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The Effect of Outbound logistics on organizational performance the case of Ethiopian Airlines Maintenance, Repair and Overhaul (MRO)

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A Thesis Submitted to the Graduate School of Addis Ababa University, School of
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**ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE, LOGISTICS
AND
SUPPLY CHAIN MANAGEMENT UNIT**

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Ethiopian Airlines Maintenance, Repair and Overhaul (MRO)*

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DECLARATION

I, Mekonnen Getahun, declare that this paper is a result of my independent research work on the topic entitled “*The Effect of Outbound logistics on organization performance the case of Ethiopian Airlines Maintenance, Repair and Overhaul (MRO)*” in partial fulfillment of the requirements for the Degree of Masters of Art in Logistics and Supply Chain Management at Addis Ababa University, School of commerce. This work has not been submitted for a degree to any other university. All the references are also duly acknowledged.

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CONFIRMATION

This is to certify that Mekonnen Getahun has carried out this research work on the topic entitled “*The Effect of Outbound logistics on organization performance the case of Ethiopian Airlines Maintenance, Repair, and Overhaul (MRO)*” under my supervision. This work is original and has not been presented for a degree in any university and it is submitted for the partial fulfillment of the requirements for the award of the degree of Masters of Art in Logistics and Supply Chain Management.

Ass. Professor Fesseha Afework

Date _____

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Abbreviation/ Acronyms

FAA: Federal Aviation Administration

ESAS: European Union Aviation Safety Agency

PMS: performance management system

KPI: Key Performance indicator

MRO: Maintenance, Repair and Overhaul

LMIS: Logistics management information system

XWB: extra wide body

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Abstract

Logistics as a business function plays an important role in the company's performance through the planning, implementation, and control of processes linked to material, information, and financial flows. Considering the importance of logistics and valuable way of securing competitive advantage the main objective of this study was to assess the current performance of Ethiopian airlines maintenance repair and overhaul outbound logistics and the effect on organizational performance. Descriptive and explanatory research designs as well as quantitative research approaches were employed in conducting the study. The population of the study was Ethiopian airline maintenance repair and overhaul logistics and purchasing department employees. For the reliability and its attainability economically and physically census sampling was used to select the appropriate sample of the study. Data was collected using questionnaires and interviews and being analyzed using Statistical Package for the Social Sciences (SPSS). Descriptive analysis namely percentage, mean and standard deviation; and inferential analysis namely Pearson correlation and multiple linear regression were employed. The study shows that the logistics performances below average and it has a great extent over organizational profitability, reliability, flexibility, and responsiveness performance. The study also revealed that the organization has a shortage of qualified logistics personnel; materials licensed packing, and needs major review on the structure and the resource available. The study recommended enhancing the logistics management practices and improving the team with certified logisticians would highly increase the performance and improve organizational performance.

Key words: Logistics, MRO, performance, ,

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

As stated by (Gabcanova, 2012) nowadays the economic environment is changing constantly increasing by its dynamism and globalization nature, setting up a global competitive environment. So as to overcome the challenge of the global competitiveness and market developments, every organization need to develop market strategy and innovate new ideas and study the results to be ready and survive over the industry.

Lots of models are developed not only just to measure and compare to their target to see achievements, but also they need to give insights to senior managements to after other alternate options as additional plans and to give adequate solutions by providing relevant information to develop and enforce implements of new strategies to challenge and survive over the industry which need to help small and medium companies get benefit of their operation. (Kennerley, 2003) (Patrizia, G.; et al, 2005)

(Sinclair, 2010) states that by definition, a performance measurement could be a numerical or quantitative marker that appears well each objective is being met. However, performance measurement requires an extensive use of quantitative and qualitative data, with clear definitions and specific frequency for analysis, so the choice between them depends on the purpose of the measurement and, in many cases, the availability of the data (Alexei, 2010),

The measurement results play an important role in the management of organizational performance, by providing information on the effective and efficient way of how the organization manages its resources, and then two central questions are imposed: what to measure and how to measure.

The Board of Logistics Administration characterizes Logistics as takes after:

It and process that contains multiple activities like plan for efficient and effective movement, keeping of commodities, services and related information from the producer to the place required to achieve consumers demand and it also implement and control all the mentioned activities (professional, 2010)

There are two activates as a set inbound logistics or outbound logistics which makes logistics activity full. The process (activity which contains the sourcing, rushing up, and accepting of merchandise that is coming to the commerce organization is **Inbound logistics**, Inbound logistics

implies the exercises which are related to sourcing, obtaining, inserting away, and conveying the crude substances and components to the object or benefits office. It is a simple action, which facilities on buying and planning the inflow of resources, apparatuses, and ultimate merchandise, from vendors to the generation unit, distribution core or retail store. On the other hand, the process of warehousing, bundling, and transporting of merchandise, going out of the organization is **outbound logistics**. Outbound logistics, as the title proposes, is the receiving, keeping, and distribution of the final products and associated records streams, from the point of origin to the final point to consumption. (Surbhi, 2017)

Thus, based on this research field, the motivation of this paper is to investigate the effect of logistics performance on organizational performance in the context of Ethiopian airlines maintenance, repair and overhaul outbound logistics. Given the multidimensional nature of the performance component, it aims to identify the key elements which, in terms of the logistic activities, like the efficiency, effectiveness and differentiation, of Ethiopian airlines maintenance, repair and overhaul outbound logistics internal processes. For this purpose, the paper defines a research framework to analyze the effect of logistics performance on organizational performance.

1.2 Background of the organization

In Ethiopia the biggest airline is Ethiopian Airlines (Ethiopian) (ET) which is owned and governed by government. The head office and main hub for operation is found in Ethiopia, Addis Ababa Bole International Airport. Though the operation is started 8 April 1946 and , 21 December 1945 is the birth date of Ethiopian airlines. The operation expanded to international destination from 1951. (TEAM, 2019)

In 1959 Ethiopian airlines joined the International Air Transport Association and in 1968 African Airlines Association (AFRAA) as a member and in December 2011 Ethiopian airlines joined and become and member of star alliance. (TEAM, 2019)

With a great dedication and employee's commitment the airline become the leading airline in Africa and have achieved tremendous success every year earning great profit frequently, with this success it is the proud of Ethiopia as a flag carrier promoting the world. (TEAM, 2019)

This operation and success is started with the first five C-47 ACs, they were operating to Cairo via Asmara and become scraps of the World War II. By introducing new technologies of aviation products and aircraft operating systems, the airline has grown in high speed and with different steps through different difficulty times. (TEAM, 2019)

Ethiopian airlines is the leading and first airline in Africa introducing new and state of the art air machines (aircrafts), and related ground support equipment, below are some list of milestones by Ethiopian airlines in Africa;

- The beginners of jet service in Africa continent,
- The first operator to fly B767 on African air
- The first to own and operate B777-200LR in Africa by 2010 and
- The first African and second only to Japan B787 Dream liner in 2012.
- The first in Africa to acquire Airbus A350 XWB ,
- Ethiopian was the first African Airline to operate the latest Boeing 787-9 in 2017.

With the above milestones, the operation has continued with more than 121 of the young and most modern fleet, with less than five years of age, and has 52 aircrafts on order.

To keep the success and improve the achievements and a strategy called vision 2025 is being implemented which is perceived as it will keep the airline leading in Africa.

Having said the above, the airline was awarded as different success winners including: SKYTRAX Best Airline Staff Service in 2013 & 2016, 'Best Airline in Africa' in 2017, 2018 and 2019 and Four Star Airline Certification in 2017. In world economic statistics Ethiopian has is listed as an average growing airline of 25% per annum for the past seven years. (TEAM, 2019)

The airline has seven subgroups as per the below detail

- **MRO** (Maintenance and repair overhaul) Give aircraft maintenance service to internal and external
 - Internally serve to flight operation and cargo and logistics services by maintain and control aircrafts health and make ready for operation
 - Externally gives maintenance and total care support to other airlines as an income generating means

As a supporting section procurement and supply chain management is operating as a central place for general consumable and aircraft materials and tools. Coordinating with maintenance personnel identify required material and facilitate the part at the requested time and approved cost and Holds some stock item material and issue at the time of requirement

- **Procurement and supply chain management** as a supporting team have **strategic sourcing team** which sources and get in to long-term agreement with capable suppliers and

avail required document, planning team which check annual targets and plan different task coordinating with engineering, **procurement team** which received requirements and procure and avail parts and tools, **logistics team** coordinate inbound and our bound shipment for the company, **Materials management team** inspect, receive, store and making available on the time of requirement.

- **Catering services** provides in flight and ground catering service to passengers and employees and to do so they need input from own catering procurement and supply chain management section as planned and required, so by this support they fulfils their day today duty of supporting the flight.
- **Aviation academy** trains and provides required certified flight, commercial and ground service personals for every operation of the airlines requirements **Cargo and logistics service** Provides logistics and transportation service o customers as a major income generating operation and transports any company bulk and hazmat materials with available free space
 - So as to give the indicated service above need MROs' cargo freighter aircrafts maintenance and total care periodically
- **Flight operation** provides required service by operating provided aircrafts and serve the customers by delivering to their destination
- **Ground support services** get in touch with customers and provide required information by generating and serving customers on ground with different location like ticker office, airport operation, aircraft ground movement and support and bagging.
- **Ethiopian hotel service** provides hotel service to passage who needs hotel service on their transit on arrival. (TEAM, 2019)

1.3 Problem Statement

According to Bhagwat and Sharma (2009), it is well understood and observed that assessment of overall logistics performance is listed under the most challenges face by state-of-the-art companies. This problem contains the design, purchaser advantage, inventory management, and managing the flow of logistics, decrease cycle times, and geological scope collectively with adaptability.

As per FAA and ESAS regulation certified aircraft unit repair, calibration and modification facilities are limited throughout the world, as an operator Ethiopian airline send many units to these limited facilities multiple of thousand times and getting these units repaired on time within reasonable amount of time. In Aviation industry the competition it about the time more than the money it consumes, so as to be competitive in the market an airline should perform its operation on time.

Due to the geographical location of Ethiopia, aviation products suppliers, most procured parts and units sent for repair spend longer time than other airlines located in Europe and America. This is the biggest advantage of location, so as to fill these location and distance gap logistics play a great role in meeting supply and demand.

According to Ethiopian Airlines Maintenance repair and overhaul 2018-2019 performance report the aircraft Maintenance TAT (Turnaround time) was 88.00 % while the target to meet 100 %, from 12.00 % delay below are reason who takes the part on the delay in break down

- Ground time shortage 2.3 %
- Material shortage 8 %
 - **Materials under shipment while it was required 6.8 %**
 - Material lost in stores (difficult to find) 1.2 %
- Task card problem 0.5%
- System problem 0.8 %
- Engineering maintenance problem 0.4 %

Having the above break down materials under shipment while required takes the line share from the reason around 57% from the total delay, so solving this problem will help to improve the general maintenance performance at least from 88 % to 94.8 %.

Different studies conducted in Ethiopian airlines under procurement and supply chain management section, below are some but neither of them have covered on outbound logistics performance and it effect on organization performance.

In 2017 Mr. Melaku Mekonnen studied The supply chain management impact on maintenance in Ethiopian airlines, repair, and overhaul (MRO) services performance and under this paper he covered the relationship of the performance of Supply Chain Management to flight cancellations and flight delays, the effect of procurement as part of the supply chain on scheduled (C-checks and

A-checks) and non-scheduled plane maintenance, the role of Supply Chain Management in turnaround times (TAT) of components sent to Foreign Repair (FR) and investigated the success & failure area of Supply Chain Management in returning the plane back into service on time.

In 2018 Mrs. Etsegenet Teka have studied the impacts of packaging and dangerous goods do logistics in Ethiopian Airlines, on here study, related issues were also covered, important packaging in the logistics value chain, why special regulations are needed to transport dangerous goods, the main effects of dangerous goods handling on Logistics of organization

As per the researchers' preliminary observation, some data shows logistics takes the lion share of the long turnaround time of overall the time it takes. In addition, some shipments were to wrong addresses and to correct these there were some more costs incurred, some shipments were also delivered damaged under the shipment circle.

Having the above concept and observation in mind the paper has studied the current performance of Ethiopian airline logistics and its effect on organizational performance. After completion, this paper has given a scientific recommendation that will help the company to look into improving areas and give recommendations for logistics efficiency, effectiveness, and differentiation.

1.4 Research Objectives

1.4.1 General Objective

Taking the importance of logistics in every organization's operation the main goal of the study was to measure outbound logistics performance and examine its effect over organizational performance of maintenance repair and overhaul.

1.4.2 Specific objectives

In line with the above general objective the research has studied the below specific objectives

- To measure the performance of Ethiopian airlines MRO outbound logistics
- To examine the effect of outbound logistics over organizational performance of Ethiopian airlines MRO
- To Identify the major problem (challenges) in outbound logistics practices of Ethiopian airlines MRO

1.5 Research Questions

- What is the outbound logistics performance of Ethiopian airlines MRO?

- What is the effect of outbound logistics over organizational performance of Ethiopian airlines MRO?
- What are the major challenges of outbound logistics practices of Ethiopian airlines MRO?

1.6 Significance of the Study

Any successful business leader should acknowledge the crucial importance of effectively organized logistics. It is understandable that implementing seamless logistics is a key element in keeping pace with customer demands and outperforming competitors.

Conducting a study on outbound logistics is definitely demanding in Ethiopian airlines. This paper has provided insight to the management team to see where the problem of outbound logistic and have given a corrective action for improvement with scientific recommendation. Having this issue investigated is important to be a competitor on the market and be profitable.

1.7 Scope of the Study

Ethiopian logistic works for two customers, first and major work to coordinate inbound and outbound logistics of the company materials (COMAT) of internal customers support for Ethiopian MRO maintenance service and the second work is to coordinate shipment for revenue generation shipments in collaboration with Ethiopian cargo and logistics, which is very low in frequency and business impact for external customers. Under this thesis, the researcher focuses on the major activity of coordinate outbound logistics of the company materials (COMAT)of internal customers support for Ethiopian MRO maintenance service in which have very high in frequency and high business impact.

1.8 Limitation of the Study

Depending on the goal this paper has limited to outbound logistics and this measurement has shown Ethiopian airlines outbound logistics but not inbound and other logistics company's performance.

This paper has only shows the current performance of outbound logistics and its effect on organizational performance; it does not show the integration with other supply chain actors, as open issue other interested researchers could work on the inbound logistics and integration of Ethiopian airlines logistics with other supply chain actors.

1.9 Definition of Terms

Supply-Chain Management (SCM), as stated by Council of Supply Chain Management professionals, The activity of supply chain activities which covers product development, sourcing, production, and logistics, as well as the information systems needed to coordinate these activities (professionals, 2017)

Logistics management, Council of Supply Chain Management professionals defined logistics performance as the efficient and effective activity and management of forward and reverses flow and keeping of merchandises, services and related data between the place of source and the required place. (professionals, 2017)

Logistics performance is a subset of a larger organizational performance. (Chow, et al., 1994). (Fugate, et al., 2010) Confirmed, the concept and effect of logistics on overall performance, by highlighting that logistics performance positively impacts organizational performance.

Outbound logistics is defined by the Council of Supply Chain Management Professionals as "the process related to the movement and storage of products from the end of the production line to the end user.

Efficiency: - (Mentzer & Konrad, 1991) define efficiency as the proportion of the output with the input used to produce the result. Show the rate and extent of the inputs are well used.

Effectiveness: -The reviewed literature provided many scholarly discourses related to logistics effectiveness. Several of these articles incorporated efficiency measures as well (Griffis S.E. et al l, 2004)

Differentiation: Comparing results of logistics activities to competitor (Langley & Holcomb, 1992) Superiority when compared to competitors. (Griffis S.E. et al l, 2004)

Organizational performance: according to o Louise James, a Senior Manager at Pitcher Partners, Organization performance relates to how successfully an organized group of people with a particular purpose perform a function.

Organization of the Study

Beneath this consider, there are five chapters as per the taking after subtle elements. Chapter one has a Presentation, Articulation of the issue, Objective of the study, Scope, and limitations of the study. The writing checked on with the help of the analyst which has been utilized as a benchmark so as to drive a conclusion and being utilized as a system within the due course as instruction has been secured underneath chapter two. Chapter three comprises of the prevalent lookup technique

in component the lookup plan, approach, insights source, and sort, populace, and design estimate. Beneath Chapter four data decided beneath survey and meet has been organized by utilizing the arranged shape the utilization of SPSS and translated for that reason to the specified information to control conclusions and give proposals. Having applicable interpretations from the previous chapter conclusion and scientific tips has been given and settled under chapter five. Finally, the paper consists of references and an appendix as a reference.

CHAPTER TWO

RELATED LITERATURE REVIEW

Introduction

The literature review covers the conceptual framework in which containing the concept of logistics, inbound and outbound logistics, Performance Measurement, key performance indicators, and metrics of logistics. All sources are indicated containing books, websites, past article journals and previous thesis.

2.1 Theoretical review

2.1.1 Concept of logistics

It strives to satisfy customers requirement by administering the movement and keeping of merchandises, services and related data between the place of origin in efficient and effective way, for illustration, of clients or organizations. The property overseen in Logistics can contain bodily things, such as nourishment, materials, creatures, gear, and fluids, as properly as unique things, such as time, data, particles, and vitality. The Logistics of bodily matters more often than now not consists of the integration of records stream, cloth dealing with, generation, bundling, stock, transportation, warehousing, and commonly security. The difficulty of logistics can be displayed, examined, pictured, and improved through a keen activity program. The minimization to make use of assets may additionally be a frequent proposal in logistics for purport and ship out. (Li, 2014)

Logistics has been defined by chamber of logistics administration experts as the administration of positioning, realizing, and monitoring the expert, movement and capability of goods, administrations, and related statistics from the factor of foundation to point of utilization for the cause of in compliance to customer desires, this process includes the inbound, outbound, inside and outdoor development logistics.

2.1.2 Concept Inbound of logistics

As define by (Lerner, 2019) inbound logistics is the movement and management of incoming shipments of raw material, semi-finished goods to the organization. Inbound logistics arrange accommodates everything required to transport, store, and convey merchandise to your commerce

from different providers. Basically, inbound logistics refers to the whole lot that simply has to be carry into the operations to make the wrapped up item certainly offer. (Lerner, 2019)

Inbound logistics is very complex and imperative in each internal operation depending it nature of shipment and external situations which affects the movement and activity. To secure the operation success in logistics there are a few important points for inbound logistics that are critical for implementation focus. In case your commerce requests crude substances to create certain merchandise, you'll require an unfaltering supply of those substances to coordinate your generation yield. To improve the efficiency and profitability every company need to work and customize the inbound logistics to meet and satisfy customers' requirement via warehousing and other internal operation to secure the customer's order delivery. (Lerner, 2019)

As expected over the plan of logistics cascaded for the organization overall objective, it is required to optimize every operation on every inbound logistics activates of receiving packages from the suppliers, transporting to manufacturing facility, receiving them by confirming with requirement and delivered the shipment to the spot where require to convert to output. And while optimizing the inbound logistics operation, the main tactic is working with a third-party logistics (3PL) supplier. These partners are experts in optimizing, improving and expediting inbound and outbound shipments by applying the utmost experience they have developed and gained through different operation to help partners to deliver shipments into and out of the organizations to meet the customer and operational requirements. (Lerner, 2019)

2.1.3 Concept of Out Bound logistics

It is the shipment or movement of raw materials, semi-finished and finished products to the final consumer or customer ordered and it is the way which brings the output to their goal. However, the reverse is true some companies out sources the inbound logistics or out bound logistics as a third party to perform the shipment activity with a great efficiency and effectiveness of the shipment of raw material to the company required for production, some also works in delivering output to the final consumers and distribution center for final users. As core competency or good competitor companies are working in transferring the raw materials to final output and to and gat them in to sales centers or shop to increase the accessibility of the product by final customers. (Lerner, 2019)

As company to improve the overall relationship between the supplier and customer outbound logistics plays vital part. It has been defined under outbound logistics: “it is the movement and storage of final products required by users from the production area to the ultimate user’s location” (Matthew, et al., 2016). Scholars have reviewed and their studies definitely showed the relation between organization profitability and logistics performance and.

For example, (Stapleton, et al., 2002) by using the profit model strategy the above scholars has showed the effect of logistics over organization productivity and financial performance, In addition this theory has been supported by (Ojha & Gianiodis, 2013) by using survey that the logistics preparation has a great effect over organizational competency and competitiveness over the industry. (Tan & Matt, 2015)

2.1.4 Performance Measurement

As stated by (Andersson, et al., 1989) The key goal of logistics is general coordination of shipment. And this issue is supported by Porter (1990) saying nation’s competitiveness would be improved by encouraging innovation and with continuous upgrading operation systems. For continuous improvement performance measurement is very important and under this logistics performance is now a high priority (Griffis S.E. et al l, 2004). Unfortunately, the LP was very challenging and was very difficult to measure the performance of logistics and the solution was provided as a model of performance indicators provided by The Netherlands Association for Logistics management which were applied and successes in multiple companies. (Press, 1992)

Larson et al., (2007) discussed that the relation between organizational performance and logistic performance and found that logistic has a significant role over organizational performance, This confirmed that organizational performance has been impacted by the performance of logistics activities. As multiple scholars confirmed on their research that major managers responded that customer service and inventory levels and minimum cost has been attributed from improved logistics, which generalizes that improved logistics brings better customer service, inventory and cost.

It is important and is highly required for decision by management team making performance measures play an important (Griffis S.E. et al l, 2004) and are of particular value to logistics managers. Logistics managers have used and sees performance measurement as a pathway to sustainable advantage by providing timely, reliable indications of both performance successes and shortcomings. (Griffis S.E. et al l, 2004)

Performance measurement is highly supported by different researches under different areas including logistics performance measurement, and further more improved organizational performance has a positive relation with successful measurement of logistics activities and capabilities. (Fugate, et al., 2010)

2.1.5 Logistics Performance Assessment

The functional view is the first requirement to the general logistics system performance assessment. In different organizations, increased attention was given for improved methods for size of ultimate users' accommodation. A suggestion has been provided over long years from different scholars using modern research management that the activity of measuring the performance of over all activities of logistics has different classes like (1) cost, (2) customer service, (3) quality, (4) productivity, and (5) asset management. (Frazelle, 2002)

There is always accountability in every fall and success of the company and each section has their own part of accountability, logistics as a single point is also accountable for each success and fall economically and productivity performance which includes the quality, time, cost, value and productivity. For positive contribution over organizational productivity logistics has scoreboard to measure the suggest best way to operate on good form, this is because best operation helps for winning and to survive over the market and be profitable, not only logistics performance but also every business unit operation need to be assessed for accountability and improvement. (Frazelle, 2002)

Most of the companies measures their performance in different parameters like financial performance on every unit of the operation including the logistics financial performance, each units' productivity performance including the logistics the logistics productivity performance, quality performance and cycle time of the logistics performance, this help to observe the company current economic and industry position on the competition. (Frazelle, 2002)

2.1.6 Logistics performance measurements Financially

In improving corporate income and general brand of the products logistics have a great role in both positive and negative impact, it has also important role over generating income, creating great worthy value and capital consumption it also can control the expense. With the above concept the

logistics financial performance has a great part over company financial performance. (Frazelle, 2002)

Below it is defined well that the logistics financial measures and companywide financial measures (Frazelle, 2002) and It is also works under the logistics financial measure developed under commercial financial measurements

Expense of Logistics (LE)

Profit of Logistics ($LP - R - LE$)

Asset Value of Logistics (LAV)

Income on Logistics Assets ($ROLA - P/LAV$)

The percentage of general profit (P) to LAV gives the return on the logistics investment. This computation shows the difference between the income from the logistics investment and the return on overall corporate investment or the assets applied in the other areas of the business. (Frazelle, 2002)

Logistics Resources Turnover ($LAT - R/LAV$)

Logistics resource turnover calculated as the percentage of general income to the investment in logistics resources and which measures the overall usage of logistics resources and it is. (Frazelle, 2002)

2.1.7 Logistics Performance Measurements in Productivity

The major problem observed on logistics operation is scope and control over all management of the operation; elaborating, logistics managers are required to focus only operating with a direct over the shipment movement, the shipment and working time to spend, control the provided space over logistics, the way, direction and distance shipment travel but other important costs are being managed by non-logistics managers.

Other important resources/cost factors required by logistics are under control over other departments than logistics this resources are inventory carrying rates, occupancy cost, fuel costs, wage rates, and systems capitalization, the resource consumed under the logistics operation depends on the logistics requirement with the logistics administration and analysis (Frazelle, 2002) The resources used (implemented) over the operations like man hour, shipments facilities and inventory are the responsibility of logistics manager and control the effective implementation as

effective and efficient implementation of resources are important and the means for goals success and most importantly they are performance indicators of logistics performance.

The percentage of output to the input applied to produce the final product, this computation shows the efficiency of the resources: (Frazelle, 2002)

Percentage of productivity = Output resource / Input resource

So as companies to survive over the industry and to be profitable they have to be productive, the activities on production of the intended products are very complex and is very important to make every process in line with the production line, and managers of the production sections are required to get in control of the production, and as it is the repetitive activity of the production process the resources used as input as well matched the output required. It is very important to measure the ratio of the product with the input to see how productive the process is and see the efficiency. (Frazelle, 2002)

2.1.8 Logistic Performance Measurements in Quality

Quality is very difficult to measure, even though there are many measurement models/techniques are available which many managers have tried, because of its complexity and difference depending on the situation, customers behavior it has been figured out the in ever industry it is exposed that multiple companies have faced major difficulty of measuring quality of the product produced, (Frazelle, 2002) perfect order processing is greatest parameter shows the logistics accuracy and quality,

The relationship between the logistics activities and their effect can clearly be displayed and seed under this indicator, and also shows the keys for logistics quality (Frazelle, 2002)

Companies are keen in managing their inventory so as to reduce costs, improve the quality of service, enhance product availability and ultimately ensure customer satisfaction (M. & Gathenya, 2014)

Perfect Order Percentage (POP)

Due to the complexity and broadness of the logistics it is very difficult to defining the acceptable range of variance from the standard. Describing the exact standard containing inventory planning, transportation, and warehousing, customer service, manufacturing and procurement, are pieces of logistics, which defines the correct measurement, when there is a small difference or if the

performance is within acceptable range it is called accurate (accuracy is being accurate. (Frazelle, 2002)

(Matiwos, 2013) discussed each step of measurement of the perfect order percentage. The first step is to consider the final output to be delivered from every set of activities of logistics and the integration between the parties worked together is to fulfill requirements, and after the first assessment for improvement it should be perfect; if not, the search of the standard will not be success full to improve the activities of logistics in all steps.

According to (Donald, et al., 2002) by using and large mirrored in an organization's estimation of coordination quality, it is unwavering exceptional Implementation. The accuracy of work performance in such training routines is positioning section, distribution middle picking, and archive planning. Many of the unique measurements are defined to screen the competency of many activities, whereas others are placed on the through and massive coordination work. For example, selecting precision of 99.5 percentage suggests that 99.5 out of a hundred times, the proper item(s) have been picked inside the stockroom. (Frazelle, 2002)

Ordinary measures comprise fault reappearance, the reappearance computed using the total items damaged with the difference damaged devises and damage occurrence is computed at a few emphases inside the coordination handle, such as distribution center injury, loading damage, and transportation damage, it usually isn't always documented till customers acquire shipments or certainly in time after receipt. Then, many organizations furthermore show the range of consumer returns of damaged or inadequate product. (Frazelle, 2002)

For example, the information between the inventory and inventory status need to to be updated periodically while making inventory adjustment are required to fill the difference to provide correct information, for future action such kind of gaps need to be recorded for improvement. (Donald, et al., 2002)

2.1.9 Logistics performance measurement in Cycle time

As stated Edward in 2002, to get the total logistics all the following costs needed to be computed together warehouse order cycle time (WOCT), in transit time (ITT), order entry time (OET), purchase order cycle time (POCT), and order processing time (OPT)

The lead time given by the supplier to deliver the order is called purchase order cycle time. The lead time counts from the time order received by the supplier and will be finalized once the order

is delivered to the place required by the customer. If the required product is not available in consumer's distributors stock the purchase order cycle time will be included the TLCT. (Frazelle, 2002)

2.1.10 Key performance Indicators and metrics of Logistics

A logistics KPI or metric coordination KPI or metric can also be execution estimation it is utilized by means of coordination administrators to track, visualize and optimize all big calculated varieties in a productive way. Among others, these estimations allude to transportation, stockroom and provide chain perspectives. (Martin Blumenau, 2017)

Here is the complete list of the most important logistics KPIs and metrics that we will discuss in this article in every detail:

- Shipping Time: Spot potential issues in your order fulfillment process
- Order perfection: Monitor the degree of incidents
- Delivery Time: Track your average delivery time in detail
- Transportation Costs: Analyze all costs from the order placement to delivery
- Warehousing Costs: Optimize the expenses of your warehouse
- Number of Shipments: Understand how many orders are shipped
- Inventory Accuracy: Avoid problems because of inaccurate inventory
- Inventory Turnover: Track how many times your entire inventory is sold
- Inventory to Sales Ratio: Identify a potential overstock

1. Shipping Time

When all shipments are shipped on time of order (once required) it is called on time shipping, and it is computed using the percentage of orders shipped on time with the total order received.

All customers need to received their order on the time order is placed, supplier or sellers really need to improve to the most possible time to shorten the shipment time if the time between the buyer places an order to positioning and the time ready for pickup is long

Whether it is expired placing changes or disconnected implementation outlines, the dilemmas learned to be tended to unexpectedly reply unforeseen actions. (Martin Blumenau, 2017)

Performance Indicators

Managers can fix a goal for shipping time respect to each product to attain, orders are to be shipped after some time observing the general turnaround time of the shipment circles. (Martin Blumenau, 2017)

2. Order Perfection

Manages the extent of occurrences from the assignment to the delivery of an order

The Normal Transportation Costs calculates is a means of an enormous of the expenses secured in getting prepared an affiliation from the beginning to the conclusion. It'll ruin down all the costs related to this coordination KPI concurring to unmistakable categories: the orchestrate planning, the definitive, the stock carrying, the warehousing, and at last the genuine transportation costs. After calculating all these, you'll look at the expense each arrangement of the strategy speaks to and see in case it really expects or inside the benchmarks. You will be in a position, in addition, to calculate the transportation charges moderately to a protest and see how an entire parcel one component charges compared to how incredible bargain profit it brings you.

Performance Indicators

The order accuracy and perfection is a base for customer's loyalty for next time purchase and make permanent user, this affects the company profitability and competitiveness, and in other part inaccuracy results losing customers and bring loss to the company and becomes hard to survive the competition, so the higher the accuracy the better for the company. (Martin Blumenau, 2017)

3. Delivery Time

Track the time it needs for an order correctly prepared to arrive at destination

The Characteristic Time Movement is measured from the time the shipment is being prepare is set to be transported and the time it is took to the customer/post office. After benchmarking and having an idea of the normal conveyance time from your distribution core to anyplace, the intention would be to cut down it when manageable - advertising and advertising and marketing tremendous conveyance administrations for tournament - then again higher critically. Moreover, in the match that you'll be in a function actual the conveyance hours (between 13h and 15h rather of between 8h and 18h), it is clearly way better. (Martin Blumenau, 2017)

4. Transportation Costs

The Usual Transportation Costs computes by using and huge of the prices protected in making ready the preparation from the start to the end. This harms down all the expenditures related to this logistics KPI compatible to unique categories: the organize preparing, the authoritative, the

inventory carrying, the warehousing, and at remaining the actual transportation costs. After, You'll be able in addition to calculate the transportation fees slightly to an object and see how lots one thing expenses in contrast to how an awful lot profits it bring you.

Performance Indicators

With high quality, speed and damage free delivery and main objective is to reduction the transportation costs. (Martin Blumenau, 2017)

5. Warehousing Costs

Managing the costs related in the administration of companies' warehouse

The administration of places and period is called warehousing and the money associated with the movement of products into and outward from stores. These fees cowl hardware and energy costs like demanding, implanting away, and loading products, as well as greater human costs like labor, shipment, or conveyance. Measuring this is not a simple assignment, but once it is finished it's going to inspire the company through and huge management and include a piece.

Performance Indicators

To move the operation and access related advancements. It is commanding to extent and studies the costs on a standard premise. (Martin Blumenau, 2017)

6. Number of Shipments

Calculate how many orders are distributed to consumers

Shipments of final out puts are the show of the distribution shops. The income from sells will also be observed from the record from distribution shops, perfect record is very essential to get perfect information. Analyzing the patterns over time will give very good bits of thoughtful on flow times or flow periods (such as Christmas time), and allow you to suppose and distribute more assets suitably. (Martin Blumenau, 2017)

7. Inventory Accuracy

Stock control is one of the logistics activity measurements that helps to improve or destroy the company cash and non-cash operation and store. In fact, having a accurate record of all your products in your database that does not coordinate the actual physical stock can hurt your commerce impressively. A well-known inventory checking the current disparities along with your digital inventory file ensures that bookkeeping hones are in organize which your commerce is reliable, dodging apparition stock horrific dreams. This percentage will too aid you spot issues associated to getting, shipping, or bookkeeping.

Performance Indicators

On a more reasonable level, it is additionally ordinary to have a few incongruities between the record and the distribution center, but the thought is to preserve that proportion over 92% as much as conceivable. (Martin Blumenau, 2017)

2.2 Empirical Review

Logistics is one of major activity that has impacts on firms' performance. Actually, it deals with a number of sub activities. Inventory control, warehousing and handling are some of them. All logistics activity has an impact on cost, time, and flexibility. Properly explored logistics capacity help organization to save significant operational cost (Mukherjee, et al., 2012)

In other words, LP does not only help firms but could also identify their performance as a benchmark study for the industries or national level to remain competitive in short and long-term periods (Mohd & Harlina, 2015)

Logistic performance is affected by both external and internal factors. The external factors include lack of adequate infrastructure. It mainly covers such as below average roads and buildings, and bureaucracy. In addition, the following external factors identified to have negative influence on logistics performance and growth of firms. The main external factors mentioned are lack of support from financial institutions especially for small and medium-sized firms; marketing problems; inadequate road networks and poor road conditions; high and fluctuating fuel costs; high costs and irregular supplies of electricity and water; poor or lacking communication networks. (Girma & Mpagalile, 2015)

On the other hand, internal factors that affect logistics performance are found lack of logistics personnel, old equipment, outdated and poor buildings, poor plant sites and layout that causing inefficiencies in operations, old and inadequate vehicles, and lack of storage space. Furthermore, the degree firms affected in the problems depended on the scale of their operations. As a result, small firms are more affected than medium and large firms. In line with this, large firms are found in a better infrastructure, good facilities, better weighing facilities, equipment for quality control systems, good vehicles, storage facilities, and better capacity and experience of logistics management. Internal infrastructure found unsatisfactory for small firms but good for large firms. The overall efficiency of firms depended on the effective performance of their logistics systems and management. It was also found that logistics performance is less satisfactory in small firms. Most firm' managers and personnel who are in charge of logistics activities do not understand the

success of the firm depends not only on the acquisition of those commodities and equipment but also on the effectiveness and efficiency of logistics systems and management. In general, most firms are suffered lacked of good understanding of logistics systems and management. The growth of firms' hindered lack of appropriate facilities and infrastructure for logistics. Sometimes supply delay due to lack of raw materials and communication barriers causes for customer dissatisfaction. Other activities of logistics like inventory control, order management done manually, inefficiency in quality control, packaging, labeling, traceability, utilization information technology, and acquisition and use of storage (facilities) found to affect logistics performance (Girma & Mpagalile, 2015)

Logistics performance is multi-dimensional and is defined as the degree of efficiency, effectiveness, and differentiation associated with the accomplishment of logistics activities (Bobbitt & Michelle, 2004).

The minimization of the ratio of resources use against result outcome (efficiency), get done predefined objective (effectiveness), competitive edge gains against (differentiation) plus the skill to meet up with the satisfaction of the customer is the actual concept behind functions of logistics (Fugate, et al., 2010). All this proves that logistics functions or a dimension does put an impact on the performance of the overall logistics.

A study done by (Nge, et al., 2016) concluded that logistics activities, factors of logistics activities and critical factors affecting those logistics activities are important element for business performance. Focusing on the enhancement of logistics capabilities is associated with superior firm performance. (Olavarrieta & Ellinger, 1997)

A study done by (Muslimin & Ardiansyah, 2015) shows that logistics operation has a significant impact on financial performance. According to them logistics cost and service qualities have positive impact on financial performance. According to the study conducted by (Tilokavichai, et al., 2012) about Analysis of Linkages between Logistics Information Systems and Logistics Performance Management under Uncertainty companies can achieve more efficient and higher performance if they systematically plan their logistics management strategy. In their study of logistics in the hospital: methodology for measuring performance, (Serrou & Abouabdellah, 2016) have shown the importance of logistics costs in health institutions, as well as performance analysis via the cost, safety and quality.

From the research conducted by (Tabeni, 2006) about the impact of inbound logistics activities on the operational performance of the postal services organization in South Africa, It has been revealed that there exists significant relationship between inbound logistics activities and the operational performance of the business. According to this study, it has been supported that inbound logistics activities and revenue generation are positively correlated. The research concluded that whatever improvement is done in respect of inbound logistics will help to enhance business performance in terms of increased revenue generated in a very cost effective way.

(Kuswanto & Rosli, 2012) in their study Logistics Efficiency and Firm Performance: Evidence from Indonesian Small and Medium Enterprises, showed the significant impact of logistics innovations in information sharing and transportation coordination on firm performance is sufficient to explain the variation in performance. In addition, the finding of this study showed that the application of information technology, such as the internet enables firms to improve their market knowledge and relationship with clients and suppliers within the same value chain. This would improve logistics efficiency in terms of costs and delivery time and finally the performance. In addition, innovative transportation coordination was found to improve logistics efficiency, which directly influenced performance.

2.2.1 Logistics Efficiency and its relation with organizational Performance

(Fugate, et al., 2010) described logistics efficiency, it discusses and measures the capability of logistics internal process that how the internal functioning to control and implement the internal resources wisely and overall it is observed best represented through some percentage of the normal level of inputs to the actual percent of outputs. Logistics has predominantly been viewed as a cost center, and the focus has been on how to reduce costs associated with the activities of inventory management, warehousing, transportation, materials handling, and order processing (Mentzer, et al., 2004)

The efficiency and effectiveness of the logistics operation has a considerable influence not only on the business performance of manufacturers but also on the customer's perception of the quality of the products and services provided by the plant. Effective logistics management can provide major source of competitive advantage to a company by ensuring that it is able to continually respond faster, more efficiently than competitors to its customers' requirement on a global basis (Adebambo & Toyin, 2011)

2.2.2 Logistics Effectiveness and its relation with organizational Performance

As discussed by (Mentzer & Konrad, 1991) about logistics effectiveness, it measures how much the accomplished objectives of the logistics function. Changes in the underlying logistics effectiveness are hypothesized to cause variation in logistics performance. (Fugate, et al., 2010) Logistics performance may be defined as the extent to which goals such as suggested in this study and that are: cost efficiency, sales growth, keeping promises, profitability, job security and working conditions, low loss and damage, social responsibility, fair prices for input, customer satisfaction, product availability, on-time delivery, and flexibility. (Garland, et al., 1994)

Effective logistics management in the enterprise is based largely on the flow of information, that should occur as smoothly and quickly as possible, so as to provide managers with comprehensive knowledge. (Grunt & Nowakowska, 2006) The application of computers, internet and information communication systems can be seen in virtually all activity in the logistics industry, such as transportation, warehousing, order processing, materials management, and procurement. It can help companies to achieve competitive advantages by providing customers with superior services (Adebambo & Toyin, 2011)

2.2.3 Logistics Differentiation and its relationship with organizational Performance

Beyond efficiency and effectiveness, logistics activities must also provide the best comparative net value to customers in order to compete in today's comparative marketplace. Because of the centrality of logistics to customer value creation (Lambert, et al., 2005), the performance of logistics activities must be perceived as differentially superior to competitors in the same market segments (Williamson, et al., 1990). In the calculation of the effectiveness and efficiency, the purpose of the performance of the logistics in today market must provide (VAS) value added service to customers to differentiate companies or company (Fugate, et al., 2010). As stated by (Bobbitt & Michelle, 2004) in any industry and company competitions it is considered that logistics is listed as one tool that can differentiate a company from competitors.

It is extremely significant to observe and know competitors' logistics understanding and pattern while working to differentiate logistics in logistics performance (Fugate, et al., 2010)

Table 2.1 Logistics dimensions and parameters

	Dimensions	Parameters of each dimensions
1	Efficiency	➤ Percent of orders shipped to customers from the primary locations designated to service those customers ➤ Line of fill rate (percentage of orders items the picking operations actually found) ➤ Percent of order shipped on time ➤ Percent of shipment requiring expediting ➤ Inventory turns per year ➤ Average order cycle time (time in days between order receipt and order delivery).
2	Effectiveness	➤ Warehousing cost ➤ Transportation cost ➤ Total logistics cost
3	Differentiation	➤ Damage free deliveries ➤ Forecasting accuracy ➤ Time between order receipt and delivery ➤ Time on back orders ➤ On-time-delivery
		<i>Adopted from</i> (Fugate, Mentzer, & Stank, 2010)

2.3 Conceptual Framework

There are three types of approaches for analysis of logistics performance and its impact on competitiveness and business performance (Rui, 2014). In line of this work, The (Fugate, et al., 2010) approach, considering a number of large companies; the Aramyan et al. (2007) approach, developed for agro-industrial products and the Töyli et al. (2008) approach with a set of Finnish Small and Medium Enterprises.

According to these authors, efficiency as the proportion of the output with the input used to operate the logistics which show the rate and extent of the resource are well used, effectiveness can be defined as the degree to which aims are done and differentiation is assumed as the significance that can be made by the features of customer service in relation to opponents.

Based on the overall review of related literatures showing the standard measuring parameters of the logistics performance, depending on the industry of Case Study Company and the problem statement of the research, the following conceptual framework is adopted.

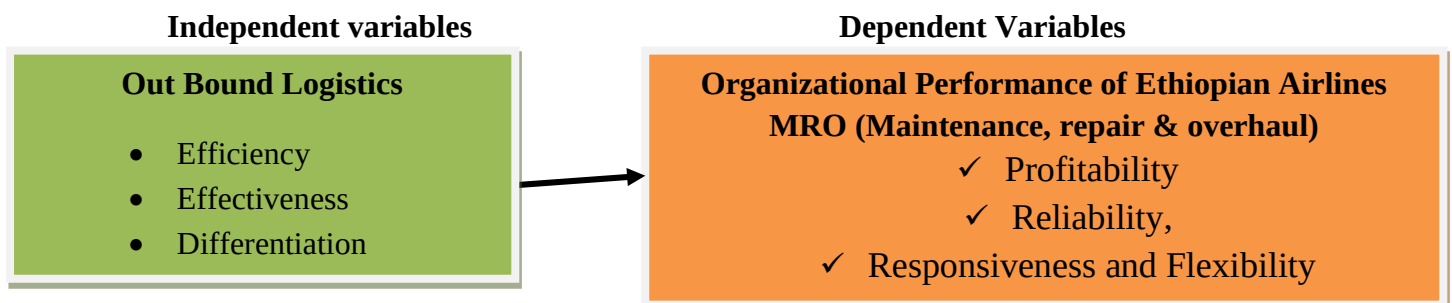


Figure 2.1 – Fugate Logistic Performance Model

Source: (Fugate, et al., 2010)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Approach and Method

3.1.1 Research Approach

Having both quantitative and qualitative data in consideration and involvement, the approach need to apply for this research is mixed methods; it involved scientific expectations and academic outlines while integrating two types of information. This approach helps to observe a complete knowledge of the problem and provide clear recommendation by coordinate and associate qualitative and quantitative.

Stating the above and taking the aim to assess the performance of outbound logistics in Ethiopian airlines and its effect on organizational performance. Even though the qualitative orientation is main, the researcher selected mixed research as an approach and quantitative analysis has also contributed to produce a more in-depth understanding of logistics in the airline industry.

3.1.2 Research Design

Looking into the requisite of the objective of the study, the researcher selected mixed method to apply for this study descriptive and exploratory type. So as to define data and characteristics about the population or phenomenon being studied, descriptive research design was used in the form of table and frequency statistics and an exploratory research design has been applied in this study (multivariate regression and correlation) was used to examine the effect of outbound logistics the performances of Ethiopian airline MRO. Under this stage, the study has fulfilled the objectives of mixed methods research by getting an in-depth knowledge of logistic performance and current outbound logistics practices within Ethiopian airline and investigating the parameters which need work to improve the performance of Ethiopian airlines MRO logistics.

3.2 Population and Sampling

Ethiopian airlines MRO logistics gives internal service to ship abroad company materials either for maintenance or exchange, procurement teams are the major users of logistics service. To get the best data and result the researcher focused on procurement and logistics department's total of 120 employees as per the below detail

- Logistics department has a total of 30 (21 from inbound and 9 from outbound logistics department) under these employees, questionnaires were distributed physically and after

the corona outbreak the questionnaire was sent via email again and 26 employees have replied the hard copy.

- There are five major purchasing departments who directly work with the logistics department these are engine parts purchase, general purchase, tactical purchase line, and component and tactical purchase base maintenance (the activities and relation with logistics of these sections are similar they are differentiated by their focus of service).
- According to Ethiopian airlines human resource documents it shows that there are a total of 90 purchasers from all purchasing section (Catering purchase (18) , Engine parts purchase (12), General purchase, Tactical purchase line and component (31) and Tactical Purchase Base maintenance(29)) from these group questionnaire was distributed physically and after the corona outbreak the questionnaire was sent via email again and 55 employees have replied the hardcopy and 0 employees have replied over email.

3.3 Sample Design

It is recommended to take all populations as part of the survey if the total population is small, economically attainable, want to eliminate sampling error and standard deviation and when we want accurate information from many subdivisions of the population. Having the previous advantages, the researcher took all populations as a sample and assuming to have reliable information and have applied the census method to collect data from all focus areas.

3.4 Data Sources and Types

The researcher has collected primary data using a questionnaire and interview, 2018/19 year Ethiopian airlines maintenance, repair, and overhaul performance year to date report we also used as a secondary data.

3.4.1 Primary data

Making this study's goal in a plan, the necessary primary data was collected through interviewing a focal person who is the immediate team leader of outbound logistics and two from procurement team leaders about the internal process and questionnaires were distributed to the whole members of the logistics team focusing on the general KPIs of the logistics performance from their point of view and questionnaires was also distributed to purchasing department who mainly uses the logistics service to measure the real performance.

3.4.2 Secondary data

Secondary data were collected from the organization procedure and target performance of the logistics process which helped to compare and came to decision regarding the internal process the performance.

3.5 Data Collection Procedures

So as to collect the relevant data from the target population the researcher has distributed research questionnaires in person using the hard copy to get quantitative data and after COVID-19 outbreak the questioners were also distributed to sample employees via email. The questionnaires focus on key performance indicators for logistics and its impact over organizational performance which has helped the researcher to come to a conclusion and drive recommendations.

So as to get reliable information about the internal process the researcher has also conducted open-ended question to get qualitative data which is good to get multiple information, the data received from the interview were screened and been used as required to meet the objective of the research.

3.5.1 Pilot Test of Research Instruments

According to (Hassan, et al., 2006), a pilot study is one of the important stages in a research project and is conducted to identify potential problem areas and deficiencies in the research instruments prior to implementation during the full study. Generally, 10–20% of the main sample size is a reasonable number for conducting a pilot study. (Hazzi & Maldaon, 2015)

A pilot study was conducted to ensure that the measurement instrument (questionnaire) was comprehensible and appropriate, to know that the questions were well defined, clearly understood and presented in a consistent way. A pilot test was undertaken prior to the main study by selecting 12 respondents (10% from the target population) and issuing them a questionnaire. The selected respondents for pilot test asked whether the study instrument(s), is asking the intended questions, whether the format is understandable and whether the selected tool is for the target population. The feedback from the pilot test helped in deleting and adjusting some of the items in the measuring instruments.

3.5.2 Data Analysis

The collected data was screened, organized, classified, coded, and encoded into a computer. The information collected from questionnaires was tallied and tabulated. Then, it was analyzed using SPSS software to calculate percentages and to produce tables and bar graphs. The qualitative data

gathered using the interview was interpreted and presented in a narrative form. After analyzing the data, the findings were summarizing and then the proper conclusion has been drawn with possible recommendations.

3.5.3 Validity and Reliability

As stated by (Kothari, 2004) the value which show the questionnaire or interview measures is validity which also shows what the instruments supposed to measure, as said by (Yin, 2003) it is to reduce the mistakes and favoritisms when we apply reliability. The internal uniformity and dependability of outbound logistics performance measurement was measured with Cronbach's Alpha and the dependability standards for all concepts was definite below

Table 3.1 Reliability Statistics

Construct	Variables	Cronbach's Alpha	N of Items
Logistics performance	Efficiency	.704	6
	Effectiveness	.850	3
	Differentiation	.81	4
Organizational Performance		.772	4

Source: SPSS output of survey, 2020

As per the above reliability summary table the Cronbach 's alpha for logistics performance with the following variables have a value of Efficiency 0.704, Effectiveness 0.850 and Differentiation 0.81, the requests under organizational performance have 0.772 value which shows all are ideal as all of them are above 0.7. According to (Gliem & Gliem, 2003) the following rule of thumb of alpha if " $\alpha < 0.5$ – Unacceptable, $\alpha > 0.5$ – Poor, $\alpha > 0.6$ – Questionable > 0.7 – Acceptable, $\alpha > 0.8$ – Good and $\alpha > 0.9$ – Excellent,". Accordingly, our data is more than acceptable and good.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

In this chapter, the collected data from the qualitative and quantitative were screened, presented, analyzed, described and interpreted in a systematic way as the next step of the research process.

The primary data were gathered using questionnaire from employees and interview from team leaders. In all, from the total sample size of 120 employees 96 questionnaires were collected as 29 employees were out of office for long time due to the current pandemic COVID-19 from 96 questionnaires 5 were screened out as they were found incomplete and was not correctly filled, the response rate was 76.66 percent. The collected data were presented and analyzed by using SPSS version 20 statistical software.

There are five scales ranging from five to one in the questionnaire: where, 1 represents poor, 2 below average, 3 Neutral, 4 better, and 5 much better. In order to assess the relationship and to measure the degree of association between Logistics activities and organizational performance, the study used correlation analysis, specifically the Pearson correlation.

4.2 Respondents demographic information

Table 4.1 Demographic information of the respondents

Demographic information of the respondents			
		Frequency	Percent
Gender	Male	73	80.2
	Female	18	19.8
	Total	91	100.0
		Frequency	Percent
Job position	Assistant	9	9.9
	Officer	72	79.1
	Team leader	6	6.6
	Manger	4	4.4
	Total	91	100.0
		Frequency	Percent
Age range	24 & below	5	5.5
	25 – 34	81	89.0
	35 – 44	3	3.3

	45 – 54	2	2.2
	Total	91	100.0
		Frequency	Percent
Level of education	Bachelor Degree	82	90.1
	Master's Degree	9	9.9
	Total	91	100.0
		Frequency	Percent
Work experience	Less than 5 years	14	15.4
	5 up to 7 Years	69	75.8
	More than 10 years	8	8.8
	Total	91	100.0

Source: SPSS output of survey, 2020

The result from the above table shows that the majorities 80.2% (73) of the respondents are male and 19.8% (18) of the respondents are female so this means the majority of the employees under the logistics and procurement section are male.

Regarding the job position result shows that majority 79.1 % (72) of the respondents are Officers followed by an assistant position taking a total share of 9.9 % (9) respondents, team leader position takes 6.6% (6) and Manager position takes 4.4 % (4) from the total response gained, this shows that the respondent's sections are majorly covered by Officer position.

Under the age group, majority 89% (81) of the respondents are within the age group of 25-34, 5.5 % (5) respondents are within the age group 24 & below, age range between 35-44 takes 3.3% (3) share of the total respondents, followed by 2% (2.2) respondents are aged between 45-54, so this shows that both sections are filled with most actively working age group that can cop up with the current change of system and world economy.

4.2.1 Work experience and Education Level

The study requires knowing the various work units that the respondents belong to ascertain whether they had relevant knowledge in their area of specialization. The above tables table 4.1. Shows the responses result which were analyzed.

As shown from the above table 4.1, majority 90.1% (82) of the responds have bachelor degree followed by 9.9% that 9 respondents hold master's degree that this shows all respondents are at least the at the level of understanding of the questionnaire with the standard specialized knowledge. Under experience level 75.8% (69) of respondents have worked 5 up to 7 Years followed by 15.4% of the respondents have worked less than 5 years and 8.8% (8) of respondents have more than 10 years of experience as shown on the above table 4.5

Generally reviewing the above data, majority of the respondents are in active working age with good level of understanding having BA degree and above working more than 5 years, which shows that the respondents are well aware of their work and the response they give is most likely reliable.

4.3 Outbound logistics Efficiency performance

(Fugate, et al., 2010) defined logistics efficiency as the capability of the internal operation of logistics functions using inputs and related logistics raw material wisely.

Mean and Standard deviation for outbound logistics efficiency performance parameters

Table 4.2 Efficiency of logistics performance parameters Statistics

		Per hundred of shipments to consumer from the principal locations chosen to facility those clients	Line of fill rate (percentage of orders the picking operations actually found)	On time shipment	Percent of shipment requiring expediting	Reverse shipment turns per year	Shipment time (time in days between order receipt and order delivery)
N	Valid	91	91	91	91	91	91

	Missing	0	0	0	0	0	0
Mean		1.89	1.79	1.19	1.16	4.09	1.99
Std. Deviation		.348	.460	.419	.402	.285	.182

Source: SPSS output of survey, 2020

Among the list of parameters under logistics effectiveness, that Percent of shipment requiring expediting and percent of orders shipments on time has the poor performance having Mean 1.16 & 1.19 falling on 0.402 & 0.419 SD respectively, which shows that the deviation is low having more sustainable feedbacks from respondents.

The following three efficiency parameters have below average performance having Line of fill rate (percentage of order items the picking operations actually found) Mean 1.73 with 0.460 SD, Per hundred of shipments to consumer from the principal locations chosen to facility those clients with Mean 1.89 and 0.348 SD and Shipment time (time in days between order receipt and order delivery) with the Mean 1.99 with SD 0.182 respectively.

Percent of shipment requiring expediting have better performance having 4.09 Mean and 0.285 SD.

The above finding contradict with the study made by (Adebambo & Toyin, 2011) as it states that The efficiency and effectiveness of the logistics operation has a considerable influence not only on the business performance of manufacturers but also on the customer's perception of the quality of the products and services provided by the plant. Effective logistics management can provide major source of competitive advantage to a company by ensuring that it is able to continually respond faster, more efficiently than competitors to its customers' requirement on a global basis.

4.4 Outbound logistics Effectiveness performance

As discussed by (Mentzer & Konrad, 1991). Logistics effectiveness measures how much the goals from logistics functions are accomplished.

Table 4.5 Outbound logistics efficiency performance parameters Statistics

		Warehousing cost	Transportation cost	Total logistics cost
N	Valid	91	91	91
	Missing	0	0	0

Mean	2.01	1.98	2.00
Std. Deviation	.483	.537	.558

Source: SPSS output of survey, 2020

Among the list of parameters under logistics effectiveness, all three parameters the transportation cost, Total logistics cost and warehousing cost fall in high value having mean 1.98, 2.00, 2.01 with SD 0.537, 0.483 & 0.558 respectively which shows that the deviation is low having more sustainable feedbacks from respondents, concluding the effectiveness performance of outbound logistics is high.

The finding about outbound logistics Effectiveness performance (table 4.12) disagrees with the literature review that was presented in the second chapter of the study. According to (Grunt & Nowakowska, 2006) Effective logistics management in the enterprise is based largely on the flow of information, that should occur as smoothly and quickly as possible, so as to provide managers with comprehensive knowledge. The application of computers, internet and information communication systems can be seen in virtually all activity in the logistics industry, such as transportation, warehousing, order processing, materials management, and procurement. It can help companies to achieve competitive advantages by providing customers with superior services. (Adebambo & Toyin, 2011)

4.5 Outbound Logistics Differentiation Performance

Beyond efficiency and effectiveness, logistics activities must also provide the best comparative net value to customers in order to compete in today's comparative marketplace (Stahl and Bounds 1991).

Table 4.10 Outbound Logistics Differentiation performance parameters Statistics

	Please rate Outbound Logistics unit's performance compared to targeted performance based on previous fiscal year Damage free deliveries	Please rate Outbound Logistics unit's performance compared to targeted performance based on previous fiscal year Forecasting accuracy	Please rate Outbound Logistics unit's performance compared to targeted performance based on previous fiscal year Time between order receipt and delivery	Please rate Outbound Logistics unit's performance compared to targeted performance based on previous fiscal year Time on back orders
N	Valid 91	91	91	91
	Missing 0	0	0	0
Mean	1.93	1.82	1.80	1.85
Std. Deviation	.416	.485	.427	.556

Source: SPSS output of survey, 2020

According to this study the current performance of logistics compared to the performance based on previous fiscal year in all dimensions of damage free deliveries, Forecasting accuracy, Time between order receipt and delivery & Time on back orders is poor as all parameters have a mean value of 1.93, 1.82, 1.8 & 1.85 respectively, with the standard deviation less than one under all parameters which shows that the observed data are relatively consistent.

The above finding is contradicted with the study conducted by (Stahl and Bounds 1991) logistics activities must also provide the best comparative net value to customers in order to compete in today's comparative marketplace, and the performance of logistics activities must be perceived as differentially superior to competitors in the same market segments.

4.6 Outbound Logistics performance position

Having the above analysis of three parameters in which logistics performance is being measured the researcher have the below summarized analysis of the current logistics performance.

Under efficiency parameter the total dimension has fallen under poor performance which shows the current outbound logistics efficiency performance is poor. The effectiveness performance of outbound logistics has poor performance and the differentiation parameter has also poor performance

Generally, standing from all three parameters output, the analysis shows that the current performance of Ethiopian airlines out bound logistics has poor performance.

4.7 Outbound logistics business unit's actual performance and its impact on organizational performance

Table 4.15 Outbound logistics unit's actual performance and its impact on organizational profitability, Reliability, Responsiveness and Flexibility performances

	Please rate the impact of logistics business unit's actual performance on organizational performances Profitability	Please rate the impact of logistics business unit's actual performance on organizational performances Reliability	Please rate the impact of logistics business unit's actual performance on organizational performances Responsiveness	Please rate the impact of logistics business unit's actual performance on organizational performances Flexibility
Valid	91	91	91	91
Missing	0	0	0	0
Mean	4.21	4.19	4.16	4.15
Std. Deviation	.782	.773	.793	.815

Source: SPSS output of survey, 2020

According to the above summary we can conclude that the logistics business unit's actual performance has a great extent on Profitability, Reliability, Responsiveness & Flexibility of organizational performance as all parameters have a mean value of 4.21, 4.19, 4.16 & 4.15 respectively with sustainable data of standard deviation of 0.782,0.773, 0.793 and 0.815 which is less than 1.

The findings from the above table disagree with the study of (M. & Gathenya, 2014) who concluded that logistics activities, factors of logistics activities and critical factors affecting those logistics activities are important element for business performance. The study done by (Olavarrieta & Ellinger, 1997), concluded that Focusing on the enhancement of logistics capabilities is associated with superior firm performance.

4.8 Correlation analysis

The relationship among the variables was examined using the correlation analysis the correlation table from the SPSS is attached as Appendix 2. The strength and direction of linear association between two variables is being measured by correlation coefficient. It ranges from -1 to +1. The closer value to 1 the stronger the relationship. A correlation of zero indicates that there is no linear relationship between the variables (Callaghan, 1996) .the independent variable outbound logistics is significantly correlated with dependent variable organizational performance of Ethiopian MRO. The results indicated that there is a positive and significant correlation between logistics efficiency and organizational performance ($r=0.67, p<0.01, r=0.29, p<0.01, r=0.29, p<0.01, r=0.51, p<0.01, r=0.28, p<0.01, r=0.40, p<0.01$). According to Evans (1996) magnitude of correlation, the relationship between the two variables is strong. In addition, the result indicated that logistics effectiveness practice is positively and significantly correlated with organizational performance ($r=0.28, p<0.01, r=0.40, p<0.01, r=0.26, p<0.01$). Consequently, the relationship between the two variables is strong. Further, the result indicated that logistics differentiation practice has less strong relationship with organizational performance which is positive and significant at ($r=0.26, p<0.01$). Generally, the correlation analysis showed that there is a positive and statistically significant relationship between outbound logistics practices and organizational performance of Ethiopian airlines maintenance repair overhaul outbound logistics. These findings are consistent with the findings of (Tabeni, 2006) who conclude that whatever improvement is done in respect of inbound logistics will help to enhance business performance in terms of increased revenue generated in a very cost effective way.

4.9 Outbound Logistics' effect on over organizational performance

Four indicators have been identified and studied under this paper to see the effect of outbound logistics over organizational performance. The above analysis shows that logistics performance has positive and significant effect over organizational Profitability, Reliability, Responsiveness and Flexibility performance.

4.10 Interview Analysis and Interpretation

Interview has been conducted with three team leaders and analyzed and interpreted as follows.

For the general question of how do they evaluate the outbound logistics performance of Ethiopian logistics. Respondents said that the outbound logistics performance of Ethiopian logistics is not good as expected and required; they have also mentioned the industry practice as a benchmark of other airlines shipment standards like turnaround time, cost, and connections on flight schedule of shipments.

For the second question broadcast, respondents said that the performance measurement has always been made for the team and each individual, but the survey has only been used to measure the individual score card but not to improve the general team performance.

Regarding the pricing the team leader from outbound logistics has explained the calculation is being made, the discussion shows that the practical calculation is not adequate as same formula is being applied for all type of shipment with different destinations.

From two perspectives, different problems have been raised from direct user procurement team and from logistics team. Screening all, the below commonly accepted problems are identified, which found to be a major reason for poor performance.

- Air craft loading space from Addis Ababa Airport to other destinations, it is only allowed when shipments are very critical and ordered by higher management but other routine shipment to be shipped are being load if there is open space available only.
- Shortage of Expert logistics officers in outbound logistics, referring the number of frequency of shipments the human capital is very short referring the performance expected to conduct. Current officers are working overloaded which affects the quality and efficiency of shipments.

- No/Low developed packing material and knowledge, no certified packing personnel available which is a reason for delay on shipments and delivery of damaged shipments because of inappropriate packages
- Implementing old logistics coordination model, respondents has raised this point being on the same side, on 21st century companies need to work on collaboration with each supply chain players but Ethiopian airlines outbound logistics has no such practice and search forwarder and

To eliminate the above and related problems recommendations have been given over different method like over meeting and annual discussions but there was no tangible change to overcome and be competitor on the market.

Having the opportunity and the platform, the organization has a great capacity to be a competitor on the market and even could be a means to generate income. Respondents have suggested improving multiple demotions of logistics parameters of efficiency effectiveness and differentiation would make the logistics to improve its performance and help to improve Ethiopian airlines maintenance, repair and overhaul.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This research was carried out to see the effect of outbound logistics over organizational performance in case of Ethiopian MRO and this chapter presents the summary of findings, conclusion driven from the study, recommendations depending on the literature and finally the limitation of the study and project further studies.

5.2 Summary of research findings

➤ While measuring the performance of Ethiopian airlines MRO outbound logistics

The overall goal of this thesis was to assess the performance of the outbound logistics and its effect over organizational performance and provide scientific recommendation for the better improvement and achievement of possible targets. Accordingly, the specific objectives were to assess the current performance of Ethiopian airlines outbound logistics, to examine the effect of outbound logistics over organizational performance and to identify the major problem in outbound logistics practice.

On the process of conducting the study questionnaire and interview were selected with census sampling technique as the population size is not too much and to get reliable information as the sample size increase the better the reliability, also same is economically attainable.

From distributed 120 questionnaires 96 were collected and from these 5 questionnaires screened out as they were received incomplete and partial, 91 responses were used to analyze the data which shows the response rate of 76.6 %. From the frequency table majority 82% of respondents were male and 79.1% of respondents are officers and regarding the age of respondents 89% of respondents were within the age group of 25-34, concerning level of education and experience 90.1% of respondents were bachelor degree holder and 75.8% of respondents have worked 5 up to 7 Years. Generally reviewing the above data, majority of the respondents appears in active working age with good level of understanding having BA degree and above working more than 5 years, which shows that the respondents are well aware of their work and the response they give is most likely reliable.

The logistics performance has been measure in three interdependent independent variables with in Efficiency, Effectiveness and Differentiation.

Under efficiency category, respondents have responded that the Percent On time shipment and Percent of shipment requiring expediting are performing very poor than expected. Accordingly, three of the parameters (Per hundred of shipments to consumer from the principal locations chosen to facility those clients, Line of fill rate (percentage of orders items the picking operations actually found) and Shipment time (time in days between order receipt and order delivery)) found performing poor unfortunately the Reverse shipment turns per year are performing very good. Generally Ethiopian airlines outbound logistics is performing poor in efficiency parameter.

In Effectiveness performance of logistics parameter, the cost was considered, having the statistics frequency table the current logistics effectiveness performance has been found very high having the Warehousing cost 76.9% responded it is high, 71.4 % responded that the Transportation cost is also high and 69.2 % of respondents said that the Transportation cost is high. Generally Ethiopian airlines outbound logistics is performing low in Effectiveness parameter stating that it is not cost effective.

From differentiation parameter of logistics performance damaged free deliveries performance found poor with 82.4%, the forecast accuracy performance has also found the it is poor with 73.6%, 78.0 % of respondents replied that the time between order receipt and delivery is very long. The Time on back orders performance of Ethiopian airlines outbound logistics is performing long.

- Examining the effect of outbound logistics over organizational performance of Ethiopian airlines MRO

Having summarized as above it is concluded that the outbound logistics is performing poor and From organizational performance dimensions it has found that, outbound logistics have a great extent effect over organizational Profitability, Reliability, Responsiveness and Flexibility performance.

- Identifying the major problem (challenges) in outbound logistics practices of Ethiopian airlines MRO and recommendation from interview as such information are to be observed from the problem owner in facing the problem as a first-hand information using open ended questions

5.3 Interview Summary

From the interview questions conducted to three team leaders (team leader out bound logistics, team leader tactical purchase teams) the below findings are summarized

- ✓ The performance of the team is being evaluated periodically and with the available resource and human capital they think they are doing their best to have better performance
 - The performance of the team is being measured using the target formulated with the current performance and
 - The feedback from customers' survey
- ✓ There is standard pricing calculation being used to calculate the price for all outbound shipment but found that it is not effective and the estimates calculation are very low accurate
- ✓ The major problems are access Air craft loading space from Addis Ababa Airport to other destinations, it is only allowed when shipments are very critical and ordered by higher management but other routine shipment to be shipped are being load if there is open space available only.
- ✓ Shortage of Expert logistics officers in outbound logistics, referring the number of frequency of shipments the human capital is very short referring the performance expected to conduct. Current officers are working overloaded which affects the quality and efficiency of shipments.
- ✓ No/Low developed packing material and knowledge, no certified packing personnel available which is a reason for delay on shipments and delivery of damaged shipments because of inappropriate packages

To eliminate such major problems many activities were done like requesting additional professional logistics officers and certified packaging personnel, and qualified packing materials to higher management and same has been under review for long time and not got solution yet Ethiopian logistics have a great capacity which can be utilized and can also be an opportunity for more income generation if it is well reviewed for expansion and capacity development.

5.4 Conclusion

Numerous researches were conducted in Ethiopian airline supply chain performance and its effect over maintenance and over haul unit, this paper specifically focuses on the performance and effect of out bound logistic over Ethiopian MRO. Studying the performance of logistics three major parameters were studied and its effect over organizational performance.

Under efficiency parameter except Reverse shipment turns per year all dimensions (Per hundreds of shipments to consumer from the principal locations chosen to facility those clients, Line of fill rate (percentage of orders items the picking operations actually found), Percent of On time shipment, Percent of shipment requiring expediting and Shipment time (time in days between order

receipt and order delivery)) are performing poor. This indicates that Ethiopian logistics is less in efficiency. We can say that the outbound logistics is not efficient.

From effectiveness parameter of logistics cost dimensions all costs (Warehousing, Transportation & total logistics costs) are performing poor and we can conclude that the current outbound logistics performance is not effective. And from differentiation parameter as per the finding all dimensions (Damage free deliveries, Forecasting accuracy, Time between order receipt and delivery & Time on back orders found poor.

It can be concluded that Ethiopian airlines outbound logistics is performing not as good as required per target and industry practice.

Having its great significant and positive relation we see that the current logistics performance is negatively affecting the organizational performance, multiple dimensions needs special attention referring the improvement opportunity of logistics so that it can contribute to the total output of the organization.

5.5 Recommendations

Having the above findings and conclusions in mind the researcher would like to give the below recommendations accordingly.

So as to improve the outbound logistics performance the below points are recommended to eliminate problems under each dimensions of logistics performance studied.

- The company should assign additional adequate, experienced and skilled manpower on logistics related departments equally with core business department.
- The company should consider the real demand in order to minimize inventory related costs which may benefit the company by reducing unnecessary inventory handling ordering & stock out.
- The company should design warehouse that are free from damage convenient to load & unload, easy to access and supported by technology.
- As recommended by Mrs. Etsegenet Teka on here research the company need to improve the packing standard as it is found that this is one reason for damaged shipment.
- Logistics department need to use reliable third party logistics while handling shipment out of the country, and considering the frequency of the shipment need to create collaboration and partnership with third party logistics companies.
- Need to work in collaboration with other forwarders as a supply chain partner.

- Continuous efforts such as providing on job training, regular supervision, regular and timely monitoring and feedback on logistics recording tools to maximize proper utilization and accuracy of LMIS tools.

Generally, to have the above recommendations accepted and be successful there must be full management support. This is not only because they are key decision makers but also because they control resources in their organizations.

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Appendix I

Appendix 1

Questionnaire

Addis Ababa University

School of Commerce

Department of Logistics & Supply Chain Management

Survey Questionnaires to be filled by selected respondents

Dear Respondent,

The purpose of this questionnaire is to collect data for the study designed to assessment of Inbound and Outbound logistics performance the case of Ethiopian airlines. The study is conducted for partial fulfillment for the degree of Master of Arts in Logistics and Supply Chain Management at Addis Ababa University School of Commerce Department of Logistics and Supply Chain Management. You are kindly requested to fill each question objectively as your response is vital for the outcome of the study.

The survey may take between 15 and 20 minutes. I would like to thank you for your valuable time to complete the survey. Your response will be confidential and will be used only for the purpose of the study.

Answering Instructions:

Please answer all questions. Most of the questions can be answered simply by selecting the best answer or by ticking the best answers from the given alternatives. On some of the questions, space is provided to add further comment. Please tick (X) the appropriate column to indicate the extent to which you agree or disagree with each statement.

Indicate your level of agreement with regard to logistics practices of your firm, please tick the appropriate number to indicate the extent to which you agree or disagree with each statement. The item scales are five-point Rating Scale from **Very poor** ----- **Excellent**

With 1 = **Very poor**, 2 = **Poor**, 3 = **Good**, 4 = **Very Good**, 5= **Excellent**.

Part A: Demographic related Information (please use X on the choice you make)

1. What is your gender?

- a. Male _____ b. Female _____

2. What is your current job position within the organization?

- a. Assistant _____ b. Officer _____
c. Team leader _____ d. Manger _____

3. What is your age range?

- a. 24 & below _____ b. 25 – 34 _____
c. 35 – 44 _____ d. 45 – 54 _____
e. 55 – 65 _____

4. What is the highest level of education you have completed?

- a. Diploma /Certificate _____ b. Bachelor Degree _____
c. Master's Degree _____ d. PhD _____

5. How many years have you worked in Ethiopian Airlines?

- a. Less than 5years _____ b. 5 up to 7 Years _____
d. More than 10 years _____
f. If Other, specify: _____

Part B: Logistics performance (please use X on the choice you make)

➤ Efficiency ➤ For the following items, please rate your business unit's performance on logistics activities for the previous fiscal year		Scale				
		1	2	3	4	5
		Poor	Below Average	Good	Very Good	Excellent
1	Percent of orders shipped to customers from the primary locations designated to service those customers					
2	Line of fill rate (percentage of orders items the picking operations actually found)					
3	Percent of order shipped on time					
4	Percent of shipment requiring expediting					
5	Inventory turns per year					
6	Average order cycle time (time in days between order receipt and order delivery)					
➤ Effectiveness ➤ For the following items, please rate your business unit's actual performance compared to targeted performance based on previous fiscal year results		1	2	3 Neutral	4	5
		Very High	High		Better	Much Better
7	Warehousing cost					
8	Transportation cost					
9	Total logistics cost					
➤ Differentiation ➤ For the following items, please rate your business unit's actual performance compared to targeted performance based on previous fiscal year results		1	2	3 Good	4	5
		Poor	Below Average		Very Good	Excellent
10	Damage free deliveries					

11	Forecasting accuracy					
		1 Very Long	2 Long	3 Normal	4 Fast	5 Very Fast
12	Time between order receipt and delivery					
13	Time on back orders					
➤ Organizational Performance ➤ For the following items, please rate the impact of logistics business unit's actual performance on organizational performance		1 Not at all	2 Small extent	3 Moderate extent	4 Great extent	5 Very great extent
14	Profitability					
15	Reliability					
16	Responsiveness					
17	Flexibility					

Adopted from (Fugate,B.J., Mentzer, T. Stank, 2010)

Thank you so much!!

Interview questions

Unstructured interview questions with Team leaders of Ethiopian airlines maintenance repair overhauls from logistics and purchasing departments

1. How do you evaluate the outbound logistics performance of Ethiopian logistics?
2. Do you measure the performance of the team performance?
3. What do think about the pricing for outbound logistics?
4. Do you think there are problems which logistics team facing?
 - a. What are the major problems?
 - b. What are the measures you took to eliminate these problems?
5. How do you describe the capacity of Ethiopian inbound and outbound logistics?
6. Do you think there are opportunities in which the team can use to improve the general performance?

7. What do you suggest to improve the performance of Ethiopian inbound and outbound logistics?

Appendix 1

Correlation table

	1	2	3	4	5	6	7	8	9
	Percent of orders shipped to customers from the primary locations designated to service those customers	Line of fill rate (percentage of orders items the picking operations actually found)	Percent of order shipped on time	Percent of shipment requiring expediting	Inventory turns per year	Average order cycle time (time in days between order receipt and order delivery)	Warehousing cost	Transportation cost	Total logistics cost
1 Percent of orders shipped to									
2 Line of fill rate (percentage	.67**								
3 Percent of order shipped on	.29**	.33**							
4 Percent of shipment	.29**	.31**	.94**						
5 Inventory turns per year	,	,	,	,					
6 Average order cycle time (	.51**	.36**	.32**	.33**	-.41**				
7 Warehousing cost	,	.36**	,	,	,	.25*			
8 Transportation cost	.28**	.29**	,	,	,	.22*	.64**		
9 Total logistics cost	.40**	.43**	,	,	-.21*	.33**	.58**	.74**	
10 Please rate logistics	.26*	,	,	,	-.23*	.28**	.22*	.29**	.24*
11 Please rate logistics	,	,	,	,	-.21*	,	,	,	,
12 Please rate logistics	,	,	,	,	,	.26*	.23*	.27**	,
13 Please rate logistics	,	,	,	,	,	,	,	,	,
14 Please rate the impact of	,	,	,	,	,	,	,	,	,
15 Please rate the impact of	,	,	,	,	,	,	,	-.26*	,
16 Please rate the impact of	,	,	,	,	,	,	,	-.25*	,
17 Please rate the impact of	,	,	,	,	,	,	,	-.22*	,

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

Source: SPSS output of survey, 2020