ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE

DEPARTMENT OF LOGISTICS & SUPPLY CHAIN MANAGEMENT

THE EFFECT OF WAREHOUSE FACILTY EQUIPMET AND MACHINERIES ON LOGISTICS OPERATIONAL PERFORMANCE: A CASE OF ETHIOPIAN AIRLINES GROUP

BY
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DECLARATION

I hereby declare that this thesis entitled “The effect of Warehouse Facility Equipment and Machineries on Logistics Operational Performance: a case of Ethiopian Airlines Group” has been prepared by me under the guidance and supervision of Busha Temesgen (PhD). The thesis is original and has not been submitted before for the award of any degree or other to any university or institutions, and that all the sources of materials used for the thesis have been duly acknowledged.

Researcher Name	Date	Signature
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CERTIFICATE

This is to certify that the thesis document carried out by Mr Ephrem Kassaye entitled “The Effect of Warehouse Facility Equipment and Machineries on Logistics Operational Performance: a case of Ethiopian Airlines Group” submitted to Addis Ababa University School of Commerce for the award of the Master of Art in Logistics and Supply Chain Management under my guidance and supervision. Accordingly, I hereby assure that the study is his own original work and no part of this thesis has been submitted to any other university or institutions for the award of any degree or diploma.

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APPROVAL SHEET

As members of the Board of Examiner of the Final Open Defense, this is to certify that the thesis prepared by Mr. Ephrem Kassaye , entitled "The effect of Warehouse Facility Equipment and Machineries on Logistics Operational Performance: a case of Ethiopian Airlines Group", which is submitted in partial fulfillment of the requirements for the Degree of Masters in Logistics and Supply Chain Management, complies with the regulation of the university and meets the accepted standards with respect to originality and quality 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.

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LIST OF ABBREVIATIONS

ANOVA: Analysis of Variance

CHS: Cargo Handling System

ECLS: Ethiopian Cargo & Logistics Services

ETAG: Ethiopian Airlines Group

ETV: Elevating Transfer Vehicle

IT: Information Technology

ICS: Inventory control system

KPI- Key Performance Indicator

SPSS: Statistical Package for the Social Sciences

VNA: Very narrow aisle truck

WMS: Warehouse management system

Abstract

This research explores 'The Effect of warehouse facility Equipment & Machineries on logistics operational performance '' within the context of Ethiopian Airlines Group specific to Cargo Terminal & Logistics services division. The researcher explores the relationship between warehouse equipment and logistics operations to enhance the required performance and the study employed a mixed research approach, combined qualitative & quantitative methods to gather the required insights from Ethiopian Cargo & Logistics services division on warehouse operation assigned employees and management personnel & 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, ninety (90) 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 23. The research has sample findings of strong correlation between the utilization of the warehouse facility equipment and machineries and the overhaul operational performance of Ethiopian Airlines Group , employees who are working under cargo operational departments highlighted the importance of efficient equipment utilization in meeting day to day operational demand with conclusion of as the findings underscore the critical role of warehouse facility equipment and machineries in enhancing logistics operational performance & as effective utilization and maintenance of equipment are major key factors in achieving operational efficiency and meeting customer demand . Furthermore, recommendations were given as Ethiopian Airlines Group should invest in modernizing and upgrading warehouse facility Equipment to improve operational efficiency, implementing a structures maintenance schedule for equipment can help prevent unplanned breakdowns and minimize operational disruptions. Overall, this study sheds light on the significance of warehouse facility equipment and machineries in driving logistics operational performance and provides valuable recommendations for enhancing efficiency within Ethiopian Airlines Group's operation and proper warehouse management.

Keywords: *Warehouse Equipment, logistics operational performance, warehouse management*

CHPTER ONE

INTRODUCTION

This chapter presents the background of the study, the background of the organization, statement of the problem, research questions, and the research hypotheses, the objectives of the study, scope of the study & the significance of the study. The chapter further presents the scope of the study, the operational definition of key, limitation of the study and the organization of the thesis, and the conclusion part.

1.1. Background of the study

Today's world is dynamic and warehouse facilities can help to improve the efficiency of logistics operation by keeping an adequate supply of equipment, better Inventory management, effective distribution of goods, provide quality and value added services, for economic growth & to ensure continuous and effective logistics operation by managing demand fluctuations and minimizing risks. In this environment warehouse equipment's and machineries have major role on Improving efficiency of the warehouse, reduce logistics costs and minimize the risk of accidents, automating the logistics operation, reduction of Inventory, improving greater storage capacity, easy flow of goods through each logistics processes by creating safe working environment & reducing the possibilities of Injuries and product damage so as to accomplish organizational goals and objectives. Warehouse: is a place where Items are received, stocked, and dispatched Aronovich, et al. (2021).

Further to the above mentioned effects for a given logistics services providing sectors warehouse equipment and machineries have great role of cost-savings by optimizing storage spaces, minimizing overstocking, streamlined processes also lower labor costs and the time it takes to move goods in and out of the warehouse, Customer service enhancement by helping businesses stay ahead of delivery timelines, Increased productivity to lower downtime and increase productivity & and for leading competitive advantage by enabling them to respond quickly to market situations and meet customer demands as they arise.

A warehouse facility without well-equipped facility equipment and machineries has a tendency of decreased productivity, repetitive workplace injuries, result unsafe working environment and decreased employee morale. It can also result damage and spoilage of goods

, inefficient warehouse space utilization and in efficient workflow and due to this reasoning the logistics company without proper facility equipment & machineries will face difficulty to competent in the logistics business sectors and to accomplish its planned organizational goals and objectives thus; considering their positive and negative impact on logistics operation high attention must be given for warehouse equipment and machineries availability , sufficient quantity in comparing to the scope of the logistics company activities , easy for operation (user friendly) , ergonomically safe & equipping advanced technology features , automation system technology products , availability of well qualified maintenance technicians and operators to avoid cost to be incurred due to traditional logistics operational handling procedures pre mature failure of equipment and machineries and related unplanned maintenance and spare part costs .

Hence, the purpose of this study is to assess the major effects of warehouse facility Equipment & Machineries on Ethiopian Airlines Group specific at Ethiopian Cargo Terminal & Logistics services division operational performance by using five Independent variables and to provide suggestions to the Airline as how it can improve both the positive & negative effects of the warehouse facility Equipment & Machineries on the organization logistics operational performance and in return get the best one out of them.

1.2. A Brief Background of the Organization

Ethiopian Airlines Group, also known as Ethiopian, is Ethiopia's flag carrier and is completely owned by the Ethiopian government. Ethiopian Airlines (Ethiopian) has had more than 75 years of successful journeys, which has made it the leading aviation group in Africa and started its operation with five C-47 aircraft operating its debut flight to Cairo via Asmara on April 8, 1946. Ever since it has been growing in leaps and bounds and continues to introduce cutting-edge aviation technology and systems. As an aviation technology leader, Ethiopian was a pioneer in ushering in new aviation technology into Africa including the first jet airplane as well as the first B767, B777-200LR, B787 Dreamliner, and 787-9 in the continent. Ethiopian also led the way in operating Africa's first Airbus A350 XWB. Currently, the airline has a fleet of more than 146 modern aircraft with an average fleet age of less than seven years; it has also more than 100 ultramodern Aircraft on order. Ethiopian Fact Sheet, (2023).

Living its motto of Bringing Africa Together and Beyond, Ethiopian has created Africa-wide and transcontinental air connectivity networks linking its main hub, Addis Ababa to the rest of the world. The airline serves 136 international passenger and cargo destinations, including

63 African cities, with daily and multiple flights with a minimum layover in Addis. As a veteran carrier serving a vast intra-African network, Ethiopian flies to more destinations in the continent than any other airline. As of March, 2024, there are a total of 16,837 permanent full-time employees in Ethiopian Airlines Group. Out of this total, 10,249 (61.00%) employees are Male, and the remaining 6,588 (39.00%) are Female.

1.3. Statement of the problem

On the effect of warehouse facility Equipment and Machineries to logistics operational performance so far many studies have been conducted by different researchers and scholars. For Instance, Kelvin, H. (2019). published an analysis on Cargo Handling Performance and its effect on turnaround time of Liner ship give emphasis on management of the logistics port should ensure that full automation of the service delivery system is used in short handling activities. This is to ensure that human errors are reduced and eliminated and the delivery of the service rate is at faster rate. It is known that in any logistics operation handling companies it is difficult to handle any activity without warehouse facility equipment and machineries and as they play significant role for a company to meet its operational performance target and to achieving the organization's goals.

In order to identify the major effects of warehouse facility Equipment and Machineries the researcher believe that taking such kind of research is mandatory and it play significant role in logistics services providing companies including ETAG. While planning to do the research the three main reasons for the selection of the research title were: first the researcher believes that warehouse facility equipment and machineries plays a significant role for the efficient utilization of the warehouse facility as it enhances easy flow of goods from their starting to end process. Second from the researcher point of view, even the total quantity of equipment and machineries have their own impact on the performance of the organization in comparing to the volume of warehouse facility handling capacity and daily planned activities , Third from the researcher physical observation on the planned research conducting area proper utilization of the warehouse facility Equipment and Machineries and capability to repair and operate the equipment's has also its own positive impact on long service life time of the equipment's and machineries & lastly management attention and users belongingness of proper utilization has also its own positive and negative impact to meet the planned operational performance target of the organization .

In Logistics operation organizations and in different warehouse facilities one of the main problems that can be mentioned & observed in all facilities is the absence of proper warehouse facility Equipment's & Machineries which will make warehouse operations easy

and efficient. This problem is growing worse in every logistics centers day by day as the supply could no longer cope with the demand as due to the continuous increase of logistics operation of different organizations. Due to the fact that Ethiopian Logistics business operation is on growing from day to day specially on the Airline business sector of Ethiopian Airlines Group the demand of having modern facility equipment's & machineries is crucial.

By considering the above reasons , the researcher believe that Availability of Equipment's and Machineries , Total quantity of Equipment's and Machineries , Operability Equipment's and Machineries (user friendly) , Safety Features of the Equipment's and Machineries , Automation system of the Equipment's and Machineries & Availability of well qualified maintenance technicians and equipment operators are critical determinants .

However, even if currently the company is on achieving its planned operational targets special attention needs to be given for its warehouse facility equipment & machineries. Thus the researcher believe that as it is important to conduct a research on factors affecting logistics performance and work on the major factors and to recommend possible solutions.

To fill this gap, the research examined how Ethiopian Airlines Cargo & Logistics Services division warehouse facility equipment and machineries influences its logistics operational performance by raising the following basic research questions in the current dynamic and highly competitive environment Airline business industry.

1.4. Research Questions

Based on the above statements of the problem the below major research questions were developed and serve as a framework for the study:

- What effect does equipment and machinery availability have on logistics operational performance?
- What effect does quantity of equipment and machinery have on logistics operational performance?
- What effect does ease of operability of equipment and machinery have on logistics operational performance?
- What effect does level of process (system) automation of equipment and machinery have on logistics operational performance?
- What effect does qualified talent of maintenance team & operators of equipment and machinery have on logistics operational performance?

1.5. Research Hypotheses

Leedy, et al. (2021). assert that the research hypothesis serves as an informed prediction that offers a provisional goal, a practical aim, and a systematic structure to guide researchers in data collection and analysis. As a result, the researcher utilized the subsequent hypothesis in the current investigation: Based on the review of theoretical and empirical literature discussed in chapter two, the following hypotheses were developed to guide the empirical work of the current study

H1: There is a positive and significant effect of equipment and machinery availability on Logistics operational performance.
H2: Total quantity of equipment and machinery have a positive and significant effect on Logistics operational performance.
H3: The ease of operability of equipment and machinery has a positive and significant effect on Logistics Services operational performance.
H4: The level of process (system) automation of equipment and machinery a positive and significant effect on Logistics operational performance.
H5: The availability of qualified talent of maintenance team & operators of equipment and machinery have a positive and significant effect on Logistics operational performance.

1.6. Objectives of the Study

1.6.1. General Objectives

The primary aim of this research is to evaluate the impact of warehouse equipment and machinery on the logistics operational performance of Ethiopian Airlines Group Cargo Terminal & Logistics Services division.

1.6.2. Specific Objectives

The below are the specific objective of the study

- To assess the effect of warehouse equipment & machinery availability on ECLS logistics operational performance
- To assess the effect of warehouse equipment & machinery quantity of warehouse equipment & machinery on ECLS logistics operational performance
- To evaluate the effect ease of operability of equipment and machinery on ECLS logistics operational performance
- To evaluate the effect of level of process (system) automation of equipment and machinery on ECLS logistics operational performance

- To evaluate the effect of qualified talent of maintenance team & operators of equipment and machinery on ECLS logistics operational performance

These objectives are structured to investigate and analyze the influence of various factors related to warehouse facility equipment and machineries on the logistics operational performance of Ethiopian Airlines Group. By addressing these specific objectives, the study aims to provide valuable insights into enhancing operational efficiency, productivity, and service quality within the airline industry, particularly focusing on the Cargo & Logistics services division of Ethiopian Airlines Group.

1.7. Significance of the Study

The study aimed to determine the impact of warehouse facility equipment and machinery on logistics operational performance. The results of this research will provide valuable insights to Ethiopian Airlines Group, enabling the organization to enhance its understanding of how warehouse facility equipment and machinery affect logistics operational performance and holds significant importance for various stakeholders due to the following reasons:

Organizational Impact: The research provides valuable insights for Ethiopian Airlines Group, enabling the organization to enhance its understanding of how warehouse equipment and machineries affect logistics operational performance. This can lead to improved efficiency, cost savings, and better service quality.

Strategic Decision-Making: The findings and recommendations from the study can assist the organization in making informed decisions, whether it be formulating strategies or enhancing policies related to the proper utilization of warehouse equipment and machinery. This can benefit all key stakeholders involved in cargo handling operations.

Academic Contribution: The study contributes to the academic literature on logistics and supply chain management by exploring the impact of warehouse facility equipment on operational performance. It provides a foundation for further research in this area and helps advance knowledge in the field.

Industry Relevance: Understanding the relationship between warehouse equipment and logistics operational performance is crucial for the aviation industry. The study addresses a critical issue in cargo handling operations, offering practical insights that can be applied by other organizations in the sector.

Knowledge Enhancement: By filling a gap in the existing literature regarding the specific

relationship between warehouse facility equipment and logistics operational performance, the study adds to the body of knowledge in the field of logistics and aviation operations.

Operational Efficiency: The research findings can help organizations streamline their logistics operations, optimize warehouse processes, and meet performance targets. This can lead to increased productivity, reduced operational disruptions, and enhanced customer satisfaction.

The results of this research can assist the organization in better understanding the appropriate use of warehouse equipment and machinery. Additionally, the findings and recommendations from the study can aid the organization in making informed decisions, whether it be formulating strategies or enhancing current policies related to the proper utilization of warehouse equipment and machinery, benefiting all key stakeholders. For scholars and researchers, the study's findings can provide a foundation for conducting more in-depth research on efficient warehouse facility equipment and machinery management, as this area requires further exploration. It also helps identify areas that are not yet understood, requiring additional research, elaboration, and enhancement.

Overall, the significance of the study lies in its potential to drive improvements in operational efficiency, inform strategic decision-making, contribute to academic research, and benefit the aviation industry as a whole by enhancing logistics operational performance

1.8. Scope of the study

The study was designed to evaluate the influence of warehouse facility Equipment & Machinery on logistics operational performance. The researcher examined various aspects including availability, quantity, operability, automation level, and the presence of qualified maintenance team & operators. Additionally, Logistics operational performance was assessed based on Employee Productivity, On-Time Delivery Performance, Inventory Management Efficiency, and Safety Performance.

Logistics Operational Performance through Warehouse Facility Equipment and Machineries: A Case Study of Ethiopian Airlines Group" encompasses a comprehensive examination of the impact of warehouse equipment and machinery on the logistics operational performance within the specific context of Ethiopian Airlines Group's Cargo Terminal & Logistics Services division. The study focuses on various aspects related to warehouse facility equipment and machineries and their influence on operational efficiency, productivity, and

service quality in the airline industry.

Geographical Scope:

The study is conducted within the operational environment of Ethiopian Airlines Group, specifically targeting the Cargo Terminal & Logistics Services division.

Functional Scope:

The study evaluates the impact of warehouse equipment and machinery on logistics operational performance, considering factors such as availability, quantity, operability, automation, and maintenance team qualifications.

Industry Scope:

The study is centered on the airline industry, with a specific focus on cargo handling and logistics operations within Ethiopian Airlines Group.

Operational Scope:

The study examines the operational performance of Ethiopian Airlines Group's Cargo Terminal & Logistics Services division in relation to warehouse facility equipment and machineries.

Analytical Scope:

The study analyzes the relationships between equipment availability, quantity, operability, automation, maintenance team qualifications, and logistics operational performance to provide insights and recommendations for improvement.

Practical Scope:

The study aims to offer practical recommendations for enhancing operational efficiency, employee expertise, and service quality within the challenging airline industry environment, based on the findings and analysis conducted.

By defining and focusing on these specific scopes, the study aims to provide a detailed understanding of how warehouse facility equipment and machineries impact logistics operational performance at Ethiopian Airlines Group, offering valuable insights for improving operational efficiency and service quality in the airline industry.

1.9. Definition of terms

A warehouse management system (WMS) - consists of software and processes that allow organizations to control and administer warehouse operations from the time goods or materials enter a warehouse until they move out. Warehouses sit at the center of manufacturing and supply chain operations because they hold all the material used or

produced in those processes, from raw materials to finished goods. (Paul Kirvan from open source)

Equipment & Machine availability - is a measures of the proportion of time an equipment or machine is actually in operation compared to the time it should be in operation. High machine availability means that a machine can produce more frequently and requires less time for maintenance and repairs. Low machine availability, on the other hand, can lead to delays and downtime in production. Worxmity, (2019).

Ease of Operability of Equipment's & Machineries is the ability to keep a piece of equipment, a system or a whole industrial installation in a safe and reliable functioning condition, according to pre-defined operational requirements. Wikipedia, (2008).

Level of process (system) Automation is a continuum from manual to fully automatic operations. Groover, (2001). The level of automation can be defined as an amount of the manning level with focus around the machines, which can be either manually operated, semi-automated, or fully automated.

Terminal throughput measures reflect the amount of cargo or number of vessels the port handles over time. These measures are affected by many variables beyond physical capacity. Bureau of Transport Association, (2017).

Total productive maintenance (TPM) - is the process of using machines, equipment, employees and supporting processes to maintain and improve the integrity of production and the quality of systems. Jonatan Trout, N (2024).

Automation - application of machines to tasks once performed by human beings or, increasingly, to tasks that would otherwise be impossible. Although the term mechanization used to refer to the simple replacement of human labor by machines, automation generally implies the integration of machines into a self-governing system. Automation has revolutionized those areas in which it has been introduced, and there is scarcely an aspect of modern life that has been unaffected by it. Mikell P, G. (2024).

1.10. Organization of the study

This research study was organized in to five chapters. The first chapter deals with introduction, which includes background of the study, statement of the problem, research questions, objectives of the study, scope of the study, limitations of the study, significance of the research, and organization of the study. The second chapter contain related literature review, which focuses on theoretical framework and conceptual issues of Strategic Sourcing Practice. The third chapter includes research methodology which is incorporated study area

description, study design; data collection methods and instruments; study population, sample size and sampling, methods of data analysis used, and ethical considerations. Chapter four has contained findings of the study including data presentation and analysis of the findings. The last chapter would be provided discussion, implication and conclusion of the study and a recommendation of the study will be assessed based on their relevancy priority.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1. Introduction

This section's aim is to discuss the ideas and concepts pertaining to how machinery and equipment in warehouse facilities affect the operational performance of logistics. ECLS logistics operational performance was impacted by a number of elements, including the general overview of the equipment and machinery. Additionally, the study's conceptual framework was also examined.

2.1.1. Definition of Warehouse Facility Equipment and Machinery

The warehouse management as stated by Van den, B. (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;

Transportation management system as stated by Dr. Patrick Karanja , N. and Dr. Makori ,M (2021). found that the implementation of transport management systems has a notable and beneficial impact on the supply chain performance of FMCG in Kenya. Transport management systems play a crucial role in offering trade compliance information and documentation, simplifying the management and optimization of transportation operations across various modes of transport, ensuring punctual delivery of goods, providing insight into daily transportation activities, and aiding in the streamlining of shipping processes.

According to Karim, (2018). a warehouse serves a purpose beyond mere inventory storage. The objectives of warehouse management encompass enhancing productivity and precision, as well as minimizing and regulating inventory and shipping expenses, all while ensuring excellent customer service. On the other hand, warehousing primarily involves activities such as receiving, storing, packing, and shipping goods, which necessitate labor, capital (including land, storage, and handling equipment), and information systems, all of which come at a significant cost.

Warehousing plays a crucial role in a company's overall performance, essential for logisticians to achieve their logistics operations' goals. Warehouses, as stated by Kittisack et al. (2019), facilitate uninterrupted production processes, futuristic production, and mass production by storing raw materials and productive inputs. Additionally, Mohd, et al. (2020). and Mpuon, O. Etim, E. and Usoro (2023a). emphasized that warehouses help enterprises capitalize on demand and supply fluctuations by offering proper custody for finished goods. Furthermore, Faber (2013) highlighted the significance of warehouses in maintaining a balance between inventory management, logistical performance, and overall organizational success.

Valentine and Gray (2002). emphasized the importance of understanding port performance for effective port management. This includes measuring port productivity in relation to utilization, output, and competition. Chung, (2005). further elaborated on this by stating that port operational performance is typically evaluated based on vessel dispatch speed, cargo handling rate, and the duration cargo spends in the port before shipment or after discharge. This highlights the significance of vessel turn-around time and cargo dwell-time as key indicators of cargo-handling performance, which are largely influenced by the efficiency of cargo handling processes at the port. According to UNCTAD, (1999). operational performance can be assessed using either macro or micro performance indicators.

Huy Tung Pham and Luong Hai Nguyen (2022) emphasized as cargo-handling equipment (CHE) is essential for the efficient operation of a container terminal. This study focuses on evaluating the performance of CHEs using the overall equipment-effectiveness (OEE) technique and data gathered from a field survey conducted in 14 container terminals in Vietnam. The results indicate that the CHEs are not performing up to their full capacity, leading to inefficiencies in terminal operations. Additionally, the study highlights the underutilization of container terminals and their inability to reach their full throughput potential due to operating above their designed capacity.

Mohd Fathi, M. Zulkifli M, U & Kamal Imran, S. (2020). mentioned in the age of globalization, where national borders no longer hinder organizations from providing services to meet customer needs, it is essential for organizations to be adaptable in delivering services of higher quality, greater variety, and improved customer service. This is due to the increased bargaining power of customers. To ensure a successful logistics operation, effective management of inventory, warehouse, and transportation is crucial. These factors play a significant role in achieving a balance between cost, quality, and delivery time. A well-

managed inventory, warehouse, and transportation system can be achieved through a systematic approach, considering the logistics operation as a network that connects and encompasses these three activities in managing the flow of materials and achieving superior logistics performance.

Logistics management practices encompass a series of activities conducted by organizations to facilitate effective logistics management Adebayo, (2012). Therefore, logistics management firms have the ability to devise and execute strategies that can lead to a sustainable competitive advantage if implemented successfully. Due to the varying scope and perspectives on logistics, there exist diverse definitions in the relevant literature and among industry professionals. Initially, logistics was defined as the movement of goods to meet the needs of consumers or businesses from the point of origin to the consumption destination Brown and Herring, (1995).

Kittisak Jermsittiparsert, Jutamat Sutduean, Thanaporn Sriyakul (2019) stated warehouse effectiveness has become a focal point of expertise and a key advantage for businesses. A well-run warehouse can meet customer demands promptly and enhance a company's overall performance. Therefore, the aim of this research is to analyze the significance of warehouse characteristics in relation to supply chain warehouse efficiency. This study focuses on two warehouse characteristics: layout and operations. Furthermore, the role of the management information system (MIS) is explored as a mediating factor between warehouse characteristics and supply chain warehouse efficiency.

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 and 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 plays a crucial role in enhancing performance, especially in warehouse operations. Automated material handling systems like conveyors and cranes, along with warehouse management systems, significantly impact warehouse efficiency. To stay

competitive, it is essential to utilize flexible and intelligent information systems that can adapt to changing market demands. These systems should support the preferred working methods and be easily customizable to incorporate any necessary process redesigns for keeping the distribution center current Van den ,B. (2012).

Warehouse Facility

A warehouse facility is a vast establishment created for the purpose of storing and distributing goods. It can be owned by third-party logistic providers and customized to meet the storage requirements of both small-scale businesses and large-scale distribution centers. The main objective of a warehouse facility is to offer sufficient space for businesses to store their inventory, as well as facilitate the packaging, labeling, and shipping of goods. Danish, K. (2023).

The purpose of warehouse Facility

Warehousing is a crucial part of the supply chain. And to effectively manage a warehouse, it's important to understand its functions. In the past, warehouses were solely used for storing goods. However, modern warehouses serve a much wider purpose. Aside from storing goods, warehouses are responsible for facilitating movement, price stabilization, and more like storing Goods, securing goods, facilitating movement, Stabilizing prices, Additional processing's by Leon, A. (2023).

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 Electronic copy available at: https://ssrn.com/abstract=3951785 12 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).

According to Shah & Khanzode, (2017). the primary goal of a warehouse is to effectively utilize resources in order to meet customer satisfaction by delivering the correct product to the right place at the right time and in good condition. Warehouses serve as a platform for temporary storage, goods protection, fulfilling individual customer orders, packaging, providing aftersales services, repairs, testing, inspection, Just in Time (JIT) sequencing, and assembly. The main warehouse operations are categorized into receiving, picking, storage,

and shipping. The storage function encompasses various sub-functions such as department or location assignment and zoning. Additionally, batching, routing, and sorting are integral parts of the picking process.

According to Karim, (2018). a warehouse serves a purpose beyond mere inventory storage. The objectives of warehouse management encompass enhancing productivity and precision, as well as minimizing and regulating inventory and shipping expenses, all while ensuring excellent customer service. On the other hand, warehousing primarily involves activities such as receiving, storing, packing, and shipping goods, which necessitate labor, capital (including land, storage, and handling equipment), and information systems, all of which come at a significant cost.

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).

Warehouse Equipment

Warehouse equipment refers to any element, system, or machine employed in logistics tasks such as goods receipt, storage, stock management, transportation, order processing and goods dispatch and they can be can differentiate between manual equipment (pallet racks, forklifts, and order pickers, to name a few) and automated equipment (such as conveyors, electrified monorails, and stacker cranes). Interlake, M. (2022).

Warehouse Machineries

Warehouse machines are essential elements in any logistics facility. They’re charged with moving goods internally, from the loading docks to the storage area, from production to the pick stations, and so on.

The purpose of warehouse Facility Equipment’s and Machinerie

- Warehouse machines for loading and unloading at the docks to carry out the goods receipt and dispatch processes at the warehouse docking areas

- Warehouse machines for depositing and extracting unit loads like Forklifts, Stacker cranes and trilateral stacker cranes, pallet movers and related
- Warehouse machines for transporting goods Interlake M. (2022).
  - **Forklifts.** Any type of forklift can temporarily, to carry goods between two points. The most common tends to be the counterbalanced forklift, since its movements are faster.
  - **Conveyors.** These consist of a set of rollers that carry the load (boxes or pallets) and propel it along a circuit. The system is equipped with electric motors that move the unit loads in a safe, controlled way. Roller conveyors work by means of the WCS, which executes machine movements as per instructions sent by the warehouse management system (WMS).
  - **Overhead chain conveyors.** These are primarily used to transport hanging items. They comprise an aerial circuit with continuously moving chains. Suspended from the chains are various supports that hold a number of different items (boxes, hanging garments, components, etc.).
  - **Pallet lifts.** Also known as vertical conveyors, these warehouse machines are integrated in a conveyor line to raise or lower a pallet several feet (e.g., to another floor). Pallet lifts make it possible to access multiple levels.
  - **AGVs/LGVs/AMRs.** Automatic guided vehicles (AGVs) are warehouse machines that move autonomously by following a preprogrammed route. They're guided by one of two systems: wire-uided (AGVs) or laser-guided (LGVs). As opposed to AGVs, AMRs (autonomous mobile robots) work and travel without preset routes, adapting their travel according to information they receive from their environment in real time.

Logistics Operational 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 rate Indicators**	**Cost / Financial Indicators**	**Productivity Indicators**
Inventory Accuracy Rate	Warehouse Order Processing Time	Total Warehousing cost	Storage Space Utilization
Put-Away Accuracy		Value of Product Damaged in the Warehouse	Units Moved Per Person Hour
Picking Accuracy Rate			% of Storage Space Dedicated for Handling

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

2.2. Empirical Review

The outcomes of earlier investigations and studies in the field were described from various angles. The following is a summary of some research findings about warehouse machinery and equipment and related logistics operational performance.

Satya S. P. Narayan C, N. and Antaryami, M. (2014). evaluated that as material handling system plays an important role in the efficient operation of port logistics Foster, (2008). Container utilities are growing very rapidly and it is expected that this growth will continue for the next decades Kaynak and Hartley, (2008). A new generation of deep-sea container vessels, with a capacity of 8,000–10,000 "20-ft container equivalent units" (CEU) is in use. Even larger vessels are under development. These developments urge major ports to reconsider their equipment and logistics performance Jian ,et al.(2009).

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.

Natasha, R. Sasho, K. & Vladimir ,P. (2017). shows as successful companies practice supply chain management and logistics management to reduce costs, increase their competitiveness and enhance operational efficiency. The logistics in modern business conditions coordinates and integrates the movement of materials and products from physical, organizational and information aspect. This research aims to analyze the impact of company's logistics management including transportation, warehousing, packaging, inventory and information management to the efficiency and effectiveness.

Logistics Management Practices and Business Performance Logistics, being an essential component of the supply chain system, offers time and place utilities, thereby contributing to

the improvement of firm performance Kuswantoro and Rosli,(2012). Companies with efficient logistics operations can enjoy cost savings in sourcing components or work expertise. Successful sales in global markets require the establishment of an international sales organization or partnerships with international entities to expand the supply chain Korsita and Cania, (2016).

The efficiency and effectiveness of logistics operations significantly impact not only the business performance of manufacturers but also the customers' perception of the quality of products and services provided by the company. Effective logistics management can serve as a significant source of competitive advantage for a company by enabling it to respond faster and more efficiently than competitors to customers' needs on a global scale Adebambo ,et al. (2016). Tabeni, (2006) suggests that any enhancements made in logistics management can lead to improved business performance, resulting in increased revenue in a cost-effective manner.

Relate theory

The research on the effect of warehouse facility equipment and machineries on logistics operational performance at Ethiopian Airlines Group is related to several theories in the field of logistics and supply chain management. One prominent theory that can be linked to this research is the Resource-Based View (RBV) theory.

The Resource-Based View theory emphasizes the importance of internal resources and capabilities in achieving sustainable competitive advantage for organizations 72. In the context of the study, warehouse facility equipment and machineries can be considered as valuable resources that contribute to the operational performance of Ethiopian Airlines Group's Cargo & Logistics services. The theory suggests that by effectively utilizing and managing these resources, organizations can enhance their operational efficiency, productivity, and overall performance in the competitive airline industry.

Furthermore, the RBV theory highlights the significance of valuable, rare, inimitable, and non-substitutable (VRIN) resources for creating a competitive advantage 72. In the case of Ethiopian Airlines Group, the presence of advanced warehouse equipment, automated processes, qualified maintenance teams, and user-friendly machinery can be viewed as valuable and potentially rare resources that can differentiate the airline's Cargo & Logistics services from competitors.

By aligning with the Resource-Based View theory, the research underscores the critical role of warehouse facility equipment and machineries in shaping logistics operational performance and achieving excellence within the airline industry. The study's findings and

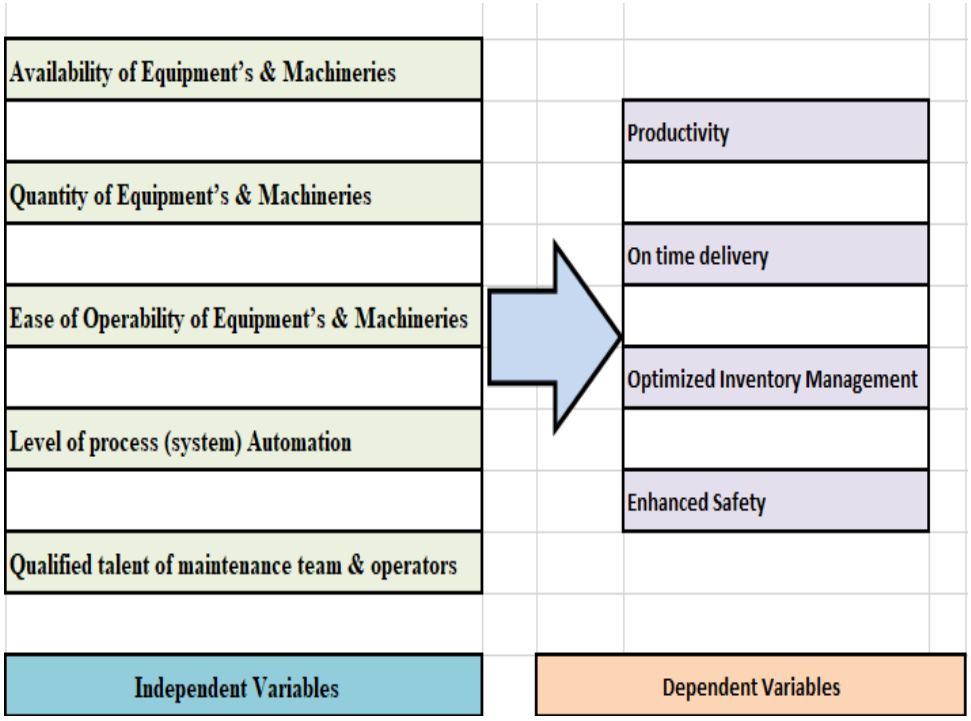
recommendations emphasize the strategic importance of these resources in driving operational efficiency, employee expertise, and service quality at Ethiopian Airlines Group, aligning with the core principles of the RBV theory.

2.3. Conceptual Framework

This section of the proposal presents the conceptual framework that will be developed for the study. The framework, formulated based on approaches and concepts identified in the literature review, serves the purpose of elucidating the conceptual logic and direction of the study. It incorporates leading ideas and helps to clarify the significance of the study's concepts. In order to determine the effects of warehouse facility equipment and machineries on logistics operational performance, the research needs to first discuss the main operational activities carried out by these equipment and machineries in warehouse facilities Satya, S. Patra, N. Nayak and Antaryami, M.(2014).

According to Reichel and Ramsey (1987). a conceptual framework is a set of wide ideas and principles taken from appropriate fields of inquiry and used to structure a subsequent presentation. It is a research tool intended to support a researcher in developing an understanding of the situation under investigation. Therefore, the present researcher in this study adopted five specific categories of optional variables (i.e. Availability of Equipment's & Machineries, Quantity of Equipment's & Machineries, Ease of Operability of Equipment's & Machineries, Level of process (system) Automation, and Qualified talent of maintenance team & operators). Generally, to give direction to the future researchers on the effect of warehouse equipment and machinery and to meet the objectives, hypotheses and research questions of the research, the present researcher developed a conceptual framework that clearly depicted the relationship between the independent variables and dependent variables that is Logistics operational performance based on the insights gained from the theoretical and empirical literature review as shown in figure 3.1 below.

Figure 3.1: Conceptual Frameworks of the study (own design)



CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

Research methodology is essential for ensuring a reliable and valid research study. Moreover, the research design plays a crucial role in carrying out high-quality research. This section delves into the specifics of the research design and methodology employed to gain a thorough understanding of the techniques utilized in conducting the study. It lays out a comprehensive plan that aids in addressing the research questions effectively. Furthermore, it outlines how samples are selected from the target population, provides details about the respondents and their selection process, and discusses the tools used for data collection. Additionally, the chapter covers the data analysis methods employed in the study, highlighting that both explanatory and descriptive designs are suitable. The study encompasses research approach, research design, data types and sources, data collection methods, sampling techniques, measurement of constructs, data analysis methods, and considerations of validity and reliability. Lastly, the ethical considerations of the study are briefly touched upon.

3.2. Description of the Study Area and population

The research focused on Ethiopian Airlines Cargo & Logistics Services division warehouse facilities, including various equipment and machinery used for handling different types of cargo shipments such as incoming, outgoing, or transfer cargo. To ensure efficient logistics services, modern cargo material handling equipment like conveyor systems, fully automated elevating transfer vehicles, security screening equipment, and cooling system equipment such as chiller systems and cool dollies were utilized. Additionally, modern ground support equipment like forklifts, VNA trucks, and related equipment were used for loading and unloading shipments, along with well-equipped material storage rack systems for storage. The warehouse handles incoming, outgoing, and transit shipments, and the study evaluated the impact of these equipment and machineries on the warehouse performance of ECLS.

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3.4. Research Approach

On the research three research approaches exist: qualitative, quantitative, and a combination of both. In this study, the researcher utilized a mixed approach that incorporated elements from both qualitative and quantitative research methods in order to leverage the strengths of each approach, enhancing flexibility and reliability. A structured questionnaire will be administered to operational staff in the warehouse, consisting of closed-ended questions. Furthermore, open-ended questions were employed to gather qualitative data from operational management personnel.

3.5. Population of the Study

The focus of this study was on employees from the Ethiopian Cargo Terminal & Logistics services division who were actively using the warehouse equipment and machinery for their daily operational activities. Specifically, data was collected from the direct users of these equipment and machineries. In the case of this research proposal, the target population consisted of employees working in the Ethiopian Airlines Cargo & Logistics Services division. According to the HRM records of the Ethiopian Airlines group as of December 2023, the Ethiopian Cargo and Logistics division had a total of 931 permanent employees, excluding outstation employees who work outside the country. Among these permanent employees, 853 were non-management employees, and they were selected as the target population for this study.

3.6. Sampling Size and Sampling Technique

3.6.1. Sampling Procedure

In this research, a combination of primary and secondary data was utilized. The primary data was obtained by distributing pre-designed questionnaires to employees working in various operational units within the warehouse, following an extensive review of relevant literature. To ensure the reliability of the questionnaire, a reliability test was conducted, and it was then

filled out by the targeted population. Additionally, detailed and in-depth interviews were conducted with the management of the warehouse operations to gather qualitative data. On the other hand, secondary data was collected from organizational reports, operational webpages, and various other available resources. By employing both primary and secondary data collection methods, this study effectively gathered the necessary information. The primary data was primarily collected through surveys administered to selected respondents and on-site visits, while secondary data was obtained through document reviews of written materials and open sources.

3.6.2. Sample Size

The researcher selected samples from both management and non-managerial employees of Ethiopian Airlines Cargo & Logistics Services division. The division consists of 117 non-management employees and management employees. To determine the sample size at a 95% confidence level and a level of sampling error of 5%, the researcher used the following sample size formula:

n = N / (1 + Ne^2)

Using the formula:

n = 117 / (1 + 117(0.05) ^2)

The calculated sample size is 90.

Table 3.1 Overall Response Rate

Name Of Department	No of Employees	N_i=(n*S)/N
Cargo Operation	23	15
Facility Maintenance	55	50
Cargo Marketing	12	8
Cargo Logistics	12	7
Other	15	10
Total	117	90

Source: Own Survey, 2024

3.6.3. Sampling Technique

The researcher utilized a sampling technique to collect data on individuals, locations, or objects for study purposes. The sample represents a portion of the target population and is selected in a systematic manner to provide insights into the entire population. Due to the absence of a sampling frame, this study relied on convenience sampling, a non-probability method where the selection of sample elements is based on ease of access. In this approach, the sample is drawn from the population area that is nearby, easily reachable, or practical.

The sample for this study was chosen from the intended population using the non-probability techniques of judgment and convenience, as they are simple, efficient, and cost-effective methods.

3.7. Data gathering instruments/variables and measures

Data collection serves as the method employed to obtain information utilized for research purposes (Creswell, 2002). The data collection phase specifies the type of data being gathered, whether it is primary or secondary, the data collection tool utilized, and the timeframe for data collection. The study utilized primary data to furnish information for data analysis. A questionnaire was developed and utilized as the primary data collection tool, featuring a semi-structured format with the structured portion ensuring consistent responses for easier data interpretation, while the open-ended section provided additional insights not covered in the structured segments. Questionnaires have gained popularity as a data collection method due to their ease of preparation, administration, and cost-effectiveness. Primary data were collected through questionnaires and observation.

3.8. Data Analysis Method

The information gathered from the survey was organized in a user-friendly manner. Once the data collection is finished, the details from the employee survey will be coded and inputted into Statistical Package for Social Science (SPSS) version 23 for data organization and computation. The descriptive analysis of the study variables will involve presenting the findings using mean, standard deviations, and range of scores (Creswell, 2011). The analysis results will be interpreted and discussed using descriptive statistics. Statistical techniques like mean, frequency, percentage, and standard deviation will be utilized. Respondent profiles will be examined through frequency and percentage analysis. Correlation analysis will be conducted to establish the relationship between independent and dependent variables. Additionally, Multiple Linear Regression will be employed to understand the cause and effect relationship between variables, and to evaluate the impact of promotion, work-life balance, and performance appraisal on employee job satisfaction. Tables and figures will be included to illustrate the findings of the study.

3.9. Validity and Reliability and Ethical consideration of the study

3.9.1. Validity

The concept of validity pertains to the extent to which a measurement truly captures what it is intended to measure. (Dennis H. and Duncan C. 2000) The researcher utilized questionnaires that were adapted from previous research conducted by various researchers. Once the initial version of the questionnaire was distributed to employees of the Ethiopian Cargo Terminal & Logistics services division to gather the necessary data, their feedback was taken into consideration for the subsequent analysis. Furthermore, the validity of the instrument was assessed to ensure that the questionnaire accurately assessed its intended purpose.

3.9.2. Reliability

Reliability is a measure of the consistency of a measurement, indicating how well an instrument produces the same results each time it is used in the same circumstances with the same individuals. It is primarily concerned with consistency. If repeated measurements yield the same outcome consistently, then the instrument used for measurement is considered reliable (John et al., 2010). To assess the internal consistency of variables in the research tool, the Cronbach's alpha coefficient will be computed. Cronbach's alpha is commonly employed in educational research when data collection instruments consist of items scored across a range of values, such as items with varying scoring points or attitude scales where responses fall along a continuum (Oluwatayo, 2012). This coefficient ranges from 0 to 1, with a value of 0.6 or lower generally indicating an inadequate level of internal consistency (Malhotra & Birks, 2003). The coefficient will be calculated for all items within each variable, and the findings demonstrated an acceptable level of reliability.

Table 3.2 Reliability Statistics

Variables	N of Items	Cronbach's Alpha
Availability of Equipment's & Machineries	7	0.809
Quantity of Equipment's & Machineries	7	0.807
Ease of Operability of Equipment's & Machineries	7	0.808
Level of process (system) Automation	7	0.807
Qualified talent of maintenance team & operators	7	0.807
Logistics Operational Performance	20	0.807

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.811	0.811	55

Source: Own Survey, 2024

As we have seen from table 3.2, the pre-test Cronbach's alpha coefficients for Availability of Equipment's & Machineries , Quantity of Equipment's & Machineries , Ease of Operability of Equipment's & Machineries , Level of process (system) Automation and Qualified talent of maintenance team & operators were 0.809, 0.807, 0.808, 0.807 and 0.807 respectively. Thus, using a rule of the thumb discussed by Cronbach, (1951), the reliability of all variable scales was good in the pre-testing .

3.9.3. Ethical Consideration

According to Bhattacherjee (2012), ethical considerations in research encompass voluntary participation, harmlessness, informed consent, anonymity, confidentiality, and the obligation to disclose research findings. These ethical principles will guide the entire research process to ensure that participants' responses are kept confidential and only accessible to the principal investigator. It is imperative that individuals participate in research willingly, without any coercion from the researcher or investigator. Furthermore, researchers must uphold the dignity of participants throughout the research study. Furthermore, it is imperative that research participants are not exposed to any procedures that pose a tangible physical risk. It is the duty of every researcher to engage in discussions with colleagues and peers regarding the ethical implications of their research. They should actively seek and consider their input, and act accordingly based on their advice. This responsibility is emphasized by D. Hewitt and D. Cramer (2000). In accordance with Bhattacherjee (2012), ethical considerations in research encompass voluntary participation, non-harmfulness, informed consent, anonymity, confidentiality, and the obligation to disclose research findings. These ethical considerations will be strictly adhered to throughout the entire research process. The confidentiality of the research will be strictly maintained, with only the principal investigator having access to the information. Participants in the study can rest assured that their responses will be kept confidential. It is important that individuals participate in the research willingly, without any coercion from the researcher or investigator. Furthermore, researchers have a duty to protect the dignity of the participants throughout the study. Procedures that pose a physical risk to the participants should be avoided. Researchers should actively seek input from colleagues and peers regarding the ethical aspects of their research, and carefully consider and act upon their advice. (D. Hewitt and D. Cramer, 2000).

CHAPTER FOUR

RESULTS, DISCUSSION AND INTERPRETATIONS

4.1. Introduction

The main focus of this chapter is on research data presentation, analysis of the collected data's, Interpretation of data obtained through research survey questionnaire and secondary source of data together

4.2.Response Rate

In order to gather primary data for this study, a total of 100 questioners were distributed as a sample size to various departments within the Ethiopian Cargo & Logistics Services Division of these, 90 respondents completed the questions; of these, 6 were not returned and 4 were rejected because the respondents did not fill them out correctly or did not have the necessary data. Ninety percent of respondents returned their completed questionnaires, indicating a satisfactory response rate. Thus, the response rate suggests that the rate is most reflective of the sample size. This result was examined using SPSS (Version 23) and EXCEL statistical software.

Table 4.1 Overall Response Rate

Population	**Number**	**Percent**
Total Number of Questioner distributed	100	100%
Total Number of returned & used Questioner	90	90%
Total Number of unreturned questioners	10	10%

Source: Own Survey, 2024

4.3.Respondents' Demographic Information

The following parameters were used by the study to examine the respondents' background information: The demographic data of the respondents are given and analyzed as shown in the following tables, taking into consideration the following information: Gender, Age, Education qualification, Total work experience and Company position held by the respondents.

Table 4.2 -Demographic Profile of Respondents

Variable	Category	Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Male	69	75.8	75.8	76.9
	Female	21	23.1	23.1	100.0
Age Group	18-29	36	39.6	40.0	40.0
	30-40	42	46.2	46.7	86.7
	41-50	12	13.2	13.3	100.0
Educational Qualification / Level	College Diploma	25	27.5	27.8	27.8
	First Degree (BA, BSC)	49	53.8	54.4	82.2
	Second Degree (MA, MSc)	16	17.6	17.8	100.0
Total Work Experience	1 - 5years	7	7.7	7.8	7.8
	6 -10 years	50	54.9	55.6	63.3
	11-16 years	33	36.3	36.7	100.0
Company Position	Assistant Level	4	4.4	4.4	4.4
	Junior Level	12	13.2	13.3	17.8
	Medium Level	54	59.3	60.0	77.8
	Senior Level	20	22.0	22.2	100.0
Work department	Cargo Operation	50	54.9	55.6	55.6
	Facility Maintenance	15	16.5	16.7	72.2
	Cargo Marketing	8	8.8	8.9	81.1
	Cargo Logistics	7	7.7	7.8	88.9
	Other	10	11.0	11.1	100.0

Source: Own Survey, 2024

4.3.1. Gender of the Respondents

The data in the above table (Table 4.2) shows from the 90 respondents, 69 (75.8%) were male employees, and the remaining 21 (23.1%) were female employees. The researcher concluded that there were more men working at Ethiopian Cargo & Logistics services than women after

taking the aforementioned research analysis data into account. The outcome suggests that male employees inside the company completed a greater number of jobs.

4.3.2. Age of the Respondents

The data in the above table (Table 4.2) shows, the frequency and percentage distribution reveals that 36 (39.5%) of respondents were found to be between the age
groups of 18-29 years, about 42 (46.2%) of them found between the age groups of 30-40, about 12 (13.2%) of them found between the age groups of 41-50 and according the age distribution of the respondent's majority of them found at young and youth age group.

4.3.3. Educational Level of the Respondents

The data in the above table (Table 4.2) shows as the research analysis data provided clearly indicates that the total number of respondents can be used as an indicator of their educational qualification or level. Out of all the respondents, 49 (53.8%) have a first degree (BA, BSC), 16 (17.6%) have a second degree (MA, MSc), and 25 (27.5%) hold a college diploma. This implies that the majority of the organization's workforce consists of individuals with a first degree. Consequently, they were able to easily understand the questionnaire and provide well-considered responses.

4.3.4. Total Work Experience of the Respondents

The data in the above table (Table 4.2) shows, it is evident that the majority of respondents in ECLS have 6-10 years of work experience. Specifically, 7 (7.7%) of the respondents have 1-5 years of experience, 50 (54.9%) have 6-10 years, and 33 (36.3%) have 11-16 years.

4.3.5. Company Position of the Respondents

The data in the above table (Table 4.2) shows, it is evident that 4 (4.4%) of the respondents hold positions at the Assistant Level, 12 (13.2%) at the Junior Level, 54 (59.3%) at the Medium Level, and 20 (22%) at the Senior Level within the company. Consequently, it can be concluded that the majority of the respondents were at the Medium Level. As a result, they were able to comprehend the questionnaire easily and provide rational responses.

4.3.6. Work department of the Respondents

The data in the above table (Table 4.2) shows, it is evident that the majority of the respondents, 50 (54.9%), were from the Cargo Operation department. Additionally, 15 (16.5%) of the respondents were from the Facility Maintenance section, 8 (8.8%) were from

the Cargo Marketing department, 7 (7.7%) were from the Cargo Logistics department, and 10 (11%) were from other departments within ECLS. This indicates that the respondents mainly belonged to the Cargo Operation team, allowing them to comprehend the questionnaire easily and respond to the questions rationally.

4.4.Descriptive Data Analysis

The mean score and standard deviation of each measuring item within the dimension were evaluated using descriptive statistics. The analysis of the variables included in the study was presented by utilizing measures of central tendency (mean) and dispersion (standard deviation). Consequently, primary data was gathered regarding the impact of Warehouse Facility Equipment and Machineries on the Logistics Operational Performance of the Ethiopian Cargo & Logistics services division. The study focused on five key factors related to logistics operational performance. Drawing from their experiences with the day-to-day operational activities of ECLS, respondents were surveyed to assess their level of agreement on the influence of Warehouse Facility Equipment and Machineries on Logistics Operational Performance using a five-point Likert scale method.

According to this information, participants individually assessed the impact of Warehouse Facility Equipment and Machineries on the Logistics Operational Performance of ECLS by providing feedback on a five-point Likert scale. The scale included the following options: 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, and 5= Strongly Agree. All participants were employees of ECLS directly involved in the logistics operations.

4.4.1. Descriptive statistics of Independent variables

The descriptive statistics of the Independent variables were analyzed in this study using measures of central tendency, specifically the mean, and the measure of dispersion, which is the Standard Deviation. According to Zaidatol, (2008). cited by Kibrom, (2019)., a mean score above 4 indicates a very high level, while a score between 3 and 3.9 is considered moderate or adequate. Scores below 2.9 are categorized as low or poor. In the following sections, the impact of Warehouse Facility Equipment and Machineries on Logistics Operational Performance will be presented and discussed. Each parameter of the independent variables will be examined using their respective tables, which include the mean and standard deviation values.

Table 4.3 - Comparison Cut-point of Mean Score of Five Point Likert Scale Instrument

Mean Score	Description
Below 2.9	Low or poor
3.00-3.90	Moderate or adequate
Above 4.00	Very high

Source: Zaidatol, (2008)

4.4.2. Availability of Equipment & Machineries

Table 4.4 - Descriptive statistics of Availability of Equipment & Machineries

Item	Mean	Standard Deviation
Equipment availability in ECLS warehouse is sufficient for the required operations.	2.2667	1.04720
Lack of ownership & responsibility has direct impact on availability of equipment	3.3333	1.17081
Less quality products are major causes for pre mature failure on warehouse equipment	3.4667	1.15340
ECLS invests on latest equipment to optimize its logistics operations.	3.1444	1.35382
The availability of equipment significantly improve productivity of employees	3.4222	1.32375
ECLS prioritizes regular preventive maintenance for the availability of warehouse equipment	2.3444	1.30824
The availability of equipment's has direct impact to meet operational targets	3.3667	1.23115
Grand Mean	**3.0492**	**1.22691**

Source: Own Survey, 2024

The data in the above table (Table 4.3) shows that the grand mean value of 3.05, as depicted in Table 4.3, reveals that Ethiopian Cargo & Logistics services possess three significant warehouse facilities. These facilities are equipped with various equipment and machineries to efficiently manage the day-to-day operational activities of cargo operations and meet the planned logistics operational performance of the section. The availability of equipment plays a crucial role in ensuring smooth handling of incoming and outgoing shipments, preventing warehouse congestion, unplanned flight delays, customer complaints, and discrepancies.

Further enhancements are needed in certain areas based on the research analysis. These include ensuring that the Equipment availability in the ECLS warehouse meets the operational requirements, prioritizing regular preventive maintenance for critical planned operations that impact equipment, and addressing potential negative consequences of unplanned breakdown maintenance incidents. This is particularly crucial for equipment used in loading and unloading cargo shipments, cargo screening equipment, sufficient shipments storage racks, and cooling system equipment for temperature-sensitive cargo shipments. The average availability of various Equipment & Machineries is 3.05, indicating that the respondents believe the organization is moderately efficient in providing the required operational demand for different Equipment & Machineries. Additionally, the standard deviation of 1.23 indicates that there is some variation in agreement compared to the common mean.

4.4.3. Quantity of Equipment & Machineries

Table 4.5 - Descriptive statistics of Quantity of Equipment & Machineries

Item	Mean	Standard Deviation
The number of warehouse equipment in ECLS is sufficient to handle planned cargo operations.	2.2444	1.21147
In comparing to the warehouse capacity, the total number of ECLS warehouse equipment is sufficient	3.0000	1.21784
Delay due to insufficient number of equipment is common in ECLS section.	2.9000	1.36612
Insufficient quantity of equipment and machineries has led to operational delays in ECLS section logistics processes.	2.8111	1.13072
ECLS optimizes its logistics operations by investing latest technologies and equipment.	2.9333	1.41262
ECLS operational target is directly impacted by the number of equipment	3.2778	1.25446
ECLS section regularly assesses the need for additional equipment to meet growing operational demands.	2.9000	1.22749
Grand Mean	**2.8666**	**1.26010**

Source: Own Survey, 2024

The data in the above table (Table 4.4) shows that the Independent variable data table focusing on the he quantity of equipment and machineries within Ethiopian Airlines Cargo &

Logistics services division reveals crucial insights in to the organization operational capacity and resource allocation. The mean scores (M= 2.87) indicates a positive correlation between the quantity of equipment and machineries available and the operational performance of the division. The data suggests that having sufficient quantities of equipment's and machineries is essential for meeting operational demands, optimizing workflow efficiency, and ensuring timely service delivery.

The findings underscore the importance of adequate resource allocation and inventory management in maintaining optimal operational performance within the organization. The results highlight the positive impact of having a diverse range of equipment and machineries in meeting the diverse need of Cargo handling operations, by investing in a sufficient quantity of equipment and machineries, Ethiopian Airlines Group can enhance operational flexibility, reduces bottlenecks, and improve the overall efficiency in cargo and Logistics services.

In conclusion, the data related to the quantity of equipment and machineries emphasizes the critical role of resources allocation and inventory management in supporting operational performance within the organization. The findings underscores as the organization needs to commit on maintaining adequate quantities of equipment's and machineries to meet the operational demands and enhance workflow efficiencies. By strategically managing inventory levels and investing in a diverse range of equipment, Ethiopian Airlines group can optimize operational performance, improve service delivery, and maintain a competitive edge in the airline industry.

4.4.4. Ease of Operability of Equipment's & Machineries

Table 4.6 - Descriptive statistics of ease of Operability of Equipment & Machineries

Item	Mean	Standard Deviation
Warehouse equipment found in ECLS are easy to operate.	2.9000	1.43824
ECLS efficiency has been improving due to user-friendly equipment	2.9667	1.41778
There is difficulties in operating warehouse equipment that results in operational inefficiencies	3.1444	1.36210
ECLS invests in easily operable equipment so as to create safe working environment.	2.4778	1.08335
The ease of operability of equipment enhanced proper warehouse space utilization	2.4889	1.39215
ECLS prioritizes the user-friendliness of warehouse equipment in decision-making processes.	3.4333	1.25465
The ease of operability of equipment minimizes unplanned cost of operators	3.0000	1.26313
Grand Mean	**2.9158**	**1.31591**

Source: Own Survey, 2024

The data in the above table (Table 4.5) shows analysis focusing on the independent variable of easy of operability provides valuable insights into the relationships between the user-friendliness and operational performance of equipment's ad machineries within Ethiopian Cargo & Logistics services division. The analysis of the mean (M= 2.91) scores and standard deviation value (M= 1.31) offers a comprehensive understanding how the ease of operability influences operational efficiency and effectiveness

Mean Score Analysis: The mean score for the ease of operability variable indicates the perceived level of user friendliness equipment's and machineries among employees directly engaged in logistics operations within the organization. A higher mean score suggests that the equipment's and machineries are considered user friendly, making it easier for operators to perform their tasks efficiently

Standard Deviation Analysis: The standard deviation provides insights in to the variability of responses regarding the ease of operability. A lower standard deviation indicates that there is a consensus among respondents regarding the user friendliness of equipment and machineries, while higher standard deviations may suggest varying perceptions among employees Implications for operational performance. The positive mean score ease of operability implies that the user friendly design of equipment's and machineries plays s significance in enhancing operational performance within the division. Easy to use equipment can streamline workflow processes, reduce errors, and improve overall efficiency in Cargo Handling and logistics operations.

Recommendations: Based on the analysis of the ease of operability variables, it is recommended that Ethiopian Airlines Group continues to prioritize user friendly design principles in the selection and maintenance of equipment's and machineries. Investing in training programs to familiarize operators with the equipment and promoting a culture of continuous improvement on usability can further enhance operational efficiency and employee's satisfaction

In conclusion the data from Table 4.5 underscores the importance of consider in the ease of operability as critical factor in optimizing operational performance within Ethiopian Airlines Cargo & Logistics services section. By ensuring that equipment's and machineries are user friendly, the organization can improve workflow efficiency, enhance employee productivity, and ultimately deliver high quality Cargo and logistics services in the competitive industry landscape.

4.4.5. Level of process (system) Automation

Table 4.7 - Descriptive statistics of Level of process (system) Automation

Item	Mean	Standard Deviation
The current level of ECLS process automation is sufficient to streamline processes.	2.5667	1.19972
In ECLS, Increased automation in processes has led to improved efficiency and productivity of ECLS.	2.6333	1.29346
Lack of system automation resulted unexpected operational delays.	2.6111	1.23338
Investing in advanced automation technologies optimized ECLS logistics operations.	3.4556	1.10322
The level of process automation enhanced the ability to meet operational targets of ECLS	3.6111	1.14847
ECLS places a high priority on implementing automation in warehouse equipment	3.3889	1.16787
The level of process automation plays a significant role in employee productivity	3.5556	1.22805
Grand Mean	**3.1174**	**1.19631**

Source: Own Survey, 2024

The data in the above table (Table 4.6) shows the independent variable "Level of process (system) Automation" insights into the perception of respondents regarding the current level of automation in processes within Ethiopian Airlines Cargo & Logistics services. Here is the analysis based on the mean and standard deviation:

1. Mean:

    - The mean score for "Level of process (system) Automation" is (M=3.12)
    - This mean score indicates a moderate to high level of agreement among respondents regarding the sufficiency of automation in processes.
    - A mean score above 3 suggests that respondents generally agree that the current level of automation in processes is adequate and contributes to operational efficiency.

2. Standard Deviation:

    - The standard deviation for "Level of process (system) Automation" is (SD1.19)
    - The standard deviation measures the dispersion of responses around the mean.

- A higher standard deviation indicates that responses are more spread out from the mean, suggesting a wider range of opinions among respondents regarding the level of automation in processes.
- In this case, the standard deviation of 1.19631 indicates a moderate level of variability in responses, implying that while there is general agreement on the sufficiency of automation in processes, there are some differing opinions among respondents.

Overall, the mean score of 3.1174 suggests that respondents perceive the current level of automation in processes within Ethiopian Airlines Cargo & Logistics services to be sufficient to streamline operations and improve efficiency. The standard deviation of 1.19631 indicates some variability in opinions among respondents regarding the level of automation in processes, highlighting differing perceptions on the effectiveness of automation in enhancing operational performance.

Mean Score Analysis: The mean score for the level of process automation variable indicate the perceived level of automation within the organization equipment and machineries. High mean score suggests a higher level of automation which can lead to improved operational efficiency, streamline process, and enhanced operational performance

4.4.6. Qualified talent of maintenance team & operators

Table 4.8 - Descriptive statistics of qualified talent of maintenance team & operators

Item	Mean	Standard Deviation
When compared to the total number of ECLS warehouse equipment, there is enough number of qualified maintenance team.	2.8444	1.25341
ECLS warehouse equipment operators are well-qualified (trained and competent) in their roles.	2.8556	1.32869
The availability of qualified maintenance technicians contributed to minimizing equipment downtime.	2.9778	1.28061
Investing in continuous training and development for ECLS staff helped in optimizing ECLS logistics operations.	2.8778	1.25266
The expertise of maintenance team and operators directly impacts the overall performance and reliability of equipment and machineries.	2.9444	1.36045
ECLS places a high priority on recruiting and retaining qualified maintenance technicians and operators.	3.5000	1.09391
The skills of equipment maintenance team play a significant role in ensuring smooth logistics operations	3.7778	1.03617
Grand Mean	**3.1111**	**1.2294**

The data in the above table (Table 4.7) shows The independent variable "Qualified talent of maintenance team & operators" provides insights into the perception of respondents regarding the expertise and qualifications of the maintenance team and operators within Ethiopian Airlines Cargo & Logistics services. Here is the analysis based on the mean and standard deviation:

Mean:

- The mean score for "Qualified talent of maintenance team & operators" is 3.1111.
- This mean score indicates a moderate to high level of agreement among respondents regarding the qualifications and expertise of the maintenance team and operators.
- A mean score above 3 suggests that respondents generally agree that the maintenance team and operators possess the necessary skills and qualifications for their roles within the organization.

Standard Deviation:

- The standard deviation for "Qualified talent of maintenance team & operators" is 1.2294.
- The standard deviation measures the dispersion of responses around the mean.
- A higher standard deviation indicates that responses are more spread out from the mean, suggesting a wider range of opinions among respondents regarding the qualifications of the maintenance team and operators.
- In this case, the standard deviation of 1.2294 indicates a moderate level of variability in responses, implying that while there is general agreement on the qualifications of the maintenance team and operators, there are some differing opinions among respondents.

Overall, the mean score of (M=3.11) suggests that respondents perceive the maintenance team and operators within Ethiopian Airlines Cargo & Logistics services to be adequately qualified and competent in their roles. The standard deviation of (SD1.23) indicates some variability in opinions among respondents regarding the qualifications of the maintenance team and operators.

4.5. Descriptive statistics of Dependent Variables

In similar to the Independent Variables on the research the descriptive statistics of the dependent variables of The effect of Warehouse Facility Equipment and Machineries on

Logistics Operational Performance were presented by using measures of central tendency mean & measure of dispersion Standard Deviation.

4.5.1. Employee Productivity

Table 4.9 - Descriptive statistics of Employee Productivity

Item	Mean	Standard Deviation
ECLS productivity increased over the last three years by utilizing advanced & automated technology in its warehouse.	3.7778	1.02527
The provision of warehouse facility or equipment contributed to overall employee productivity improvement in ECLS.	3.6444	1.03110
The number of warehouse equipment available for the operations increased employee's level of productivity	3.2778	1.18063
Opportunities for skill development on warehouse equipment enhanced employee productivity.	2.9222	1.30020
Proper handling of warehouse equipment enhanced ECLS productivity	3.1667	1.36777
Grand Mean	**3.3577**	**1.1809**

Source: Own Survey, 2024

The data in the above table (Table 4.8) shows employee productivity the analysis of the dependent variable focusing on employee productivity within Ethiopian Airlines Cargo & Logistics services division reveals crucial insights. The mean scores (M= 3.36) indicates a; positive trend in employee's productivity related to warehouse facility equipment & machineries. The findings of the research suggest that the utilization of advanced and automated technology in the warehouse has significantly contributed to productivity improvements over the past three years. Moreover, the availability of warehouse equipment and opportunities for skill development has positively influenced employee productivity levels.

It is evident from the data that proper handling of warehouse equipment's plays a vital role in enhancing overall productivity within the organization. The results highlight the importance of investing in employee training and technological advancements to optimize productivity levels in logistics operations. By recognizing the impact of warehouse facility equipment on

employee productivity, Ethiopian Airlines Group can strategically focus on enhancing operational efficiency and performance.

In conclusion, the data pertaining to employee productivity underscores the significance of effective utilization of warehouse facility equipment and machineries in driving positive outcomes within logistics operation. The findings emphasize the need for continuous improvement, investment in technology, and skill development initiatives to sustain and enhance employee productivity levels for long term organizational success.

4.5.2. On-Time Delivery Performance

Table 4.10 - Descriptive statistics of On-Time Delivery Performance

Item	Mean	Standard Deviation
The current on time delivery performance of ECLS meets customer expectations.	3.4333	1.26358
The availability of automated warehouse system enhanced on time delivery performance.	3.3444	1.22851
ECLS warehouse related customer service delivery is on time	2.6667	1.19925
Well-trained maintenance team / operates have on time delivery capabilities.	3.0222	1.27180
Effective planning and scheduling on warehouse equipment's maintenance contribute to improving on time delivery rates.	3.4444	1.11286
Grand Mean	**3.1822**	**1.2152**

Source: Own Survey, 2024

The data in the above table (Table 4.9) shows the analysis of the dependent variable focusing on time delivery performance within Ethiopian Airlines Cargo & Logistics services division provides valuable insights into the impact of warehouse facility equipment's and machineries on service delivery. The mean scores (M= 3.18) indicates a positive correlation between the availability of automated warehouse systems and meeting customers' expectations regarding on time delivery performance. The data suggests the effective planning, scheduling of maintenance, and well trained maintenance team contributes to improving on time delivery rates.

The finding highlights the importance of technological advancements and operational efficiency in enhancing on time delivery performance within logistics operations. The results underscore the significance of investing automated systems and skilled maintenance

personnel to ensure timely service delivery and meet customers' expectations, by prioritizing effective maintenance practices and operational planning, Ethiopian Airlines Group can optimize on time delivery performance and enhance customer's satisfaction.

In conclusion, the data related to on time delivery performance emphasizes the critical role of warehouse facility equipment and machineries in achieving operational excellence and meeting service delivery targets. The findings underscore the importance of continuous improvement, training and strategic maintenance practices to uphold high standards of on time delivery performance in the airline industry. By leveraging technology and operational best practices, Ethiopian Airlines Group can further enhance its reputation for reliable and timely service delivery

4.5.3. Inventory Management Efficiency

Table 4.11 - Descriptive statistics of Inventory Management Efficiency

Item	Mean	Standard Deviation
The current inventory management practices in ECLS are efficient	3.2667	1.17846
ECLS optimized its inventory levels by using advanced warehouse technology or equipment.	3.4111	1.19826
ECLS maintained optimal inventory levels by using efficient inventory tracking systems	3.6000	1.05788
ECLS prioritized cost-effective inventory management strategies to optimize inventory levels	3.3667	1.30212
In ECLS, there is continuous monitoring and analysis of warehouse inventory data	3.3778	1.25042
Grand Mean	**3.4044**	**1.1974**

Source: Own Survey, 2024

The data in the above table (Table 4.10) shows the analysis of the dependent variable above data table focusing on Inventory management efficiency within Ethiopian Airlines Cargo & Logistics services division provides valuable insights into the organization inventory practices. The mean scores (M= 3.40) indicate a positive trend in inventory management efficiency, within a focus on utilizing advanced warehouse technology, optimizing Inventory levels, and prioritizing cost effective strategies. The data suggests that continuous monitoring optimal inventory levels within the organization.

The findings underscore the importance of efficient inventory management practices and utilization of advanced technologies to enhance overall Inventory performance. The results highlight the organization commitment to optimizing inventory levels, investing in tracking systems and prioritizing cost effective strategies to improve operational efficiency. By emphasizing safety measures, regular inspections and investing in safety practices, Ethiopian Airlines Group demonstrates a proactive approach to ensuring a safe working environment for its employees.

In conclusion , the data related to inventory management efficiency emphasizes the critical role of effective inventory practices and advanced warehouse technologies in optimizing operational performance .The findings underscore the organization dedication to continuous improvement , safety and cost effective ,strategies in managing inventory levels .By leveraging efficient Inventory practices and investing in safety measures , Ethiopian Airlines Group can enhance operational efficiency , reduce costs , and maintain high standards of inventory performance in the airline industry

4.5.4. Safety Performance

Table 4.12 - Descriptive statistics of Safety Performance

Item	Mean	Standard Deviation
ECLS has achieved adequate number of warehouse equipment to ensure a safe working environment.	3.4000	1.10971
In ECLS, warehouse equipment has been regularly inspected to identify and address potential safety hazards.	2.5111	1.30895
ECLS prioritized safety measures and invests in continuous improvement of safety practices	3.3778	1.24140
In ECLS, investment on warehouse equipment is adequate by considering all safety aspects	3.4000	1.24341
Employee involvement in safety committees and initiatives promoted a culture of safety in the workplace.	3.3333	1.20858
Grand Mean	**3.2044**	**1.2224**

Source: Own Survey, 2024

The data in the above table (Table 4.11) shows the analysis of the dependent variable focusing on safety performance within Ethiopian Airlines Cargo & Logistics services division provides crucial insights into the organization commitment to ensuring a safe

working environment. The mean scores (M= 3.20) indicate a positive trend in safety performance, emphasizing the importance of implementing safety protocols, training programs, and regular safety inspections in the operational areas. The data suggests that the organization emphasizes on safety measures, adherence to safety guidelines, and investment in safety training contribute to monitoring high safety standards within the workplace.

The findings underscore the significance of prioritizing safety performance and fostering a culture of safety within the organization. The result highlights the positive impact of safety protocols, training initiatives, and regular inspections on enhancing safety performance and minimizing workplace incidents. By promoting a safety continuous environment and investing in safety practices, Ethiopian Airlines Group demonstrates a proactive approach to safe guarding the wellbeing of its employees and maintaining operational continuity.
In conclusion, the data related to safety performance underscores the critical importance of prioritizing safety measures and fostering a culture of safety within the organization. The findings highlight the organization dedication to ensuring a safety working environment, implementing safety protocols, and in investing safety training to uphold high safety standards. By continuous improving safety practices and promoting a safety oriented culture, Ethiopian Airlines Group can enhance safety performance, mitigate safety risks, and reinforces its commitment to employee wellbeing in the airline industry.

4.6. Inferential Analysis

4.6.1. 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 (Availability of Equipment's & Machineries, Quantity of Equipment's & Machineries, Ease of Operability of Equipment's & Machineries, Level of process (system) Automation and Qualified talent of maintenance team & operators) explains the dependent variable that is Logistics Operational Performance.

Table 4.13 - Linear relationship (Pearson Correlation) between the variables

Correlations							
		Performance	Availability of Equipment	Quantity	Operatbility	Process	Qualified
Logistics Operational Performance	Pearson Correlation	1					
	Sig. (2-tailed)						
	N	90					
Availability of Equipment's & Machineries	Pearson Correlation	.437**	1				
	Sig. (2-tailed)	.000					
	N	90	90				
Quantity of Equipment's & Machineries	Pearson Correlation	.501**	.362**	1			
	Sig. (2-tailed)	.000	.000				
	N	90	90	90			
Ease of Operability of Equipment's & Machineries	Pearson Correlation	.464**	.268*	.455**	1		
	Sig. (2-tailed)	.000	.011	.000			
	N	90	90	90	90		
Level of process (system) Automation	Pearson Correlation	.526**	.254*	.481**	.241*	1	
	Sig. (2-tailed)	.000	.016	.000	.022		
	N	90	90	90	90	90	
Qualified talent of maintenance team & operators	Pearson Correlation	.457**	.309**	.492**	.418**	.387**	1
	Sig. (2-tailed)	.000	.003	.000	.000	.000	
	N	90	90	90	90	90	90
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

Source: Own Survey, 2024

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 the effect of Warehouse Facility Equipment and Machineries, and dependent variable of Logistics Operational 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 above findings (in table 4.12) would be supported by a correlation matrix, which created by using the Pearson correlation coefficient (r). It demonstrates how each effect of warehouse equipment & machinery dimensions (Availability of Equipment's & Machineries, Quantity of Equipment's & Machineries, Ease of Operability of Equipment's & Machineries and Level

of process (system) Automation) correlated with Logistics operational performance. The results are demonstrated in detailed as follow

- The correlation between availability of equipment's and machineries and Logistics Operational Performance have a positive and significant correlation ($r=0.437$, $N=90$, $p<0.01$) suggesting that there is existence of association in between the two variables. The correlation between quantity of equipment's and machineries and Logistics Operational Performance is positive and significant correlation ($r=0.501$, $N=90$, $p<0.01$) suggesting that there is existence of association in between the two variables.
- The correlation between easy of operability of equipment's and machineries and Logistics Operational Performance is positive and significant correlation ($r=0.464$, $N=90$, $p<0.01$) suggesting that there is existence of association in between the two variables.
- There is a negative and significant correlation ($r=-0.526$, $N=90$, $p<0.05$) between the level of process automation and logistics operational performance, indicating a negative link between the two variables.
- There is a positive and substantial correlation ($r=0.457$, $N=90$, $p<0.01$) between the qualified talent of the maintenance team and operators and Logistics Operational Performance, indicating that there is a link between the two variables.
- The correlation analysis shown in (Table 4.12) offers important insights into the relationship between the independent variables, which include the degree of system automation, the availability, quantity, and operability of machinery and equipment, and the qualification of maintenance technicians, and the dependent variable, logistics operational performance.

Positive Relationships:

1. Availability of Equipment & Machineries. The analysis data indicates a positive correlation between the availability of equipment's and machineries and logistics operational performance. This suggests that higher availability of equips and machineries is associated with improved operational performance within the Ethiopian Cargo & Logistics division
2. Quantity of Equipment's and machineries. The analysis shows a positive relationship between the quantity of equipment and machineries and logistics operational performance. This implies that a greater quantity of equipment's and machineries is linked with enhanced operational efficiency and performance outcomes

3. Ease of operability: The analysis data shows positive correlation between the ease of operability of equipment's and machineries contribute to improved operational performance within the division

Negative Relationships:

1. Level of Automation: The analysis suggests a negative correlation between the level of automation of equipment's and machineries and logistics operational performance. This implies that a higher level of automation may not always directly translate to improved operational performance highlighted the need of balanced approach to automation implementation
2. Qualification of Maintenance technicians and operators: The analysis data indicates a negative relationship between the qualification of maintenance technicians and equipment's operators and operational performance. This suggests that he viability of well qualified maintenance technicians may not always grantee improved operational performance, emphasizing the importance of other factors in influencing performance outcomes

Overall, the analysis highlights the compiles interplay between the independent variables related to equipment's and machineries and their impact on the operational; performance within the Ethiopian Airlines Cargo & Logistics services division. While certain variables show positive correlation with performance, others demonstrate negative relationships, underscoring the need for comprehensive and balanced approach to optimizing operational efficiency and service delivery within the organization

4.6.2. Multiple linear regression assumptions

I. Multi collinearity Test

The multicollinearity test is used to determine the correlation between explanatory variables and prevent the double effect of an independent variable in the model. When independent variables are multicollinear, there is an overlap or sharing of predictive power. This can result in a paradoxical effect where the regression model fits the data well, but none of the explanatory variables individually have a significant impact on predicting the dependent variable. To address this issue, the variance inflation factor (VIF) and tolerance test are employed to determine if multicollinearity is present in the explanatory variables. If the VIF value is less than 10, it indicates that multicollinearity is not a problem. There is no multicollinearity detected among the explanatory variables. Conversely, a VIF value greater than or equal to 10 indicates a serious multicollinearity problem. Additionally, Tolerance measures how much of the variability of the specified independent variable is not accounted

for by the other independent variables in the model, calculated using the formula 1-R2 for each variable. A Tolerance value below .10 suggests a high multiple correlation with other variables, indicating the potential presence of multicollinearity Keith, (2006)., Shieh, (2010).

Table 4.14 Multicollinearity Test

Independent Variables	**Collinearity Statistics**	
	Tolerance	VIF
Availability of Equipment's & Machineries	0.853	1.197
Quantity of Equipment's & Machineries	0.565	1.769
Ease of Operability of Equipment's & Machineries	0.733	1.365
Level of process (system) Automation	0.720	1.389
Qualified talent of maintenance team & operators	0.654	1.528

Source: Own Survey, 2024

The data in the above table (Table 4.13) shows that the results of tolerance for all independent variables were above 0.1 and below 1. Similarly, the results in table 4.13 revealed that all-variable variance inflation factors (VIF) values were above one and below 10. Therefore, using the results reported in table 4.13, the researcher can conclude that there was no multicollinearity problem means there was no strong correlation between two or more predictors in a regression model.

Table 4.14 presents the results of the multicollinearity test conducted in Ephrem Kassaye's thesis on the impact of warehouse facility equipment and machineries on logistics operational performance within Ethiopian Airlines Group. The multicollinearity test is crucial in regression analysis to assess the correlation between independent variables and prevent issues such as the double counting of effects or unstable coefficient estimates. Here is an analysis of the multicollinearity test results:

Tolerance Values:

- The tolerance values measure the proportion of variance in an independent variable that is not explained by the other independent variables in the model.
- In Table 4.14, the tolerance values for all independent variables (Availability of Equipment's & Machineries, Quantity of Equipment's & Machineries, Ease of Operability of Equipment's & Machineries, Level of Process (System) Automation, Qualified Talent of Maintenance Team & Operators) range from 0.565 to 0.853.

- These tolerance values indicate that each independent variable has a substantial amount of unique variance not shared with the other variables, suggesting no issues with multicollinearity.

Variance Inflation Factor (VIF):

- The **VIF** values provide a measure of how much the variance of an estimated regression coefficient is increased due to multicollinearity.
- In Table 4.14, the VIF values for all independent variables range from 1.197 to 1.769.
- These VIF values are all below 10, which is a commonly used threshold to detect multicollinearity. **VIF** values below 10 indicate that multicollinearity is not a significant concern in the regression model.

Interpretation:

- Based on the tolerance values and VIF values reported in Table 4.14, it can be concluded that there is no strong correlation or multicollinearity issue among the independent variables included in the regression model.
- The results suggest that each independent variable contributes unique information to the model and that the estimates of the regression coefficients are stable and reliable.
- In summary, the multicollinearity test results in Table 4.14 indicate that the independent variables in the regression model exhibit low levels of multicollinearity, supporting the validity and robustness of the regression analysis conducted in the study.

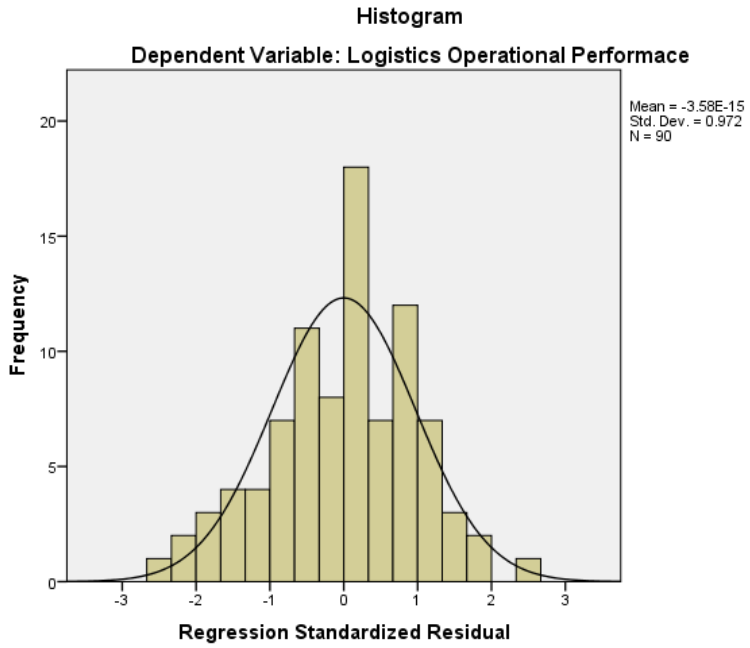
II. Normality Test

Normality tests are utilized to assess whether a dataset follows a normal distribution or not, or to determine the likelihood of an underlying random variable being normally distributed Gujarati, (2009). Consequently, the researcher employed Histogram methods to test the normality of the data. As per Fidell, (2001). if the residuals exhibit a normal distribution around a mean of zero, the histogram should display a bell-shaped curve and regression standardized residuals should fall between 3 and -3. Therefore, based on figure 4.1 below, it is evident that the data adheres to the normality assumption Stevens, (2009).

Ghozali, (2006) states the normality can be seen on the data distribution when the curve does not pass through either the left or the right. In order to test the normality of the data, kurtosis and skewness measurement are critical. Kurtosis measure the level of peakness in a histogram. High peak has positive kurtosis, while flatter distribution has negative kurtosis. For a normal distribution, the value of the kurtosis is zero. Positive kurtosis indicates that,

relative to a normal distribution, the observations is more clustered about the center of the distribution and have thinner tails until the extreme value of the distribution at which point the tails of the leptokurtic distribution are thicker relative to a normal distribution. Negative kurtosis indicates that relative to the normal distribution the observations are cluster less and have thicker tails, until the extreme value of the distribution at which point the tails of the platykurtic distribution are a thicker relative of normal distribution. On the other hand, skewness measures the degree to which cases are clustered towards one end of an asymmetry distribution. Skewness is the measures of the asymmetric. The normal distribution is symmetric has a skewness zero. Distribution with a significant positive skewness has the right tail. Distribution with a significant negative skewness has a left tail Ghozali, (2006). In order to test the normality of the data, kurtosis and skewness value was checked and illustrated in Figure 4.1.

Figure 4.1: Normal distribution Histogram results



Source: Own survey data, 2024

The data in the above figure (Figure 4.1) shows Frequency distributions come in many different shapes and sizes. It is quite important, therefore, to have some general descriptions for common types of distributions. In the above figure revealed that the data would be distributed symmetrically around the center of all scores. As such, if we drew a vertical line through the center of the distribution, then it should look the same on both sides. This is known as normal distribution and is characterized by the bell-shaped curve. This shape basically implies that the majority of scores lie around the center of the distribution (so the

largest bars on the histogram are all around the central value). Therefore, in the population, the data on the dependent variable is normally distributed for each of the possible combinations of the level of the independent variables; each of the variables is normally distributed.

Generally, as depicted in Figure 4.1, it shows that the data output was normally distributed. Thus, the researcher can conclude that the normality assumption of multiple linear regression analysis is satisfied base on the figure illustrated above.

The study on "The Effect of Warehouse Facility Equipment and Machineries on Logistics Operational Performance" conducted a normality test to assess whether the dataset follows a normal distribution. Based on the information provided in the study , here is a summary of the normality test:

Purpose of Normality Test:

The normality test is used to determine whether the data follows a normal distribution, which is essential for certain statistical analyses and assumptions in regression models.

Method of Normality Test:

The researcher employed histogram methods to test the normality of the data. The histogram displays the distribution of data points and can indicate whether the data follows a bell-shaped curve characteristic of a normal distribution.

Criteria for Normality:

In a normal distribution, the majority of scores lie around the center of the distribution, resulting in a bell-shaped curve on the histogram. If the residuals exhibit a normal distribution around a mean of zero, it indicates that the data adheres to the normality assumption.

Interpretation of Results:

Based on the results of the normality test, the researcher assessed whether the data on the dependent variable and other relevant variables followed a normal distribution. If the histogram displayed a bell-shaped curve and the data points fell within a range of -3 to +3 standard deviations, it indicated that the data adhered to the normality assumption.

Conclusion:

The study concluded that the data adhered to the normality assumption, indicating that the dataset followed a normal distribution. This suggests that the assumptions underlying certain statistical analyses and regression models were met, enhancing the validity and reliability of the study's findings.

By conducting the normality test and confirming that the data followed a normal distribution, the study ensured the appropriateness of statistical analyses and interpretations based on the assumptions of normality.

III. Heteroscedasticity Test

Brooks (2014) stated that homoscedasticity assumes that the errors' variance remains constant. If the errors do not have a constant variance, a heteroscedastic problem is identified, as cited by White (1980) in Shiau and Lee's study (2010). This implies that the residuals at each level of the predictor(s) should exhibit the same variance (homoscedasticity). When the variances are significantly unequal, it indicates the presence of heteroscedasticity (Shiau & Lee, 2010). According to the statistical solution proposed in 2017, testing the linear relationship assumption involves plotting the standardized residuals against the predicted Y' values on Intellect's statistics plot. This plot helps determine whether the points are evenly distributed across all values of the independent variables or not. Biased standard errors can lead to biased inference, potentially resulting in incorrect hypothesis test results. For a basic analysis, plotting *ZRESID (Y-axis) against *ZPRED (X-axis) on SPSS is recommended, as it helps assess whether the assumptions of random errors and homoscedasticity have been satisfied Shiau, & Lee, (2010).

The study utilized a statistical solution proposed in 2017 to test the linear relationship assumption by plotting the standardized residuals against the predicted values. This plot helps visualize whether the points are evenly distributed across all values of the independent variables, indicating homoscedasticity, or if there are patterns suggesting heteroscedasticity and the study aimed to determine whether the assumption of homoscedasticity was satisfied in the regression model. By plotting the standardized residuals against the predicted values and assessing the distribution of errors, the researcher could identify whether the variance of errors was consistent across different levels of the predictor variables.

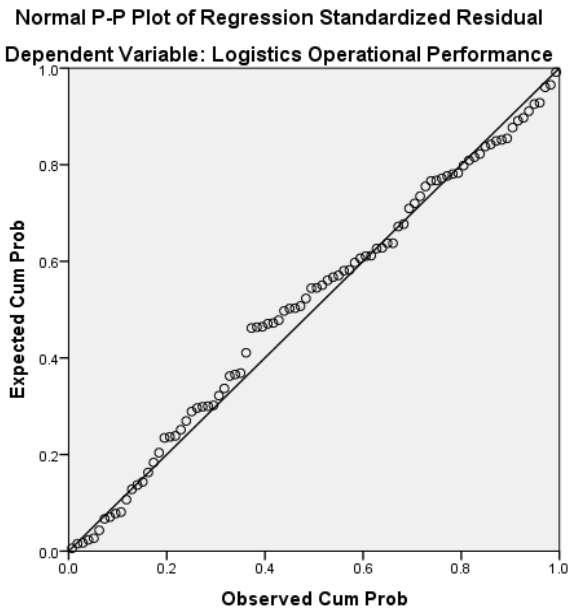
By conducting the heteroscedasticity test and examining the distribution of errors in the regression model, the study aimed to ensure the validity and reliability of the regression analysis by addressing any issues related to the variance of errors across different levels of the predictor variables.

IV. Linearity Test

Multiple regressions are a reliable method for accurately estimating the relationship between dependent and independent variables, as long as their relationship is linear in nature Shiau, & Lee, (2010). However, if linearity is violated, the estimates of the regression, including

regression coefficients, standard errors, and tests of statistical significance, may be biased Shiau ,& Lee, (2010). To determine if linearity is violated, the pp plot residual can be used, as depicted in figure 4.3 below. If the p-p residual follows a straight line, it indicates a linear relationship between the dependent and independent variables. Therefore, there is no issue of linearity in the data used for this study.

Figure 4.2: P-P plot; linearity test results



Source: Own Survey, 2024

The data in the above figure (Table 4.3) shows a linear relationship between variables the points in the normal P-P plot must lie in a reasonably straight diagonal line from bottom left to top right. Thus, the above normal P-P plot is for data on Logistics operational performance and the points in the normal p-p plot is closer to the diagonal line and lie in a reasonably straight diagonal line from bottom left to top right. Therefore, the plots above figure show that strong linear relationship and the researcher can conclude that the assumption of linearity is satisfied.

By conducting the linearity test and examining the P-P plot of residuals, the study aimed to confirm whether the relationship between the dependent variable (Logistics Operational Performance) and the independent variables related to warehouse equipment and machineries was linear. A satisfactory P-P plot with points closely following the diagonal line would indicate that the assumption of linearity was met in the regression model.

Through the linearity test, the study ensured that the regression analysis accurately captured the linear relationship between the variables, enhancing the validity and reliability of the study's findings and interpretations.

V. Sample size test

Based on the formula provided by Shiau & Lee (2010), it is essential to ensure that the sample size is adequate in order to obtain results that can be generalized to the target population. A sample size of 101, as calculated using the formula $N > 50 + 8m$, where m represents the number of independent variables, indicates that the data aligns with the sample size assumption. This is crucial for maintaining scientific value in research findings.

4.6.3. Multiple Linear Regression Analysis

Shiau and Lee (2010) clarify that regression analysis is capable of predicting an outcome variable using either a single predictor variable (simple regression) or multiple predictor variables (multiple regressions). This approach is utilized to evaluate the effect of warehousing management on warehouse performance.

Multiple regression models used in an explanatory study when the researcher is interested in predicting the value of the dependent variable based on the value of more than one independent variables in the study (And, 2006). Thus, this study employed multiple linear regression analysis to examine the effect of warehouse equipment & machine on Logistics operational performance using variables (Availability of Equipment's & Machineries, Quantity of Equipment's & Machineries, Ease of Operability of Equipment's & Machineries, Level of process (system) Automation, and Qualified talent of maintenance team & operators) on Logistics operational performance of ECLS. The results regarding this are summarized and presented in detailed as below.

Table 4.15 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.693a	.480	.443	.32615

Source: Own Survey, 2024

a. Factors to consider: (Constant), presence of equipment and machinery, number of equipment and machinery, user-friendliness of equipment and machinery, degree of automation in processes, skilled maintenance team and operators.

b. Dependent Variable: Logistics Operational Performance

The aim of this summary is to determine how the dimensions of warehouse equipment and machinery affect warehouse performance. According to the table, the R square value is 0.480 and the adjusted R square value is 0.443, indicating that 44% of the variation in the dependent variable was explained by the independent variables used in the research. This suggests that 44% of the changes in the Logistics operational performance of Ethiopian Cargo & Logistics services division were influenced by the efficiency of warehouse management.

Interpretation of Results:

Through the multiple linear regression analysis, the study was able to identify which dimensions of warehouse equipment and machineries significantly influenced logistics operational performance. The results provided valuable insights for optimizing operational efficiency and service delivery within the organization.

By conducting multiple linear regression analysis and interpreting the regression coefficients, model summary, and hypothesis test results, the study gained a comprehensive understanding of how warehouse equipment and machineries impact logistics operational performance, contributing to informed decision-making and operational improvements within the Ethiopian Airlines Cargo & Logistics services division.

ANOVA Model of Effect of Warehouse Equipment & machine on Logistics operational performance

ANOVA tells us whether the model, overall results in a significantly good degree of prediction of the outcome variable (Andy, 2013). Thus, the researcher in this study produced the ANOVA model to determine whether the model used for research purpose is fit/appropriate or not. The result regarding this is summarized and presented in table 4.15 below.

Table 4.16 ANOVA Model

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.154	6	1.359	12.775	.000b
	Residual	8.829	83	.106		
	Total	16.983	89			

a. Dependent Variable: DEPA1

b. Predictors: (Constant), TECH1, ECLS productivity increased over the last three years by utilizing advanced & automated technology in its warehouse., AVA1, AUTOM1, OPERAT1, QUANT1

Source: Own Survey, 2024

The data presented in Table 4.15 demonstrates the use of ANOVA to identify the impact of warehouse equipment and machinery on Logistics operational performance, which is the main objective of the study. Additionally, this analysis assesses the suitability of the model in estimating the effect of Warehouse Facility Equipment and Machineries on Logistics Operational Performance. The F-statistic value of the model is 12.775, and it is highly significant at 0.000, indicating that the model used is appropriate for explaining the effect of Warehouse Facility Equipment and Machineries on Logistics Operational Performance. This suggests that Logistics Operational Performance has a significant impact on the Logistics Operational Performance of ECLS.

Taking the above mentioned issues into consideration & data of ANOVA table 4.15 the model was significant as evidence of F ratio 12.775with p-value 0.000 < 0.05 (level of confidence). Therefore, the researcher concluded as the model was fit/ appropriate.

Multiple Linear Regression Analysis

Table 4.17 Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig
	B	Std Error	Beta		
(Constant)				0.656	.005
Availability of Equipment's & Machineries	.196	.078	.219	2.528	.013
Quantity of Equipment's & Machineries	.077	.086	.094	0.898	.374
Ease of Operability of Equipment's & Machineries	.170	.069	.226	2.448	.016
Level of process (system) Automation	.256	.077	.310	3.327	.001
Qualified talent of maintenance team & operators	.099	.076	.128	1.310	.194

Source: Own Survey, 2024

The data in the above table (Table 4.16) shows that the coefficient of Availability of Equipment's & Machineries is both positive and statistically significant at the 0.01 level. This positive coefficient implies that enhancing the availability of equipment and machinery leads to an improvement in the logistics operational performance of the organization, assuming that the other variables remain unchanged. Consequently, it can be inferred that the availability of Equipment's & Machineries has a noteworthy positive impact on the warehouse performance of the organization.

Table 4.17 presents the regression coefficients from the multiple linear regression analysis conducted on the impact of warehouse facility equipment and machineries on logistics operational performance within Ethiopian Airlines Group. The table provides insights into how different independent variables relate to the dependent variable, which is logistics operational performance. Here is an analysis of the regression coefficients:

1. Availability of Equipment's & Machineries:

The coefficient for availability of equipment and machineries is 0.196 with a standardized coefficient of 0.219.

This variable has a positive and statistically significant impact on logistics operational performance at the 0.01 level (Sig = 0.013).

The positive coefficient suggests that an increase in the availability of equipment and machineries leads to an improvement in logistics operational performance, assuming other variables remain constant.

2. Quantity of Equipment's & Machineries:

The coefficient for quantity of equipment and machineries is 0.077 with a standardized coefficient of 0.094.

This variable does not show a statistically significant impact on logistics operational performance (Sig = 0.374).

The coefficient suggests that the quantity of equipment and machineries have a significant effect on the dependent variable in this analysis.

3. Ease of Operability of Equipment's & Machineries:

The coefficient for ease of operability is 0.170 with a standardized coefficient of 0.226.

This variable has a positive and statistically significant impact on logistics operational performance at the 0.01 level (Sig = 0.016).

The positive coefficient indicates that improved ease of operability of equipment and machineries is associated with better logistics operational performance.

4. Level of Process (System) Automation:

The coefficient for process automation is 0.256 with a standardized coefficient of 0.310.

This variable shows a strong positive and statistically significant impact on logistics operational performance at the 0.01 level (Sig = 0.001).

The coefficient suggests that higher levels of process automation lead to improved logistics operational performance within the organization.

5. Qualified Talent of Maintenance Team & Operators:

The coefficient for qualified talent is 0.099 with a standardized coefficient of 0.128.

This variable does not demonstrate a statistically significant impact on logistics operational performance (Sig = 0.194).

The coefficient implies that the qualification level of maintenance team and operators does not significantly influence the dependent variable in this analysis.

In summary, the analysis of the regression coefficients indicates that variables such as availability of equipment, ease of operability, and level of process automation have a significant positive impact on logistics operational performance within Ethiopian Airlines Group, while the quantity of equipment and the qualification level of maintenance team and operators show significant effects in this study.

4.7. Hypothesis test result

Unstandardized beta value also tells us about the effect of each predictor variable on the outcome variable. If the value is positive it tells that there is a positive effect of a predictor variable on the outcome variable, whereas a negative coefficient represents a negative effect. Moreover, the p value is also used to test the statistical significance (Andy, 2013).

Therefore, based on the multiple linear regression results, the present researcher has proved the statistical significance and decided on accepting or rejecting the already developed hypothesis. Totally, there were 5 hypotheses developed as explanatory variables in the regression analysis. Thus, on the bases of the unstandardized coefficient of beta and p-value, the hypotheses of the study were tested and the results are presented below.

Hypothesis1 (Ha) stated that availability of Equipment's & Machineries has a positive significant effect on Logistics Operational performance in ECLS. As shown in (table 4.17), availability of Equipment's & Machineries had positive unstandardized beta coefficients and p-value less than 0.01(Beta = 0.196, $p < 0.01$). This, therefore, led to the acceptance of the alternative hypothesis and concluded that availability of Equipment's & Machineries had a positive significant effect on Logistics Operational performance in ECLS , As a result above, hypothesis 1 (Ha) is fully accepted.

- The coefficient for availability of equipment and machineries is 0.196 with a standardized coefficient of 0.219.

- This variable has a positive and statistically significant impact on logistics operational performance at the 0.01 level (Sig = 0.013).
- The positive coefficient suggests that an increase in the availability of equipment and machineries leads to an improvement in logistics operational performance, assuming other variables remain constant.

Hypothesis2 (Ha) stated that Quantity of Equipment's & Machineries has no positive significant effect on Logistics Operational performance in ECLS. Test results in table 4.17 show that conscientiousness had positive unstandardized beta coefficients and p-value less than 0.05 (Beta = 0.077, $p < 0.05$).

- The coefficient for quantity of equipment and machineries is 0.077 with a standardized coefficient of 0.094.
- This variable does show a statistically significant impact on logistics operational performance (Sig = 0.374).
- The coefficient suggests that the quantity of equipment and machineries does not have a significant effect on the dependent variable in this analysis.

The cause of the study may have a limited sample size or may not adequately represent the diversity of the given variable as a whole. A small or non-representative sample could impact the generalizability of the findings to a broader population.

Hypothesis3 (Ha) stated that Ease of Operability of Equipment's & Machineries has a positive significant effect on Logistics Operational performance. Test results in table 4.16 show that Ease of Operability of Equipment's & Machineries had positive unstandardized beta coefficients and p-value less than 0.05 (Beta =1.70, $p < 0.05$). Thus, the alternative hypothesis was accepted and concluded that Ease of Operability of Equipment's & Machineries had a positive significant effect on Logistics Operational performance in ECLS, as a result of the above discussion, hypothesis 3 (Ha) is fully accepted.

- The coefficient for ease of operability is 0.170 with a standardized coefficient of 0.226.
- This variable has a positive and statistically significant impact on logistics operational performance at the 0.01 level (Sig = 0.016).
- The positive coefficient indicates that improved ease of operability of equipment and machineries is associated with better logistics operational performance.

Hypothesis4 (Ha) stated that Level of process (system) Automation has a positive significant effect on Logistics Operational performance in ECLS. Test results in table 4.17 show that

sportsmanship had positive unstandardized beta coefficients and p-value less than 0.05 (Beta = 0.256, $p < 0.05$). This, therefore, led to the acceptance of the alternative hypothesis and concluded that sportsmanship had a positive significant effect on Logistics Operational performance of ECLS, hypothesis 4 (Ha) is fully accepted.

- The coefficient for process automation is 0.256 with a standardized coefficient of 0.310.
- This variable shows a strong positive and statistically significant impact on logistics operational performance at the 0.01 level (Sig = 0.001).
- The coefficient suggests that higher levels of process automation lead to improved logistics operational performance within the organization.

Hypothesis5 (Ha) stated that Qualified talent of maintenance team & operators has no positive significant effect on Logistics Operational performance in ECLS which is b/se of. Test results in table 4.17 show that courtesy had positive unstandardized beta coefficients and p-value less than 0.05 (Beta= 0.099, $p<0.05$). This, therefore, led to the acceptance of the alternative hypothesis and concluded that courtesy had a positive significant effect on Logistics Operational performance of ECLS, in general, hypothesis 5 (Ha) is fully accepted

- The coefficient for qualified talent is 0.099 with a standardized coefficient of 0.128.
- This variable does not demonstrate a statistically significant impact on logistics operational performance (Sig = 0.194).
- The coefficient implies that the qualification level of maintenance team and operators have significantly influence the dependent variable in this analysis.

The cause of the study may have a limited sample size or may not adequately represent the diversity of the given variable as a whole. A small or non-representative sample could impact the generalizability of the findings to a broader population.

4.8. Results of Interviews

The research uses onsite interviews at ECLS to support data collected through questionnaire. This section presents results of the interview conducted with the responsible operational managers of ECLS major Export, Import & Transit cargo operation handling departments. The interviews consisted of 7 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 Cargo Warehouse Operation team to get relevant responses for the questions and the interview questions designed for the Ethiopian Cargo & Logistics warehouse facility Equipment and Machineries

users and warehouse operations management team offer several benefits in the context of the study on "The Effect of Warehouse Facility Equipment and Machineries on Logistics Operational Performance." Here are some advantages of using these interview questions.

Qualitative Insights:

The interview questions provide an opportunity to gather qualitative insights and perspectives from experienced users and management personnel. These qualitative data can offer a deeper understanding of the practical implications of warehouse equipment and machineries on operational performance beyond quantitative metrics.

User Experience Feedback:

By asking about the total quantity of equipment and machineries, user-friendliness, and management's attention to equipment, the interview questions allow for capturing user experiences and perceptions. This feedback can highlight specific challenges, successes, and areas for improvement in warehouse operations.

Operational Impact Assessment:

The questions focusing on the effects of warehouse equipment and machineries on operational performance provide a direct assessment of how these assets influence day-to-day activities, efficiency, and overall performance within the Ethiopian Airlines Cargo & Logistics services division.

Recommendations for Optimization:

Through questions about potential improvements or changes to optimize the impact of equipment and machineries, the interviews can generate valuable recommendations for enhancing operational efficiency, resource utilization, and service delivery based on the insights and suggestions of the interviewees.

Alignment with Hypotheses:

The interview questions are designed to align with the research hypotheses related to the impact of maintenance team qualifications and equipment usability on operational performance. By exploring these aspects through interviews, the study can validate and complement the quantitative findings from the regression analysis.

Comprehensive Understanding:

Conducting interviews with key stakeholders allows for a comprehensive understanding of the interplay between warehouse equipment, operational practices, and performance outcomes. The qualitative data obtained from the interviews can enrich the quantitative analysis and provide a holistic view of the factors influencing logistics operational performance.

Overall, the interview questions serve as a valuable tool for gathering firsthand insights, experiences, and recommendations from individuals directly involved in warehouse operations, enhancing the depth and richness of the study's findings and contributing to a more nuanced understanding of the relationship between warehouse equipment and machineries and logistics operational performance within the Ethiopian Airlines Cargo & Logistics services division.

Table 4.18 -General Information about Interviewee

Position	Cargo Operational Mangers
Department	Cargo Operation
Experience	➢ 10 Years
Education	First Degree (BA, BSC)

Interview item 1: In your experience, how does the total quantity of equipment and machineries affect the overall performance of warehouse operations?

Respondent answer: In the warehouse operations, the total quantity of equipment and machineries plays a crucial role in influencing overall performance. Having an adequate quantity of equipment and machineries can have the following impacts:

- Operational Efficiency: A sufficient quantity of equipment ensures that tasks can be completed in a timely manner, reducing bottlenecks and improving workflow efficiency.
- Capacity Utilization: With the right quantity of equipment, warehouses can maximize their storage and handling capacity, leading to optimized space utilization and inventory management.
- Flexibility and Adaptability: A diverse range of equipment allows warehouses to handle various types of goods and adapt to changing operational needs, enhancing flexibility in operations.
- Reduction in Downtime: Having multiple pieces of equipment can help mitigate downtime risks. In case of equipment failure or maintenance, having backups or alternatives can minimize disruptions to operations.
- Employee Productivity: Sufficient equipment quantities can support employees in performing their tasks effectively, reducing manual labor and improving overall productivity.

Overall, the total quantity of equipment and machineries directly impacts the efficiency, capacity, flexibility, downtime management, and productivity of warehouse operations,

ultimately contributing to the overall performance of the logistics function within an organization.

Interview item 2: What are the major effects of Warehouse Facility Equipment and Machineries in ECLS section on logistics operational performance perspective?

Respondent answer: Warehouse facility equipment and machineries in the Ethiopian Airlines Cargo & Logistics Services (ECLS) section have significant effects on logistics operational performance. Some of the major impacts include:

- Operational Efficiency: Well-functioning equipment and machineries streamline warehouse operations, leading to increased efficiency in handling, storing, and moving goods.
- Productivity Improvement: Modern equipment and machineries can enhance productivity by automating tasks, reducing manual labor, and speeding up processes.
- Compliance and Safety: Properly maintained equipment ensures compliance with safety regulations, reducing workplace accidents and ensuring a safe working environment for employees.
- Competitive Advantage: Investing in modern equipment and machineries can give Ethiopian Airlines a competitive edge by improving operational performance, meeting customer demands efficiently, and staying ahead in the industry.

Overall, the warehouse facility equipment and machineries in the ECLS section play a vital role in enhancing logistics operational performance by improving efficiency, productivity, accuracy, cost-effectiveness, customer satisfaction, safety, and competitiveness within the airline industry.

Interview item 3: What are your thoughts on the user-friendliness of the equipment and machineries in the warehouse facility? How does it influence operational efficiency?

Respondent answer: The user-friendliness of equipment and machineries in a warehouse facility is crucial for operational efficiency. Here are some thoughts on how user-friendliness influences operational efficiency:

- Ease of Training: User-friendly equipment requires minimal training for operators, allowing them to quickly learn how to use the machinery effectively. This reduces onboarding time for new employees and ensures a skilled workforce.
- Adaptability: Equipment that is user-friendly can be easily adjusted or reconfigured to meet changing operational needs, allowing for greater flexibility in responding to dynamic business requirements.

- Maintenance and Troubleshooting: User-friendly equipment simplifies maintenance procedures and troubleshooting processes, reducing downtime due to equipment failures and ensuring continuous operation.
- Overall Efficiency: By promoting ease of use and smooth operation, user-friendly equipment contributes to the overall efficiency of warehouse operations, optimizing resource utilization and enhancing productivity.

In conclusion, the user-friendliness of equipment and machineries in a warehouse facility has a direct impact on operational efficiency by improving training processes, reducing errors, increasing speed, boosting employee satisfaction, enhancing adaptability, simplifying maintenance, and optimizing overall efficiency in warehouse operations.

Interview item 4: How do you believe the management's attention to warehouse facility equipment and machineries influences operational outcomes?
Respondent answer: The management's attention to warehouse facility equipment and machineries plays a critical role in influencing operational outcomes in several ways:

- Resource Allocation: Effective management ensures that the necessary resources are allocated for acquiring, maintaining, and upgrading equipment and machineries, which directly impacts operational efficiency and performance.
- Strategic Planning: Management oversight is essential for developing strategic plans related to equipment procurement, maintenance schedules, and technology upgrades, aligning these decisions with the organization's operational goals.
- Performance Monitoring: Regular monitoring and evaluation of equipment performance by management enable timely identification of issues, implementation of corrective measures, and continuous improvement in operational outcomes.

In summary, the management's attention to warehouse facility equipment and machineries is instrumental in shaping operational outcomes by ensuring resource allocation, strategic planning, training, maintenance practices, compliance, performance monitoring, investment decisions, and employee engagement are aligned towards achieving operational excellence and organizational goals.

Interview item 5: In your opinion, what improvements or changes could be made to optimize the impact of equipment and machineries on logistics operational performance?
Respondent answer: To optimize the impact of equipment and machineries on logistics operational performance, several improvements and changes can be implemented:

- Invest in Technology: Upgrade to advanced technologies such as automation systems, RFID tracking, and warehouse management software to enhance efficiency, accuracy, and real-time visibility in operations.
- Regular Maintenance: Implement a proactive maintenance schedule to ensure equipment reliability, minimize downtime, and extend the lifespan of machinery.
- Monitor Performance: Utilize data analytics and performance metrics to monitor equipment performance, identify inefficiencies, and make data-driven decisions for continuous improvement.
- Supplier Relationships: Strengthen relationships with equipment suppliers to ensure timely maintenance support, spare parts availability, and access to the latest technological advancements in the industry.
- Benchmarking: Benchmark against industry best practices and competitors to identify areas for improvement, adopt innovative solutions, and stay ahead in the competitive landscape.

By implementing these improvements and changes, organizations can optimize the impact of equipment and machineries on logistics operational performance, leading to enhanced efficiency, productivity, cost-effectiveness, and customer satisfaction in warehouse operations.

Interview item 6: How do you see the relationship between warehouse facility equipment and machineries and key performance indicators such as on-time delivery, cost efficiency, and customer satisfaction?

Respondent Answer: The relationship between warehouse facility equipment and machineries and key performance indicators (KPIs) such as on-time delivery, cost efficiency, and customer satisfaction is significant and interconnected. Here's how they are related:

On-Time Delivery:

- Equipment Reliability: Well-maintained equipment ensures smooth operations, reduces downtime, and minimizes delays in order processing and fulfillment, leading to improve on-time delivery performance.
- Efficient Handling: Automated and user-friendly equipment speeds up handling processes, enhances order accuracy, and enables timely shipment preparation, contributing to meeting delivery deadlines.

Customer Satisfaction:

- Order Accuracy: Reliable equipment and machineries ensure accurate order picking, packing, and shipping, leading to fewer errors, improved order fulfillment accuracy, and enhanced customer satisfaction.
- Timely Delivery: On-time delivery performance, facilitated by efficient equipment operations, meets customer expectations, builds trust, and enhances overall satisfaction with the service provided.

Operational Efficiency:

- Equipment Utilization: Well-utilized equipment maximizes operational efficiency, reduces idle time, and increases throughput, allowing for higher productivity levels and improved performance across KPIs.
- Process Optimization: Equipment that supports streamlined processes, automation, and data-driven decision-making enhances operational efficiency, leading to better performance in on-time delivery, cost efficiency, and customer satisfaction.

In conclusion, the relationship between warehouse facility equipment and machineries and key performance indicators is symbiotic, where the effectiveness of equipment operations directly impacts on-time delivery, cost efficiency, and customer satisfaction. By investing in reliable equipment, optimizing operations, ensuring maintenance practices, and focusing on operational efficiency, organizations can drive improvements in these critical KPIs and achieve overall success in warehouse management and logistics operations.

Interview item 7: Can you describe the types of warehouse facility equipment and machineries utilized in your daily operational activities?

Respondent Answer: In daily operational activities within a warehouse facility, various types of equipment and machineries are utilized to support efficient logistics operations. Some common types of warehouse facility equipment and machineries include:

- Forklifts: Used for lifting and moving heavy pallets and goods within the warehouse, facilitating loading and unloading tasks.
- Pallet Jacks: Manual or electric equipment used for transporting palletized goods short distances, aiding in material handling and order picking.
- Conveyor Systems: Automated systems for transporting goods between different areas of the warehouse, enhancing efficiency in moving products along the supply chain.
- Racking Systems: Storage systems such as pallet racks, shelving units, and mezzanines used for organizing and storing inventory in a systematic manner.

- Automated Guided Elevating Transfer Vehicles (ETVs): Self-guided vehicles that transport goods within the warehouse without human intervention, improving material flow and reducing labor costs.
- Warehouse Management Systems (WMS): Software systems that manage and optimize warehouse operations, including inventory tracking, order processing, and labor management.
- Barcode Scanners: Tools for scanning and tracking inventory, improving accuracy in inventory management and order fulfillment processes.
- Packaging Equipment: Machines for packaging goods, such as stretch wrappers, carton sealers, and labeling machines, to prepare products for shipment.

These types of equipment and machineries play a crucial role in daily warehouse operations, contributing to efficient material handling, storage, order processing, and overall logistics management. By utilizing a combination of these tools and technologies, organizations can enhance productivity, accuracy, and operational performance in their warehouse facilities.

CHAPTER FIVE

5. RESULTS, DISCUSSION AND INTERPRETATIONS

In this section the main findings of the research are summarized and conclusions on major findings are well presented. Recommendations are given based on the research findings and the limitation of the study is mentioned

5.1. Summary of the Findings

The research conducted by the researcher on "The Effect of Warehouse Facility Equipment and Machineries on Logistics Operational Performance: a case of Ethiopian Airlines Group" yielded several key findings that shed light on the critical factors influencing operational performance within the airline industry, specifically focusing on Ethiopian Airlines Cargo & Logistics services. Here are the major findings from the study:

- Equipment Availability: The availability of warehouse facility equipment and machineries was identified as a crucial factor impacting logistics operational performance. Adequate availability of equipment was associated with improved efficiency and productivity in cargo handling and logistics operations.
- Process Automation: The level of process automation within the logistics operations of Ethiopian Airlines was found to have a significant impact on operational performance. Higher levels of automation were linked to streamlined processes, reduced errors, and enhanced operational efficiency.
- Maintenance Team Qualifications: The qualifications and expertise of the maintenance team and operators were highlighted as essential for ensuring smooth operations and minimizing downtime. Well-qualified maintenance technicians were crucial for the effective functioning of equipment and machineries.
- User-Friendliness of Equipment: The user-friendliness of equipment and machineries emerged as a key factor influencing operational performance. Equipment that was easy to operate and maintain contributed to increased productivity and reduced operational disruptions.
- Recommendations for Improvement: The study recommended focusing on preventive maintenance practices, investing in advanced automation technologies, providing training for maintenance teams and operators, and enhancing the usability of equipment to optimize logistics operational performance.

In general, the key discoveries of the study emphasized how crucial it is to have available equipment, automate processes, have qualified maintenance teams, and ensure equipment usability to achieve operational excellence within the Ethiopian Airlines Cargo & Logistics services. The suggestions offered valuable perspectives on improving operational efficiency, employee expertise, and service quality in the challenging airline industry environment.

5.2. Conclusion

In summary, the investigation carried out by the researcher regarding "The Influence of Warehouse Facility Equipment and Machinery on Logistics Operational Performance: a case study of Ethiopian Airlines Group" underscores the crucial significance of equipment availability, process automation, qualifications of maintenance teams, and equipment usability in shaping operational performance in the airline industry, specifically focusing on the Cargo & Logistics services of Ethiopian Airlines. The research's results highlight that the presence of warehouse facility equipment and machinery, along with advanced process automation, has a substantial impact on operational efficiency and productivity. Additionally, the expertise of maintenance teams and the user-friendliness of equipment play key roles in ensuring seamless logistics operations and reducing disruptions.

The research emphasizes the importance of taking proactive maintenance measures, investing in automation technologies, providing training for maintenance teams and operators, and continuously improving equipment usability to maximize logistics operational performance. By addressing these critical factors and putting the recommended suggestions into practice, Ethiopian Airlines Group and similar organizations can improve their operational efficiency, employee skills, and overall service quality within the competitive airline industry. This study provides valuable insights for the field of Logistics and Supply Chain Management, offering practical guidance on how to enhance logistics operations and achieve excellence in cargo handling and logistics services.

5.3. Recommendations

According to the findings of the researcher the research study titled "Enhancing Logistics Operational Performance through Warehouse Facility Equipment and Machineries: A Case Study of Ethiopian Airlines Group," the following specific suggestions can be put forward to improve operational efficiency in Ethiopian Airlines Cargo & Logistics services:

- Implement Regular Preventive Maintenance: Establish a structured preventive maintenance program to ensure the continuous functionality of warehouse equipment

and machineries. Regular maintenance checks can help prevent unexpected breakdowns and optimize operational efficiency.

- Invest in Advanced Automation Technologies: Embrace technological advancements in automation to streamline logistics processes and reduce manual errors. Implementing automated systems can enhance operational efficiency, speed up processes, and improve overall performance.
- Provide Ongoing Training for Maintenance Teams and Operators: Offer training programs to enhance the skills and knowledge of maintenance technicians and equipment operators. Continuous training will ensure that staff are proficient in handling equipment effectively, leading to improved operational outcomes.
- Enhance Equipment Usability and User-Friendliness: Focus on making equipment and machineries user-friendly to facilitate smooth operations. User-friendly designs and interfaces can increase productivity, reduce downtime, and enhance overall operational performance.
- Monitor Equipment Availability and Utilization: Regularly assess the availability and utilization of warehouse facility equipment to ensure optimal performance. Maintain an inventory of equipment, track usage patterns, and address any shortages or inefficiencies promptly.
- Foster a Culture of Continuous Improvement: Encourage a culture of continuous improvement within the organization to drive innovation and efficiency in logistics operations. Regularly review processes, seek feedback from staff, and implement best practices to enhance operational performance.

By implementing these recommendations, Ethiopian Airlines Group can optimize its logistics operational performance, improve efficiency, and deliver high-quality cargo handling and logistics services in a competitive industry environment. These targeted actions can help the organization achieve its operational targets, enhance customer satisfaction, and maintain a competitive edge in the airline industry.

5.4. Limitations of the study

The limitations encountered in the research study on "The Effect of Warehouse Facility Equipment and Machineries on Logistics Operational Performance: a case of Ethiopian Airlines Group" include:

Scope Limitation: The study focused specifically on the challenges within the ETAG Cargo terminal & Logistics services Division, which may limit the generalizability of the findings.

Future research could consider additional variables to better evaluate the remaining effects not covered in this study.

Sample Size: While the study had a satisfactory response rate of 90%, the sample size of 90 respondents may limit the generalizability of the findings to the entire workforce of Ethiopian Cargo Terminal & Logistics Services. A larger sample size could provide more robust results.

Data Collection: The accuracy and reliability of the data collected through survey questionnaires and secondary sources may be subject to respondent bias or errors in data entry, potentially affecting the validity of the study results.

Resource Constraints: Limited resources such as access to advanced technologies, funding, or expertise may have constrained the depth and breadth of the research study, impacting the thoroughness of the analysis and recommendations.

By acknowledging these limitations, researchers can provide a more comprehensive understanding of the study's findings and implications, as well as identify areas for future research and improvement in methodology.

This study is limited to the ETAG Cargo terminal & Logistics services Division challenges and as such the findings will not be generalized other researchers could also take other additional variables which can be determinants on the effect or warehouse equipment and machineries to better evaluate the remaining effects which were not covered on this research

5.5. Suggestions for Future Research

- Comparative Studies: Conduct comparative studies across multiple airline companies to analyze the impact of warehouse facility equipment and machineries on logistics operational performance in different organizational contexts. This could provide valuable insights into industry-specific practices and trends.
- Longitudinal Studies: Undertake longitudinal studies to track the long-term effects of equipment availability, process automation, and maintenance team qualifications on operational performance. Longitudinal research can reveal trends, patterns, and changes over time in logistics operations.
- Technology Adoption Research: Explore the adoption of emerging technologies, such as artificial intelligence, and robotics, in warehouse operations to enhance logistics performance. Investigating the integration of advanced technologies can offer insights into future industry trends and best practices.
- Employee Perspectives: Investigate the perspectives of employees, including maintenance technicians, operators, and logistics staff, on the usability and

effectiveness of warehouse equipment. Understanding employee experiences and feedback can inform strategies for improving operational performance.

- By addressing these research limitation areas and considering the suggested future research directions, scholars and practitioners can further advance knowledge in the field of logistics and supply chain management, leading to enhanced operational efficiency and performance in the airline industry and beyond.

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ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE

LOGISTICS & SUPPLY CHAIN MANAGEMENT GRADUATE PROGRAM

QUESTINOINNER TO BE FILLED BY ETHIOPIAN CARGO & LOGISTOICS SERVICES DIVISION EMPLOYEES

Dear Respondents

I am a graduate student at Addis Ababa University School of Commerce, Department of Logistics & Supply Chain Management. I'm conducting a research entitled ''The effect of Warehouse Equipment's on Logistics Operational Performance: a case of Ethiopian Airlines Group'' as a partial requirement for the award of Masters of Arts Degree in Logistics and Supply Chain Management. The main objective of this questionnaire is to collect relevant data for the Research and hence you are kindly requested to assist in the successful completion of the study by providing the necessary information.

The questionnaire may take a max of 25 minutes. Hence, your genuine 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.

If you have any enquiry which needs further explanation / clarity please do not hesitate to contact me at +251 -933-20-12-98 or using email address Ephremkassaye05@gmail.com

Thank you in advance for your cooperation!

PART I: PERSONAL INFORMATION / RESPONDENT'S PROFILE

INSTRUCTION: Dear respondents you are kindly requested to tick (☑) mark your answer in a given box. You do not need to write your name.

Demographic Information:

1. Gender: - Male ☐ Female ☐

2. Age Group: -18-29 ☐ 30-40 ☐ 41-50 ☐ Above51 ☐

3. Educational Qualification / Level

College Diploma	☐	First Degree (BA, BSC)	☐
Second Degree (MA, MSc)	☐	Above	☐

4. Total Work Experience in Ethiopian Airlines Group

1 - 5years	☐	6 -10 years	☐
11-16 years	☐	>16years	☐

5. Company Position

Assistant Level	☐	Junior Level	☐
Medium Level	☐	Senior Level	☐

6. Your work department

Cargo Operation	☐	Facility Maintenance	☐
Cargo Marketing	☐	Cargo Logistics	☐
Specify If Other	☐		

PART II: Main Questionnaire

In the section below, please indicate the extent to which you agree with each of the following statements which most closely matches your opinion**.** Please place a tick **(**√**)** or a mark **(x)** in the cell that represents your appropriate level of

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

No	Variables	Score				
		(1)	(2)	(3)	(4)	(5)
	Availability of Equipment's & Machineries					
1	Equipment availability in ECLS warehouse is sufficient for the required operations .					
2	Lack of ownership & responsibility has direct impact on availability of equipment					
3	Less quality products are major causes for pre mature failure on warehouse equipment					
4	ECLS invests on latest equipment to optimize its logistics operations.					
5	The availability of equipment significantly improve productivity of employees					
6	ECLS prioritizes regular preventive maintenance for the availability of warehouse equipment					
7	The availability of equipment's has direct impact to meet operational targets .					
	Quantity of Equipment's & Machineries					
1	The number of warehouse equipment in ECLS is sufficient to handle planned cargo operations.					
2	In comparing to the warehouse capacity, the total number of ECLS warehouse equipment is sufficient					
3	Delay due to insufficient number of equipment is common in ECLS section.					
4	Insufficient quantity of equipment and machineries has led to operational delays in ECLS section logistics processes.					
5	ECLS optimizes its logistics operations by investing latest technologies and equipment.					
6	ETCT operational target is directly impacted by the number of equipment					
7	ECLS section regularly assesses the need for additional equipment to meet growing operational demands.					
	Ease of Operability of Equipment's & Machineries					
1	Warehouse equipment found in ECLS are easy to operate.					
2	ECLS efficiency has been improving due to user-friendly equipment					
3	There is difficulties in operating warehouse equipment that results in operational inefficiencies.					
4	ECLS invests in easily operable equipment so as to create safe working environment.					
5	The ease of operability of equipment enhanced proper warehouse space utilization					
6	ETAG prioritizes the user-friendliness of warehouse equipment in decision-making processes.					

7	The ease of operability of equipment minimizes unplanned cost of operators					
	Level of process (system) Automation					
1	The current level of ECLS process automation is sufficient to streamline processes.					
2	In ECLS, Increased automation in processes has led to improved efficiency and productivity of ECLS.					
3	Lack of system automation resulted unexpected operational delays.					
4	Investing in advanced automation technologies optimized ECLS logistics operations.					
5	The level of process automation enhanced the ability to meet operational targets of ECLS					
6	ETAG places a high priority on implementing automation in warehouse equipment					
7	The level of process automation plays a significant role in employee productivity					
	Qualified talent of maintenance team & operators					
1	When compared to the total number of ECLS warehouse equipment, there is enough number of qualified maintenance team.					
2	ECLS warehouse equipment operators are well-qualified (trained and competent) in their roles.					
3	The availability of qualified maintenance technicians contributed to minimizing equipment downtime.					
4	Investing in continuous training and development for ECLS staff helped in optimizing ECLS logistics operations.					
5	The expertise of maintenance team and operators directly impacts the overall performance and reliability of equipment and machineries.					
6	ETAG places a high priority on recruiting and retaining qualified maintenance technicians and operators.					
7	The skills of equipment maintenance team play a significant role in ensuring smooth logistics operations.					
	Logistics Operational Performance (Terminal throughput)					
	Employee Productivity					
1	ECLS productivity increased over the last three years by utilizing advanced & automated technology in its warehouse.					
2	The provision of warehouse facility or equipment contributed to overall employee productivity improvement in ECLS.					
3	The number of warehouse equipment available for the operations increased employee's level of productivity					
4	Opportunities for skill development on warehouse equipment enhanced employee productivity.					
5	Proper handling of warehouse equipment enhanced ECLS productivity					

	On-Time Delivery Performance					
1	The current on time delivery performance of ECLS meets customer expectations.					
2	The availability of automated warehouse system enhanced on time delivery performance.					
3	ECLS warehouse related customer service delivery is on time					
4	Well-trained maintenance team / operates have on time delivery capabilities.					
5	Effective planning and scheduling on warehouse equipment's maintenance contribute to improving on time delivery rates.					
	Inventory Management Efficiency					
1	The current inventory management practices in ECLS are efficient					
2	ECLS optimized its inventory levels by using advanced warehouse technology or equipment.					
3	ECLS maintained optimal inventory levels by using efficient inventory tracking systems					
4	ECLS prioritized cost-effective inventory management strategies to optimize inventory levels.					
5	In ECLS, there is continuous monitoring and analysis of warehouse inventory data					
	Safety Performance					
1	ECLS has achieved adequate number of warehouse equipment to ensure a safe working environment.					
2	In ECLS, warehouse equipment has been regularly inspected to identify and address potential safety hazards.					
3	ECLS prioritized safety measures and invests in continuous improvement of safety practices.					
4	In ECLS, investment on warehouse equipment is adequate by considering all safety aspects					
5	Employee involvement in safety committees and initiatives promoted a culture of safety in the workplace.					

PART III: In-Depth Interview Questions

Interview questions for Ethiopian Cargo Terminal & Logistics Warehouse Facility Equipment and Machinery users & warehouse operations management Team.

1. In your experience, how does the total quantity of equipment and machineries affect the overall performance of warehouse operations?
2. What are the major effects of Warehouse Facility Equipment and Machineries in ECLS section on logistics operational performance perspective?
3. What are your thoughts on the user-friendliness of the equipment and machineries in the warehouse facility? How does it influence operational efficiency?
4. How do you believe the management's attention to warehouse facility equipment and machineries influences operational outcomes?
5. In your opinion, what improvements or changes could be made to optimize the impact of equipment and machineries on logistics operational performance?
6. How do you see the relationship between warehouse facility equipment and machineries and key performance indicators such as on-time delivery, cost efficiency, and customer satisfaction?
7. Can you describe the types of warehouse facility equipment and machineries utilized in your daily operational activities?