	Storage capacity in quintals
80	Gursum store	Gursum town	Oromiya region	634	18,666
81	Bekoji store	Bekoji town	Oromiya region	634	18,666
82	Fichie store	Fichie town	Oromiya region	504	14,852
83	Bako store	Bako town	Oromiya region	634	18,666
84	Gimbi store	Gimbi town	Oromiya region	350	3,000
85	Agaro store	Agaro town	Oromiya region	656	15,000
86	Dodola store	Dodola town	Oromiya region	634	20,000
87	Deder store	Deder town	Oromiya region	1084	20,000
88	Gelemso store	Gelemso town	Oromiya region	784	15,000
89	Ginir store	Ginir town	Oromiya region	1084	20,000
90	Lemugenet store	Lemugenet town	Oromiya region	1084	20,000
91	Arjo store	Arjo town	Oromiya region	1084	20,000
92	Negeleborena store	Negele borena town		492	14,714
93	Mekaneselam	Mekaneselam	Amhara	656	19,022

S/n	**Name of warehouse**	location of warehouse	Region/State	Built up Area With Certificate (m^2)	Storage capacity in quintals
	store	town	region		
94	Dabat store	Dabat town	Amhara region	540	14,806
95	Kombolcha depot	Kombolcha town	Amhara region	6792	140,000
96	Kombolcha store	Kombolcha town	Amhara region	634	18,666
97	Debretabor store	Debretabor town	Amhara region	1088	32,200
98	Gonder store no.1	Gonder city	Amhara region	588	15,448
99	Gonder store no.2	Gonder city	Amhara region	436	10,898
100	Chagini store	Chagini town	Amhara region	504	14,852
101	Debremarkos store	Debremarkos town	Amhara region	1088	16,356
102	Bechena store	Bechena town	Amhara region	534	17,100
103	Dejen store	Dejen town	Amhara region	484	14,172
104	Mota store	Mota town	Amhara region	634	18,666
105	Addis zemen store	Addis zemen town	Amhara region	634	18,666
106	Debreberhan store	Debreberhan town	Amhara region	476	13,208

S/n	**Name of warehouse**	location of warehouse	Region/State	Built up Area With Certificate (m^2)	Storage capacity in quintals
107	Mehalmeda store	Mehalmeda town	Amhara region	360	5,798
108	Ware-ilu store	Ware-ilu town	Amhara region	634	18,666
109	Woldiya store	Woldiya town	Amhara region	1088	32,200
110	Finotselam store	Finotselam town	Amhara region	262	4,800
111	Dangila store	Dangila store	Amhara region	432	5,040
112	Ataye store	Ataye town	Amhara region	432	5,100
113	Alemketema store	Alemketema town	Amhara region	1084	20,000
114	Ayikal store	Ayikal store	Amhara region	1084	20,000
115	Dila store no.1	Dila town	SNNPR	432	12,000
116	Dila store no.2	Dila town	SNNPR	262	3,714
117	Dila store no.3	Dila town	SNNPR	350	4550
118	Wolayita store 1	Wolayita sodo	SNNPR	504	14,852
119	Wolayita store no.2	Wolayita sodo town	SNNPR	420	6,318
120	Butajera store	Butajera town	SNNPR	634	18,666
121	Hossaina store	Hossaina town	SNNPR	494	14,714
122	Halaba qulito	Halaba town	SNNPR	640	18,670

S/n	**Name of warehouse**	location of warehouse	Region/State	Built up Area With Certificate (m^2)	Storage capacity in quintals
	store				
123	Arba minch store	Arba minch town	SNNPR	494	14,714
124	Jinka store	Jinka town	SNNPR	504	14,852
125	Yelasawula store	Yelasawula town	SNNPR	380	10,070
126	Mizan teferi store	Mizan teferi town	SNNPR	496	14,714
127	Tepi store	Tepi town	SNNPR	634	18,666
128	Yergalem store	Yergalem town	SNNPR	636	18,666
129	Aletawondo store	Aletawondo town	SNNPR	464	12,000
130	Chencha store	Chencha town	SNNPR	464	10,530
		Total	**130**		

Source: - from survey data, observation; (2020) and review of asset valuation documents of the Enterprise; 2019).

Appendix 5

List of warehouses in the Enterprise and their location

S/N	Description of Warehouse location/Region	Number of warehouses found in the region	Holding Area With Certificate (m^2)	Storage or Holding capacity in quintals	Land Use
1	A/A	36	73620.74	889,832	Office &store
2	Diredewa	5	23155	226,825	Office &store
3	Oromiya	42	222549.83	696,698	Office &store
4	Amhara	32	134433.39	651,524	Office &store
5	Afar	3	16080	48,698	Office &store
6	Tigray	4	5253	72,200	Office &store
7	Somalia	7	40330	104,704	Office &store
8	Gambela	1	3183	18,666	Office &store
9	Harari	3	3439	55,998	Office &store
10	SNNPR	18	55675.89	231,002	Office &store
11	Assosa	1	4083	14,714	Office &store
	Total	**152**	**600,256.71**	**3,010,987**	Office &store

Source: - from survey data, observation and inspection; (2020) of asset valuation documents of the Enterprise.

Appendix: 6

Warehouses Operated by Third Parties (3rd Party logistics providers)

	Name of warehouse	location of warehouse	Region/State	Built up Area With Certificate (m^2)	Storage capacity in quintals
1	Teklehaimanot store	Addis Ababa	Addis Ababa city adm.	328	4930
2	Diredawa store no.2	Diredawa city	Dire dewa city adm.	1123	25,704
3	Diredawa customs store no.3	Diredawa city	Dire dewa city adm.	1775	34,390
4	Diredawa store no.1 and office	Diredawa city	Dire dewa city adm.		
5	Shashemane store no.4	Shashemane city	Oromiya region	1088	32,200
6	Shashemane store no.3	Shashemane city	Oromiya region	1088	32200
7	Shashemane store no.2	Shashemane city	Oromiya region	1106	32,976
8	Shashemane store no.1	Shashemane	Oromiya R.	1106	32,976
9	Dessie store no.1	Dessie city	Amhara region	233	3,490
10	Dessie store no.2b	Dessie city	Amhara region	490	7,530
11	Dessie store no.2c	Dessie city	Amhara region	442	7,514
12	Dessie store no.3	Dessie city	Amhara region	328	4,930
13	Dessie store no.4	Dessie city	Amhara region	328	4,930
14	Bahirdar store no.1	Bahirdar city	Amhara region	1088	32,200
15	Bahirdar store no.2	Bahirdar city	Amhara region	1088	32,200
16	Bahirdar store no.3	Bahirdar city	Amhara region	1088	32,200
17	Bahirdar store no.4	Bahirdar city	Amhara region	1114	32,200
18	Hawassa store	Hawassa city	SNNPR	636	18,666
19	Amiche Store	Addis Ababa	Addis Ababa city	1088	36,582
20	Wolqite store	Wolqite town	SNNPR	432	5100
21	Bulehora store	Bulehora town	Oromiya region	492	10070
22	North Gonder	Gondar Town	Amhara region		

Appendix 7: Pictures of Warehouses and Office buildings

TYPOLOGY - 3 - STORE

TYPOLOGY -4- HEAD OFFICE AND STORE