The Effect of Warehousing Management on Warehouse Performance:

(A Case of Modjo Dry Port, Ethiopia)

A Thesis Submitted to the School of Graduate Studies of Jimma University in Partial Fulfillment of the Requirement for the Award of the Degree of Master of Art in Logistics and Supply Chain Management

BY:

ARARSA BUZU KIDANE

JIMMA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

PROGRAM: MA IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT

JULY 20, 2021

JIMMA, ETHIOPIA

The Effect of Warehousing Management on Warehouse Performance:

(A Case of Modjo Dry Port, Ethiopia)

BY:

ARARSA BUZU KIDANE

Under the guidance of

Dr. Zerihun Ayenew (Associate Professor)
And
Mrs. Tsigereda Aboye (MBA)

A Thesis Submitted to the School of Graduate Studies of Jimma University in Partial Fulfillment of the Requirement for the Award of the Degree of Master of Art in Logistics and Supply Chain Management

JIMMA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

PROGRAM: MA IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT

JULY 20, 2021

JIMMA, ETHIOPIA

DECLARATION

I hereby declare that this thesis entitled “The Effect of Warehousing Management on Warehouse Performance: A Case of Modjo dry port, Ethiopia”, has been carried out by me under the guidance and supervision of Dr. Zerihun Ayenew (Associate Professor) and Mrs. Tsigereda Aboye (MBA).

The thesis is original and has not been submitted for the award of any degree or diploma to any university or institutions.

Researcher’s Name	Date	Signature
_____	_____	_____

CERTIFICATE

This is to certify that the thesis entitled "The Effect of Warehousing Management on Warehouse Performance: A Case of Modjo Dry Port, Ethiopia" Submitted to Jimma University for the award of the Master of Art in Logistics and Supply Chain Management (MA) and is a record of Valuable research work carried out by Mr. *Ararsa Buzu Kidane*, under our guidance and supervision.

Therefore, we hereby declare that no part of this thesis has been submitted to any other university or institutions for the award of any degree of diploma.

Main Advisor's Name	Date	Signature
_____	_____	_____
Co-Advisor's Name	Date	Signature
_____	_____	_____

Approval sheet of Thesis

As members of the Examining Board of the Final Open Defense, we certify that we have read and evaluated the thesis prepared by **Ararsa Buzu Kidane**, entitled "The Effect of Warehousing Management on Warehouse Performance: A Case of Modjo Dry Port, Ethiopia", and recommend that it be accepted as fulfilling the thesis requirements for the award of the Master of Art in Logistics and Supply Chain Management.

_____	_____	_____
Name of Chairman	Date	Signature
_____	_____	_____
Name of Internal Examiner	Date	Signature
_____	_____	_____
Name of External Examiner	Date	Signature

Abstract

In today's challenging and competitive world, success can be determined by whether a warehouse management is productive and effective enough to meet the expectations of customers. The purpose of this study was examining the effect of warehousing management on warehouse performance in the case of Modjo dry port concerning the five main warehousing activities (receiving, put-away, storage, order-picking, and shipping). Both primary (questionnaires and interviews) and secondary sources of data were used. To achieve the objectives of this study, an explanatory and descriptive research design was used, and this study also applies a mixed research approach. Stratified simple random sampling was used to select the respondents for the study and, accordingly, one hundred one (101) sample sizes were taken for the study. The descriptive and inferential statistical tools such as; mean, standard deviation, percentage, correlation and multiple regressions were used to analyze collected data with the aid of IBM SPSS statistics version 20. The descriptive analysis shows that there is lack of space for loading and unloading items, lack of shelves, pallets and racks; poor well established put away process for received items, poor tight control the storage areas, high warehousing cost, and high inventory cost. The multiple regression analyses reveals that receiving, storage, put away, order picking and shipping significantly influence warehouse performance of the organization. Hence, organizations are expected to enhance their warehousing management so as to gain better warehouse performance. Furthermore, it's advisable to the organization to improve the warehouse performance making use of an automated system to reduce unnecessary process from receiving up to shipping, creating the additional areas for each warehousing activity, and codifying each of the material in the warehouse to reduce the theft and redundancy of materials in the warehouse.

Keywords: Warehouse**,** Warehousing management, warehousing performance

Acknowledgment

First and for most, I would like to express my unshared thanks to the almighty God for providing me the opportunity for what I have achieved and for his mercy.

My greatest thanks and heartfelt appreciation to my main advisor **Dr. Zerihun Ayenew (Associate Professor)** and Co-advisor **Mrs. Tsigereda Aboye (MBA)** for their guidance, valuable comments, and their encouragement during my thesis work. Without their encouragement, insight, guidance, and professional expertise, the completion of this work will not be possible.

Besides, I would like to thank the management and staff of Modjo dry port, especially Ato Derese Alemu, the manager of the warehouse department and those other who has been providing different information on the preparation of this research.

I expressed my gratitude to all JU friends and instructors in general and especially instructor Mesfin Mekonen for being supportive and sharing ideas in every step of my research work, moreover, for making me have a fascinating time while I am staying at the university.

Finally, I would like to express my heart-felt thanks and appreciation to my beloved wife Bikiltu Tesema for her encouragements and constructive advice.

Table Contents

Contents **Page**

List of Tables

List of figure

LIST OF ACRONYMS/ABBREVIATIONS

ABC- Activity Based Costing

CCTV- Computer Controlling Technology Visual

ERCA- Ethiopian Revenue and Customs Authority

ERP- Enterprise Resource Planning

FIFO- First In Frist Out

FTL- Full Truck Load

KPI- Key Performance Indicator

LAN- Local Area Network

LTL- Less Truck Load

MDP- Modjo Dry port

MED- Minister of Economic Development

RFID- Radio-frequency identification

SKU- Stock Keeping Units

SOP- Standard Operating Procedure

SPSS- Statistical Package for Social Science

WMS- Warehouse Management System

CHAPTER ONE

1. INTRODUCTION

This chapter deals with a brief background of the study, statements of the problem, basic research question, objectives of the study which deals with a general and specific objective, significance, scope, operational definition of key terms, and organization of the paper.

1.1. Background of the Study

The study deals with the effect of warehousing management on warehouse performance in dry port of Modjo. Warehousing is the method of storing goods in a systematic and organized manner on a large scale and making them readily accessible when needed. In other words, warehousing means holding or preserving goods in huge quantities from the time of their purchase or production till their actual use or sale (Frazelle, 2002). Warehouse: is a place where items are received, stocked, and dispatched (Aronovich *et al*., 2010).

A warehouse plays an important role in meeting consumer demands in today's business world. It serves as a key source of competition, determined by whom, with better cost efficiency, and versatility, can produce goods faster. In this respect, managers must have detailed understanding of warehousing and how it impacts the entire supply chain (Richards, 2017). Trappy *et al.*, (2017) have explained that the upgrading of warehouses can be measured by the accuracy and speed of meeting demands, the decrease in non-value-added functions, and effective management. Another concern is the information integration that consists of key functions for inventory updates, order management, and product tracking.

Today's business environment requires implementing innovative solutions to effectively manage increasingly complex warehouse management activities while simultaneously reducing operational expenses (Hackman, 2014). A warehouse is a facility in the supply chain to consolidate products to reduce transportation costs, achieve economies of scale in manufacturing or in purchasing (Bartholdi J, 2006). Or provide value-added processes and shorten response time (Gong *et al.*, 2008). Storage has always been an important aspect of economic development.

In today's competitive environment, companies must operate at maximum efficiency and provide superior service to ensure profitability. Three factors have been found to affect the efficiency and

effectiveness of the warehouse operations for the fast-moving consumer goods industry such as simplicity/complexity of the warehouse management systems, product slotting techniques, and layout planning of the warehouse (Lakmal and Wickramarachi, 2011). The organization's ability to effectively manage the warehouse, reduce costs and fulfillment operations are critical to their success.

A well-implemented warehousing management system helps in coordinating operations in the stores. This is imperative in ensuring the smoothing of production and these benefits the organization from the economies of scale and improved customer service. Well-implemented warehousing systems are designed to help in the specification of inventory procedures, operation, and control (Forger, 2004). As indicated by Richards *et al.*, (2006) warehouses have, in the past, been constantly referred to as cost centers and rarely adding value. The movements of production to the Far East, the growth of e-commerce, and increasing demands from consumers have seen a step-change in warehouse operations. Warehouses are now seen as a vital link within today's supply chains.

More recent work in this area includes Collins, (2006) which described the collection of warehouse metrics; i.e., picking and inventory accuracy, storage speed, and order cycle time are the performance measurement in the warehouse industry traditionally employs a set of single factor productivity measures that compare one output to one resource (or input).

The organization does not pay attention to warehouse management theories and procedures. Even though there are no protocols or manuals to conduct each warehouse function and their information sharing activities and internal operation flexibility to satisfy customer demand are not sufficient, the organization continues to operate in long-established traditions (Asmelash, 2017). Goods are not properly sorted in the company warehouse in a way that avoids the risk of spoilage or damage. If goods are not processed and stored inside the warehouse in appropriate locations, the quality of the goods can be at risk. If items are not properly sorted and put in the correct location, it affects warehouse space usage (cost) and customer order lead time (delays order delivery time) (Abdi, 2019).

At the dry port level in our country, warehouse management is poor. The dry port of Modjo is one of the largest dry ports in our nation that store a variety of materials and is the backbone of the economy of our countries. If this dry port's warehousing management is poor, it will be

difficult to store materials safely to meet customer demands, and run the country's economy effectively. So, the warehouse is the foundation for an organization's ability to satisfy its customers because if there are no products available in the store/warehouse, customers will be dissatisfied, and if the organization fails to meet the customer's needs, it becomes to fail.

Therefore, Warehousing has serious importance to the port because the warehouse management function assumes particular importance in every industry where material identity, then handling, proper storage, and accounting accuracy during problems are paramount in the efficient operation of the warehouse, and it also allows companies to store their products in a port, as opposed to a separate district. In order to accommodate the handling of heavy containers, warehouses in and around ports often need appropriately surfaced, open yard areas. These warehouses often specialize in heavy lifts, projects, and irregular cargo, which mean that their requirements for architectural design and material handling equipment vary from inland warehouses. The handling of a range of goods at the ports is supported by forklifts, front-end loaders, access stackers and gantry cranes.

Despite the fact that many scholars have proposed various reasons as well as alternative solutions, warehouse management is still under pressure to increase productivity and accuracy, reduce costs and inventory while improving customer service, and the case in Ethiopia is still under investigation and requires further research.

1.2 Statement of the Problems

Since the turnover of inventory is one of the key sources of revenue generation and eventual earnings for most companies, warehousing is one of the most valuable assets they have. Nearly 60% to 70% of total funds working in manufacturing firms are invested in current assets, with inventory being the most significant portion (Carter, 2002). Moreover, as stated by (Heung, 2006), Warehousing accounts for between 2% and 5% of an organization's cost of sales, and in today's highly competitive global business environment, organizations are focusing on return on assets, so reducing warehousing costs has become a critical business issue. Many companies are automating their basic warehousing functions in order to achieve the higher throughput rates or inventory turns that are required to make their warehousing operations cost-effective.

Warehousing is the glue that holds supply chains together, and it has become increasingly critical in landlocked countries' dry port management. Ethiopia is one of the landlocked countries that relies on dry ports to address these issues. Modjo dry port is one of the largest in the country, with more than 95% of all freight passing through it. It is also the country's first dry port. The increase in unstuffed container flows in the terminal has an effect on warehouse operations; the current dedicated volume of the warehouse exceeds the warehouses' dedicated capacity (Georgise *et al*., 2020).

In today's challenging and competitive world, success can hinge on whether your warehouse operations are productive and effective enough to meet your expectations and those of your customers. One way to gauge how effectively your warehouse operations are meeting those expectations is to determine the effect of warehouse, a systematic review of the warehouse functions looking for possible improvements in efficiency and service.

As conducted by De Assis & Sagawa, (2018) Assessment of the implementation of a Warehouse Management System in a multinational company of industrial gears and drives, concluded that warehousing tools were not performing functions as expected. In relating to the recordings of inward/outward movements of stock, to the culture of logistics operators and the company's own strategy regarding fixed storage locations. Other researchers Zehrer & Raich, (2016) conducting out customer satisfaction and the impact of warehousing, The finding of those authors concludes that insufficient storage is the result of material deterioration that ultimately leads to financial loss for a company, which allows us to understand that storage of the warehousing activity is needed to safeguard their safety, quality, respond to customers in a timely manner etc.

As Kusrini *et al.,* (2018) conducted on determining key performance indicators for warehouse performance measurement a case study in construction materials of warehouse; they concluded that Warehouse activity improvement can be done based on the most important KPI in each activity. But those authors failed to elaborate those KPI (performance measurements). As Campus, (2013) and Aminoff *et al*., (2002) conducted on factors affecting warehousing operations in supply chains of small manufacturing firms. His finding provides the main factors that affect warehousing operations are long lead times, poor warehouse layout, irregular deliveries, improper forecasting of demand and the latter authors identify picking, packaging and shipping affect the efficiency of warehousing, and forward the solution to solve those problems;

enlarging picking lot size, minimizing the picking time, the efficient use of receiving and shipping area and aisles.

When we comes to our country cases Assessments of warehousing are conducted by different authors Tibebu, Habtamu, (2018), Asmelash, (2017), Belayhun, (2016), and Endaykiros, (2019). The first two authors concluded that the warehousing activity receiving, storage, put away, order picking and shipping/dispatching are get attention and are practiced to perform organization goals in a good way except order picking and in the case of the third author storage gates little attention in different organizations and also the result of his finding from the first to the third authors is almost similar. The last two writers, however, are opposed to the three authors. There is a contradiction between them as the Belayhun, (2016) concludes that the warehousing activity is not technology-based, they follow traditional methods such as using paper, and it takes more labor to obtain, store, pick, order and ship the materials to or from the warehouse. So, the warehousing activity of the organization is poor. But, Endaykiros, (2019) as a result of their study all warehousing activities can be poorly performed in a given organization, such as a lack of modern equipment availability, which causes it to take too long to inspect received materials and move them from receiving to storage, a lack of storage separation for materials based on their characteristics, such as perishable, long lasting, frequently required etc., Lack of a separate shipping area to dispatch the necessary materials in a timely manner to meet the needs of the customer.

However, the researcher takes this gap and examines those contradiction ideas between those authors, and it is needed to investigate warehousing management by adding to that, those authors forget the warehouse performance measurements like quality, cost/financial, productivity, and response time of the warehouse and to examine the relationships between them.

To fill this gap, the researcher intends to examine how the warehousing management influences the warehouse performance of Modjo dry port because of the organization economy is mostly dependent on the warehouse. Until today no-one has been conducting the effect of warehousing management on warehouse performance in the case of Modjo dry port. As a result, the researcher wants to fill the gap by raising the following basic research questions below.

1.3 Basic Research Question

1. What effect does receiving have on warehouse performance?
2. What effect does storage have on warehouse performance?
3. What effect does put away have on warehouse performance?
4. What effect does order picking have on warehouse performance?
5. What effect does shipping/dispatching have on warehouse performance?

1.4 Research Hypotheses

According to Leedy *et al.*, (2010), the research hypothesis is a reasonable conjecture, an educated guess, and its purpose is to provide a temporary objective, an operational target, a logical framework that guides researchers as they collect and analyze data. Therefore, in this study the researcher used the following hypothesis:

H_1: Receiving has a positive and significant effect on warehouse performance of MDP.

H_2: Storage has a positive and significant effect on warehouse performance of MDP.

H_3: Put away has a positive and significant effect on warehouse performance of MDP.

H_4: Order picking has a negative and significant effect on warehouse performance of MDP.

H_5: Shipping has a positive and significant effect on warehouse performance of MDP.

1.5 Objectives of the Study

1.5.1. General Objectives

The general objective of the study is to examine the effect of Warehousing Management on Warehouse Performance at Modjo dry port.

1.5.2. Specific Objectives

- ✓ To explain the effect of receiving on warehouse performance of MDP.
- ✓ To determine the effect of storage on warehouse performance of MDP.
- ✓ To reveal out the effect of put away on warehouse performance of MDP.
- ✓ To identify the effect of order picking on warehouse performance of MDP.
- ✓ To find out the effect of shipping/ dispatching on warehouse performance of MDP.

1.6 Significance of the Study

The findings of this study may useful to the following stakeholders:

For Modjo Dry Port, Ethiopia; this study could help management of Modjo dry port, Ethiopia. The managers may consider the result of this study, which may help them gain better understanding about the current warehouse management from the perspectives of receiving, put away, storage, shipping, and order picking to address the shortcomings and sustainably continuing the strengths to compete with the best. Also, the findings of this study may benefit the organization in understanding its warehousing management. Moreover, the finding and the recommendation of the study could help the organization in decision-making related to its warehouse management and also from the results of this study the managers of the organization may either draw strategies or improve the current policies that govern warehousing management in their organization.

For academicians/researchers; the study‘s findings provided a room to other researchers may serve as a baseline to conduct further and more detailed research in the area of warehousing management as the issue will get more attention in the future. It may enable them to see the gaps of what is unknown, what needs further research, elaboration and improvement. It added value to the body of knowledge in bridging the gap between theories and practical implementation of warehousing management of Modjo dry port, Ethiopia.

To this end this study would be have policy implications and delivered multifaceted purposes for the government and other beneficiaries of the study. It would be as an asset to the concerned bodies to be aware of the problem of spare part warehouse management Modjo dry port, it would be help to develop the warehousing management service, in order to make more efficient and fast the delivery services for users, and to maintain the spare part assets in proper way.

1.7 Scope of the Study

This study was delimited to:

Conceptually; this study was focused on the relationship between warehousing management (receiving, storage, put away, order picking, and shipping/dispatching) and warehouse performance in relative term. Although there are different dimensions of warehousing management, the researcher analyzed the effect of receiving, storage, put away, order picking

and shipping/dispatching on warehouse performance. Moreover, the study analyzed warehouse performance using productivity, quality, cost/financial and response time to meet customer's requirements.

Geographically; the study was conducted or limited to only Modjo dry port, Ethiopia of Modjo town; which is found in East Shoa Zone of Oromia regional state of Ethiopia.

Methodologically; this study was conducted based on descriptive and explanatory research design. Additionally, the main tool used to collect data from respondent is questionnaires and interview with the manager of warehouse department.

1.8 Operational definition of key terms

Warehousing: It refers to activities involving the storage of goods on a large scale in a systematic and orderly manner and making them readily available when necessary. In other words, warehousing means holding or preserving goods in enormous quantities from the time of purchase or production to their actual use or sale (Frazelle, 2002).

Receiving: is an operation that involves the assignment of trucks to dock and the scheduling and execution of unloading activities to schedule the carrier, unload the vehicle, and inspect for damage (Kusrini *et al.,* 2018).

Put-away: is an activity of placing a product or material that has been purchased in the warehouse (Frazelle, 2002).

Storage: is the movement of material from the unloading area to its designated place (John J., 2011).

Order picking: is the process of obtaining the products requested by a customer order in pallet/case/broken case form from the storage area(John J., 2011).

Order picking: is the process of obtaining the products requested by a customer order in pallet/case/broken case form from the storage area (Faber N., 2015).

Shipping: is activity that involves scheduling and assignment of trucks to docks the orders through automated loading, schedule carrier, and load vehicle (Stoltz *et al*., 2017).

1.9 Structure of the Thesis

The study was organized into five chapters. The first chapter presents the introduction part which contains: background of the study, statement of the problem, objective of the study, significance of the study, scope of the study, definition of key terms, and structure of the thesis. The second chapter deals with literature review, empirical review, and conceptual framework. The third chapter contained research methodology which incorporated: description of study area, study design, research approach, data collection methods and instruments, study population, sampling design and sample size, methods of data analysis used, and ethical considerations, model specification, and validity and reliability. The fourth chapter contained data analysis and interpretation and the fifth chapter contained summary of major findings, conclusion, recommendation, limitation of the study, and direction for further studies.

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

2.1. Theoretical Frameworks of Warehouse Management

The parts of this chapter related to the theories related to the research issues which are relevant to the present study work are described. The theoretical framework for warehousing is briefly established, with all of the important aspects of warehousing discussed. The aim of this part of the study work is to establish a basis for the theoretical framework of warehousing concepts and examine whether the warehouse gap and the theoretical advantages are likely to have an impact on the efficiency of warehouse management and also to determine whether they generate any real added value for warehouse management.

2.1.1 Definition of Warehouse Management

The warehouse management as stated by Van den Berg, (2012) is defined as the on-going effort to operate and improve the distribution center's processes, organizational structure, and information technology, as well as collaboration with supply chain partners. An integrated approach that examines all options for optimization is proposed by highly competitive warehouse management. People, process, technology, and business are the four elements that make up warehouse management;

People: The manager has the responsibility to ensure that the people in the warehouse execute the processes well. This involves guiding and training people, addressing and motivating them, and taking their feedback seriously (Linde & Olhager, 2016).

Process: If there are no specified procedures in the warehouse, then each operator may perform a task in his or her way. So, when there are 10 operators, one of them will have the best procedure. If we combine the best parts of each of those 10 procedures, we could come up with a best practice that outperforms all others. Moreover, without specified procedures, the manager cannot tackle people on their conduct since there is no standard (Stoltz *et al.*, 2017).

Technology: Tools and technology can create a breakthrough in performance. The tools that we use in warehouses are automated material handling systems, such as conveyors and automated

cranes, and information technology such as warehouse management systems. Information technology has a major impact on warehouse performance. Highly Competitive Warehouse Management proposes the use of flexible and intelligent information systems. The systems should be able to support the desired method of working. Moreover, it should be easy to modify the software to accommodate any process redesign necessary to keep the distribution center up-to-date with ever-changing market requirements (Van den Berg, 2012).

Business: Within a company, the warehouse typically plays the role of the service provider, while other departments such as sales or purchasing are its clients who decide what the warehouse should do. Thus, if we could change the requirements imposed by others upon the warehouse operation, then we could achieve major benefits in the distribution center. The challenge is to align the various parties involved. This implies that their actions and decisions should aim at achieving the overall objective of the company or the supply chain rather than their objectives (Yener & Yazgan, 2019).

As stated by Faber *et al.,* (2013), Warehouse Management plans, controls and optimizes the material flows and the use of warehouse resources in a daily context, aimed at delivering products to customer requirements while minimizing operating costs (that is, eliminating unnecessary work and unnecessary movement of people and equipment).

Warehousing is the activities involving the storage of goods on a large scale in a systematic and orderly manner and making them available conveniently when needed (Tsige, 2013). It creates time utility by bridging the time gap between production and consumption of goods. Also, minimizing travel time between the point of supply locations and demand destinations can greatly improve productivity. However, to achieve this increase in efficiency, manufacturing firms must develop processes to regularly monitor picking travel times and storage locations (Hackman, 2014).

Warehouse

A warehouse is a facility in the supply chain to consolidate products to reduce transportation costs, achieve economies of scale in manufacturing or in purchasing or provide value-added processes and shorten response time. Warehousing has also been recognized as one of the main operations where companies can provide tailored services for their customers and gain a competitive advantage. There are various types of warehouses: they can be classified into

production warehouses and distribution centers and by their roles in the supply chain they can be classified as raw materials warehouses, work-in-process warehouses, finished good warehouses, distribution warehouses, fulfillment warehouses, local warehouses direct to customer demand, and value-added service warehouses (Ramaa, 2012).

As Shah & Khanzode, (2017) states, the objective of a warehouse is to satisfy customers with effective resource utilization and deliver the right product, the right place and at the right time in good condition. The warehouse is a means of providing functions of temporary storage, protection of goods, the fulfillment of individual customer orders, packaging of goods, after-sales services, repairs, testing, inspection, Just in Time (JIT) sequencing, and assembly. Major warehouse operations are classified into receiving, picking, storage and shipping. The storing function includes various sub-functions like department or location assignment and zoning. Further, batching, routing and sorting have been considered as part of the picking process.

Karim, (2018) states that warehouse is more than just a place where inventories are stored. The aims of warehouse management are to increase productivity and accuracy, and reduce and control the cost of inventory and shipping while providing good customer service. Meanwhile, warehousing is primarily for receiving, storing, packing, and shipping goods and requires labor, capital (land, storage, and handling equipment) and information systems, all of which are expensive.

A warehouse is planned space for the storage and handling of goods and materials. In general, warehouses are focal points for product and information flow between sources of supply and beneficiaries (Anteneh B., 2017). A warehouse is a commercial building for buffering and storage of goods for consumption or an intermediate area for storage of raw materials for production until they are needed (Belayhun B., 2017).

The reasons for warehousing of products are; to achieve transportation and production economies of scales, to take advantage of quantity purchase discounts and forward buys, maintaining a source of supply, supporting the firm's customer service policies, supporting the just-in-time programs of suppliers and customers, providing customers with a mix of products instead of a single product on each order, providing temporary storage of materials to be disposed or recycled with reverse logistics (Faber N., 2015).

Paul & Lestari, (2015) the activity to manage the goods stored in the warehouse is called warehousing. While the warehouse has a lot of different operations, they have some common patterns in the material flow and warehouse typical operations such as receiving, put-away, replenishment, internal order picking, gathering and sorting, packing, cross-docking, and delivery.

Faber N.,(2015) stated that Warehouse performance: 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.

2.1.2 The Purpose of Warehousing

A warehouse is a commercial building used for the storage of goods. The most important element of warehousing is order processing which generally refers to the workflow coupled with delivering products ordered by a customer. The prime objective of most warehouses is to facilitate the movement of goods from suppliers through the supply chain to the end consumer while meeting the customers' demand in a timely and cost-effective manner. In the old days of warehousing, inventory was seen to represent the wealth of a company. However, these days this is not the case anymore. Instead, many companies have noticed the high cost associated with holding inventory. In practice, however, there are overriding factors such as meeting customer demand and expectations that make it hard to operate without inventory. Even though the new technologies in e-commerce, supply chain integration, quick response, just-in-time delivery and efficient consumer response that connect the manufacturing with the end customers, businesses are still struggling to eliminate the existence of a warehouse. Thus, to meet the customer’s requirements, the warehouse needs to be properly coordinated and maintained (Van den Berg, 2012).

Valid reasons for holding inventory include, for example, buffering cycles between two production processes, covering demand during supplier’s lead-time, enabling savings by using volume discounts, coping with seasonal fluctuations, providing a variety of products in a centralized location, or holding anticipation and investment stocks. As a result, the basic aim of

most warehouses is simply to minimize the total cost of operations while providing a desired level of service (Krajewski & Ritzman, 2005).

Warehousing also plays an important role from the supply chain perspective. Despite all the integration initiatives, supply chains will never be so well coordinated that warehousing can be completely eliminated. Frazelle, (2002) states that warehouses are important for a supply chain because they provide storage for raw materials, components, work-in-process, and finished goods; operate as distribution and order fulfillment centers; and perform localized and value-added warehousing.

2.1.3 The Role of Warehouse in Supply Chain

Warehouses are crucial components of the most modern supply chains. They are likely to be involved in various stages of the sourcing, production, and distribution of goods, from the handling of raw materials and work-in-progress through to finished products. As the dispatch point serving the next customer in the chain, they are critical to the provision of high customer service levels. Warehouses are an integral part of the supply chains in which they operate, and therefore recent trends, such as increasing market volatility, product range proliferation and shortening customer lead times, all have an impact on the roles those warehouses are required to perform. Warehouses need to be designed and operated in line with the specific requirements of the supply chain as a whole. They are therefore justified where they are part of the least-cost supply chain that can be designed to meet the service levels that need to be provided to the customers. Owing to the nature of the facilities staff and equipment required, warehouses are often one of the most costly elements of the supply chain and therefore their successful management is critical in terms of both cost and service (Baker, 2007).

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. Warehousing plays a vital role in the supply chain in providing a desired level of customer service at the lowest possible total cost. Warehouses are expected to be more responsive to customer demands than ever before by providing value-added services such as 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 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 (Faber N., 2015).

A warehouse reorganizes and repackages products. Products typically arrive packaged on a larger scale and leave it packaged on a smaller scale. In other words, an important function of this warehouse is to break down large chunks of products and redistribute them in smaller quantities. For example, some stock keeping units (SKUs) may arrive from the vendor or manufacturer in pallet quantities but be shipped out to customers in case quantities; other SKUs may arrive as cases but be shipped out as each; and some very fast-moving SKU may arrive as pallets and be shipped out as each (Hackman, 2014).

Since inventory holding and the customer serving are key warehouse functions, which implies the warehouse has an important role to play in supply chain. Some of the important roles of the warehouse are to make or break bulk. Consolidation centers, cross-docking centers, transshipment, product fulfillment centers, returned goods depots. Some other roles like customer support, installation and repair services. The roles mentioned here are associated with some concepts like agility, production postponements and time compression which are recognized as increasing trends in warehousing. Thus, inventory has an important role in the warehouse in modern supply chains (Asmelash, 2017).

Warehousing facilities play a vital role in the overall supply chain process. It is evident that continuing globalization and changes/challenges occurring in such areas as reverse logistics, environmental sustainability, information technology and overall supply chain integration are further evolving the strategies, roles, and responsibilities for warehouses. Warehousing is costly in terms of human resources and of the facilities and equipment required, and its performance will affect directly the overall supply chain performance (More, 2016).

Warehouses function as node points in the supply (value) chain linking the material flows between the supplier and the customer. As a result of the highly competitive market environment, companies are continuously forced to improve their warehousing operations. Many companies have also customized their value offer to meet customer demands, which has led to

changes in the role of warehouses. In such conditions, improvement of order processing and materials handling can bring significant cost savings and at the same time increase customer value (Tommy, 2010).

2.1.4 Warehousing Activities

In order to grasp detailed knowledge, articles of different authors will be presented in a detailed step-by-step manner as follows: As Discussed by Habazin, (2017), basic warehouse processes are the following: receiving, put-away, internal replenishment, order picking, accumulating and sorting, packing, cross-docking, dispatch and shipping. Receipt and storage are considered inbound processes, while others are considered outbound processes. In various warehouses, goods, which usually enter as units of a larger scale, go through reorganization submitted to repackaging that result in units of a smaller scale. Large packages of items, which arrive in a warehouse as pallet quantities, are broken down into smaller quantities throughout order picking, packing and finally distribution. In this kind of warehouses, operations, which are done daily, are tied with human performance and greatly depend on it. The smaller the handling unit, the greater the handling cost. Smaller units require more labor and much more processing to be delivered. Precisely, pallet manipulation at a warehouse directly influences the time used for picking. This results in accurately collected units, which are then forwarded to the next process.

Receiving

First in the line of warehouse processes is receiving of goods. This process does not take as much time as picking, which is shown onwards, but it is as relevant as any. Especially if incorrect put-away occurs and causes errors in further processing. The process of receiving can begin with the notice of the goods arrival. This permits the warehouse to prepare, to schedule inbound operations so there are no uncoordinated events. With arrival, unloading begins after which units are put away with accurate documenting (Habazin, 2017).

Receiving is the setup for all other warehousing activities. If we don’t receive merchandise properly, it will be very difficult to handle it properly in put away, storage, picking or shipping. If we allow damaged or inaccurate deliveries at the door, we are likely to ship damaged or inaccurate shipments out the door (Frazelle, 2002b).

Receiving may begin with advance notification of the arrival of goods. This allows the warehouse to schedule receipt and unload to coordinate efficiently with other activities within the warehouse. Once the product has arrived, it is unloaded and possibly staged for put away. It is likely to be scanned to register its arrival so that ownership is assumed, payments dispatched, and so that it is known to be available to fulfill customer demand. The product will be inspected for any exceptions noted, such as damage, incorrect counts, wrong descriptions, and so on. Generally, receiving accounts for only about 10% of operating costs in a typical distribution center (Bartholdi and Kackman, 2011).

Put-away: Put-away process may require a large amount of work because SKUs must be moved over significant distances to their storage position. Put-away accounts for approximately 15% of warehouse operating costs (Kusrini *et al*., 2018). Every Stock Keeping Unit (SKU) in a warehouse has its own location, determined in advance, whether the positioning is predefined or random. Precisely, there are several storage policies. A predefined storage policy prescribes a particular location for SKU to be stored, but a random policy leaves the decision to the operator. Both of these storage policies can be used in some warehouses. Furthermore, a class-based storage system allocates zones to a specific product which is based upon products turnover rate as ABC zoning.

Before the product can be put away, an appropriate storage location must be determined. This is very important because where the warehouse operator stores the product determines to a large extent how quickly and at what cost the operator later retrieves it for a customer. This requires managing a second inventory, not of product, but of storage locations. The operator must know at all times what storage locations are available, how large they are, how much weight they can bear, and so on. When the product is put away, the storage location should also be scanned to record where the product has been placed. This information will subsequently be used to construct efficient pick lists to guide the order-pickers in retrieving the product for customers. Put-away can require a fair amount of labor because the product may need to be moved a considerable distance to its storage location. Put-away typically accounts for about 15% of warehouse operating (Bartholdi and Kackman, 2011).

The direct put-away activity involves transferring of (if applicable repacked, i.e., from pallets to cases) incoming products to a location within the storage area. 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. A wide range of systems can be used to store products, varying from shelf racks to automated storage systems (Faber N., 2015).

Order picking

Order picking involves the processes of clustering and scheduling the customer orders, assigning stock on locations to order lines, releasing orders to the floor, picking the items from storage locations and the disposal of the picked items. It is the process of order picking in a warehouse which involves selecting and gathering a specified amount of right SKUs in accordance with the order, and it is composed of lifting, moving, picking, putting, packing, and other related activities (Shiau & Lee, 2010).

During the order picking process, the orders are generally assigned to several pickers. However, in order to prevent control problems, the total pick area is often divided into picking zones. After this, the zones are generally served by different pickers through the zoning policy. Orders are picked one by one or in batches in a predetermined order. Further, order picking can be manual or automated. In manual order picking, the picker gathers units from their locations and then transports them to a picking area. In the case of automated picking, that is, automated storage and retrieval systems, systems retrieves one or more unit loads and place them to a picking station. After that, the picker takes products on orders, and the remaining items on the unit loads are transferred to storage again (Tommy, 2010).

Order picking (pallet/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. 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-intensive. Many different order-picking system types can be found in warehouses. In the picking process, the requested number of units of a product can be less than the number of units contained within a case (broken case picking), equal to or a multiple of the number of units within a case (full case picking), or as many units as on a pallet (pallet or bulk picking). When picking the products, an order picker may pick one customer order at a time

(single order picking), several customer orders at once (batch picking), or parts of several customer orders (zone-batch picking) (Faber N., 2015).

Shipping

The process of shipping is the final process amongst warehouse processes. After packing and preparing units for shipping (consolidation), the first step is loading into transportation vehicles with the assumption that the shipping methods have been previously arranged. This process is not as complex and generally includes less labor than mentioned before, although there can be some additional activities if the product is being staged before being loaded. Also, outbound zone can include control, which will often occupy at least one warehouse worker to provide the activity. Depending on the warehouse information system, control can be done manually or using a scanner (Paul & Lestari, 2015).

Shipping generally handles larger units than picking because packing has consolidated the items into fewer containers (cases, pallets). Consequently, there is still less labor here. There may be some walking if the product is staged before being loaded into freight carriers. The product is likely to be staged if it must be loaded in the reverse order of delivery or if it is shipped long distances, when one must work hard to completely fill each trailer. Staging freight creates more work because staged freight must be double-handled. The trailer is likely to be scanned here to register its departure from the warehouse (Bartholdi and Kackman, 2011).

Shipping includes the tasks that help prepare usable commodities for shipment to customers and the placement of those commodities on vehicles for transport to the customers. The shipping activities like other warehouse activities need a dispatching area for processing information and for dispatching personnel to fulfill various tasks like checking packing, labeling or loading items. Sometimes, the dispatching area is located in a walled office although more often it is located in an open area within the receiving/shipping section of the warehouse. The dispatching section of the receiving/shipping area should require a minimum area. If cross docking is likely to become part of the requirements, you may need to estimate its space requirements and establish a separate area in the store for these purposes (USAID, 2016).

Storage

Storage is the physical containment of merchandise while it is awaiting a demand. The storage method depends on the size and quantity of the items in inventory and the handling characteristics of the product or its container. Storage is essential in many cases and, when properly designed, it also provides added value (Frazelle, 2002).

Storage is the activity of storing products at warehouses and logistics centers. Its role is to provide a steady supply of goods to the market to fill the temporal gap between producers and consumers. It also plays an important role in maintaining quality at warehouses and logistics centers and value of products. For example, the storage function for fresh fish, vegetables, and fruits has dramatically improved with the advent of freezer and refrigerated warehouses. Important logistics centers in storage include: distribution centers (DC), transfer centers (TC), and process distribution centers (PDC) (Hompel *et al.*, 2007).

2.1.5 Types of Warehouses

As explained by Sneha & More, (2016) types of warehouse as follows:

Private Warehouses: The warehouses, which are owned and managed by the manufacturers or traders to store, exclusively, their own stock of goods are known as private warehouses. Generally, these warehouses are constructed by the farmers near their fields, by wholesalers and retailers near their business centers and by manufacturers near their factories. The design and the facilities are provided according to the nature of products to be stored.

Public Warehouses: The warehouses that are run to store goods of the general public are known as public warehouses. Anyone can store his goods in these warehouses on payment of rent. An individual, a partnership firm or a company may own these warehouses. To start such warehouses, a license from the government is required. The government also regulates the functions and operations of these warehouses. Mostly these warehouses are used by manufacturers, wholesalers, exporters, importers, government agencies, etc.

Government Warehouses: These warehouses are owned, managed and controlled by central or central or state governments or public corporations or local authorities. Both government and private enterprises may use these warehouses to store their goods.

Bonded Warehouses: These warehouses are owned, managed and controlled by the government as well as private agencies. Private bonded warehouses have to obtain a license from the government. Bonded warehouses are used to store imported goods for which import duty is yet to be paid. In case of imported goods, the importers are not allowed to take away the goods from the ports until such duty is paid. These warehouses are generally owned by dock authorities and found near the ports.

Co-operative warehouse: These warehouses are organized on a co-operative basis and run on joint efforts of people. These are made in rural areas for storage of agricultural goods. The best example of a co-operative warehouse is cold storage.

2.1.6 Warehouse Management System (WMS)

A warehouse performance measurement is a method to measure activity performance, program or service which is provided by a warehouse. Performance measurement system as the sets of metrics used to quantify both the efficiency and effectiveness of action. Performance measurement can be divided in four categories: input, output, efficiency and effectiveness. In general, efficiency and effectiveness are the most widely utilized as a measure of performance (Kusrini *et al*., 2018).

Ramaa *et al.,* (2012), states that warehouse management system or WMS primarily aims to control the movement and storage of materials within a warehouse and process the associated transactions, including shipping, receiving, put-away and picking. A warehouse management system (WMS) is a database-driven computer application to improve the efficiency of the warehouse by directing cutaways and to maintain accurate inventory by recording warehouse transactions. The systems also direct and optimize stock based on real-time information about the status of bin utilization. It often utilize Auto ID Data Capture (AIDC) technology, such as barcode scanners, mobile computers, wireless LANs (Local Area Network) and potentially Radio-frequency identification (RFID) to efficiently monitor the flow of products. Once data has collected, there is either batch synchronization with or a real-time wireless transmission to a central database. The database can then provide useful reports about the status of goods in the warehouse.

A WMS is a software system that enables one to control different activities in a warehouse or a distribution center. It regulates the tasks that need to be accomplished by sending commands to the staff's hardware devices or the automated material control systems. A WMS provides real time communication by conveying activities for staff and machines to perform. There are very many different functions in a WMS, ranging from receiving and quality assurance to packing and shipping. In some, there are more high-end functions which cover, for example, forklift travel optimization, support for forward pick areas and automated replenishments. The most important capabilities of a WMS are apart from controlling the warehouse, of course to handle all main activities from the receiving to the shipping (Van den Berg, 2012).

Atieh *et al.*, (2016) states that warehousing management system (WMS) is a necessary approach for every warehouse; An automated warehousing system provides less effort, more efficient, and reliable results compared to a manual handled system. WMS is designed to help reduce costs through effective warehouse processes. The WMS granule provides functionality for handling advanced warehouse processes that involve the so-called zones and bins, directed picks and put-away., as well as automated data capture systems. To perform directed pick and put away, it is necessary to divide the warehouse into zones and bins. A zone could be a receiving zone or a stocking zone, and each zone can consist of one or several bins. The need for automating the warehouse arises from the fact that manual handling may cause human errors in which may affect the warehouse utilization.

The objective of a warehouse management system is to provide a set of computerized procedures to handle the receipt of stock and returns into a warehouse facility, model and manage the logical representation of the physical storage facilities (e.g. racking etc.), manage the stock within the facility and enable a seamless link to order processing and logistics management in order to pick, pack and ship product out of the facility. Warehouse management systems can be stand-alone systems or modules of an ERP system or supply chain execution suite (Saxena, 2013).

The main function of a warehouse management system is the management of a warehouse. The system keep record of the storage capacity, i.e., the specification of the existing storage bins (location management) and record of the stored units (inventory management) (Heung, 2016). A WMS focuses on coordinating the processes within the warehouse. It supports the day-to-day operations in a warehouse (Faber N., 2015). It is generally built around an industrial-strength

relational database. At a minimum, the database tracks all product arriving and all product shipped out and the most fundamental capability of a WMS is to record receipt of inventory into the warehouse and to register its shipment out (Bartholdi and Kackman, 2016).

A warehouse management system primarily aims to control the movement and storage of materials within a warehouse and process the associated transactions, including shipping, receiving, put-away and picking and to improve the efficiency of the warehouse (Faber N., 2015).

Warehouses usually managed their inventory manually, which was quite difficult, and the rate of error was high in the manual work. With the implementation of Warehouse Management system, all that paper work has ended, and the inventory is managed in a computerized way, and the error in the inventory management has decreased (Naseed and Husain, 2013).

WMS tend to be more often associated with the need to do something to service your customers that your current system does not support such as first-in-first-out, cross-docking, automated pick replenishment, wave picking, lot tracking, yard management, automated data collection and automated material handling equipment (Apparel Logistics Group, 2014). WMS enables real-time tracking of receiving, storage and immediate access to information on combined statistics of weight and lines for a specified customer (Hui Nee, 2009). WMS will reduce labor costs, inventory, increase storage capacity, increase customer service and increase inventory accuracy (Apparel Logistics Group, 2014).

By integrating advanced radio frequency and bar coding technologies with core warehousing functionality, WMS provides comprehensive fulfillment center and warehouse management, including receiving, stocking, picking and related warehouse tasks. WMS also provides detailed audit trail that measures performance levels objectively, ensures employee accountability and allows material flow to be easily traced (Hui Nee, 2009).

Warehouse accuracy is paramount for the software to operate and do this; data will need to be entered accurately and in a timely fashion. Although most WMS implementations will reduce labor costs in the placement and removal of materials, there is often an added warehouse management function required just to operate the software. Despite the complexity, WMS implementations do offer businesses significant benefits. Not only will placement and removal cycle times be reduced, but inventory accuracy should be improved as well as increased storage

capacity, more organized storage of materials and greater flexibility of warehouse operations (Karimi and Namusonge, 2014).

Basic features of most WMS's include tools to support: Appointment scheduling, receiving, quality assurance, put-away, location tracking, work-order management, picking, packing and consolidation and shipping (Bartholdi and Hackman, 2014).

2.2 Empirical Review

Previous studies and researches in the area explained results they found from different perspective/dimensions. Some of the research findings related to warehousing activities are summarized as follows.

Sneha & More, (2016)**,** finds out in her study of efficiency and effectiveness of Warehouse Management that, as a result of global competition and supply chain concepts, including a focus on integral inventory control, warehousing has become a critical activity in the supply chain to outperform competitors on customer service, lead-times, and costs. Timely and accurate information about products, resources and processes are essential to operationalize a planning and control structure that effectively and efficiently achieves the high performance of warehouse operations required in today's marketplace. The author also showed that warehouse complexity affects the planning and control structure through the comprehensiveness of the work to be done. In highly complex warehouses, feeding organizational actors with the right type of information and knowledge at the right time is difficult. Nonetheless, a complex warehousing operation requires a control structure that has a great deal of information, data, and knowledge about products, processes, customers, and resources readily available. Thus, Optimization strategies are utilized to position product availability and delivery as a competitive advantage while also optimizing the cost trade-offs associated with transportation, facilities, equipment, workforce, and other critical cost variables. The distribution center also provides time-saving utility by storing product until it is demanded.

Shah & Khanzode, (2017), identifies the tradeoffs between picking efficiency and order responsiveness could be studied with different stochastic issues (worker overtime, earliness, tardiness, penalty, order due date, costs, etc). In addition, many studies have been found solely

for picking efficiency, but the integrated model including responsiveness may provide better results.

Karim *et al.*, (2018), show their result of on failure factors of Warehouse productivity as; to sustain economic development, the warehousing industry must be focused on positive action that should be supported by everyone at all levels of government, private and nonprofit organizations as well as the people. Therefore, suggestions and recommendations on warehouse productivity performance will directly influence development to a higher level and boost competitiveness in the logistics service sector. However, these warehousing and storage strategies will be beneficial when everyone participates consistently, endeavors to innovate and improve productivity, and increases the efficiency of warehousing operations.

Habazin *et al.*, (2016), provide their recommendation in the study of the Order Picking process in warehouses" that every process, from receiving until shipping as well as order picking is also the one that accounts for the majority of warehouse operating costs and requires the most performing time. Once the picker starts gathering products from orders, they walk, move, lift, put, pack and do other related works, which take time and, in that way, become costs. To perform a suggestion of a solution, the order picking process has been analyzed, regarding detailed process flow and time dedicated for its performance. In accordance with its status, it has a possibility of being reduced by different strategies. Companies willing to optimize their processes tend to measure them but also tend to have an objective view on the core process structure. To be open to change and to be continuous in evaluation is a crucial matter for any process optimization.

In addition, the authors also suggest that, after a detailed analysis, observed on broad data that include seasonality, KPIs, types of goods, performance and the structure of any kind of warehouse process, it can be well modified. By optimizing order picking as proposed, it is considered that the processes would run more efficiently. The optimization includes predefining WMS data and reorganization of dedicated storage locations directly influencing the time-consuming order picking, which is presented with the proposed changes in the observed company's warehouse layout. The evaluation of effectiveness of a certain process, such as order picking, should be constantly supervised in the form of analysis and chronographically measured to be controlled and reduced.

Atieh *et al.*, (2016), examines the main purpose of automating the warehouse system is to control the movement and storage of the products, together with the benefit of enhanced security and quicker handling. The newly created software upgraded the capabilities of the warehouse management system. Currently, the stored data can be organized according to serial number, activated easily assuring the FIFO concept, and handed to the dealers accurately with the least number of possible errors.

Van den Berg, (2012) reflects in his study of highly competitive warehouse management that excellent warehouse performance helps companies to create competitive advantage by reducing logistics costs, by increasing internal and external customer service levels, and by aligning business activities. Research shows that best-in-class companies realize competitive customer service levels while achieving logistics costs advantages of 20 to 30 percent over their laggard peers. Moreover, these companies are financially more successful.

2.2.1 Challenges of Warehousing Activities

Paul & Lestari, (2015) illustrate warehousing related challenges as shown below:

Receiving Related Challenge: in this stage the warehouse has problems that contribute to stock inaccuracy: miscount due to human error, miswritten, misread, and mixed up goods (when there are no regulations about product placement in this section, and this can cause goods to get mixed up and confuse the employee during the recording process causing inaccurate stock data).

Put-away related challenge: The problem occurring in this section is the goods arrangement and access to storage. Even though employees have already put the same product within the same goods type, this is not enough. There is another consideration for goods placement besides product type such as order frequency arranged goods from the highest demand/sales to the lowest. There will also be easily accessed and controlled means that the goods have to be put at the place where the employee can take the goods as soon as the order comes in, and it will be easy to notice whenever something happened to the goods such as out of stock or missing goods.

Storage access related challenge: one of the problems within this stage that contributes to stock inaccuracy is due to the uncontrolled storage access. There are two types of storage access, authorized and unauthorized. The employee in need to do order picking has the order bill authorized by the Supervisor, then enters storage to do the order picking process, and the

employee with unknown intention and just enters the storage unauthorized. This happened because the company's regulations before order picking process occurred in the storage section while issuing no regulations about the storage access for other employees and no control over the storage access. In addition, there may be insufficient and/or inappropriate storage area.

Order picking related challenge: the problems identified during order picking are the higher process time of certain goods, difficulties to access the goods, the movement path blocking the path. The process time would be affected by the goods placement. The goods placement affected the picking process by causing the employee to have difficulties to access the goods. Difficult access is when an employee has to do extra work to take the needed goods to go through by moving some of the blocking the path, then take the moved goods back to their place.

Shipping Related Challenge: The problem in this section is the same problem in a continuous workflow delay in the predecessor activity causes another delay in the next process, continue and accumulate affecting the process output as shipment delay. However, the delay in the predecessor process barely affects the work in this section.

2.2.2 Warehouse Performance

Performance refers to the way in which work is done. There can be a good performance or a poor one (Liviu, Ana-Maria and Emil, 2009). As stated by Frazelle, warehousing is one of the factors which are responsible for business competitiveness. Businesses compete on the basis of financial, productivity, quality and cycle time performance. So it is important to hold warehousing accountable for these activities to go smoothly. There are four quality indicators for warehouse performance two of which for inbound handling and the other to for the outbound handling of products, these indicators are Put away accuracy (the percent of items put away correctly), Inventory accuracy (the percent of warehouse locations without inventory discrepancies), Picking accuracy (the percent of order lines picked without errors) and Shipping accuracy (the percent of order lines shipped without errors) (Frazelle, 2002). Dr. Vipul Chalotra in his study identified that four factors affect warehouse performance, and these factors are long lead time, poor warehouse layout, irregular deliveries, and improper forecasting of demand (Venul, 2013). Yu and De Koster in their study discussed the concept of dynamic storage, which can improve order throughput and reduce labor cost simultaneously due to shorter travel in picking tours (Yu and De Koster, 2010). According to these two studies warehouse performance,

warehouse performance is affected if the storage practice is not as efficient as supply chain system expects.

For describing the warehouse performance and improvement, we should have to perform a process mapping. It is a useful way of depicting all activities that take place in the warehouse. Generally, a company's warehouse operations can influence the firm's corporate performance in manners such as receiving, storage and shipping (dispatching) in relation to quality, cost, speed and productivity. Receiving, storage as well as picking and shipping has their own cost, quality such as perfect order fulfillment incorporating accuracy and response time as speed should be measured and continuously improved.

To narrate Warehouse activities performance with performance indicators the below table explains the relation.

Table 2.1 Warehousing/Storage Performance indicators

Quality Indicators	**Response Time Indicators**	**Cost/Financial Indicators**	**Productivity Indicators**
Inventory Accuracy Rate	Warehouse Order Processing Time	Total Warehousing Cost	Storage Space Utilization
Put-Away Accuracy	Customs Clearance Cycle	Value of Product Damaged in the Warehouse	Units Moved Per Person Hour
Picking Accuracy Rate	Put-Away Time		% of Storage Space Dedicated for Handling
Warehouse Accident Rate			
Defined Security			

Source: a modified adoption from (Aronovich *et al.*, 2010).

Quality

A. Inventory Accuracy Rate

This indicator measures the percentage of warehouse or storage locations that had no inventory discrepancies when stock cards were compared to a physical inventory count out of the total number of locations under review during a defined period of time. Alternatively, this indicator

can be calculated for a single facility as the percentage of months or quarters with no inventory discrepancies out of the total number of months or quarters in the review period (e.g., annual). The inventory accuracy rate can be used to assess overall inventory control performance for a group of storage facilities or for one storage facility over a set of review periods. Inventory accuracy is critical for managers to know how much they have in stock at any given point in time and to know when a new order must be placed to replenish stock. This discrepancy analysis can help managers identify storage locations that are having problems with inventory management; the analysis can lead to opportunities for improvement.

B. Put-away Accuracy

This indicator is the percentage of items placed in the correct location or bin in a warehouse or storage area. This indicator measures a facility's ability to stock items in the correct location so they can be quickly and easily located. This can provide an indication of whether staff is practicing good warehousing practices and guidelines. This indicator can be measured during a site visit or by making periodic checks at the facility over a specified length of time. For example, during a quarterly period, the number of times items were found in the wrong location.

C. Picking Accuracy Rate

This indicator is defined as the percentage of items or lines picked accurately (i.e., the correct items and quantities) from storage based on a request or packing list, and then placed into the appropriate container. This indicator measures whether items are accurately selected from storage and placed into a container to be shipped to the requesting facility. It can reveal the ability of the facility to pick requests correctly in terms of quantity and item. Errors can result in stock outs or overstocks at the ordering facility. To collect data for this indicator, a review of items just before they are loaded for transporting can be conducted to determine the accuracy of picked items compared against an invoice or requisition form. It can be calculated for a single order or for all orders during a defined period of time.

D. Warehouse Accident Rate

This indicator measures the total number of accidents occurring in a warehouse or other storage facility during a defined period of time. This indicator can reveal poor warehouse management and practices, untrained staff, unclear safety guidelines, faulty equipment, or poor conditions. It

can help pinpoint areas needing improvement by determining the cause of the accidents because of human error or other reasons. With intervention, accidents should decrease in frequency.

E. Defined Security Measures

This indicator measures whether there are guidelines or standard operating procedures (SOP) in place that provide instructions to prevent theft or leakage at a given storage location. Implementing proper security measures at storage facilities will help prevent theft and leakage of products, thus saving money and increasing the availability of commodities. The program should have defined and detailed instructions for facilities to follow to ensure that the facility is secure and the products protected. Evaluators should also assess the quality or thoroughness of these guidelines or SOPs and the level of adherence by the facilities.

Response Time

A. Warehouse Order Processing Time

This indicator measures the average amount of time (e.g., minutes, hours, days, weeks) from the moment an order is received at the storage facility until the time the order is actually shipped to the client. The order processing time can be calculated for a specific shipping facility averaged across orders or on average for orders to a specific client or for a specific product. This indicator helps monitor the order processing performance and the efficiency of a shipping facility. It also helps identify opportunities for improving staff performance in order management and a facility's response time.

B. Customs Clearance Cycle

This indicator measures the amount of time (e.g., minutes, hours, days, and weeks) from the moment the cargo arrives in the port or airport until the moment that it clears customs, arrives at the warehouse, and is ready to be put away. This indicator can be calculated by product or supplier or the average across products or suppliers during a specified period of time. If other factors affect getting the product from the port to the warehouse, such as lack of equipment at the port facility, evaluators can scale this calculation down to the specific amount of time that the products were sent to the customs office until the customs office cleared and released them. The indicator can help identify delays in customs clearance and, with additional research, the causes involved such as incomplete paperwork, poor material description, missed certificate of origin,

etc. Based on that, opportunities for improvement can be identified and actions taken to minimize the amount of time required for products to clear customs and to be made available at the warehouse.

C. Put-away Time

This indicator measures the amount of time it takes from when the product (s) has been unloaded from a truck after arriving at a warehouse or other storage location to when it is stored in its designated place and is ready for picking. This indicator can be calculated by product or by shipment or as an average across products or shipments, during a specified period of time. Measuring the put-away time can help improve productivity by monitoring the efficiency of the put-away processes and the staff responsible for the task. It can help managers identify work conditions or processes that need improvement, as well as the need for staff training.

Cost/Financial

A. Total Warehousing Cost

The total warehousing costs collect all costs related to warehousing, such as labor costs and warehouse rent; or mortgage payments, utility bills, equipment, material- and information handling systems, etc. It also includes costs related to systems, supplies, and any other material with specific use in warehousing. This indicator is usually measured annually. This indicator can also be calculated as the total warehousing cost per piece/line by dividing the total warehousing cost by the quantity of stocked units or by the volume of stocked items in cubic meters (m3), per storage area (m2) or program. Using this indicator, managers can monitor the costs of different components in a warehouse, as well as compare costs between different warehouses. It can help identify the most cost-effective warehouses and can also lead to an analysis of best practices. Dividing total warehousing costs by units or area can also indicate storage usage, cost effectiveness, etc. By dividing the warehousing costs per SKU, this indicator provides the management team with excellent detailed cost visibility.

B. Value of Product Damaged in the Warehouse

This indicator calculates the value of products damaged, during a defined period of time (usually one year), in the warehouse as a percentage of the value of all shipped products during that period. Inappropriate warehousing conditions or handling of products can lead to inventory

damage. This indicator can help put the value of products damaged into perspective and can be used to help identify the causes, as well as the actions needed to avoid such damages, including better infrastructure, manpower, training, etc.

Productivity

A. Storage Space Utilization

Storage space utilization indicates the percentage of the total storage space actually being used out of the total storage space available. Based on this indicator, managers can monitor storage capacity and utilization at a warehouse. By assessing storage space utilization, managers can look for opportunities to improve storage capacity (e.g., remove expired products, de junking, reorganizing) and maximize the use of the storage space, or request a re-evaluation of layout, material flow, shelves disposition, etc.

B. Units Moved Per Person-Hour

This indicator measures the number of units (e.g., boxes, pallets) or weight moved during a defined period of time, per person-hour, for each person working during that period. It can be considered both when receiving and shipping inventory. This indicator helps measure material handling productivity for a period of time (hours, days, or months). It helps compare productivity levels in different working shifts or different warehousing locations. It can be a source for identifying needs for training and measuring its effectiveness.

C. Percentage of Storage Space Dedicated to Product Handling

This indicator measures the number of units (e.g., boxes, pallets) or weight moved during a defined period of time, per person-hour, for each person working during that period. It can be considered both when receiving and shipping inventory. This indicator helps measure material handling productivity for a period of time (hours, days, or months). It helps compare productivity levels in different working shifts or different warehousing locations. It can be a source for identifying needs for training and measuring its effectiveness.

2.3 Conceptual Framework

This part of the proposal introduces the conceptual framework that is developed for the study. The framework which is developed for this study is formulated based on approaches and

concepts identified in the literature review in this chapter. The purpose of the framework is to explicate the conceptual logic and direction of the study. It engages leading ideas and helps to explain the significance of this study's concepts. Since the aim of this research is to determine warehousing management practices, it needs first to discuss the main activities of warehousing.

The main activities that are included under warehousing are:

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

Actual physical receipt starts after the arrival of the shipments. Incoming stock needs to be checked carefully, received correctly and stacked in a systematic way. The receiving of stock should be performed according to the Standard Operating Procedure for Receiving of Stock which is compiled for use by the warehouse. Once the product is arrived, the warehouse manager needs to coordinate and complete the following receiving activities:

- ***Unloading-*** Planning unloading can improve efficiency of the warehouse operation. The warehouse manager should inspect the arriving vehicle and the way the shipment has been packed in order to determine the most efficient way of unloading. Sufficient staff as well as storage equipment must be available for unloading.
- ***Checking stock against documentation-*** The package, quantities and condition or quality should be verified against the documentation. The documents used to verify the delivery are the original order and the invoice/ packaging list that is attached to or included in the package. The supplier compiles this packaging list or invoice, and it gives a detailed description of each item with delivery. Each item in the package is now checked by comparing it with the item ordered and the item reflected on the invoice/packaging list. Always ensure that the stock item complies with set specifications and standards.

- ***Check for any discrepancy-*** A discrepancy is simply a difference in what was physically received versus what was sent as per the delivery note. It could be product difference, quantity difference, quality difference, batch difference and expiry difference. The discrepancy must be followed and resolved shortly. Formal nonconformance report must be completed and communicated to the supplier. The report should include the details including product description, batch number and expiry, invoice number, date and time of receipt, transporter responsible for delivery, and nature of the discrepancy.
- ***Capture data of received stock-*** If all of the above checks have been done and everything received is correct and corresponds with both the order and the invoice and the quality is acceptable, the person responsible for receiving the order signs and dates the packaging slip or invoice. Products can now be accepted into the stock control system by entering them on your stock card (manual system), or by capturing them on the computerized stock control system where a "goods received note" will be generated.

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

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

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

4. Order picking: is the process of selecting products from the storage area in the required quantities and at the required time to meet customer orders. Order picking efforts should be managed for maximum efficiency by attempting to reduce travel times, miss-picks and product

damage while maximizing worker efficiency and reducing time spent on picking. Picking activity is becoming increasingly important in supply chain management. Any underperformance in order picking can lead to unsatisfactory service and high operational costs for the warehouse and the whole supply chain.

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

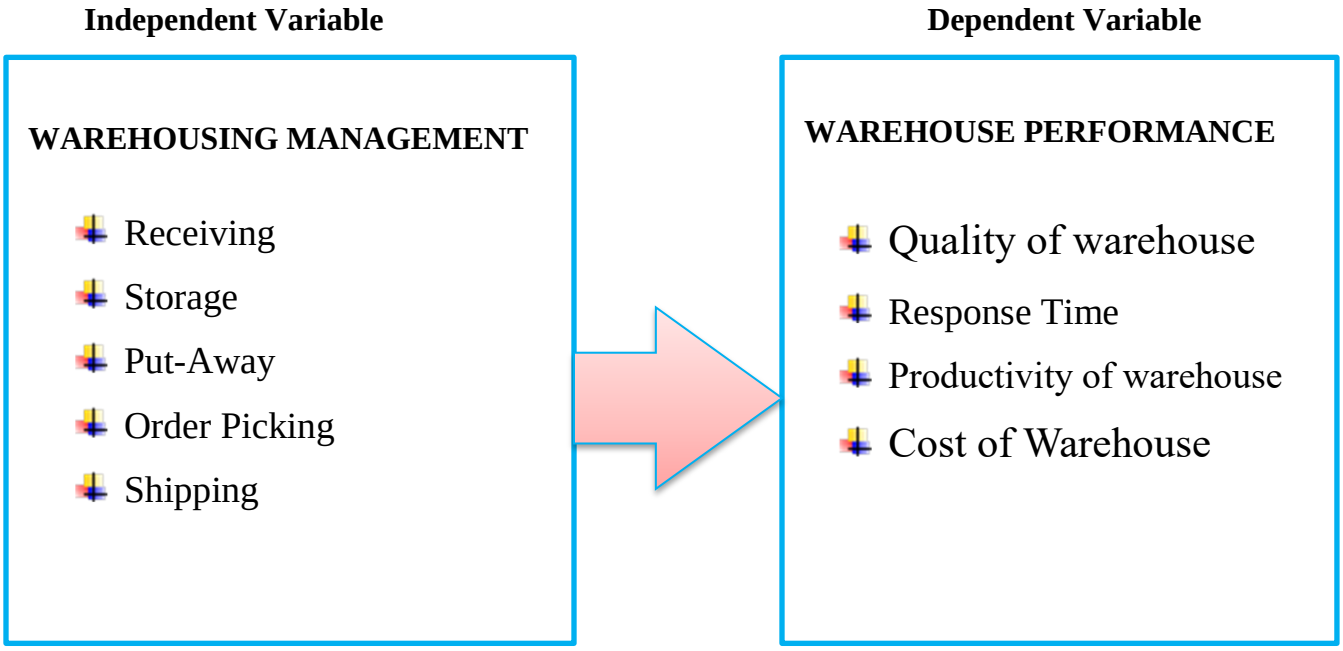

Figure 2.1 Conceptual Frameworks of the study (own design)

CHAPTER THREE

3. RESEARCH METHODOLOGY

Introduction

This part of the study shows the research design and methods that were used to achieve the objectives of the research. It includes a description of the study area, research design, research approach, sample design, data source & type, data collection procedures, data analysis, ethical consideration, model specification, reliability, and validity.

3.1 Description of the Study Area

This study was conducted at Modjo dry port. Modjo dry port is located in the East Shoa Zone of Oromia Region, Ethiopia at a distance of 38 miles (75 km) southeast of Addis Ababa and 850 km (528 miles) from Djibouti (the main gateway to the sea for Ethiopia). The Modjo dry port covers more than 60 hectares of land, from which 27.84 hectares have been developed for container yards. Currently, the port can hold 14,500 containers and handles 95% of Ethiopia's trade (UNDP, 2017). The study was engaged in examining the effect of warehousing management on warehouse performance in Modjo dry port. To examine those effects, data were collected from the warehousing department and those who closely work with them (transportation and customer response).

3.2 Research Design

Ornstein, (2013) defined research design as a strategic framework for action that serves as a bridge between research questions and the execution or implementation of the research. Saunders *et al.*, (2009) outlined different types of research methodology into categories such as exploratory, descriptive, and explanatory. An explanatory and descriptive design was employed in this study for the realization of intended objectives.

The reasons for the researcher using descriptive research design it is applicable to describe a situation, problem, phenomenon, service, or activities in a systematic manner related to warehousing management, and the reason for the researcher using explanatory design it enables to determine causality; to observe variation in the variable that is assumed to cause the change in the other variable and then measure the changes in the other variable using statistical methods. It

enables us to understand the nature of what we are looking at the different effects of warehousing management of Modjo dry port as they exist.

3.3 Research Approach

The research approach employed in this study was a mixed research approach. Mixed methods research approach is a procedure for collecting, analyzing, and "mixing" both quantitative and qualitative methods in a single study or a series of studies to understand a research problem. The basic assumption is that the uses of both quantitative and qualitative methods in combination are to provide better understanding of the research problem and question than either method by itself (Creswell, 2011). Mainly, data were collected using a questionnaire, hence the nature of data obtained through this method is quantitative. Besides, qualitative types of data were gathered and an informant interview conducted.

3.4 Data Type and Source

The data used for research work can be collected from several sources. The data which is used for both the theoretical as well as the empirical approach can be collected from various sources such as archival records, interviews, observations, physical artifacts, etc. This collected data can be divided into two different types, primary and secondary data (Kumar, 2005).

To address the questions of the study, the data were collected accurately. The data needed for the research were collected either as secondary or primary data. Hussey, (1997) explain the difference between them as follows: Secondary data is already collected by someone else and passed through the statistical process. So, the secondary source of data for this study was collected from the literature (books, journals, research papers, articles, company files, and the internet). The primary data was collected from the section of the selected group, which is the result of questionnaires and interviews.

3.5 Sample Design

In order to select the appropriate representative of the total population and make the research findings more relevant and accurate, the sample design would be well-structured (Davis, 2000). So, the researcher designed the sample as follows.

3.5.1 Sampling Technique

The sampling technique is a procedure that a researcher used to gather people, places, or things to study. A sample is part of the target population that has been procedurally selected to represent it and whose properties are studied to gain information about the whole. The sampling technique used for this study is probability sampling of proportional stratified simple random sampling. Stratified sampling was employed based on the strata of the departments that have a direct relationship with the warehousing management department and through a simple random sampling random table was done accordingly to the three departments (Warehousing Management, Transportation Management, and Customer Response department) form the strata. From each segment, employees were selected systematically by random sampling techniques. A sample size of 112 employees of the three target departments were taken to get a reasonable sample size (Yamane's, 1967).

3.5.2 Sample Size

To get a reasonable sample size, a sample determination of 95% level of confidence was used to select a sample of 112 workers of target departments (from transportation department 74, from warehousing department 50, and from customer response department 31), the total population was one hundred and fifty-five (155) employees of the organization by using Yamane's, (1967) simplified formula to calculate sample sizes. This formula was used to calculate the sample sizes from the population of 155, where A= 95% confidence level and P =5%, and by assuming that where n is the sample size, N is the population size, and e is the level of precision.

$$\mathbf{n} = \frac{\boldsymbol{N}}{\mathbf{1} + \boldsymbol{N}(\boldsymbol{e})^{\mathbf{2}}} \qquad n = \frac{155}{1+155(0.05)^2} = \frac{155}{1.3875} \approx \mathbf{112}$$

Where; N is Total number of target population of the study, n is sample size, and e error term

To get the sample size of each department

$$ni = \frac{Ni * n}{N}$$

Where; ***ni***= is sample from the department/strata, ***Ni***= Total number of each target department, ***n***= Sample size of all target department, and ***N***= Total population of all target department

Table 3.1: Number of target population and sample

No	Department	Total Number of employee	Samples size taken
1	Warehousing Management	50	36
2	Transportation Management	74	54
3	Customer response	31	22
	Total	**155**	**112**

Source: Own computation

To get a proportional sample size, the total sample sizes (112) were distributed proportionally across the target departments for the study in the organization.

3.5.3 Sampling Frame

A sample frame is an objective list of the population from which the researcher makes his or her selection. A sampling frame should be a complete and correct list of population members only (Cooper and Schindler, 2008). The sampling frame for this study was obtained from the Human Resource Department of Modjo dry port of Ethiopia consisting of management and staff who know about warehouse and closely work with the warehousing department.

3.6 Data Collection Instruments

The questionnaires were prepared using a 5-point Likert-Scale approach (i.e. Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree). According to Creswell J., (2003), open-ended questionnaires are appropriate when the objective is to discover opinions and attitudes. In addition to quantitative data collection, a qualitative approach through semi-structured interviews with managers of warehouse departments was used.

3.7. Validity and Reliability

3.7.1 Validity

Bryman & Bell, (2007) defined validity as how much any measuring instrument measures what it is intended to measure. They also suggest that the important issue of measurement validity

relates to whether measures of concepts really measure the concept or not. There are several ways of establishing validity such as content validity; concurrent validity; predictive validity; construct validity; and convergent validity. Cavanna *et al.*, (2001) state that validity is concerned with whether the researcher measures the right concept, whereas reliability is concerned with stability and consistency in measurements. That is if the same phenomenon is measured more than once with the same instrument, then the same results should be obtained (Mason, 2004).

For clarification and comprehension, the questions are written in a clear way. The subjects were given clear instructions, and the researcher completed the questionnaires for those who couldn't read. As a result, the researcher indicates the data collection methods are measuring what they are supposed to measure. This indicates that internal validity has been achieved.

3.7.2 Reliability

Nunnaly, (1978) stated that reliability is the consistency of a test, survey, observation, or another measuring device. The level of reliability of the instrument indicates the consistency of the variables. Cronbach‘s alpha is an index of reliability associated with the variation accounted for the true score of the underlying construct and it can only be measured for variables which have more than one measurement question. 0.5 is a sufficient value, while 0.7 is a more reasonable value. Therefore, the reliability of the questionnaire is analyzed by using Cronbach’s alpha statistics. As it is indicated in the table 3.2 below, all Cronbach‘s alpha indexes are above 0.7 suggesting that the variables are consistent to measure warehousing management in the organization.

Table 3.2 Reliability test

Construct	N of Items	Cronbach's Alpha
Receiving	11	0.767
Put away	7	0.714
Storage	10	0.757
Order picking	9	0.788
Shipping	7	0.866
Warehouse Performance	18	0.864

Source: Own Survey, 2021

3.8 Data Analysis

In general, there are two types of data analysis techniques namely: qualitative and quantitative where the choice of these methods greatly depends on the type of information the researcher has at hand. All quantitative data collected from respondents were analyzed using SPSS version 20 (Statistical Package for Social Science). The study employed descriptive analysis and inferential statistics (correlation) where necessary to show the relationship between variables and to infer the result of the sample to the population under study. The researcher presents the qualitative data collected from the in-depth interview to incorporate as evidence or to show the extent to provide detailed insight about the situation.

3.9 Model Specification

Multiple regression analyses is a general system for examining the relationship of a collection of independent variables to a single dependent variable in which independent variables may be quantitative measures or categorical (Aiken *et al.*, 2012)

In this study, multiple linear regression models were used to achieve research objectives. The basic objective of using multiple linear regression analyses in this study was to make the research more effective in analyzing impacts of independent variables (Receiving, storage, order picking, put away, and shipping) on the dependent variable (warehouse performance).

Gujarati, (1995) defines a regression function as follows:

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots.. + \beta_n X_n + \varepsilon i$

Where; $\boldsymbol{Y}$ is dependent variable (Warehouse performance). $\boldsymbol{X_n}$ is independent variables (receiving, storage, order picking, put away, and shipping) $\boldsymbol{\beta_0}$ is constant. $\boldsymbol{\beta_1 \ldots \beta_n}$ are the coefficient of the independent variables X_1 to X_n. $\boldsymbol{\varepsilon}$ is an error term

Multiple linear regression model assumptions were conducted based on Gujarati, (1995) and (Fidell, 2001). Checking goodness-of-fit carries significant benefits for the research because once the model is fitted; it is effective in describing the outcome of variables.

3.10 Ethical Issues

The researcher was used the following ethical issues in this study; the participants are not being subjected to physical or psychological harm; participants participate voluntarily; participants' right to privacy would be respected; and results was reported completely and honestly. In general, this study avoided causing any harm to the organization and maintained the confidentiality of the study participants.

CHAPTER FOUR

4. DATA ANALYSIS AND INTERPRETATION

This chapter concerned with the data analysis and presentation for the study.

4.1 Response Rate

The researcher distributed 112 questionnaires, out of which 101 questionnaires were successfully completed and returned a total of 101 questionnaires were effectively used for analysis that shows response rate of 90.18.

Table 4.1 Overall Response Rate

Population	**Number**	**Percent**
Numbers of questionnaire distributed	112	100
Unreturned questionnaires	11	9.82
Returned and usable questionnaires	101	90.18

Source: Own Survey, 2021

4.2 Respondents' Demographic Information

The demographic profile of the sample respondents is presented and analyzed below.

Table 4.2 General Information/Respondents Profile

Variable	Category	Frequency	Percent	Valid Percent	Cumulative Percent
Sex	Male	62	61.4	61.4	61.4
	Female	39	38.6	38.6	100.0
	Total	101	100.0	100.0	
Age	18-25 years	11	10.9	10.9	10.9
	26-33 years	56	55.4	55.4	66.3
	34-41 years	29	28.7	28.7	95.0
	above 42 years	5	5.0	5.0	100.0
	Total	101	100.0	100.0	
Educational Qualification	Below college diploma	2	2.0	2.0	2.0
	College diploma	22	21.8	21.8	23.8
	BSc, BA	68	67.3	67.3	91.1
	MSc, MA	9	8.9	8.9	100.0
	Total	101	100.0	100.0	
Field study	Accounting & Finance	31	30.7	30.7	30.7
	Management	17	16.8	16.8	47.5
	Marketing	8	7.9	7.9	55.4
	Economics	14	13.9	13.9	69.3
	LSCM	12	11.9	11.9	81.2
	Other	19	18.8	18.8	100.0
	Total	101	100.0	100.0	
Service year	Below 1 year	8	7.9	7.9	7.9
	1 to 2 years	35	34.7	34.7	42.6
	2 to 3 years	29	28.7	28.7	71.3
	More than 3 year	29	28.7	28.7	100.0
	Total	101	100.0	100.0	

Source: Own Survey, 2021

As its depicted on the above table 4.2 from the total respondents 62 (61.4%) of them are male and 39 (38.6%) are female respondents. From this analysis the researcher recognize that the number of male workers were greater than number of female workers. This implies that, more work was performed by male workers in the organization.

As it is clearly revealed in the above table 4.2 as the age of the respondents from the total number of respondents 11(10.9%) of them age are lies between 18-25 years, 56(55.4%) of the respondents age are lies between 26-33 years, 29(28.7%) of the respondents age are lies between the 34-41 years, 5(5%) of the respondents age are lies above 42 years. Therefore this indicates that the majority of the employees of the organization are productive group those whose age lies between 26 and 33 years.

As it clearly seen from above table 4.2 the total number of respondents as a reference to their education status 2(2%) of the employees are below diploma, 22(21.8 %) of the respondents have diploma, 68(67.37%) of the respondent are a degree holders and 9(8.9%) of the respondent are a masters holder. Therefore, this implies that the majority of the employees of the organization are the first degree holders. Hence, they can easily understand the questionnaire and responded rationally.

As its indicated on the above 4.2 table the total number of the respondents on their field of study 31(30.7%) of the employees are accounting and finance, 17(16.8%) of the respondents are management, 8(7.9%) of them are marketing, 14(13.9%) are economics, 12(11.9%) are Logistics and supply chain management (LSCM), and 19(18.8%) of the respondents are from other field of the study. So, the majority of respondents are accounting and finance field of study.

The above table 4.2 the number of respondents 8(7.9%) of the employees have below 1 year of work experience, 35(34.7%) of the employees have between 1-2 years of work experience, 29(28.7%) of the employees have between 2-3 years of work experience, and 29(28.7%) of the respondents are those who has more than three years of work experience. Therefore this express that the majority of employees of the organization have relatively low years of work experience so, they have motivation for work because of they are relatively between one and two year of experience in the organization.

4.3 Descriptive statistics of Independent variables (receiving, storage, put away, order picking, and shipping/dispatch)

The descriptive statistics of the variables included in the study were presented by using measures of central tendency (mean) and measure of dispersion (Standard Deviation). According to cited Zedatol, (2008) by Kibrom, (2019), mean score more than 4 is very high, 3-3.9 is moderate (adequate) and below 2.9 is low/poor. Warehousing management of organization is presented and discussed for each parameter of warehousing management with respective tables through mean and standard deviation.

4.3.1 Receiving

Table 4.3 Descriptive statistics of receiving activity of warehousing management

Item	***Mean***	***Std. Deviation***
MDP have a standard operating procedures (SOP) in place that provide instructions to receive items properly	3.43	1.424
We have notice of the goods arrival in advance which allows the warehouse to prepare	3.47	1.480
MDP has sufficient equipment's to unload materials.	3.39	1.449
MDP has sufficient space for loading/unloading materials	3.38	1.392
At the time of receiving, occurrence of physical accidents on received goods are minimum	3.65	1.315
At the time of items arrival appropriate documents are brought together	3.62	1.287
The shelves for each received materials in the warehouse are adequate to store and put away	2.94	1.199
There is clearly defined separated receiving area in Modjo Dry Port Warehouses	3.40	1.123
All members of the receiving team are well trained in the receiving procedures.	3.29	1.052
There is a pre-notification of the incoming goods that will be received in the warehouses	3.83	1.175

During the time of receiving goods, there are procedures for the cross checking of the documents with the goods	3.81	1.155
Grand Mean	***3.47***	***1.28***

Source: Own Survey, 2021

On the above table 4.3 as a grand mean value of (M=3.47) shows that the activity regarding to receiving in the organization are adequately performed in relating to the receiving warehouse of the organization like cross checking of the documents with incoming goods, there is pre-notification of incoming goods to prepare the warehouse, minimizing the physical accidents on received goods, and following the standard operating procedures/guidelines which helps to receive goods in to warehouse, but in the organization the shelves are inadequate for each received materials in the receiving warehouse of the organization to store the items in a suitable ways. Of course, the organization in relation to receiving of warehouse is good, still now there are insufficient shelves in the warehouse of the organization to receive the goods. Overall mean for receiving is 3.47 suggesting that the respondents agree that the organization is efficient in all parameters of receiving of warehouse of the organization except shelves, and standard deviation of 1.28 suggests that there is variation in agreement from common mean.

As can be seen above, receiving activity is agreed with the grand mean of (3.47) and this indicates the current receiving activity of the organization which includes the typical carrier processing like unloading, item identification, recording the goods receipt, quantity and quality inspection, un-packing, and sorting activities is good (Bodnar, 2013). The receiving procedure can begin as soon as the goods are delivered. This allows the warehouse to prepare, synchronize inbound operations with arrival, and begin unloading. Units are then packed away with precise documentation before being shipped out (Habazin, 2017).

4.3.2 Put-away

Table 4.4 Descriptive statistics of put away activity of warehousing management.

Item	***Mean***	***Std. Deviation***
Warehouse personnel's of MDP are skilled to perform put away activities.	3.18	1.236
In MDP warehouse there is sufficient equipment's to do the put-away activity.	3.41	1.142
When product is placed on its location, the storage location of the product is properly recorded	3.10	1.269
The MDP warehouse design/layout is convenient to perform put-away activities.	3.48	1.110
The design of the warehouse is easy to access items, convenient to load and unload	3.22	1.262
There is an established well-structured put-away process for all items received into MDP warehouses	2.90	1.237
In MDP warehouse put away activity performed manually via labor force	3.07	1.387
Grand Mean	***3.19***	***1.23***

Source: Own Survey, 2021

On the above table 4.4 as a grand mean value of (M=3.19) put away indicated that in the organization there are adequate activities concerning the put away warehouse of the organization; like adequate equipment to do put away, the design/layout which is convenient to perform put away of warehouse, and the design of warehouse is easy to access items, and convenient to load and unload the items in the organization based on the above grand mean of (3.19). But, in the organization there are inadequate well established put away process/guidelines for all received items to put away in warehouse of the organization based on the above table mean of (2.90) and the standard deviation of 1.23 suggests that there is variation in agreement from common mean. So, in the organization put away activity of the warehouse is adequate, but it's insufficient.

So, The result shows regarding to put-way activity of warehouse is agreed with the grand mean of (3.19) and this indicates the contemporary put-way activity of Modjo dry port which comprises the process that moves material from the receiving area to the storage, replenishment, or pick areas is importance (Faber N., 2015).

4.3.3 Storage

Table 4.5 Descriptive statistics of Storage activity of warehousing management.

Item	***Mean***	***Std. Deviation***
Our warehouse team are effective in minimizing total goods damage that are stored in the warehouse	2.44	1.228
In MDP warehouse are appropriately using available storage areas for storing goods	2.50	1.301
The space between the stored items in the warehouse is not sufficient to move the workers and machinery.	2.61	1.208
In the warehouse storage areas are available based on the nature of the items.	2.56	1.499
In the warehouse there is tight control of accessing the storage area	2.45	1.292
In the warehouse there are material protection equipment's to minimize the extent of materials damage.	2.65	1.330
There is no updating of records when putting the goods away in their storage areas	2.40	1.457
Shelves/racks/pallets are arranged in lines with the adequate passageways to facilitate put away and order picking activities.	2.94	1.455
There is regular inspection and cleaning of storage areas.	3.03	1.431
In our warehouse the materials can be stored in codification	2.69	1.447
Grand mean	***2.63***	***1.36***

Source: Own Survey, 2021

As indicated on the above table 4.5 the extent storage activity of warehousing management the case of the organization is poor. Accordingly, the grand means storage of warehousing management is 2.63 which is low performance with respect to the overall measures taken into

consideration like the activities implemented linking to the storage of warehouse of the organization, updating records of goods in warehouse, the tight control around the storage of warehouse, in storage the materials are not classified based on their nature like perishable goods, frequent etc., the organization is inappropriately using available storage areas for storing goods, the shelves/racks/pallets are not arranged in lines to facilitate put away and picking activity in storage warehouse of the organization, and the materials stored in storage are not stored in a codification. But in the storage warehouse of the organization there is adequate regular inspection and cleaning of storage area; and the standard deviation of 1.36 suggests that there is considerable variation in agreement from common mean. So, the grand mean of storage warehouse of the organization is still inadequate to store the received materials in appropriate ways.

The aggregated value of storage activity has scored the grand mean value of (2.63) this shows that the current storage activity warehouse of the organization disagree with designates the handling of goods and material and the storage methods not depends on the size and quantity of the items in inventory and the handling characteristics of the product or its container (Frazelle, 2002).

4.3.4 Order Picking

Table 4.6 Descriptive statistics of order picking activity of warehousing management.

Item	***Mean***	***Std. Deviation***
Warehouse personnel's are skillful in performing order Picking process.	3.28	1.668
In MDP warehouse design/layout is convenient for an easy order picking process.	3.00	1.470
Items returned from end user due to error in order-picking are high.	3.09	3.244
MDP has adequate shelves for the goods in the warehouse to facilitate order picking process.	3.12	1.451
In MDP order-picking is performed through gathering the item correctly by requested order.	3.00	1.217

Processing time to do the order-picking in our warehouse is reasonable.	3.32	1.208
The design of the warehouse system is properly done to improve customer service in order picking process	2.73	.989
MDP warehouse performs order picking manually	2.82	1.438
Items are picked from the storage area as exactly mentioned on the picking slip/issue order	2.93	1.243
Grand mean	***3.03***	***1.55***

Source: Own Survey, 2021

The above table 4.6 indicates that the overall mean values of order picking warehouse of the organization is adequate (M=3.03). like the processing time to do the order-picking in warehouse, the shelves in order picking of warehouse of the organization to facilitate order picking process, the order picking is gathering the items correctly by the requested order, but the order picking warehouse of the organization is insufficient in terms of items are picked from the storage is not based on the picking slip/issue order, and the design of warehouse system is not properly done to improve customer service in order picking process warehouse of the organization; and standard deviation of 1.55 suggests that there is considerable variation in agreement from common mean.

Generally, above table 4.6 shows that the organization order picking activity is agreed with the grand mean of (3.03) and this indicates the recent order picking activity of the organization involves the processes of clustering and scheduling the customer orders, assigning stock on locations to order lines, releasing orders to the floor, picking the items from storage locations and the disposal of the picked items and it involves selecting and gathering specified amount of right in accordance with the order and it is composed of lifting, moving, picking, putting, packing, and other related activities. So, this variable supported as per the interpretation set by (Shiau & Lee, 2010).

4.3.5 Shipping/dispatching

Table 4.7 Descriptive statistics of shipping/dispatch activity of warehousing management.

Item	***Mean***	***Std. Deviation***
The staffs of the warehouse do not have known how the motions of them have impact on waiting and un-satisfaction of customers.	3.26	1.016
MDP warehouse perform perfect order delivery lead time to the organization customers.	3.19	1.247
In our warehouse there is high commitment to protect the items safety.	3.70	1.015
In our warehouse there is high commitment to make easy of shipping and transportation process.	2.96	1.303
Goods are delivered to buyer according to the specification, at the right without any damage.	3.27	1.038
Communication is successful in making ready the transportation and to inform the recipient	3.65	1.053
The customer orders are packed into the manner to prevent damage during transit.	3.73	1.104
Grand Mean	***3.39***	***1.11***

Source: Own Survey, 2021

As it's illustrated on the above table 4.7 the grand mean value of (M=3.39) the above table is adequate shipping/dispatching of warehousing management of the organization. like the customer orders are packed into the manner to prevent damage during transit in the organization, commitment to protect the items safety, communication that making ready the transportation and to inform the recipient, and shipping of the goods are delivered to buyer according to the specification, at the right without any damage. But, in the shipping/dispatching warehouse of the organization there is inadequate commitment to make easy of shipping and transportation process for the customers; and standard deviation of 1.11 suggests that there is great variation in agreement from common mean. Still in the organizations shipping of warehouse is adequate, but it's not totally sufficient.

Generally, as can be observed, the shipping activity is agreed with the grand mean of (3.39) and this indicates the existing shipping activity of the organization which indicates the preparation of usable commodities for shipment to customers and the placement of those commodities on vehicles for transport to the customers and processing information and for dispatching personnel to fulfill various tasks like checking packing, labeling or loading items is crucial. So, this analysis related with the interpretation by (Shiau & Lee, 2010).

4.4 Descriptive statistics of dependent variables (Quality, Response time, Cost/financial, and Productivity)

Warehouse performance of Modjo dry port is presented and discussed for each parameter with respective tables through mean and standard deviation.

4.4.1 Quality

Table 4.8 Descriptive statistics of quality of warehouse performance.

Item	***Mean***	***Std. Deviation***
In our warehouse there is no inventory discrepancies	2.79	1.283
Our warehouse give a priority for a safety of items	3.20	1.357
Accidents are not occurred in our warehouse	2.81	1.347
Our warehouse put away accurately materials in a correct location	3.60	1.184
MDP warehouse picking accurately materials from the storage based on the requested	3.88	1.267
Grand Mean	***3.26***	***1.29***

Source: Own Survey, 2021

As its showed on the above table 4.8 based on the response the grand mean value of quality performance of warehouse is adequate (M=3.26). So, this grand mean shows that quality performance of warehouse adequately materials are picked from the storage based on the requested order, put away materials in a correct location, and give a priority for a safety of items in quality performance of warehouse of the organization. But accidents are not highly occurred in quality warehouse performance of the organization, and there is a low inventory discrepancy in the warehouse quality performance of the organization; and the standard deviation of 1.29

suggests that there is substantial variation in agreement from common mean. So, the quality of warehouse performance of the organization is adequate but, it's not sufficient.

4.4.2 Response time

Table 4.9 Descriptive statistics of response time of warehouse performance.

Item	***Mean***	***Std. Deviation***
Our warehouse serve our customer on the reasonable time	3.72	1.040
In MDP warehouse monitor the order processing timely	3.76	1.088
We measure the time of order is received and order is shipped to the clients	3.69	1.037
Our warehouse serves our supplier and makes product ready for shipment on the reasonable time.	3.70	1.044
MDP measure the amount of put away time from product is unloaded and ready for picking in warehouse	3.70	1.171
Grand mean	***3.71***	***1.07***

Source: Own Survey, 2021

As it's clearly stated on the above table 4.9 the response time of warehouse performance have an appropriate grand mean value of 3.71. So, the adequate grand mean value of response time of warehouse performance of the organization shows that the port serve their customers at the reasonable time to satisfy them, the organization monitor the order processing timely to fulfill the requirements of the customer, measure the amount of put away time from product is unloaded and ready for picking in warehouse, serves the supplier and makes product ready for shipment on the reasonable time, and the standard deviation of 1.07 suggests that there is considerable variation in agreement from common mean So, generally the response time of warehouse performance of the organization is adequately implemented but it's not enough to meet their customer requirement timely as the grand mean of (M=3.71) above table states.

4.4.3 Cost/financial

Table 4.10 Descriptive statistics of cost/financial performance of warehouse.

Item	*Mean*	*Std. Deviation*
We are successful in minimizing total inventory cost	3.12	1.291
We are successful in minimizing total product damage in the warehouse like product deterioration, breakage, leakage etc.	3.26	1.347
We are successful in minimizing all warehousing activity costs	3.28	1.422
Grand Mean	***3.22***	***1.35***

Source: Own Survey, 2021

Based on the response as it's clearly stated on the above table 4.10 the grand mean value is adequate (M=3.22). So, the above table grand mean reflects the organization is adequately minimizing total inventory cost; reducing all warehousing activity cost of warehouse, and minimizing total product damage in the warehouse of the organization; and the standard deviation of 1.35 suggests that there is large variation in agreement from common mean. Generally, above table 4.10 presents that the organization financial performance of warehouse is agreed with the grand mean of (3.22) and this indicates the recent financial performance of warehouse of the organization is adequate but it's not enough.

4.4.4 Productivity

Table 4.11 Descriptive statistics of productivity of warehouse performance.

Item	*Mean*	*Std. Deviation*
Our warehouse personnel utilizes warehouse spaces properly	3.59	1.060
Our warehouse personnel measure material handling productivity of the warehouse thoroughly	3.56	1.135
MDP warehouse utilizes a reasonable warehouse spaces for product handling	3.78	.996
We are working to improve storage capacity by removing unnecessary item	3.68	1.104
We measure the total storage area that is committed specifically to product handling	3.74	1.137
Grand Mean	***3.67***	***1.08***

Source: Own Survey, 2021

As revealed on the above table 4.11 the statistics shows the question asked on productivity of warehouse performance of the organization is sufficient grand mean value of (M=3.67). So, this grand mean value shows that in the organization productivity of warehouse performance sufficiently utilize a reasonable warehouse spaces for product handling, measure the total storage area that is committed specifically to product handling, and working to improve storage capacity by removing unnecessary materials in the productivity of warehouse performance of the organization; and the standard deviation of 1.08 suggests that there is substantial variation in agreement from common mean. So, the grand mean of productivity of warehouse performance of the organization is adequate but it's not sufficient.

4.5 Inferential Analysis

4.5.1 Correlation Analysis of Variables

According to (Shiau & Lee, 2010) a correlation coefficient is a measure of linear association between two continuous variables and represented by "r". The correlation coefficient "r" takes a value between -1 and +1 ($-1 < r < +1$), -1 means there is perfect negative association between the variables, 0 means there is no association among the variables of interest and +1 indicates there is perfect positive relationship between the variables. Correlation is the measure of relationship between variables. According to (Shiau & Lee, 2010) the measure of correlation value from 0.1 to 0.29 small or weak correlations, from 0.3 to 0.49 medium or moderate correlations, the value > 0.5 is large or strong correlation & the value which zero indicated there is no correlation between variables.

This regression analysis was conducted to know by how much the independent variable explains the dependent variable. It is also used to understand by how much each independent variable (Receiving, Put away, Storage, Order picking and Shipping/dispatch) explains the dependent variable that is Warehouse Performance.

Table 4.12 Linear relationship (Pearson Correlation) between the variables

		Warehouse performance	Receiving	Storage	Shipping	Put away	Order picking
Warehouse performance	Pearson Correlation	1					
	Sig. (2-tailed)						
	N						
Receiving	Pearson Correlation	.507**	1				
	Sig. (2-tailed)	.000					
	N	101					
Storage	Pearson Correlation	.298**	.217*	1			
	Sig. (2-tailed)	.002	.029				
	N	101	101				
Shipping	Pearson Correlation	.487**	.481**	.134	1		
	Sig. (2-tailed)	.000	.000	.183			
	N	101	101	101			
Put away	Pearson Correlation	.345**	.190	.232*	.320**	1	
	Sig. (2-tailed)	.000	.057	.020	.001		
	N	101	101	101	101		
Order picking	Pearson Correlation	-.218*	-.116	.075	-.058	.015	1
	Sig. (2-tailed)	.029	.247	.458	.568	.882	
	N	101	101	101	101	101	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Own Survey, 2021

This study used both descriptive and explanatory designs to reach at aforementioned objectives. Correlation analysis is one of explanatory design that is intended to identify the relationship between independent variables of warehousing management, and dependent variable of warehouse performance. Based on assumption of linear relationship between the variables, Pearson correlation method is used to identify the correlation. Table 4.12 above presents the correlation coefficients and respective significance of the correlation.

The correlation between receiving and warehouse performance have a positive and significant correlation ($r=0.507$, $N=101$, $p<0.01$) suggesting that there is existence of association in between the two variables. The correlation between storage and warehouse performance is positive and significant correlation ($r=0.298$, $N=101$, $p<0.01$) suggesting that there is existence of association in between the two variables. The correlation between put away and warehouse performance is positive and significant correlation ($r=0.345$, $N=101$, $p<0.01$) suggesting that there is existence of association in between the two variables.

The correlation between the order picking and warehouse performance is a negative and significant correlation ($r=-0.218$, $N=101$, $p<0.05$) suggesting that there is a negative existence of association in between the two variables. The correlation between shipping and warehouse performance is positive and significant correlation ($r=0.487$, $N=101$, $p<0.01$) suggesting that there is existence of association in between the two variables.

4.5.2. Multiple linear regression assumptions

i. Multicollinearity Test

According to Gujarati, (2003) multicollinearity test helps to identify the correlation between explanatory variables and to avoid double effect of independent variable from the model. When independent variables are multicollinear, there is overlap or sharing of predictive power. This may lead to the paradoxical effect, whereby the regression model fits the data well, but none of the explanatory variables (individually) has a significant impact in predicting the dependent variable. For this purpose, variance inflation factor (VIF) and tolerance test were employed to check whether or not multicollinearity problem exists in explanatory variables. If the value of VIF is less than 10, there is no multicollinearity between the explanatory variables and on the other hand VIF greater or equal to 10 is an indicator there is a serious Multicollinearity problem. In addition, Tolerance is an indicator of how much of the variability of the specified independent is not explained by the other independent variables in the model and is calculated using the formula $1-R^2$ for each variable. If this value is very small (less than .10), it indicates that the multiple correlation with other variables is high, suggesting the possibility of multicollinearity (Keith, 2006; Shieh, 2010).

Table 4.13 Multicollinearity Test

	Collinearity Statistics	
	Tolerance	VIF
Receiving	.734	1.362
Storage	.906	1.104
Shipping	.714	1.401
Put away	.861	1.161
Order picking	.976	1.025

Source: Own Survey, 2021

To detect the problem of multicollinearity the VIF technique is used prior to executing the regression analysis. As presented in the above table 4.13, the values of VIF are well below 10 and suggesting that there is no problem of multicollinearity among the study independent variables.

ii. Normality Test

The normality assumption is about the mean of the residuals is zero. Moreover, Normality tests are used to determine whether a data set is well-modeled by a normal distribution or not, or to compute how likely an underlying random variable is to be normally distributed (Gujarati, 2009). Therefore, the researcher was used Histogram methods of testing the normality of the data. According to Fidell, (2001) if the residuals are normally distributed around its mean of zero, the histogram should be a bell-shaped and regression standardized residual plotted between 3 and –3. So that, from figure 4.1 below, it can be noted that the data conforms to the normality assumption (Stevens, 2009).

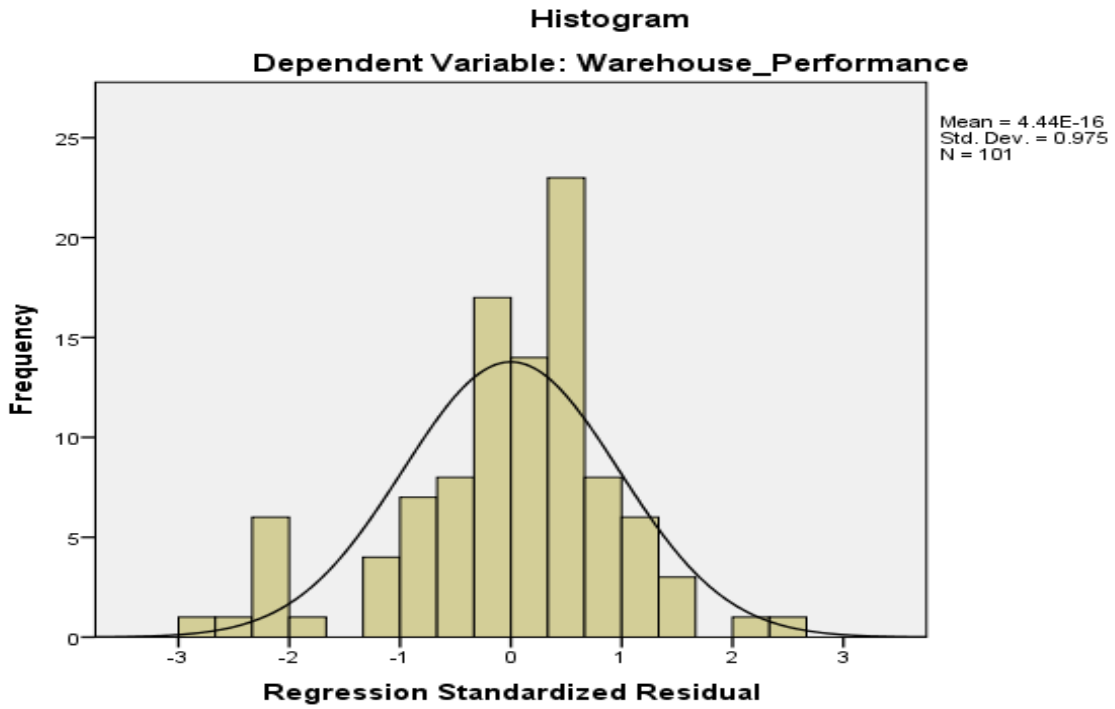

Figure 4.1: Normal distribution Histogram results

Source: Own Survey, 2021

iii. Heteroscedasticity Test

Brooks, (2014) expressed homoscedasticity assumes that the variance of the errors is constant. If the errors do not have a constant variance heteroscedastic problem is detected White, (1980) as cited by (Shiau & Lee, 2010). This just means that the residuals at each level of the predictor(s) should have the same variance (homoscedasticity); when the variances are very unequal there is said to be heteroscedasticity (Shiau & Lee, 2010) According to the statistical solution, (2017), to test the linear relationship assumption, Intellect's in the statistics plot the standardized residuals verses the predicted Y' values can show whether points are equally distributed across all values of the independent variables or not. Biased standard errors lead to biased inference, so results of hypothesis tests are possibly wrong. For a basic analysis, we first plot *ZRESID (Y-axis) against *ZPRED (X-axis) on SPSS because this plot is useful to determine whether the assumptions of random errors and homoscedasticity have been met (Shiau & Lee, 2010)

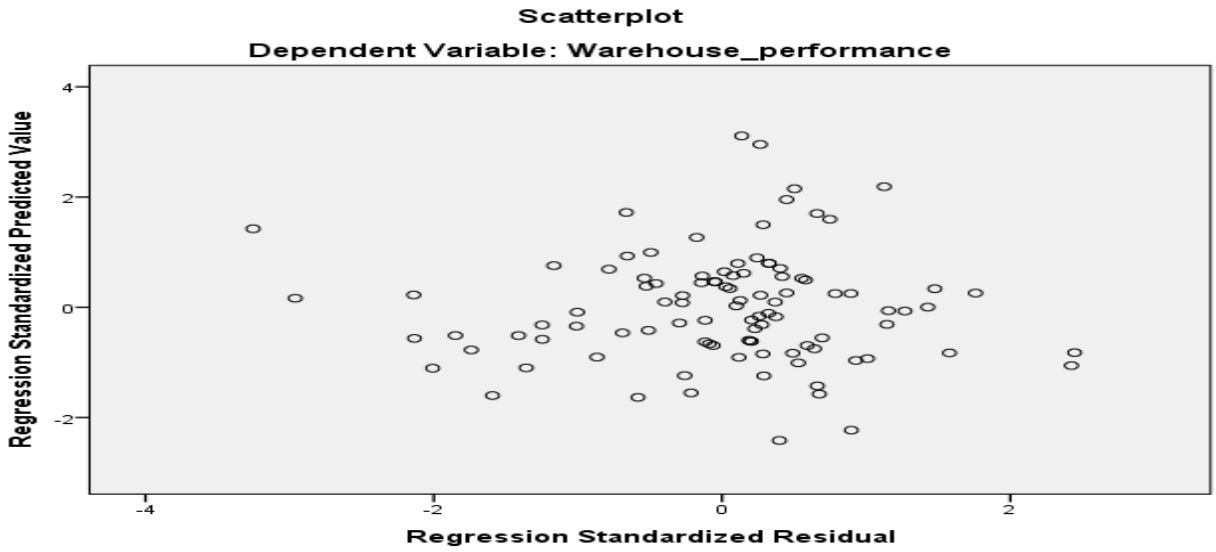

Figure 4.2: Heteroscedasticity test result

The graph of *ZRESID and *ZPRED should look like a random array of dots evenly dispersed around zero. If this graph funnels out, then the chances are that there is heteroscedasticity in the data. If there is any sort of curve in this graph, then, the chances are that the data have broken the assumption of linearity (Shiau & Lee, 2010) As can be seen in the scattered plot on figure 4.2 above, the residuals at each level of explanatory variables look like they are evenly dispersed and that the graphs do not assume any type of shaped. Therefore, it is safe to say that this study has no heteroscedasticity problem.

iv. Linearity Test

Multiple regressions can accurately estimate the relationship between dependent and independent variables, when their relationship is linear in nature (Shiau & Lee, 2010) If linearity is violated, all the estimates of the regression including regression coefficients, standard errors, and tests of statistical significance may be biased (Shiau & Lee, 2010) This can be best checked by pp plot residual as shown in figure 4.3 below. When, p-p residual look at straight line, the relationship between the dependent and independent variables is linear. Therefore, there is no linearity problem on the data used for this study.

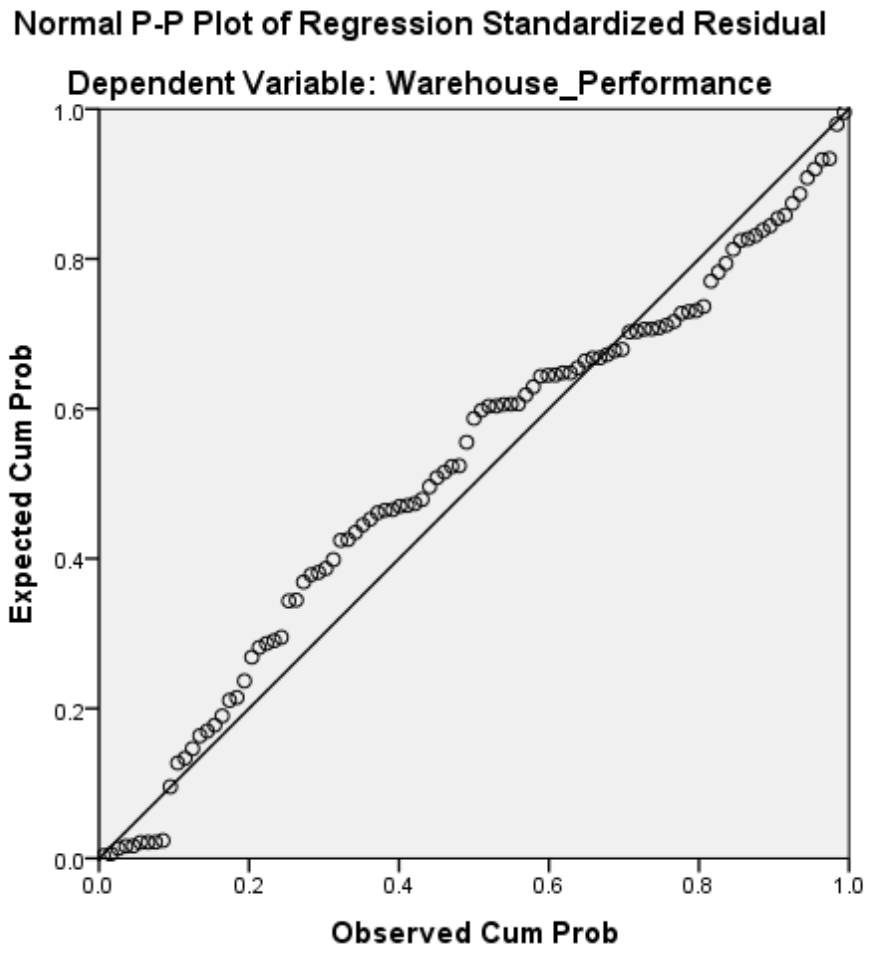

Figure 4.3: P-P plot; linearity test results

V. Sample size test

With a small sample, one can obtain a result that does not generalize other target population. If results do not generalize to other samples, then it is little scientific value. To test sample size researcher uses a formula given by (Shiau & Lee, 2010). This formula used to test sample size problem by taking into account the number of independent variables as follow:

$N > 50 + 8m$ = $N > 50 + 8(5)$ = $101 > 90$

Where; m = number of independent variables, N valid sample size.

Therefore, based on the above equation result, valid sample size 101 is greater than 90 and this result showed that the data conforms to the sample size assumption.

4.5.3 Regression Analysis

Regression analysis is a way of predicting an outcome variable from one predictor variable (simple regression) or several predictor variables (multiple regressions) (Shiau & Lee, 2010) This analysis is used to identify effect of warehousing management on warehouse performance.

Table 4.14 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.652[a]	.425	.394	9.16803

a. Predictors: (Constant), Storage, Order picking, Shipping, Put away, Receiving

b. Dependent Variable: Warehouse performance

Source: Own Survey, 2021

The study model summary is presented in above table 4.14. This summary is used to identify role of dimensions of warehousing management in explaining warehouse performance. As it is shown in the table, R square is 0.425 and adjusted R square is 0.394 that 39.4% variation in dependent variable is explained by independent variables used in the model. This implies that 39.4% variation in warehouse performance of Modjo dry port is affected by warehousing management.

Table 4.15 ANOVA[a]

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	5890.784	5	1178.157	14.017	.000[b]
Residual	7985.018	95	84.053		
Total	13875.802	100			

a. Dependent Variable: Warehouse performance

b. Predictors: (Constant), Storage, Order picking, Shipping, Put away, Receiving

Source: Own Survey, 2021

ANOVA is presented in above table 4.15. This analysis is used to identify the effect of warehousing management on warehouse performance which is general objective of the study. In addition, this analysis is used to identify appropriateness of the model in estimating the effect of warehousing management on warehouse performance. F-statistic value of the model is 14.017 and it is significant at 0.000 indicating that the model used is appropriate to explain effect of

warehousing management on warehouse performance. This implies that warehousing management significantly affects warehouse performance of Modjo dry port.

Table 4.16 Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	21.482	7.422		2.894	.005
Receiving	.441	.138	.290	3.197	.002
Shipping	.831	.295	.259	2.817	.006
Put away	.379	.188	.169	2.019	.046
Order picking	-.300	.128	-.185	-2.344	.021
Storage	.269	.126	.175	2.139	.035

a. Dependent Variable: Warehouse performance

Source: Own Survey, 2021

The effect of individual dimension of warehousing management is presented in table 4.16 above. The researcher used unstandardized coefficients and their sign to analyze the effect on warehouse performance.

Coefficient of receiving is positive and significant at 0.01. The positive coefficient suggests that improving warehousing management's receiving increases the organization's warehouse performance while other variables remain constant. This implies that receiving of warehouse have significant positive effect on warehouse performance of the organization.

This result is supported by Frazelle, (2002) Receiving serves as the foundation for all subsequent warehousing operations. It will be very difficult to handle merchandise properly in put away, storage, picking, or shipping and receiving is the collection of activities involved in the orderly receipt of all materials coming into the warehouse, ensuring that the quantity and quality of such materials are as ordered, and disbursing materials to storage or to other organizations.

Coefficient of shipping is positive and significant at 0.01 indicating that shipping has a positive effect on warehouse performance. Positive sign of the coefficient of the shipping indicates that increasing shipping increases warehouse performance and vice versa holding other things

constant. This implies that the port has as shipping/dispatching that positively contributes to warehouse performance of the organization. This result is in agreement with (Shiau & Lee, 2010) Shipping is a process involves inspecting, packing, palletizing and loading items into a carrier for further delivery.

Coefficient of put away is positive and significant at 0.05. Positive sign of the coefficient suggests that when put away increases warehouse performance of the organization increases and vice versa holding other variables remain constant. This implies that put away is positively affecting warehouse performance of the organization. This result is agreement with Bartholdi and Kackman, (2011) Following that, this information will be used to create efficient pick lists that will aid order-pickers in retrieving the goods for customers. Because the goods may need to be transported a long distance to its storage site, put-away might be time-consuming.

A coefficient of order picking is negative and significant suggesting that they have negative but significant effect on warehouse performance. So, This result is inconsistent/disagreement with Collins *et al.*, (2006), which discussed the gathering of warehouse measurements, such as picking and inventory accuracy, for use in a multi-attribute utility theory study to select the best-performing warehouses.

Coefficient of storage is positive and significant at 0.05. Positive sign of the coefficient suggests that when storage increases warehouse performance of the organization increases and vice versa holding other things constant. This implies that storage is positively affecting warehouse performance of the organization. This outcome supported by Frazelle, (2002) The storage method depends on the size and quantity of the items in inventory and the handling characteristics of the product or its container.

In other way, the relationship of dependent variable Y to the independent variables X_1, X_2, X_3 ….X_n can be expressed as: $Y= \beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+e$. Here, β0 is constant and βn is the coefficient of independent variables (Satendra *et.al*, 2011). The researcher used unstandardized coefficients to constructing a regression equation (Pallant and Julie, 2005). From the coefficient table 4.16, the substitution of the equation becomes:

Warehousing Management = 21.48 + 0.441 receiving + 0.831 shipping + 0.379 put away + 0.269 storage + (-0.300) order picking.

4.5.4 Hypothesis test result

Five hypotheses have been tested to answer the research questions based on the research problem and objectives. The hypotheses address each warehousing management activity such as; receiving, storage, put away, order picking and shipping has an impacts on warehouse performance. The hypothesis test results were presented as follows.

Hypothesis 1

H1: Receiving has a positive and significant effect on warehouse performance of the Port; at p value of ≤ 0.05 and β value 0.441.

The value of $p \leq 0.05$ with contribution of β=0.441 revealed that receiving has a significant effect on warehouse performance. So that, the alternative hypothesis was rejected; although, the beta value of 0.441 indicates that receiving has a positive effect on warehouse performance of the organization. Moreover, the beta value of 0.441 implies that an increase in the effectiveness of receiving by one percent leads to an increase in warehouse performance by 44.1 percent's. Therefore, receiving is the setup for all other warehousing activities. So, the organization is better to keep the receiving because if we don't receive the item properly, it will be very difficult to handle it properly, whether it is thrown away, storage, picking, or shipping. If allow damaged or inaccurate deliveries in the door, it's likely to ship damaged or inaccurate shipments out the door.

Hypothesis 2

H2: Storage has a positive and significant effect on warehouse performance of Modjo Dry Port; at p value of ≤ 0.05 and β value 0.269.

In the above coefficient table 4.16, the $p \leq 0.05$ with contribution of β=0.269 showed that shipping has a significant effect on warehouse performance. So, the alternative hypothesis was rejected. Although, the beta value of 0.269 indicates that storage has a positive effect on warehouse performance of the organization. Moreover, the beta value implies that an increase in the effectiveness of storage by one percent leads to an increase in warehouse performance level by 26.9 percent's. Therefore, the organization has to protect and daily clean the safety of the warehouse, hiring qualified man power, installing material protection equipment like

refrigerator, ventilator etc., separating the storage based on items in storage in order to increase the performance of the warehouse and to attract the customers of the organization.

Hypothesis 3

H3**:** Put away has a positive and significant effect on warehouse performance of Modjo Dry Port; at p value of ≤ 0.05 and β value 0.379.

Based on above coefficient Table 4.16; $p \leq 0.05$ with contribution of β=0.379 revealed that put away has significant effect at warehouse performance. Therefore, the alternative hypothesis was rejected. Also, the beta value of 0.379 indicates that put away has a positive effect on warehouse performance of the port. Moreover, the beta value of 0.379 implies that an increase in the effectiveness of put away by one percent leads to an increase in warehouse performance by 37.9 percent's. Hence, this finding is consistent with the previous study Kusrini *et al.*, (2018) Put-away process may require a large amount of work because SKUs must be moved over significant distances to their storage position. Put-away accounts for approximately 15% of warehouse operating costs. Therefore, the MDP transferring of (if applicable repacked, i.e., from pallets to cases) incoming products to a location within the storage area must be determined.

Hypothesis 4

H4: Order picking has a negative and significant effect on warehouse performance of Modjo Dry Port; at p value of ≤ 0.05 and β value -0.300.

Based on above coefficient table 4.16; p value of ≤ 0.05 with contribution of β= (-0.300) revealed that order picking has a significant effect on warehouse performance. So that, the null hypothesis was rejected; Also, a beta value of (-0.300) indicates order picking has a negative effect on warehouse performance of the organization. Moreover, the beta value of -0.300 implies that decrease in the effectiveness of order picked by one percent leads to increase in warehouse performance by 30 percent's. Therefore, the organization involves the processes of clustering and scheduling the customer orders, assigning stock on locations to order lines, releasing orders to the floor, picking the items from storage locations and the disposal of the picked items to reduce the negative effect of this order picking.

Hypothesis 5

H5: Shipping has a positive and significant effect on warehouse performance of Modjo Dry Port; at p value of ≤ 0.05 and β value 0.831.

Based on coefficient table 4.16, $p \leq 0.05$ with contribution of $\beta=0.831$, it revealed that shipping has a significant effect on warehouse performance. Therefore, the alternative hypothesis was rejected. Also, the beta value of 0.831 indicates that shipping has a positive effect on warehouse performance of the organization. Moreover, the beta value of 0.831 implies that an increase in the effectiveness of shipping by one percent leads to an increase in warehouse performance by 83.1 percent's. So, to increase the warehouse performance, prepare usable commodities for shipment to customers and the placement of those commodities on vehicles for transport to the customers, prepare dispatching area for processing information and for dispatching personnel to fulfill various tasks like checking packing, labeling or loading items.

Moreover, based on the findings of regression analysis, the researcher found that the warehousing management activity (receiving, storage, put away, and shipping) had positive and significant effects on warehouse performance of the organization. In addition to that the order picking has a negative and significant effect on warehouse performance of the organization.

The Standardized Beta values for each of the different variables have been converted to the same scale; so that, it is better compete them (Pallant and Julie, 2005). Therefore, researcher was used the standardized Beta coefficients, to compare or prioritize the effects of independent variables (receiving, storage, put away, order picking, and shipping) on dependent variable (warehouse performance) in Modjo dry port. So that, based on table 4.16 above, receiving had a relatively strong and direct effect on warehouse performance at β value of 0.290 and followed by shipping at β value of 0.259, storage at β value of 0.175, put away at β value of 0.169, and order picking at β value of (-0.185) respectively.

4. 6 Results of Interviews

The study uses interviews to support data collected through questionnaire. This section presents results of the interview conducted with managers of warehousing departments. The interviews consisted of 6 structured questions that were prepared based on the questionnaire components and the literature review. This section presents the results of each interview questions. The

researcher interviewed only the manager of the Warehousing department because he knew about the warehouse rather than that other department. Table 4.17 below presents general information about interviewees that helps to analyze the appropriateness of the interviewees for the study.

Table 4.17 General Information about Interviewee

Position	Warehouse Team Leader
Department	Warehousing
Experience	5 year
Education	BA Degree

The interviewees are the manager of the warehouse department, suggesting that they have good knowledge about the issues of warehousing management. In addition, the interviewees have 5-year experience in managerial positions in the department. Educationally, the interviewee has a BA degree. Therefore, the researcher used appropriate respondents to examine warehousing management and its effect on warehouse performance.

Interview Item 1: What are the main problems of warehousing process in your organization?

According to our organization, we have many problems related to warehouse management. There is lack of pallet, lack of shelves etc., are the problems of the warehouse in our organization. But the main and the most difficult problem of the warehouse in the organization is we have four large warehouses, but now days only two of them are giving service, and by these two warehouses, it's difficult to give adequate service to the customers on time. Due to the shortage of warehouse, we are losing the revenue we generate from the left of two warehouse services. In addition, our warehouse has the following problems;

In accurate inventory (i.e incomplete or in accurate record often reveal themselves when a warehouse worker attempts to retrieve product from unexpected location and it’s not there or they are directed to store product into a location that’s already full at that time the time and effort are wasted making physical checks and trying to correct error, often leading to delayed shipment and miss picks). There is lack of standardize processes, insufficient pick routes, and lack of invest in appropriate automation for data handling/inventory management, poor layout/space utilization, lack of product diversification, poor avoiding damaged products timely. The problems listed above are the problems facing the Modjo dry port currently. This implies that the warehouse of the organization was affected by lack of pallet, shelves, inaccurate inventory, lack

of clear procedure, insufficient routes to pick the item from the storage, lack of applying modern technology, lack of separating the storage based on the nature of the item, and lack of eliminating unnecessary damage of the materials are those problems that facing the organization to perform its activity.

Interview item 2: Do you think your organization is well-performing the warehousing process? If no what are the challenges?

No. Because the organization is not performing/managing the warehouse in a good way because there is a complaint with the revenue and customs authority of Modjo branch; If the contraband items are controlled by ERCA, they store in the port warehouse, at that time we lose the place to store our product, then the following things challenge our warehouse;

Excess stock; in some cases, when we store stock from a single channel, it is possible that it exceeds the acceptable level, which results in the accumulated goods becoming more of an expense than an income. Lack of space; the problem of not having enough space is that the goods will keep on accumulating inadequately, which may result in work accidents, time lost in locating the products, and a loss of quality of the merchandise. Low traceability and connectivity (i'e loss of control over the goods and over the continuity of the supply), Excess procedures; This problem covers issues such as extra operations like rework, reprocessing, and unnecessary handling due to defects, overproduction, or shortage.

Incorrect time management, Inaccurate inventory and outfitting; Having excess goods or lack of them may become a problem because, at the end, it translates into storage expenses or lost sales. Damaged products; when an item gets damaged, it generates a cost for warehouse operations. Being unprepared for the demand; internal and external factors such as seasons, weather, and the economy contribute to the demand's volatility. Issues with human capital: The lack of training and integration of employees may delay the whole chain, turn it inefficient, and create expenditures due to rework. This shows that there is excess stock in the warehouse due to complain with the Revenue and customs authority, shortage of space, lack of time management, the item has high chance of damage, the warehouse is influenced in a season way, lack of training to the employees, low connectivity are those currently challenging the organization warehouse to achieve its mission.

Interview item 3; Do you believe all the sold goods are delivered at the right time to the right buyer in the right quality with the right quantity? If "No" what do you think the reason and your suggestion to solve these problems?

Yes; I believe the sold materials can be delivered to the customers timely when they need, where they need because we use the multimodal transport system and arrive at what else place in time. In addition we are doing more to save our customer time (i,e within a short period of time to deliver the material within one day through the online system). So, Modjo dry port are delivering those sold goods at the right quantity, at the right quality, at the right time, at the right price, at the right product, from the right source, to the right customers. This implies that the Modjo dry port assists their customer in a time efficient manner.

Interview item 4; Do organizational and human capital challenges occur in the organization's property management areas?

The Modjo dry port has an optimum capital which is enough to run the organization until today without any challenge, but there are challenges that face the organization property management; hiring and maintaining quality staff (the quality of staff can make or break any organization), growing revenue, property damage and unexpected maintenance, time management, lowering operating costs, attracting and maintaining quality tenants, inspection, marketing, government regulations, communication to staff/tenants etc. So, the organization is challenged in terms of the lack of skilled manpower, inspection, property management, time management, growing revenue etc. It can be challenging to the organization rather than the capital.

*Interview item 5: Do the customers complain about the service that your warehousing department provides for them as compared to the competitors? If your answer is "**Yes**" could you mention which type of service did your customer have the complaint?*

Yes; Our customer complain us in terms of un full materials in packed way because of some workers of warehouse especially who work in order picking have a problem they take some of material from the packed item (i,e cheating) after that when the item arrive their destination to the customer there is a problem of quantity (numbering error) is happened, at that the customer can complain us and we complain with the supplier of transport and with the staff. To solve this kind of problem in our organization, we are constructing CCTV security camera in each terminal and each warehouse to control in one system in order to reduce the customer complaints and

cheat in our organization to achieve our objective. So, the organization employees who work around order picking of the warehouse are not honest to the organization as well for their work. Such kinds of things are the obstacles for organizations to be competitive with their competitor.

Interview item 6: Overall what are the weakness of the warehousing practice from the end users, suppliers, and organization side?

The weakness of warehousing from the end user is the end users may not receive the materials timely from the warehouse. At that time the warehouse is busy, and then it's difficult to receive other material before the first order leaves the warehouse, and then the other users will lose the service.

Weakness of warehousing from suppliers; the suppliers may be not timely dispatching the materials from or shipping to the warehouse, if the supplier doesn't importing timely the needed materials the warehouse is empty then we lose the loyal customer if we lose the customer we fail to achieve our objective, and if the supplier fail to distribute the materials to the users at the right time and at the right place also the organization lose their loyal customer and it becomes to fail.

Weakness of warehousing from our organization (Modjo dry port); less control, lack of controlling all warehouse in one way, lack of adequate pallet, shelves, pallet, lack of hiring qualified man power on related work, lack of automatically counting the item which is withdrawals from warehouse and income to the warehouse, significantly lower investments, lack of safety, security, and insurance, inefficient and quick movement of stocks, lack separation of warehouse based on the basis of structure, on the basis of ownership, on the basis of service rendered, storing method, on the basis of building forms, based on the nature of the items at the storage, and based on the storage of items. This shows that the weaknesses of the warehouse it depends on (i.e from end user, supplier and organization has different weaknesses).

CHAPTER FIVE

5. SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This chapter discusses the summary of findings along the study objectives and the corresponding hypothesis. It then draws conclusions based on the findings and discussions are put for the recommendations of the study based on both warehousing management and warehouse performance.

5.1. Summary of Major Findings

The aim of this study was to examine the effects of warehousing management on warehouse performance of Modjo dry port. Based on different literatures and implementations in the organization, to measure warehousing management; receiving, storage, put away, order picking, and shipping/dispatching are used as a dimensions of warehousing management. Data regarding to warehousing management and its effect on warehouse performance were gathered through a questionnaire and interview. The independent variables of the study have a significant effect on dependent variables. In the organization there is low shelves, pallets and racks to store the received material, lack of updating the record of materials in the storage is one of the cause for the deterioration, and theft of materials in the organization, there is no well-structured put-away process for items received, and the organizations are not appropriately using available storage areas for storing goods, and there is lack of recording the items in their location.

On the other hand, in the organization there is lack of suitably of inspection and cleaning of storage timely, and the materials stored in storage are not stored in a codification, picking the item is not based on the order of the customer, especially in the order picking activity. The design of warehouse system is not properly done to improve customer service in order picking process, in the organization there is lack of distributing the materials to the end users based on their order specification and perform perfect order delivery time to the customers of the organization, there is inventory discrepancies in the warehouse of the organization, there is poor safety of items, accidents are highly occurred in warehouse, and the organizations are put away

materials in a correct location, and in the organization there is no hard work to minimize the total inventory and warehousing cost.

5.2 Conclusion

Based on the findings of this study, the effect of Warehousing Management on Warehouse Performance, the researcher draws the following conclusions.

Relying on the results of the study and the summary of findings, the roles of warehousing are to provide storage facility, maintain regular supply, create time utility, minimizes risk, facilitates movement of goods, and generates employment. The study reveals that the prime reason for the establishment of warehouse management in the organization is to store the materials in a safe, quality and to provide service to the customers, and the study concludes that there is a significant relationship between warehousing management and warehouse performance.

However, it is difficult to generalize that the warehousing management of the organization under the study was providing services to the customer efficiently and effectively. Of course, some of reasons for poor warehousing management in the organizations to provide adequate service are; lack of skilled man power, existence of poor shelves, pallets, and racks, lack of minimizing the cost of warehousing activity, lack of following the customer order, lack of giving priority for the safety of item, low level of giving attention to the accident occurred in warehouse, poor information sharing, and lack of appropriately cleaning the storage areas. Finally, as per the multiple regression analyses, the main variables that could affect warehouse performance include; receiving, storage, put away, order picking and shipping of warehousing management. Hence, organizations are expected to enhance their warehousing management so as to gain better warehouse performance in terms of quality, response time, cost/financial, and productivity.

5.3 Recommendation

Based on the findings of this research, the researcher gave the following recommendation that helps the Modjo dry port to improve their warehouse performance.

- Since warehousing management has significant effect on warehouse performance of the Modjo dry port, hence, it is advisable for the management to enhance the efficiency of warehousing through, maximize and optimize all available space, lean inventory

(possibly reduce or eliminate safety stocks, and try to get suppliers to deliver smaller quantities more frequently), adopt enabling technology (i.e a warehouse management system (WMS) or an ERP system with a strong WMS module can improve efficiency by suggesting the best routes and methods for picking or put-away), organize workstations i.e organizing workstations improves productivity of warehouse because workers do not have to search for tools or equipment, use the "5S" method of Sort; Set in order; Shine; Standardize; and Sustain which is designed to keep clutter at bay, reduce errors, and improve safety, and optimize labor efficiency.

- Shipping has significant effect on warehouse performance of the Port, hence, the management of the organization shall use the following to enhance the shipping warehouse of the organization through having an inventory control procedures in place to receive, store and ship goods which help to manage and run an efficient warehouse, have an efficient pick, pack and ship process to reduce an error and to accelerate shipping and delivery, use the right equipment (pallets and forklifts to move goods through), optimize the receipt of goods, and design an optimized warehouse layout to reduce the cost of warehouse, and giving high commitment to make easy of shipping and transportation process.
- Based on the findings, receiving strongly affects the warehouse performance of the organization. Hence, the management of the organization is advisable to improve its receiving through compile the correct metrics for time it takes to move materials through the system to usability, error reports, pre-receiving i.e. before the receiving process begins need to establish and enforce receiving requirements for suppliers and shippers, shipment identification, count the product received to make sure the correct amount of the shipment has been sent to warehouse, check all products being received for possible damage caused during shipping, receiving documentation, and adding more shelves in warehouse to store materials in a free ways.
- Since storage is significantly affecting warehouse performance of the organization, hence, warehouse management of the organization shall further improve the storage through evaluate whether racks up vertically, consider installing a mezzanine above a floor-level process, reduce aisle width in the racking area, appropriately using available

storage areas for storing goods, the team collaboratively work to minimizing the damage of goods in storage of warehouse, separating the storage based on the nature of item, codifying each material in storage either in terms of alphabetical or numerical, and adding material protection equipment's to minimize the extent of materials damage in storage like refrigerator, ventilator etc.

- Since a put away has a positive and significant effect on warehouse performance of the organization, so, the organization specially the warehouse manager better to improve the efficiency of put away in warehouse through; collect the correct data and analysis (i.e before put away process begins collect the correct data in order to make this go as smoothly as possible), be put away as quickly as possible make sure items are placed correctly the first time, minimize damaged items in put away process, track all item locations correctly, count items before they are put away, use direct put away when possible, and keep warehouse clean and organized.
- Finally, giving a training for the staff of each respective activity, codifying each materials in the storage, update recording the materials in the storage, adding more pallet, racks, and shelves for materials in the warehouse, sharing the information with the end user/customer, check each and everything in warehouse either during receiving or shipping the item, keep the customer order appropriately, as much as possible add another warehouse to store the materials in a free ways, to eliminate the waste of items, and to keep the safety of items in warehouse, installing security camera to reduce the theft of materials in warehouse through cheating, deliver the materials to the customer according to their specification, and giving priority to the safety of item in warehouse, and the receiving of items should be performed according to the standard operating procedure for receiving of standard which is compiled for use by the warehouse.

5.4 Limitation of the Study

Since this study is confined to the evaluation and identification of the effect of warehousing management on warehouse performance of Modjo dry port only in one of the dry ports of the country, it might not be sufficient to infer generalizations based on its findings. Some of the respondents are not filling or completing the questions and unexpected occurrences like people going on leave before completing the questionnaire. This was diminishing through constant

reminder to the respondents during the period the questionnaires were administered to them. This study involved employees of the organization working in different departments (warehousing, transportation, and customer response). This may have affected the results as the effect of warehousing management may vary in each departments, and finally, insufficient literature written on warehousing management in the Ethiopian context.

5.5 Direction for Further Studies

For future researchers, it's better to choose a longitudinal (time series or panel) research design to examine the cause and effect relationship as well as to analyze and compare changes in variables over time. Although, it is better to involve or include other rest of dry ports in our country level like Kality, Mekelle, Dire Dawa, etc. because the survey method may increase reliability of the research finding; Due to the scope of this research objective, the researcher did not investigate the impact of warehousing management in the performance of the organization. So, future research can further investigate the impacts of warehouse management on organizational performance.

Moreover, the current study employed five elements as independent variables under warehousing management dimensions and investigated their effects on warehouse performance. This implies that other variables relating to warehousing dimensions were not considered. Hence, it is suggested that in the future, other researchers should factor in other elements of warehousing dimensions like packing, packaging, accumulation and assess their impact on warehouse performance.

REFERENCE

Ain, K. (2014). Warehousing basic concepts 2015. Presented on LogOnTrain Summer School. L – Consult OU. 30.6-4.7.2014.

Aminoff, A., Kettunen, O., & Pajunen-Muhonen, H. (2002). Research on Factors Affecting Warehousing Efficiency. *International Journal of Logistics Research and Applications, 5*(1), 45–57. https://doi.org/10.1080/13675560110114252.

Anteneh B. (2017). *Effectiveness of Warehouse Management in Save the Children Ethiopia A Case of Gambella Emergency Office.* MA thesis, Addis Ababa University, Logistics and Supply Chain management, Addis Ababa, Ethiopia.

Apparel Logistics Group, I. (2014). The Truth About Warehouse Management Software (WMS) Packages, 883 Trinity Drive Lewisville.

Asmelash, T. (2017). *Assessment of Warehousing Practices: A Case of Finfine Furniture Factory S.CO.* MA thesis, Addis Ababa University School of Commerce, Logistics And Supply Chain Management, Addis Ababa, Ethiopia.

Atieh, A. M., Kaylani, H., Al-abdallat, Y., Qaderi, A., Ghoul, L., & Jaradat, L. (2016). Performance Improvement of Inventory Management System Processes by an Performance improvement of inventory management system processes by an automated warehouse management system. *Procedia CIRP*, *41*(March), 568–572. https://doi.org/10.1016/j.procir.2015.12.122.

Baker, P. (2007). *An Exploratory Framework of the Role of Inventory and Warehousing in International Supply Chains*. *18*(1), 64–80.

Bartholdi J., J., & Kackman S., T.,. (2011). Warehouse & Distribution Science, The Supply Chain and Logistics,Institute School of Industrial and Systems Engineering Georgia.

Bartholdi JJ, H. S. (2006). *Warehouse and distribution science.* Retrieved from www.warehouse-science.com.

Belayhun B. (2017) *Assessment Of Ware House Management The Case Of Ethiopian National Defense Main Department Of Logistics In Adama.* School of Commerce, Logistics and Supply Chain Management. Addis Ababa, Ethiopia: Addis Ababa University.

Blomqvist T. (2010). *A warehouse design framework for order processing and materials handling improvement - Case Etra Oy*, Master's thesis, school of economics Aalto University, Helsinki, Finland.

Bodnar. (2013). *Essays on Warehouse Operations School of Business and Social Sciences.* Denmark: Aarhus University.

Campus, U. (2013). Factors Affecting Warehousing Operations in Supply Chains of Small Manufacturing Firms *Dr. Vipul Chalotra. *International Journal of Engineering and Management Research*, *3*(1).

Carter, R. J. (2002). *Purchasing and Supply Management.* London: Pitman Publishing.

Creswell, J. (2003). *"Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research"* (3rd edition ed.). New Jersey: Prentice hall.

Creswell, J. W. (2011). *Designing and conducting mixed methods research, .:* (2nd ed ed.). London, Thousand Oaks, CA: SAGE publication.

da Cunha Reis, A. d. (2017). Warehouse design: a systematic literature review. *Journal of Operations & Production Management*,(14(4), pp.542-555.

Davarzani, H. a. (2015). Toward a relevant agenda for warehousing research. *literature review and practitioners' input. Logistics Research, 8(1), p.1*.

De Assis, R., & Sagawa, J. K. (2018). Assessment of the implementation of a warehouse management system in a multinational company of industrial gears and drives. *Gestao e Producao*, *25*(2), 370–383. https://doi.org/10.1590/0104-530X3315-18.

European Logistics Association and A.T. Kearney Management Consultants. (2004). *.Differentiation for Performance Excellence in Logistics".* Hamburg.

Faber, N., de Koster, M. B. M., & Smidts, A. (2013). Organizing warehouse management. *International Journal of Operations and Production Management*, *33*(9), 1230–1256. https://doi.org/10.1108/IJOPM-12-2011-0471.

Faber N. (2015). Exploring the Fit between Warehouse Characteristics and Warehouse Planning and Control Structure, and its Effect on Warehouse Performance. *Ph.D thesis, Rotterdam School of Management (RSM) and the Erasmus School of Economics*.

Forger, G. A. (2004). *"Leading Trends in Manufacturing, Warehousing & istribution." Modern Materials Handling.* New York, NY: McGraw-Hill.

Frazelle, E. (2002b). *World-class Warehousing and Material Handling.* New York: McGraw-Hill.

Georgise, F. B., Assefa, B., & Bekele, H. (2020). *DESIGN OF ALTERNATIVE WAREHOUSE LAYOUT FOR EFFICIENT SPACE UTILIZATION : A CASE OF MODJO DRY PORT*

ARTICLE DETAILS Advances In Industrial Engineering And Management DESIGN OF ALTERNATIVE WAREHOUSE LAYOUT FOR EFFICIENT SPACE UTILIZATION : A CASE OF MODJO DR. *March*. https://doi.org/10.7508/aiem.01.2020.06.13.

Habazin, J., Glasnović, A. and Bajor, I.,. (2017). Order picking process in warehouse: Casestudy of dairy industry in Croatia. Promet-Traffic&Transportation, 29(1), pp.57-65.

HAGOS, E. (2019). *ASSESSMENT OF CHALLENGES OF WAREHOUSING PRACTICES:THE CASE OF ETHIO TELECOM IN ADDIS ABABA,* Ethiopia: Addis Ababa University.

Heung S. Hwang, a. G. (2006). A performance evaluation model for order picking warehouse design,. *Computers & Industrial Engineering, Vol. 51(2).*

Hompel, M., Hompel, M. Ten, & Schmidt, T. (2007). Warehouse management: automation and organisation of warehouse and order picking systems.

John J., B. I. (2011).*"Warehouse & Distribution Science" The Supply Chain and Logistics Institute School of Industrial and Systems Engineering Georgia Institute of Technology.* Atlanta, USA.

Karimi K. & Namusonge G.S. (2014). Role of Information Technology on warehouse Management in Kenya: A Case Study of Jomo Kenyatta University of Agriculture and. *International Journal of Academic Research in Business and Social Sciences, Vol. 4, No. 11*.

Karim, N. H., Shaiful, N., & Abdul, F. (2018). *Empirical Evidence on Failure Factors of Warehouse Productivity in Malaysian Logistic Service Sector The Asian Journal of Shipping and Logistics Empirical Evidence on Failure Factors of Warehouse Productivity in Malaysian Logistic Service Sector*. *December*. https://doi.org/10.1016/j.ajsl.2018.06.012.

Kusrini, E., Novendri, F., & Helia, V. N. (2018). Determining key performance indicators for warehouse performance measurement - A case study in construction materials warehouse. *MATEC Web of Conferences*, *154*, 6–9. https://doi.org/10.1051/matecconf/201815401058.

Krajewski & Ritzman. (2005). Operations Management: Strategy and Analysis. *Business & Economics.*

Kumar, M. R. (2005). *Research methodology.* London: Sage Publications.

More S.V. (2016). The study of Efficiency and Effectiveness of Warehouse Management in the context of Supply Chain Management. *International Journal of Engineering Technology*.

Naseed R.A.K., Youni N., Husain S. & Kausar U. (2013). Warehouse Management System. *nternational Journal of Management Sciences and Business Research, 2(12)*.

Nunnely, C. a. (1994). *"Psychometric Theory"* . H.NY, Mac Graw Hill.

Nur Hazwani, Syed F., and Noorul Shaifu, (2018). Empirical Evidence on Failure Factorsof Warehouse Productivity in Malaysian Logistic Service Sector. *Asian Journal of Shipping and Logistics*.

Nynke.F. (2013). Organizing warehouse management; *International Journal of operation and Production Management, Vol. 33 No. 9, 2013* , pp. 1230-1256.

Paul, Y. and Lestari, Y.D. M. (2015). MANAGING STOCK IN WAREHOUSE:A CASE STUDY OF A RETAIL INDUSTRY IN JAKARTA. *Journal of Business and Management School of Business and Management Institute Technology Bandun, Vol. 4.*

PROJECT, USAID | DELIVER. (2014). Guidelines for Warehousing Health Commodities Arlington, Va: USAID | DELIVER PROJECT, Task Order 4. Second edition.

Ramaa A., Subramanya K.N. & Rangaswamy T.M. (2012). Impact of Warehouse Management System in a Supply Chain. *International Journal of Computer Applications*.

Reis, C., Souza, C. G. De, Nogueira, N., Henrique, G., Stender, C., Vieira, P. S., & Pizzolato, N. D. (2017). *WAREHOUSE DESIGN : A SYSTEMATIC LITERATURE REVIEW*. *14*, 542–555. https://doi.org/10.14488/BJOPM.2017.v14.n4.a10.

Richards, G. (2017). *Warehouse management: a complete guide to improving efficiency and minimizing costs in the modern warehouse,* 3rd Edition.

Saunders, M., Lewis, P. & Thornhill, A. (2009) *"Research methods for business students",* (5th ed ed.). Harlow: Pearson Education.

Saxena JP. (2003). warehouse management inventory control.

Sciences, T., Transport, I., & Communication, P. (2016). *ORDER PICKING PROCESS IN WAREHOUSE : CASE STUDY OF DAIRY INDUSTRY IN CROATIA*. *1*, 57–65.

Shah, B., & Khanzode, V. (2017). *A comprehensive review of warehouse operational issues*.. https://doi.org/10.1504/IJLSM.2017.081962.Aiken, L., West, S., Pitts, S., Baraldi, A., & Wurpts, I. (2012). Data Analysis Issues: Multiple Linear Regression. In *Research Methods in Psychology* (pp. 511–542).

Shiau, J., & Lee, M. (2010). Computers & Industrial Engineering A warehouse management system with sequential picking for multi-container deliveries. *Computers & Industrial*

Engineering, *58*(3), 382–392. https://doi.org/10.1016/j.cie.2009.04.017

Sneha, M., & More, V. (2016). *The study of Efficiency and Effectiveness of Warehouse Management in the context of Supply Chain Management* . *4*(8), 160–169.

Stoltz, M. H., Giannikas, V., McFarlane, D., Strachan, J., Um, J., & Srinivasan, R. (2017). Augmented Reality in Warehouse Operations: Opportunities and Barriers. *IFAC-PapersOnLine*, *50*(1), 12979–12984. https://doi.org/10.1016/j.ifacol.2017.08.1807

Tommy, B. (2010). *A warehouse design framework for order processing and materials handling improvement - Case Etra Oy*. 86. file:///C:/Users/User/Downloads/A-warehouse-design-framework-for-order-processing-and-materials-handling-improvement-Case-Etra-Oy.pdf

United Nations Development Programme (UNDP). (2017). *United Nations Development Programme Ethiopia - National Logistics Strategy*. 1–16. www.et.undp.org

Yener, F., & Yazgan, H. R. (2019). Computers & Industrial Engineering Optimal warehouse design : Literature review and case study application. *Computers & Industrial Engineering*, *129*(January), 1–13. https://doi.org/10.1016/j.cie.2019.01.006

Zehrer, A., & Raich, F. (2016). The impact of perceived crowding on customer satisfaction. *Journal of Hospitality and Tourism Management*, *29*(5), 88–98. https://doi.org/10.1016/j.jhtm.2016.06.007

APPENDIX I

JIMMA UNIVERSITY

COLLEGE OF BUSINESS & ECONOMICS

DEPARTMENT OF MANAGEMENT

MA IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT

QUESTIONNAIRE

Dear respondents;

I am a graduate student at Jimma University College of Business & Economics, Department of Management MA in Logistics and Supply Chain Management. Currently, I'm conducting a research entitled *"The Effect of Warehousing Management on Warehouse performance: A case of Modjo Dry port"* as a partial requirement for the award of Masters of Arts Degree 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 in the successful completion of the study by providing the necessary information. I confirm you that the information you share will stay confidential and only used for the academic purpose and the administered questionnaire may take about 15-20 minutes. Hence, your genuine, frank and timely response is vital for the success of the study. I want to thank you in advance for your kind cooperation and dedication of your precious time to fill this questionnaire.

Note:

- No need of writing your name;
- Indicate your answer with a checkmark (√) on the appropriate cell
- You can provide your answer in English, Amharic, and Afan Oromo language for the open-ended questions
- If you need further explanation please do not hesitate to contact me at +251-910-15-46-85 or ararsabuzu@gmail.com

Thank you in advance for your cooperation!

Ararsa Buzu Kidane

PART I: General Information/Respondents Profile:

1. Sex: Male ☐ Female ☐

2. Age: 18-25 years ☐ 26-33 years ☐ 34-41 years ☐ above 42 years ☐

3. Educational Qualification:

Below college diploma ☐ College diploma ☐ First Degree (BSc, BA) ☐

Second Degree (MSc, MA) ☐ PhD and above ☐

4. What is your field of study:

Accounting & Finance ☐ Management ☐ Marketing ☐

Economics ☐ Logistics &Supply Chain Management ☐ Other ☐

5. Year of service in the current position:

Below 1 year ☐ 1 to 2 years ☐ 2 to 3 years ☐ More than 3 year ☐

PART II: Main Questionnaire

Please indicate your choice by putting the check mark (√) on the appropriate cell.

Where; 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree.

6. Please indicate the degree to which you agree with the following statements regarding to Warehousing Management in your organization. (Please take your key warehouse activities in mined while rating the statements).

No.	***Variables***	***Score***				
	Receiving Activity	***1***	***2***	***3***	***4***	***5***
6.1	MDP have a standard operating procedures (SOP) in place that provide instructions to receive items properly					
6.2	We have notice of the goods arrival in advance which allows the warehouse to prepare					
6.3	The MDP has sufficient equipment's to unload materials.					
6.4	The MDP has sufficient space for loading/unloading materials.					
6.5	At the time of receiving, occurrence of physical accidents on					

	received goods are minimum					
6.6	At the time of items arrival appropriate documents are brought together					
6.7	The shelves for each received materials in the warehouse are adequate to store and put away					
6.8	There is clearly defined separated receiving area in Modjo Dry Port Warehouses					
6.9	All members of the receiving team are well trained in the receiving procedures.					
6.11	There is a pre-notification of the incoming goods that will be received in the warehouses					
6.12	During the time of receiving goods, there are procedures for the cross checking of the documents with the goods					
Put-way Activity		***1***	***2***	***3***	***4***	***5***
6.13	Our warehouse personnel's are skilled to perform put away activities.					
6.14	In the warehouse to do the put-away activity there is sufficient equipment's.					
6.15	When product is placed on its location, the storage location of the product is properly recorded					
6.16	The MDP warehouse design/layout is convenient to perform put-away activities.					
6.17	The design of the warehouse is easy to access items, convenient to load and unload					
6.18	There is an established well-structured put-away process for all items received into MDP warehouses					
6.19	In MDP warehouse put away activity performed manually via labor force					

	Storage Activity	***1***	***2***	***3***	***4***	***5***
6.20	Our warehouse team are effective in minimizing total goods damage that are stored in the warehouse					
6.21	In MDP warehouse appropriately using available storage areas are for storing goods					
6.22	The space between the stored items in the warehouse is not sufficient to move the workers and machinery.					
6.23	In the warehouse storage areas are available based on the nature of the items.					
6.24	In the warehouse there is tight control of accessing the storage area					
6.25	In the warehouse there are material protection equipment's to minimize the extent of materials damage.					
6.26	There is no updating of records when putting the goods away in their areas					
6.27	Shelves/racks/pallets are arranged in lines with the adequate passageways to facilitate put away and order picking activities.					
6.28	There is regular inspection and cleaning of storage areas.					
6.29	In our warehouse the materials can be stored in codification					
	Order Picking Activity	***1***	***2***	***3***	***4***	***5***
6.30	Warehouse personnel's are skillful in performing order Picking process.					
6.31	Our warehouse design/layout is convenient for an easy order picking process.					
6.32	Items returned from end user due to error in order-picking is high.					
6.33	MDP has adequate shelves for the goods in the warehouse to facilitate order picking process.					
6.34	In MDP order-picking is performed through gathering the item correctly by requested order.					
6.35	Processing time to do the order-picking in our warehouse is					

	reasonable.					
6.36	The design of the warehouse system is properly done to improve customer service in order picking process					
6.37	MDP warehouse performs order picking manually					
6.38	Items are picked from the storage area as exactly mentioned on the picking slip/issue order					
Shipping/dispatching Activity		***1***	***2***	***3***	***4***	***5***
6.39	The staffs of the warehouse do not have known how the motions of them have impact on waiting and un-satisfaction of customers.					
6.40	MDP warehouse personnel perform perfect order delivery lead time to the organization customers.					
6.41	In our warehouse there is high commitment to protect the items safety.					
6.42	In our warehouse there is high commitment to make easy of shipping and transportation process.					
6.43	Goods are delivered to buyer according to the specification, at the right without any damage.					
6.44	Communication is successful in making ready the transportation and to inform the recipient					
6.45	The customer orders are packed into the manner to prevent damage during transit.					
	Warehouse Performance					
	Quality	***1***	***2***	***3***	***4***	***5***
1	In our warehouse there is no inventory discrepancies					
2	Our warehouse give a priority for a safety of items					
3	Accidents are not occurred in our warehouse					
4	Our warehouse put away accurately a material in a correct location					
5	MDP warehouse picking accurately materials from the storage					

	based on the requested					
	Response Time	**1**	**2**	**3**	**4**	**5**
1	Our warehouse personnel serve our customer on the reasonable time					
2	In MDP warehouse monitor the order processing timely					
3	We measure the time of order is received and order is shipped to the clients					
4	Our warehouse serve our supplier and makes product ready for shipment on the reasonable time ready for picking.					
5	MDP measure the amount of put away time from product is unloaded and ready for picking in warehouse					
	Cost/Financial	**1**	**2**	**3**	**4**	**5**
1	We are successful in minimizing total inventory cost					
2	We are successful in minimizing total product damage in the warehouse like product deterioration, breakage, leakage etc.					
3	We are successful in minimizing all warehousing activity costs					
	Productivity	***1***	***2***	***3***	***4***	***5***
1	Our warehouse personnel utilizes warehouse spaces properly					
2	Our warehouse personnel measure material handling productivity of the warehouse thoroughly					
3	MDP warehouse utilizes a reasonable warehouse spaces for product handling					
4	We are working to improve storage capacity by removing unnecessary materials					
5	We measure the total storage area that is committed specifically to product handling					

APPENDIX II

Semi-structured Interview Questions for Managers

PART I: General Information

This part of the interview the researcher tries to gather some general information about the background of the respondents

1. Sex: Male ☐ Female ☐
2. Age: 18-25 years ☐ 26-33 years ☐ 34-41 years ☐ above 42 years ☐
3. Educational Qualification:
   Below college diploma ☐ College diploma ☐ First Degree (BSc, BA) ☐
   Second Degree (MSc, MA) ☐ PHD and above ☐
4. What is your field of study:
   Accounting & Finance ☐ Management ☐ Marketing ☐
   Economics ☐ Logistics & Supply Chain Management ☐ Other ☐
5. Current Position_____
6. Year of service in the current position:
   Below 1 year ☐ 1 to 2 years ☐ 2 to 3 years ☐ More than 3 year ☐

PART II: Main question on warehousing management

7. What are the main problems of warehousing process in your organization?
8. Do you think your organization is well-performing in the warehousing process? If no what are the challenges?
9. Do you believe all the sold goods are delivered at the right time to the right buyer in the right quality with the right quantity? If "No" what do you think the reason and your suggestion to solve these problems?
10. Do organizational and human capital challenges occur in the organization's property management areas?
11. Do the customers complain about the service that your warehousing department provides for them as compared to the competitors? If your answer is "**Yes**" could you mention which type of service did your customer have the complaint?
12. Overall what are the weakness of the warehousing practice from the End Users, suppliers, and organization side?