



Feb, 2017

**ADDIS ABABA UNIVERSITY  
SCHOOL OF COMMERCE  
DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT**

**EFFECTS OF SOURCING STRATEGY ON OUTBOUND LOGISTICS PERFORMANCE,  
IN THE CASE OF ETHIOPIAN AIRLINES**

**BY  
SAMUEL TEMESGEN**

**A Thesis Submitted to, The Addis Ababa University, School of  
Graduate Studies in Partial Fulfillment of the Requirement for Degree  
Of Masters Of Arts In Logistics and Supply Chain Management.**

**RESEARCH ADVISOR: BREHANU D.(PhD)**

**March, 2017  
ADDIS ABABA , Ethiopia**

**Approved by Board of Examiners**

Birhanu D.(PhD) \_\_\_\_\_  
Advisor Signature Date

\_\_\_\_\_  
Internal Examiner Signature Date

\_\_\_\_\_  
External Examiner Signature Date

**Declaration**

I hereby declare that the study which is being presented in this thesis entitled **“The Effect of Sourcingstrategy and logistics integration on the performance of outbound logistics: the case of Ethiopian Airlines”** is original work of my own, had not been presented for a partial fulfillment for any educational qualification at this university or any other and in any projects by any means, and all the resources materials used for this thesis had been accordingly acknowledged.

---

**Samuel Temesgen**

**ID NO: 0793/06**

---

**Date**

**Approved by:**

---

**Birhanu D. (Ph.D)**

**Advisor**

---

**Date**

## **ACKNOWLEDGMENT**

---

I sincerely appreciate my advisor Berhanu D. (PhD) for the unreserved and vital advice without which it would have been difficult, if not impossible, to succeed.

I extend my deepest thanks to all officials of Ethiopian Airlines who have provided data and information mandatory to complete this project especially to strategic sourcing and logistics

My special thanks go to my colleagues for the moral support, until the completion of this project.

It is also my pleasure to express my deepest gratitude for my mom and brother who have supported me throughout the project on all matters.

Finally, I would like to thank the almighty GOD who made everything possible right from the start up to the end.

Samuel Temesgen

### Abstract

Ethiopian airlines is getting its part and component requirement through component exchange program service providers. However, due to lack of integration among stakeholders and poor execution of component exchange program agreement Ethiopian airlines being paying hundred thousands of dollars. Consequently, the objective of this research is to identify and examine the in component exchange program sourcing and to draw their effect on the performance of outbound logistics. A lot of literatures were reviewed empirically to produce a set of concepts and factors about sourcing and logistics integration and its effect on the performance of outbound logistics. From the total of 180 populations 153 participants selected and a total of 153 questionnaires were distributed to Aircraft mechanics, Procurement and Logistics officers, and section team leaders. The raw data captured by questionnaire in word format were then converted into statistical software package for Social Science version 10 and analyzed quantitatively. The research finding shows despite the fact that component exchange program sourcing strategy is one of the best sourcing strategy in aviation industry, there is a significant disintegration between sourcing and logistics department which result poor execution. It also disclosed that the 7 days agreed lead time for core return and different terms and conditions stipulated on the agreement doesn't consider the competency and capability of outbound logistics section. To bring the required level of operational efficiency all component exchange program stakeholders should work together. In particular utmost collaboration and integration required among sourcing and logistics section from the inception of component exchange program agreement through execution.

**Keywords:** *CEP sourcing strategy, outbound logistics performance indicators and Supply chain integration.*

**TABLE OF CONTENT**

Pages

Acknowledgment ..... I

Abstract..... II

Table of content .....III

List of tables .....IV

List of charts.....V

Acronyms .....VI

**I- Introduction..... 1**

1.1 Background of the study ..... 1

1.2 Background of the company ..... 2

1.3 Statement of the problem ..... 3

1.4 Objective of the study..... 6

1.5 Delimitation..... 6

1.6 Significance of the study..... 6

**II- Related Literature Review..... 7**

2.1 Evolutionary Process of Global Sourcing Strategy..... 7

2.2 Logistics performance measurement..... 11

2.3 Third-party logistics..... 15

2.4 Integrated Logistics and Supply Chain Management on Firm Performance.....20

2.5 Supply chain improvements, and specialized service providers in aviation industry.....24

2.6 Conceptual framework..... 25

**III- Research Methodology ..... 27**

3.1 Introduction.....27

3.2 Research Design..... 27

3.3 Population.....27

3.4 Sampling Technique and Sample Size .....28

3.5 Data Sources..... 28

3.6 Instruments of data collection..... 28

3.7 Method of data analysis ..... 29

3.8 Description of variables ..... 29

3.9 Validity and reliability ..... 29

IV- Data analysis .....31

    4.1 Introduction .....31

    4.2 Correlationanalysis.....31

    4.3Descriptive StatisticsData Analysis.....33

V- Summary Conclusion and recommendation .....44

    5.1 Summary.....44

    5.2 Conclusion.....45

    5.2 Recommendation.....46

**Reference**

**Appendix I: Questionnaires**

**Appendix II:Frequency table**

## List of tables

Table 3.1 Reliability analysis .....	30
Table 4.1 correlation between dependent and independent variables.....	32
Table 4.2 Descriptive Statistics.....	33
Table 4.3 Level of cost effective Logistics service.....	34
Table 4.4 Cost saving awareness .....	34
Table 4.5 Cost advantage from current Freight Forwarder.....	35
Table 4.6 Logistics Information System.....	36
Table 4.7 Late Return Penalty.....	36
Table 4.8 CEP delay contribution .....	37
Table 4.9Staffs competency level .....	37
Table 4.10CEP shipment damage due to poor package .....	38
Table 4.11 Shipment Miss labeling.....	39
Table 4.12 Pre alert Document.....	39
Table 4.13 Paper Work Quality .....	39
Table 4.14Shipment Follow Up .....	40
Table 4.15 Customer Service .....	40
Table 4.16 Customer Complain Handling .....	41
Table 4.17 POD Update on the System .....	41
Table 4.18 CEP agreement .....	42
Table 4.19 Sourcing and Logistics Integration .....	42
Table 4.20 Area of focus during agreement evaluation.....	42

---

## List of charts

Chart 4.1 Rush Order ..... 35

Chart 4.2 Outbound Logistics Employee Service Year..... 38

---

## ACRONYMS

CEP	COMPONENT EXCHANGE PROGRAM
AOG	AIRCRAFT ON GROUND
MRO	MAINTENANCE REPAIR & OVERHAUL
FF	FREIGHT FORWARDER
SOP	Standard Operation Procedure
SCM	SUPPLY CHAIN MANAGEMENT
POs	PURCHASE ORDER

## Chapter One

### 1.1 Background of the study

The increasing competitiveness in today's business environment causes enormous pressure for many companies in different industries. In such an environment, companies need to continuously search for ways to design and manufacture new products and services, and provide these products & services in an efficient and effective manner to their customers(Pfohl, H.-Chr, 2004).

The demand for products or services of many companies varies and can only be forecasted with variable accuracy. This unstable demand is accompanied by limited variable capacities and it is the challenge of capacity management to balance capacity demand and supply at the optimal level (Pfohl, H.-Chr, 2004).This capacity management problem can also affect outbound logistics, where variable demand from customers is accompanied by limited capacity of storage and transport. At the same time customers require high flexibility and short lead-time, which is a huge challenge for the logistics service provider.

For many years, companies focused their efforts on reducing costs occurring in the manufacturing processes as well as other operations. There are an increasing number of companies looking at outboundlogistics and recognizing it as the last frontier for cost reduction.

Logistics is the management of the flow of goods and related information. The goal is to guide the flow of materials and information throughout the supply chain. Logistics is comprised of several processes, such as procurement, manufacturing, transportation, warehousing, inventory and information systems. From these important logistics functions,outbound logistics is a major function in the entire logistics system and the key link between manufacturers or service providers and customers in a supply chain. In addition, outbound logistics is a key driver of profitability in a company, because it has a direct impact on both the logistics cost and the customer experience.Outbound logistics functions include packing, storing and transportation of the finished products and handling the export documentation and booking the transportation from forwarding agents (Chopra, 2003).

The efficient application of logistics has long been viewed as a significant enabler for firmsseeking to achieve competitive superiority.The application of logistics by service industries remains relatively limited due to the bias in the literature towards logistics processes of manufacturing industries. This

paper attempts to breach this gap by comprehensively reviewing factors that shape logistics processes of firms in general, which allows the modeling of logistics processes of any firm, either in manufacturing or service industries.

## 1.2 Background of the company

Ethiopian Airlines (Ethiopian) is the flag carrier of Ethiopia established on December 21, 1945 and fully owned by Ethiopian government. During the past seventy years, Ethiopian has become one of the continent's leading carriers, unrivalled in Africa for efficiency and operational success, turning in profits for almost all the years of its existence.

Operating at the forefront of technology, the airline has also become one of Ethiopia's major industries and a veritable institution in Africa. It commands a lion's share of the pan African network including the daily and double daily east-west flight across the continent. Ethiopian currently serves 91 international destinations operating the newest and youngest fleets. The airline grown faster in recent years and to accommodate its growth and expansion and easy of management the airline divided into seven business unites. These are Ethiopian domestic and regional flight, Ethiopian international flight, Ethiopian catering and inflight service, Ethiopian aviation academy, Ethiopian cargo, Ethiopian ground handling and Ethiopian MRO. One of the core activities of the airline is Ethiopian MRO (maintenance, repair and overhaul) established in 1945 with the establishment of the airline. Ethiopian Airlines maintains modern and complete aircraft, engine and component overhaul and repair facilities with an all-Ethiopian work force of over 750 technical personnel – most of whom are trained by the airline's Aviation Maintenance Technicians School and are United States FAA and Ethiopian CAA licensed. Ethiopian has gained a distinguished recognition for its high standard and excellent safety record.

Ethiopian MRO has several approved capabilities by different regulatory bodies in the aviation industry, below major capabilities.

**Airframe Maintenance** the base provides complete package maintenance on Boeing Models MD11, B777, B767, B757, B737, Bombardier DHC-8 100/Q200/ Q300/Q400, Fokker Model F-50, and Diamond DA40/42.

**Engines Maintenance** Complete repair, modification, and overhaul, Modular maintenance, Engine performance testing, a range of special process shops for parts, salvage work and modification.

**Component overhaul/Testing** Complete Repair, overhaul and testing of components fitted on the above mentioned fleets.

**Non-destructive testing (NDT)** with specialized inspection X-ray, Radiography, Eddy current, Ultrasonic, Magnetic particles and Dye penetrant.

**General Engineering Support** this include development of Major repair, Engineering orders, Maintenance programs and Complete inspection/check work packages Operational Assistance through, Aircraft performance analysis, Engine condition monitoring, Handling of Technical records keeping, Technical planning functions, and Reliability analysis. Also provides Facility evaluation, development plans and recommendation, Technical evaluation/Damage assessment on aircraft at any location.

**Line station Technical Handling & Mobile technical team and Crew secondment** In addition to the base at ADD, we offer service at various international stations as well as Experienced technician and flight crew for a short and long term assignment upon request.

**Spare Parts Inventory Exchange/lending** of parts for Boeing, Fokker, De-haviland, Sale of surplus aircraft parts & automated stores and inventory control services.

**Complete repair, modification, overhaul and testing** of P & W Models; PW127, PW121 and PT6. CFM Models: CFM 56-3/7 APUs: GTCP331-200.

**Engine performance test:** In support of its engine overhaul facility, Ethiopian utilizes a fully equipped jet engine test stand and a two-cell modern turboprop engine test bed. The 100,000 lb thrust test cell - a capacity significantly above the current power level for wide-bodied aircraft - provides a safe environment in which to fully test overhauled engines.

### 1.3 Statement of the problem

Ethiopian airline provide different MRO services i.e. maintaining, repairing and overhauling different aircraft parts, components, engine and engine components, full aircraft servicing like A check, B check

and C check for different types of fleets for its own operation as well as different customer airlines from all over the world. In order to provide these MRO activities, high value parts and components are required. These parts and components are very expensive and difficult to source due to the limited number of manufacturers and suppliers authorized by FAA (Federal Aviation Authority) and other international and regional regulatory bodies.

Here Procurement and supply chain division plays great role in sourcing, procuring and availing the required parts and components through its logistics system with possible low cost. Previously, there were different ways of purchasing these parts and components. The most common ways are procuring in advance and keeping as inventory or purchase on need basis. Both options have their own costs and constraints. If we see the first scenario; maintaining inventory for such high value parts and components result in huge tie-up of capital and increase firms' insolvency. However, the second way of getting parts and components on need basis increase the lead time and at the same time creates a huge expense such as; high ordering cost as a result of rush order that causes the company to incur extra charges of more than two to three fold of the actual cost and even more at times. In addition to that, as most of the suppliers are located in Europe and America the logistics cost will be significantly high and this requires special arrangements of transportation by air or road or both. Whenever there is AOG, the logistics may require charter airplane and/or dedicated truck which increase the logistics cost significantly and the company is as a result subjected to a more expenses.

Subsequently, Ethiopian airlines change its supply chain strategy for the fulfillment of some selected high value parts and components and entered a component exchange program (CEP) with different CEP providers. The CEP service agreement between four different CEP service providers allows Ethiopian airlines to have some parts and components that included in the CEP agreement under different terms and conditions;

- Ethiopian airlines request parts and components that are covered by the CEP agreement whenever they encounter AOG scenario.
- CEP services providers will make the parts and components ready for shipment within 2 hours for some parts and components with the service level guarantee of 97% and within 8 hours with 90% of service level for the remaining parts and components as stated on the agreement.

- The service charge will be calculated based on the flight hour's aircraft was operated while the part or component was installed on the aircraft.
- The exchange core i.e. the unserviceable part or component must be returned to the CEP provider in exchange for the serviceable part or component the airline received within 7 days. Delay in return of the exchange core will result late return fee that will accrue with the rate of 1% per day.

For the successful implementation of CEP agreement the logistics plays a key role as the process involves importing the serviceable exchange parts or components and the export of exchange core or unserviceable parts or components right on time with the possible lowest cost. Ever since the CEP agreement has been signed with CEP service providers, the inbound logistics has been efficient in the import of serviceable parts and components. For all serviceable parts or components the transportation system used are couriers without weight limitation as long as parts arrived on the required time. Ethiopian flights are also used if it connects within the required time otherwise other airlines flight will be used. However, there are scenarios the above options are not possible and push ET to charter aircraft or renting dedicated trucks to forward the nearest country that Ethiopian has a flight and will be connected to Addis Ababa. All this involves a huge logistics cost since the aircraft will not be able to fly unless the required part or component is installed. To facilitate this move, Ethiopian airlines also has nominated freight forwarder that are outsourced and in charge for the import of serviceable parts and components. Much of the inbound logistics activates is done by freight forwarder with a little involvement of Ethiopian logistics team.

The outbound logistics system uses courier service for shipments below 40 Kg where Ethiopian doesn't have direct flight. This is mainly to save cost as courier service is less expensive. For shipments in excess of 40 kg, Ethiopian use another route to forward the exchange core up to a given transit station using its own flight and use truck if the final destination is near, if not will use other carrier to forward to final destination. This increase the transit and lead time that the exchange core stays on transit until it reaches the final destination. Freight forwarders are involved on the outbound logistics only after shipment reaches at destination and their role is clearing shipment from customs and delivery to CEP service providers. All the remaining logistics activity is done by Ethiopian logistics team, this is mainly to save logistics cost.

Since this sourcing strategy never consider the capability and constraint of logistics section while entering in to CEP agreement, Ethiopian airlines is being penalized the agreed 1% late return fee as the cores do not reach the CEP providers within the agreed time frame.

## Research questions

- To what extent CEP sourcing strategy affect outbound logistics performance?
- How valuable to use multiple forwarders for outbound CEP shipment?

## 1.4 Objective of the study

### 1.4.1 General objective:

The general objective of this study is to analyze the effect of strategic sourcing and logistics integration of the performance of outbound logistics, the case of Ethiopian airlines.

### 1.4.2 Specific objective:

- To examine current problem validate of 7 days lead time for core returning
- To determine level of CEP sourcing strategy and outbound logistics integration

## 1.6 Delimitation

This study only focuses on CEP sourcing strategy i.e. component exchange between the service provider and Ethiopian airlines i.e. outbound logistics. This is due to the fact that CEP sourcing strategy is a burning issue in supply chain division and other sourcing strategy and logistics system go through different lengthy process. Thus, this requires extensive study of the different sourcing strategies and outbound logistics systems and examining process necessitate substantial budget for time and money.

## 1.7 Significance of the study

This study intended to have both practical and theoretical significance;

Theoretically, this thesis could perhaps become a starting point for other researcher to increase their knowledge on this topic and at the same time can be used as reference for their future studies.

Practically, this thesis will help management of Ethiopian airlines to clearly understand the current problem related to CEP return performance resulted from poor disintegration of sourcing and logistics section and proposed recommendations thereby management will be able to pass their decision to overcome the underlying problem.

## Chapter Two

### Related Literature review

#### 2.1 Theoretical Review

##### 2.1 Evolutionary Process of Global Sourcing Strategy

Kotabe and Swan (1994) have explained that Stop (ford and Wells, 1966) firstly recognized the importance of global sourcing as part of global strategy development and then (Moxon, 1975) empirically found that offshore sourcing was motivated primarily by the use of inexpensive labour, particularly in newly industrialized countries for the export of finished products. (Monczka and Trent, 1991) have described a four-phase global procurement process. In the first phase, firms do not engage in direct international purchasing. Firms in this phase either do not perceive the need or lack the expertise to pursue foreign sourcing. A firm enters phase-two because it is confronted with a requirement for which there is no suitable domestic supplier, or because competitors are gaining an advantage from foreign sourcing. The firm is reactively driven by shortcomings within the domestic supply base to satisfy customer requirements. In phase-three, multinational companies begin to comprehend that a focused international procurement strategy creates significant performance gain. Global sourcing strategies developed in the fourth and final phase are aggressive sourcing responses which result from viewing the market from a worldwide perspective. (Swamidass, 1993) also suggested a four stage evolutionary process in import sourcing:

(1) No import sourcing; (2) import sourcing for cost minimization; (3) import sourcing for competitive advantage; and (4) import sourcing as a strategic asset. Meanwhile (Samli et al, 1998) explored the evolution of the interest in sourcing research. They identified five stages in sourcing strategy research through a critical literature review. In the first stage, researchers emphasized procurement as a corporate function and its importance in helping a company to maintain its competitiveness. The second stage in sourcing research emphasized the advantages of a strategic rather than a simply reactive way of sourcing. The third stage expanded sourcing into global scales. The fourth stage highlighted the development of a global sourcing strategy. In the final stage, the 46 researchers distinguish global sourcing strategy from strategic sourcing globally. Here, the emphasis is placed on the value of global sourcing as an integrated key strategic tool rather than just having a sourcing strategy, which may not be a part of the top strategic plan

**UPS supply chain solution also defined Sourcing and strategic sourcing as follow;**

Sourcing by identifying and locating suppliers is relatively simple, but it becomes more complex as the amount of unique raw materials, ingredients, parts, components, connectors, apparatus, products, equipment, supplies, and services increase and the numbers of buyers involved in the decisions expand. In a global enterprise, it is possible for one purchasing decision to impact numerous business processes or departments including manufacturing, receiving, distribution, marketing, sales or customer support. The risks of buying the wrong items, services or from the wrong supplier can have major impacts and ripple throughout a business. Consequences can range from late delivery to total service failure liability and can even affect market competitiveness. In addition, if the selected suppliers cannot provide opportunities to reduce costs, improve and upgrade product/service offerings or provide other market-facing advantages, then an organization can quickly find itself losing market share (UPS, 2005).

To help clarify the confusion, UPS Supply Chain Solutions is offering insights into the optimum approach to buying. Often known as Strategic Sourcing, it begins the critical process and lays the foundation for creating value through the purchasing process. Sourcing and Strategic Sourcing are critical steps in buying goods and services. In this stage, individuals or groups analyze, assess, and select vendors and their goods and services based on certain specifications and requirements. This relationship is typically documented in a contract with terms and conditions regarding products, services, prices, and service levels. The next steps are Purchasing and Procurement Management which are established after Sourcing and Strategic Sourcing to execute upon the contract and to supply the enterprise with required goods and services at the negotiated price and agreed-upon times. These actions are typically represented in purchase orders (POs) or release orders/instructions on MasterPOs. POs are communicated via phone, fax, mail, EDI, etc (UPS, 2005).

The Internet has proven to be a highly effective tool for sourcing and procurement. Strategic Sourcing has been e-enabled through web applications, marketplaces and portals that support auctions, reverse auctions, etc. Procurement has also been e-enabled through web applications, marketplaces, and portals that support requests for information (RFIs), requests for quotes (RFQs), purchase orders, logistics arrangements, payment, etc. The final building block is Supplier Relationship Management(SRM). Managing and partnering with suppliers is important from sourcing through

procurement. Integrating operations and establishing mutually beneficial programs are essential to a successful company (UPS, 2005).

Defining Strategic Sourcing should be fairly simple. Most companies are already involved with some form of Strategic Sourcing initiative. Typically, when professionals define Strategic Sourcing they limit the scope and therefore the impact of a Strategic Sourcing initiative. However, Strategic Sourcing can go well beyond cutting costs. It can have a profound impact on a company's financials and can strongly influence the purchasing and procurement processes.

For purposes of this paper, Strategic Sourcing will be defined as the process of evaluating, selecting and aligning with suppliers or consortiums of suppliers to achieve operational improvements in support of an organization's strategic objectives. The phrase Strategic Sourcing was coined and is used when the activities of sourcing are directly tied to a sourcing strategy (UPS, 2005).

## **Results that can be achieved**

### **Know thyself**

One advantage attributed to a well-coordinated Strategic Sourcing initiative is gaining an understanding of how competencies and processes support a clearly defined business strategy. Obviously, it's impractical to meet the requirements of a business without first understanding them. A Strategic Sourcing initiative presents the opportunity to clarify and communicate corporate goals and objectives. It also is a means to define and document what an organization's competencies are and what they should be. Nonvalueadds functions that waste critical time, resources and require financial support can be identified and outsourced or eliminated. As companies grow, many redundancies tend to occur. These redundancies can be in the form of distributed activities that mirror each other, or they may take the form of similar products being itemized and purchased separately. After these redundancies are identified, aggregation of similar products or consolidation of activities can occur. The processes and workflows can also be redesigned to eliminate the non-value-added work. Ultimately, an organization will select its suppliers based on their ability to support and assist in improving a process, providing a product/service at a lower total cost, or offering a better product/service that helps to differentiate. For example, computer manufacturers differentiate their computers' capabilities by using specific suppliers and noting the suppliers' technology on their computers and marketing materials (UPS, 2002).

Cost reduction is typically the primary goal of most Strategic Sourcing initiatives.

**Realize the benefits**

Executives are beginning to understand that procurement is a key part of the business or supply chain process. It is typical for businesses to spend more than 60 percent of revenue purchasing goods and services; and it is estimated that approximately 70 percent of all potential savings from purchasing can only be achieved through the Strategic Sourcing process. The results of a well-managed Strategic Sourcing initiative can be impressive and the benefits can be extended well beyond cost reduction (UPS, 2002).

**Impact the Bottom-line**

Cost reduction is typically the primary goal of most Strategic Sourcing initiatives, because savings in cost of goods sold (COGS) fall directly to the bottom-line. For example, let's assume that a business reduces COGS by \$1 million. If that business has a 10% margin on sales, it must sell \$10 million worth of products to achieve the same \$1 million in reductions or savings. Again, every dollar from reducing COGS comes directly off of the bottom-line. This is critical in a business environment where it is more difficult to increase revenues. When properly executed, Strategic Sourcing focuses on total costs and not just the purchase price. Often, procurement professionals consider the "sticker price" versus the price of the complete lifecycle. However, other costs should also be taken into account such as carrying costs, service and repair expenses, and end-of-life/disposal costs (UPS, 2002).

**Best Practice Case Study — Dial Corporation<sup>1</sup>**

Recently Dial Corp., the Scottsdale, AZ, based manufacturer of soaps and detergent products and consumer goods, split from ViadCorp, its parent company, and became an independent entity to better focus on its core competencies. Accompanying that change was a restructuring of Dial's corporate functions into a business-unit approach, which included an overhaul of the purchasing function from a decentralized organization operating at the site level, to a central body headed by a chief procurement officer (CPO) (UPS Supply, 2002).

The move not only changed the structure of the company but it also changed the way its employees viewed total costs. By simplifying its supply base, working closely with its key suppliers, leveraging its buying power with key suppliers across the different business units, and developing a system for implementing innovative cost-savings<sup>1</sup> Reilly, Christopher, Purchasing Magazine, "Central Sourcing Strategy Saves Dial \$100 Million," (UPS Supply, 2002)

## 2.2 Logistics performance measurement

### Financial measurement

Logistics is playing an increasingly important role in value creation, revenue enhancement, capital consumption, and expense control. As a result, logistics financial performance is playing a bigger role in corporate financial performance. Measuring and improving logistics financial performance is increasingly important in measuring and improving corporate financial performance. In addition, since logistics is often in competition with other business processes for capital projects, the better the overall financial reporting we do in logistics, the better chance we have to justify our logistics projects. The most important principle to remember in developing and implementing logistics financial performance measures is that nearly every generally accepted corporate financial measure has a corresponding logistics financial measure. Some key corporate financial measures and their corresponding logistics financial measures are described below.

#### 1. Logistics Expenses (LE)

Logistics expenses are dominated by labor expenses but also include telecommunications, inbound and outbound freight, fuel, fees to third parties, and leased or rented space.

#### 2. Logistics Asset Value (LAV)

The logistics asset value is the sum total of the value of assets deployed in logistics including inventory, logistics facilities, transportation fleets, material handling systems, logistics information systems, and so on. The valuation is typically based on book value, replacement value, and/or the capitalization of logistics assets.

#### 3. Return on Logistics Assets (ROLA = $P/LAV$ )

The return on logistics assets is computed simply as the ratio of corporate profit (P) to LAV. The ratio can demonstrate the difference between the return on logistics assets versus the return on overall corporate assets or the assets deployed in the other areas of the business.

#### 4. Logistics Capital Charges (LCC = $LAV * ACR$ )

Logistics capital charges are computed as the product of the investment in logistics assets and the asset carrying rate (ACR). The ACR is used to annualize the holding cost of fixed assets.

#### 5. Total Logistics Cost (TLC = $LE + LCC$ )

Total logistics costs (TLC) is defined to include expense and capital costs in the five logistics processes: customer response, inventory planning and management, supply, transportation, and warehousing.

The total logistics costs are made up of the following: total response cost (TRC), total inventory costs (TIC), total supply costs (TSC), total transportation costs (TTC), and total warehousing costs (TWC).

## Productivity measurement

A danger in focusing too much attention on logistics costs is that certain cost elements cannot be controlled by logistics managers and engineers. For example, logistics managers have limited control over some of the major cost factors, including wage rates, fuel costs, occupancy cost, inventory carrying rates, and systems capitalization rates. Instead, logistics managers have direct control over the amount of inventory in the system, the amount of working hours expended, the amount of occupied space, and the number of transportation miles traveled. Essentially, logistics managers and analysts have influence over the amount of logistics resources consumed in providing target customer service levels.

Performance indicators will include measures of logistics resource utilization and productivity. Those measures are the focus of this section, which describes utilization and productivity measures for the logistics workforce, transportation capacity, logistics facilities, and inventory. The productivity of a specified resource(s) is generically measured as the ratio of the output of the resource(s) to the consumption of the resource(s):

### 1. Logistics Workforce Productivity Indicators

The logistics workforce includes the operators, supervisors, planners, analysts, and managers employed in customer response, inventory planning and management, supply, transportation, and warehousing.

The principal mission of the logistics workforce is order fulfillment. Hence, the output of the logistics workforce is typically measured in orders. The consumption unit for the logistics workforce is typically measured as the number of full-time equivalents (FTEs) and/or working hours. As a result, logistics workforce productivity (LWFP) is computed as the ratio of the total orders shipped (TOS) to the number of full-time equivalents working in logistics (LWF):

$$\text{LWFP} = \text{TOS} / \text{LWF} \quad \text{LWFP} = \text{TOS} / \text{FTEs}$$

Two popular variants on this indicator are the logistics hours per order (LHPO) and the sales per logistics employee (SPLE). The LHPO is computed as the ratio of the number of hours worked in logistics to the total orders shipped. This is the inverse of LWFP with the consumption of the logistics

workforce measured in hours as opposed to FTEs. The indicator is an effective benchmark for determining the labor requirements and labor cost per order (LCPO). LHPO and LCPO are calculated as follows:

$$\text{LHPO} = (\text{LWF} * \text{FHPY}) / \text{TOS}$$

$$\text{LCPO} = \text{LHPO} * \text{LWR}$$

The deployment of electronic commerce technologies and paperless logistics should dramatically reduce the LHPO, and this measure can be used in the justification of those technologies. The sales per logistics employee (SPLE) are computed as the total sales revenue divided by the number of FTEs in the logistics workforce:

$$\text{SPLE} = \text{TSR} / \text{LWF}$$

## **2. Customer Response (CR) Productivity Indicators**

The primary productivity indicator for CR is the number of customer orders processed per person-hour. Through customer service automation methods, including Internet ordering, EDI, automated contact management, call center automation, and/or touchtone ordering, the productivity and quality of CR can be improved.

## **3. Inventory Management Productivity**

The most popular indicators for inventory management productivity are inventory turnover and the productivity of the inventory planners. The productivity of the inventory planners is computed simply as the number of SKUs planned per planner. Inventory turnover computations are more varied and sophisticated. Since the output of inventory is sales and the consumption is investment, by far the most popular measure of inventory productivity is inventory turnover (IT). IT may be computed as the ratio of total sales revenue at cost (TSR) to the average inventory value (AIV) or the total unit sales (TUS) to the average inventory level (AIL):

## **4. Supply Productivity**

Supply productivity measures are focused on the buying and procurement organization. Three common measures of supply productivity are:

- The number of purchase orders per person-hour
- The number of SKUs managed per full-time-equivalent
- The dollar value managed per full-time-equivalent in procurement

## 5. Transportation Productivity

The principal output of transportation is delivered dollars, orders, weight, and/or cubic volume.

The principal resources consumed in transportation are operating (vehicle and/or driver) hours, container capacity, and fuel. (These resources are of principal concern if the corporation operates a private fleet.) The useful productivity ratios resulting from these inputs and outputs relate in ratio the delivered dollars, orders, pounds, or cubic volume to the available operating hours, cubic capacity, weight capacity, or fuel.

## 6. Warehouse Operations Productivity

The principal missions of a logistics facility (warehouses, distribution centers, logistics centers, and/or terminals) are throughput and storage. The principal resource consumed in achieving the throughput mission is the labor and systems deployed in material handling. The overall labor productivity for a distribution center is computed as the ratio of the number of units processed per year to the number of person-hours consumed per year. For material-handling systems, we measure consumption as the annualized investment cost in material-handling systems. The annualized material handling systems investment (MHSI) is estimated by multiplying the estimated replacement cost of MHSI by the systems capitalization rate (SCR). The principal material-handling output is the number of units and/or weight moved. The material handling unit cost (MHUC) is computed as a ratio of the annualized investment in material handling systems to the total units moved (TUM) measured in pallets, cases, containers, and/or pieces):

## Quality measurement

### Perfect Order Percentage (POP)

According to the American Heritage Dictionary, accurate means deviating only slightly or within acceptable limits from a standard (accuracy is the quality or state of being accurate.) Logistics encompasses customer service, inventory planning, manufacturing and procurement, transportation, and warehousing. The process of Defining the right measurement focus, defining the right standard, and defining the acceptable limits of deviation from the standard for an integrated set of activities as broad as logistics are complex tasks. Let's consider each issue in turn. First, the right measurements focus; the link and common deliverable of customer service, inventory planning, manufacturing and procurement, transportation, and warehousing is an order. Logistics exists to fill orders. Second is the standard. The standard has to be perfection; otherwise, the pursuit of the standard will not yield the order of magnitude improvements needed in all areas of logistics.

The perfect order is logistically perfect, meaning it is:

- Perfectly entered (the entry is exactly what the customer wants) by the means (telephone or direct entry) the customer desired in a single entry
- Perfectly fillable with the exact quantity of each item available for delivery within the customer-specified delivery window
- Perfectly picked with the correct quantities of the correct items
- Perfectly packaged with the customer-designated packaging and labeling
- Perfectly shipped without damage
- Perfectly delivered in the customer-designated time window and to the customer designated location
- Perfectly communicated with order status reports available 24 hours a day
- Perfectly billed with on-time payment
- Perfectly documented with customer-specified documentation means, including paper, fax, EDI, and/or Internet

Suppose each of these nine logistics activities were performed correctly (assuming performance-independence) 90 percent of the time. Then more than 60 percent of the orders would be imperfect. If each of these activities were performed correctly 95 percent of the time, 40 percent of the orders would be imperfect. If each of the activities were performed correctly 99 percent of the time, 10 percent of the orders would be imperfect. If each of these activities were performed correctly 99.95 percent of the time, then 0.5 percent of the orders would be imperfect.

## 2.3 Third-party logistics

The use of third- party logistics (3PL) and supply chain management providers is a growing trend, as firms seek to gain quick competitive advantage from the development of effective supply chain strategies.

3PL Services assume some or all of a firm's sourcing, materials management, and product distribution responsibilities: charging fee for their services while saving costs (estimated 10 to 20 percent of total logistics costs); and improving service, quality, and profits for their clients.

Essentially, a third- party logistics firm may be defined as an external supplier that performs all or part of the company's logistics function Beyond the concept of a third – party logistics provider, the next

evolution may be thought of as a fourth party logistics provider (4PL), or a provider of “fourth- party logistics” services (Matiwos E., 2013).

Essentially a supply chain integrator, a 4PL is thought of as a firm that “assembles and manages the resources, capabilities, and technology of its own organization with those of complementary service providers to deliver a comprehensive supply chain solution” as Stated in the work of (Langley *et al.*, 2006). Many firms have directed significant attention toward working more closely with supply chain partners, including not only customers and suppliers but also various types of logistics suppliers. Considering that one of the fundamental objectives of effective supply chain management is to achieve coordination and integration among participating organizations, the development of more meaningful “relationships” through the supply chain has become a high priority especially in logistics activities. Generally, there are two types of logistics relationships. The first is what may be termed vertical relationships; these refer to the traditional linkages between firms in the supply chain such as retailers, distributors, manufacturers, and parts and material suppliers. The second type of logistics relationship is horizontal in nature and includes those business agreements between firms that have “parallel” or cooperating positions in logistics process (Matiwos E., 2013).

### **Supply chain improvements, and specialized service providers in aviation industry**

The world has an insatiable appetite for air travel, which is creating massive demand for new planes. Airbus' latest Global Market Forecast predicts the need for more than 29,220 new freighter and passenger aircraft, and estimates the world's overall passenger aircraft inventory will double from 17,739 in 2013 to more than 36,500 by 2032 (Lisa Terry, 2012).

"It's a paradox: The airline industry is suffering, but there have never been so many orders for new aircraft," says Joël Glusman, president and CEO of The Aerospace Logistics Alliance (TALA), a Miami-based cooperative that provides supply chain management, freight forwarding, and customs clearance services to aerospace companies. This backlog, particularly from Middle East buyers, is putting pressure on the aerospace industry to produce planes more quickly, efficiently, and profitably. Aircraft manufacturers are challenged to make lighter aircraft with lower fuel consumption, using materials sourced from a geographically diverse supplier base. Technical challenges are also delaying some production timetables, causing a ripple effect through a carefully planned schedule of costly incoming parts timed to keep inventories low.

A related demand is to keep the planes flying—servicing and managing replacement parts across an increasingly global footprint. Those pressures are elevating supply chain management to an unprecedented status within aerospace organizations, which have historically emphasized research and development, and manufacturing. They're also prompting aerospace companies to hire third-party logistics (3PL) providers to manage inbound materials movement, production, maintenance, repair, and overhaul operations.(Lisa Terry, 2012).

"The aerospace supply chain is five years behind the automotive and high-tech industries," notes Erik Goedhart, senior vice president, aerospace for a global supply chain solutions provider. "So 3PLs are trying to adapt automotive and high-tech supply chain concepts for the aerospace industry. Regulation is a key topic in aerospace; however, companies often use it as an excuse not to make improvements in the value chain."(Lisa Terry, 2012).

### **Supply chain in aviation industry**

"During the next few years, 20 new aircraft will be in circulations that are not built yet," says John Brennan, managing director, government sector at UPS. The parts to build those new planes are sourced from more than one dozen different countries, increasing lead time, complicating customs clearance, and challenging supply chain managers to match the right parts and orders to the right modes and trade lanes in time to meet narrow delivery windows (Lisa Terry, 2012).

"This shift is stretching the elasticity of the aerospace supply chain," Brennan adds. Signs of progress, however, are emerging. In April 2013, Airbus broke ground on a \$600-million A320 Family jetliner final assembly line in Mobile, Ala., which will become the global company's first U.S. production facility. Aircraft assembly is scheduled to begin in 2015, with the first delivery targeted for 2016. The Gulf Coast location will enable parts to be delivered from global locations via deep-sea vessels, in addition to other modes. Airbus' move spurred its suppliers to also open facilities in the area, which is increasingly becoming a hub for the aerospace and defense industries (Lisa Terry, 2012).

Meanwhile, Boeing is deciding where to manufacture its 777X aircraft, which it launched at the 2013 Dubai Airshow with a record-breaking 259 orders from four customers across Europe and the Middle East. The 777X's design includes a new composite wing. Production is set to begin in 2017, with first delivery targeted for 2020 (Lisa Terry, 2012).

### **STREAMLINING PARTS FLOW**

Both new and current model production lines require improved processes for the inbound flow of parts. "Aerospace companies are striving to streamline movement, and continuously synchronize the manufacturing process," says Kim Wertheimer, executive vice president of the global industrial sector for supply chain management company CEVA Logistics. "Previously, those processes were batch- or project-oriented." (Lisa Terry, 2012).

One improvement involves determining how to move the parts. While most aircraft components are parcel-size, some can scale up to an engine or wing, which requires specialized handling, racks, and conveyances. Given tight production timeframes, and the nature of the business, aerospace companies make heavy use of air freight to move components, taking advantage of its value, lead times, and contract terms. But they also use some ground, rail, and steamship transportation, which requires careful coordination, particularly as points of origin grow more diverse. (Extreme Aerospace Makeover, 2009)

"Like automotive companies, aerospace companies have moved some sub-assembly activities to low-cost countries," says Wertheimer. "They've extended their supply chains to 3PLs to support the manufacturing process, and handle staging, kitting, and other tasks." (Lisa Terry, 2012).

Those other tasks include providing visibility to the order and part level, determining total delivered cost, and synchronizing the flow of material from suppliers using tools such as warehouse, event, and transportation management systems. (Lisa Terry, 2012).

As manufacturing supply chains become more disciplined, inbound materials movement is becoming less urgent and more synchronized, with supply chain managers monitoring flow and communicating with suppliers to address exceptions. (Lisa Terry, 2012).

In addition to moving parts cost effectively, aerospace supply chain managers must meet increasingly tight delivery time windows. "In the past, meeting delivery schedules was easy because companies held one month's supply of buffer stock close to the plant," says (Goedhart, 2009). "Today, however, the increased production tempo results in less stock held at the plant or with vendors. Aerospace companies are more frequently requesting that their 3PLs manage vendor relationships and inbound logistics (Lisa Terry, 2012).

"It's helpful to develop close relationships with those suppliers, so they can anticipate issues and create contingencies based on past experience," he adds.

Supply chain managers must also contend with the increased risk for disruption that accompanies global sourcing. When a volcanic eruption in Iceland disrupted air travel in 2010, for example, parts suppliers had to reroute orders through southern Europe via ground, then get them in the air. That risk is being compounded by a move to reduce the number of suppliers from hundreds to dozens. Take into account additional tiers, and the total supply base can number in the thousands. The same is true of logistics providers: aerospace providers want to work with only one or two that understand the industry's specialized needs and can handle the scope. (Lisa Terry, 2012).

### **BORROWING FROM AUTOMOTIVE**

One inbound materials management idea aerospace is adapting from automotive is creating a vendor village: building a warehouse at the front of the production line where goods are combined into multi-function units designed for each aircraft in the queue. This strategy reduces stock in the value chain by 15 to 20 days.

"Besides cost savings, the big benefit is that once an aircraft is produced, changes to parts can be implemented more rapidly because of the small amount of stock in the supply chain," This strategy is intense to manage, but far more flexible." (Lisa Terry, 2012).

Northrop Grumman Aerospace Systems is employing another strategy new to the aerospace industry. The military contractor tackled its materials flow system by reorienting its Joint Strike Fighters and F18s supply chain to pull, rather than push, inventory. In the past, the company would send a purchase order to a supplier and specify delivery dates for parts. A subcontractor could then deliver, say, 48 center fuselage assemblies at regular intervals over the course of one year. But production didn't necessarily move at that pace: schedules may accelerate, or fall behind. Nevertheless, those parts would keep coming, building up inventory if they were not needed or slowing production if the line had to wait for the next shipment (Lisa Terry, 2012).

Using the Material Acquisition Pull System, Northrop Grumman Aerospace now provides suppliers with a minimum and maximum level for inventory, and they are free to deliver as they want in order to stay within those parameters (Lisa Terry, 2012).

The pull system has been a huge success, says (Wink Williams, 2009) director of goods movement for Northrop Grumman Aerospace Systems. "We don't have to worry about big inventory fluctuations, and buyers no longer need to issue change orders with new dates."

## KEEPING PLANES FLYING

Once aircraft are inducted into service, it's up to carriers and their partners to maintain their aircraft, including regular and emergency parts replacement. That's a costly undertaking, adding to the many other pressures currently impacting airline carriers: consolidation of major players, rising debt, pressure from low-cost airlines, depressed cargo demand, the rising incidence of natural disasters and other disruptions, and escalating costs. Carriers also are looking to trim costs and streamline spending as much as possible (Lisa Terry, 2012).

With the advent of deregulation, airlines began outsourcing some parts of their operation not considered a core competency, and that trend is now escalating. Many airlines began by entrusting maintenance, repair, and overhaul (MRO) to OEMs or MRO specialists, followed by catering, aircraft loading/unloading, and fueling. Some are even spinning off their own MRO units into independent companies (Lisa Terry, 2012).

When outsourcing MRO, as well as the logistics around MRO parts and other components, airlines are seeking global reach, speed, visibility, 24/7 service, a single point of contact, and management of spare parts inventory including reverse logistics. Airlines only make money when they're flying, so service providers must be highly responsive and offer exceptional service levels (Lisa Terry, 2012).

"When outsourcing, the main concern of air carriers is not how much it costs, but how the service provider will do what needs to be done, says (TALA France's Glusman, 2009). "Price comes second to customer service."

One approach to outsourcing is "Power by the Hour"—the concept of paying a flat hourly rate to ensure complete service, support, and replacement parts. Engine manufacturers have long offered this model, and it is now being applied to other types of equipment.

When a plane is grounded and in need of a part, time is of the essence. Getting the part there is the bailiwick of providers such as TALA France. When a customer needs a part, TALA France formulates a solution within one hour, and uses whatever means necessary to deliver the part—via ground, the customer's own airline, another airline's scheduled service, charter, even hand-carried.

The unpredictability means "flexibility is essential, says (Glusman, 2009). Being able to support both scheduled maintenance and emergency needs requires TALA France to strategically stock parts in the right places, as well as work closely with parts suppliers.

"We're seeing an increase in the number of urgent shipments for aircraft on ground (AOG)," says Morten Jensen, corporate market director, aerospace and defense, for (Geodis, 2009) a global logistics provider headquartered in Clichy, France. "Because manufacturers are trying to reduce inventories and enable just-in-time delivery, the number of urgent shipments is up." That means service providers are required to offer round-the-clock staffing to address emergencies.

Increasingly, those parts are supplied from manufacturers spread across a broad geography, making quick fulfillment even more complex, and requiring service providers to operate in diverse locations.

## **VITAL VISIBILITY**

The United States and other governments impose strict rules about tracing the location and history of airline parts, down to the serial number. Airline parts are often high-value and have a limited lifecycle, so each one must be monitored and replaced on a specific schedule (Lisa Terry, 2012).

That means reverse logistics is as much a part of the job as distribution—not only moving the parts, but monitoring them through repair, returning them to service, and providing visibility to the carriers. Tracking expectations also are growing increasingly sophisticated and granular, with more data collection points and greater detail. Air carriers want to be able to search databases by reference, project, or purchase order number. Parts are also growing more specialized, with less ability to share them across airlines, complicating inventory management (Lisa Terry, 2012).

RFID and GPS are emerging as options to increase visibility and tracking of aircraft components. TALA France, for example, is considering RFID for parts tagging. CHEP Aerospace Solutions, which offers management of unit load devices (ULD) and galley carts as well as MRO for non-flight-critical equipment, is in the midst of a two-year project to test GPS devices in ULDs. The devices will supplement the container tracking currently attained through flight load sheets sent via EDI to a central tracking location in Bangkok (Lisa Terry, 2012).

Cargo airline Cargolux is currently testing GPS for high-value containers of shipments such as pharmaceuticals. "Visibility is not limited, but it is based on human activity, says (Henrik Ambak,

2009) vice president, ground services and commercial IT at Cargolux. But GPS can be used without a human touching the shipment.

The confluence of all these changes is challenging aerospace logistics. "In the past, standardized solutions were the norm, says (Geodis' Jensen, 2009). "Today, aerospace companies require tailored solutions. No two companies are alike."

## Empirical Review

### 2.4 Integrated Logistics and Supply Chain Management as a Core Competency

Terminology and Typology of Integrated Logistics and SCM Researchers identified several terminologies to express the types and degrees of integration such as interaction, cooperation, coordination and collaboration. (Kahn and Mentzer, 1996, 1998) identified two interdepartmental integration characterizations, namely, interaction and collaboration. In this conception, interaction is information flow via communication and is usually mandatory, formal and perhaps rather tangible, which means it can be easily tracked. Collaboration, on the other hand, refers to working together in a team environment using shared goals and is a concept which cannot be mandated, programmed, or formalized, thus making it more difficult to monitor. (Kemppainen and Vepsalainen, 2003) have stated that collaboration refers not only to the development of dyadic buyer-supplier relationships, but also to bringing about real time information sharing within the supply chain. (Spekman *et al.*, 1998) have explained the key transition from open-market negotiations to collaboration. Cooperation is the starting point for supply chain management and has become a necessary if not a sufficient condition. The next stage is co-ordination in which both specified workflow and information are exchanged to make seamless linkages between and amongst trading parties. Finally, collaboration requires high levels of trust, commitment, and information sharing amongst supply chain partners. In this stage, partners should hold a common vision of the future as well. The Key Transition from Open-market Negotiation to Collaboration

Open Market Negotiations	Cooperation	Coordination	Collaboration
Price-based discussions	Fewer supplies	Information linkages	Supply chain integration
Adversarial relationships	Longer-term contracts	WIP linkages	Joint planning
		EDI exchange	Technology sharing

Source: (Spekman *et al.*, 1998). Many empirical studies have categorized the types of supply chain integration and tested the usefulness of these integration efforts. Most simply, some researchers (Gustinet *et al.*, 1995; Daugherty *et al.*, 1996; Stock *et al.*, 2000; Stank *et al.*, 2001) categorized supply chain integration into two dimensions — internal integration and external integration. (Gustinet *et al.*,

1995) have mentioned the importance of linking traditional logistics functions such as transportation and warehousing internally. Additionally, it must be possible for logistics to communicate with other functional areas inside the firm such as production and marketing. The argument goes on that externally the firm must be connected with other channel members including suppliers, customers, and third-party providers. Similarly, (Daugherty et al, 1996) have stated that “internally, supply chain management involves working to achieve a seamless integration of logistics with other functional areas.” The business philosophy also requires trading partners and service companies jointly to plan, execute, and coordinate logistical performance. (Stock *et al.*, 2000) have explained that internal integration is the logistics integration across functional boundaries within a firm and external integration means the integration of logistics activities across firm boundaries. (Stank *et al.*, 2001) have emphasized the collaborative dimension of internal and external integration. (Kahn and Mentzer, 1996, 1998) and (Stank *et al.*, 1999) have concentrated on intra-company relationships, particularly interdepartmental integration. They proposed two types of activities for the integration: interaction/communication related activities and collaboration-related activities. According to (Stank *et al.*, 1999), the former involves the formal coordination of a range of interdepartmental activities to minimize misconceptions and misunderstandings between departments through routine meetings, planned teleconferencing calls, memoranda, and the flow of standard documentation. The latter involves unstructured, largely informal interdepartmental teamwork. In contrast, in this view, it is a voluntary process where two or more departments’ work together sharing resources and seeks to achieve collective goals. Meanwhile, (Larson, 1994) examined the relationship between inter-organizational functional integration and total costs. In his work, inter-organizational functional integration was defined as buyer/supplier cooperation in performing activities necessary to create utility. (Morash, 2001) emphasized demand-management capabilities, namely collaborative integration with key customers. Such customer closeness strategies can aid business strategies of differentiation through high levels of value-added customer service, proactive quality and collaborative communications and interactions with customers. Concerning the integration stage, (Bowersox and Closs, 1996) and (Morash, 2001) remarked that intra-organizational process integration might be a preliminary requirement for subsequent successful inter-organizational integration with suppliers and customers. (Morash and Clinton, 1998) categorized supply chain integration into intra-organizational integration and inter-organizational integration, and then re-categorized inter-organizational integration into collaborative form and operational form. In thi

categorization, an intra-organizational form is a company's cross functional process integration within the firm such as between production, logistics, and marketing. Secondly, inter-organizational collaborative integration refers to a company's collaborative closeness of relationships with customers and suppliers including collaborative forecasting, collaborative scheduling, or sharing capacity. Thirdly, inter-organizational operational integration can also entail operational integration such as optimizing inter-company material flows. (Bowersox *et al.*, 1999) introduced six critical areas of competence that top firms deploy to achieve supply chain logistics integration as follows: (1) customer integration (segmental focus, relevance, responsiveness, flexibility); (2) internal integration (cross-functional, unification, standardization, simplification, compliance, structural adaptation); (3) material and service supplier integration (strategic alignment, operational fusion, financial linkage, supplier management); (4) technology and planning integration (information management, internal communication, connectivity, collaborative forecasting and planning); (5) measurement integration (functional assessment, activity-based and total cost methodology, comprehensive metrics, financial impact); and (6) relationship integration (role specificity, guidelines, information sharing, gain and risk sharing).

## **2.5 Integrated Logistics and Supply Chain Management on Firm Performance:**

Many empirical studies found positive relationships between integrated supply chain management and various sorts of performance. An empirical study by (Larson, 1994) reported a significant relationship between inter-organizational functional integration and total costs. In particular, physical distribution/logistics was found a leader in promoting functional integration. (Gustinet *et al.*, 1995) showed that significant improvements in profitability could be realized through logistical integration. According to this work, integration helps to minimize the build-up of inventory at critical business interfaces and at the same time improves transport and warehouse asset utilization and eliminates duplication of efforts. Savings which result from increased efficiency and productivity can then be used to enhance logistics service quality. (Daugherty *et al.*, 1996) found that integrated firms showed more success in improved customer service, quality improvements, productivity improvements, reduced costs, improved strategic focus and cycle time reductions than non-integrated firms. (Morash and Clinton, 1997) found that structural integration of the supply chain, such as operational coordination and information sharing had the effect of reducing transportation time and consequently total supply chain costs. Similarly, (Morash and Clinton, 1998) also found that a competitive market strategy of total cost reduction was best supported by an operationally excellent

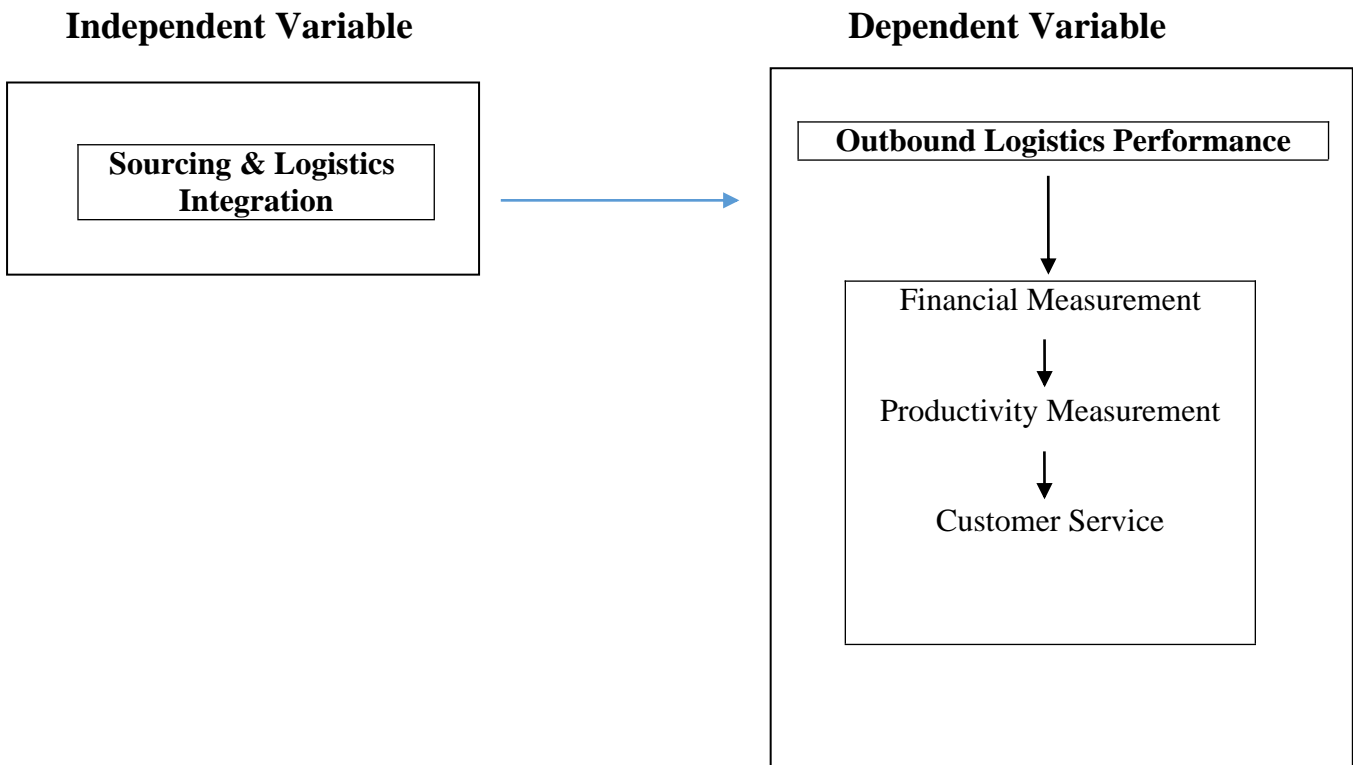
supply chain while differentiation was best supported by a collaborative relationship with customers and partners. (Stank and Traichal, 1998) showed that functional integration had a strong relationship with manufacturers' overall logistical flexibility. (Stank *et al.*, 1999) empirically showed that there were positive associations between the frequency of collaborative integration of marketing and logistics departments and between logistics managers' perceptions of the effectiveness of the relationship between departments, as well as, departmental performance relative to competitors. (Ellinger *et al.*, 2000) have stated that "integrated logistics management mainly focuses on coordinating all logistics activities in a system that will simultaneously attempt to minimize total distribution costs and maintain desired customer service levels". They showed that the ability to accommodate the specific service requests were significantly higher for integrated firms than for non-integrated firms on seven of the eight service requests. Similarly, (Stank *et al.*, 2002) found that synchronized logistical activities amongst supply chain members could create value for end customers by reducing costs related to redundancy and duplication. However, some empirical studies have shown that few companies are actually engaged in extensive supply chain integration. According to (Levy, 1995), under the complex, dynamic system, if one element of a supply chain is disrupted it generates a sequence of changes and adjustments in other parts of the system. Through an empirical study of the personal computer industry, (Levy, 1995) showed that demand-related disruptions were the most important source of instability in the supply chain.

(Hertz, 2001) found that a higher degree of integration in the relationship led to higher inertia, greater risk and higher costs associated with dissolution. According to (Fawcett and Magnan, 2002), although SCM has achieved much credibility as a viable competitive practice, in practice, many companies place most of their SCM emphasis on improving integration just within their own organization. Many managers express skepticism about true integration since it is tantamount to giving up 'sovereignty' and has the potential to constrain the company's ability to respond quickly to significant changes in the competitive environment. They also show concern that a current supplier may become a potential future competitor or that a current customer will integrate backward into their domain.

## **2.6 Conceptual framework**

Conceptual framework is a set of wide ideas and theories that enables the researcher to identify problems in the study, frame questions and discuss the relevant literature for the study (Stratman & Roth, 2004). The independent variable of the study is sourcing strategy and logistics integration.

According to (Larson, 1994) there is a significant relationship between inter-organizational functional integration and total costs. Thus, integration between CEP sourcing strategy and outbound logistics increase efficiency and productivity can then be used to enhance logistics service quality. The dependent variable of the study is outbound logistics consisting: Financial measure, Productivity measure and customer service measure.



## Chapter Three

### Research Methodology

#### 3.1 Introduction

This chapter deals with the methods that have been used in the research to come up with the findings of the study. The chapter includes research design, population of the study, sampling technique and sample size, methods of data collection, data source, instruments of data collection, description of variables, data analysis and presentation, validity and reliability.

### **3.2 Research Design**

Descriptive research was used to get a clear understanding of how CEP sourcing strategy affects the performance of outbound logistics in the case of Ethiopian airlines. To understand the unique nature of CEP sourcing strategy and its implication on outbound logistics concurrent mixed strategy employed. Thus, as the researcher chooses mixed research approach both quantitative and qualitative data have been used from different sources.

Quantitative method used for data collected through closed end questionnaires and qualitative method used for data obtained through interview and open end questionnaires.

### **3.3 Population**

The target population for the study generally focuses on MRO service and Procurement and supply chain Management division. Directly or indirectly handling of CEP shipment is mainly the responsibility of MRO service and Procurement and supply chain Management division, where the aggregate number of employee from these two responsible divisions is 3200. Due to resource limitation i.e. time and money, the researcher choose to focus on population who have direct participation in handling of CEP shipments from point of sourcing until return to the service provide. Accordingly major actors in handling of CEP are 180 employee from 12 aircraft maintenance shop and 6 sections from procurement and supply chain management.

### **3.4 Sampling Technique and Sample Size**

A stratified random sampling technique was used to select participants from the target population. The main reason for using this sampling technique is because of the population from which a sample was drawn did not constitute a homogeneous group; the target population was classified to the strata (Aircraft mechanics, Procurement & Logistics officers, section team leaders). For the random sampling techniques a lottery method without replacing the selected sample was employed to randomize the selection process.

In order to make the research complete it is very essential to make sure that the sample size represents the population very well. Thus, the researcher used 95% of confidence which show level of confidence correct reply collected from the participant and 3% margin of error that describes the answer received from the sample is to the “true value” is in the population. The researcher make the

margin error 3% is to get answer closer to the exact at a given confidence level. The participant distribution probability used to calculate sample size is 50% due to the fact participant has equal chance for each question. Accordingly sample calculator software used to calculate the sample size and 155 chosen.

$$\text{Sample Size} = \frac{Z^2 \cdot p(1-p)}{e^2} \quad \text{Population size} = N$$

$$\text{Margin of error} = e$$

$$\text{Z-score} = Z$$

$$e^2 N$$

### 3.5 Data Sources

The data for the study was obtained from both primary and secondary sources. Primary data was collected from respondents (Aircraft mechanics, Procurement & Logistics officers, section team leaders) through questionnaire and interview. Secondary data was obtained from Standard Operating Procedure, Policies, HR record, Periodic reports.

### 3.6 Instruments of data collection

In this study, a survey-based questionnaire was developed and appraised by focused group joined by team leaders, managers, and director from key CEP stakeholders. Accordingly questionnaire were distributed in various section of procurement and supply chain management division as well as different MRO shops and hangars to capture the perception and judgment of the concerned stakeholders who working in this domain. Invitations to participate in the survey requested responses from those experts who have experienced in this field of supply chain and MRO service.

The researcher framed the questionnaire based on 5-point likert scale, where 1 meant “strongly disagree” and 5 meant “strongly agree”. E-mail & personal shop visit survey questionnaire was used as the research instrument. The questionnaire focused on CEP sourcing strategy and outbound logistics performance related factors that clarified the literature review. Also semi structured interview were conducted with Team leaders and managers at different PSCM sections and MRO shops and hangars in order to capture their opinion about the CEP sourcing strategy and the overall impact at their respective area.

### 3.7 Method of data analysis

In this research, the raw data captured by a questionnaire in word format sheet and this sheet were then converted into statistical software package SPSS (Statistical Packages for Social Science) version 20 and analyzed quantitatively. The data from open ended questionnaires and from interviews has been analyzed qualitatively. Both descriptive and inferential statistics have been employed to summarize and draw conclusions about the population from the sample data. Analyzed data converted and shown in the form of table and graph.

### 3.8 Description of variables

The dependent and independent variables for the study has been identified. The Dependent variables are financial impact (role of Logistics in value creation), productivity (logistics resource utilization) and customer service. The independent variable is sourcing strategy and logistics integration.

### 3.9 Validity and reliability

Reliability is the degree to which an assessment tool produces stable and consistent results (William, 2006) Accordingly the internal consistency and reliability of Sourcing strategy practice and outbound logistics performance were assed with Cronbach’s Alpha and the reliability value greater than 0.70 and according to (Liam Healy, 2010) reliability coefficient greater than 0.70 is acceptable.

**Table 3.1 Reliability analysis**

Variable	Reliability
<b>1. CEP Sourcing &amp; Logistics Integration</b>	
• CEP Sourcing and Logistics Integration	$\alpha = 0.894$
<b>2. Outbound Logistics Performance</b>	
• Financial Measures	$\alpha = 0.988$
• Productivity Measures	$\alpha = 0.992$
• Customer Service Measures	$\alpha = 0.994$

### Analysis of Validity

(Malhotra, 2010) mentioned about three types of validity in his study: content validity, predictive validity, and construct validity. This study addressed content validity through the review of literature and conducting open discussion with CEP stakeholders mainly, Shop foremen, Section team leaders and Management staffs regarding Sourcing strategy and logistics integration towards outbound logistics performance.

## **Chapter Four**

### **Result, Discussion and Interpretation**

#### **4.1 Introduction**

In this chapter the data collected through questionnaire and interview is processed with statically software package SPSS. A total of 155 questionnaires were distributed and collected. A structured interview has also been conducted with Team leaders and managers at different PSCM sections and MRO shops and hangars in order to capture their opinion about the CEP sourcing strategy and the overall impact at their respective area. Accordingly, descriptive statics and correlation analysis used to evaluate the effect and interdependency of variables.

## 4.2 Correlation Analysis between sourcing strategy and logistics integration and outbound logistics performance

Here correlation measured between two independent variables (sourcing & logistics disintegration and using of multiple forwarder) and four dependent variable (Shipment status, POD availability, rush order and late return penalty) analysis as follows;

Table 4.1 correlation between dependent and independent variables

		Flexible FF	Shipment status	Late penalty	Rush order	Shipment POD	Sourcing & logistics disintegration
Flexible FF	Pearson Correlation	1	-.355**	-.150*	-.427**	.423**	.649**
	Sig. (2-tailed)		.000	.013	.000	.000	.000
	N	155	155	155	155	155	155
Shipment status	Pearson Correlation	-.355**	1	-.314**	-.268**	-.770**	.185*
	Sig. (2-tailed)	.000		.000	.001	.000	.021
	N	155	155	155	155	155	155
Late penalty	Pearson Correlation	-.150*	-.314**	1	.098	.081	-.435**
	Sig. (2-tailed)	.013	.000		.227	.317	.000
	N	155	155	155	155	155	155
Rush order	Pearson Correlation	-.427**	-.268**	.098	1	.407**	-.649**
	Sig. (2-tailed)	.000	.001	.227		.000	.000
	N	155	155	155	155	155	155
Shipment POD	Pearson Correlation	.423**	-.770**	.081	.407**	1	.027*
	Sig. (2-tailed)	.000	.000	.317	.000		.013
	N	155	155	155	155	155	155
Sourcing & logistics disintegration	Pearson Correlation	.649**	.185*	-.435**	-.649**	.027*	1
	Sig. (2-tailed)	.000	.021	.000	.000	.013	
	N	155	155	155	155	155	155

- Sourcing & logistics integration and late return penalty:** Since most respondent expressed their disagreement regarding sourcing and logistics integration while evaluate CEP agreement. Referring to table 4.1, the correlation between Sourcing & logistics integration and late return penalty is -43.5 percent. This implies when sourcing & logistics integration decrease late return penalty will increase significantly.
- Sourcing & logistics integration and Rush order:** referring to table 4.1, the correlation between Sourcing & logistics integration and rush order is -64.9percent. This implies when Sourcing & logistics integration decreased rush order will increased by 64.9 percent also when

rush order increase outbound logistics need to deploy extra resource to fulfill rush requirement.

- Sourcing & logistics integration and Shipment status update:** referring to table 4.1, the correlation between Sourcing & logistics integration and shipment status update is 18.5 percent. Here, there is a direct correlation between the two variables, when sourcing and logistics integration decrease shipment status update for user also decrease with 18.5 percent.
- Multiple/flexible FF and late return penalty:** referring to table 4.1, the correlation between Multiple/flexible FF and late return penalty is -15 percent. Here there is indirect correlation between the two variables, when multiple/flexible FF usage decreased late return penalty will increase. Thus, this implies using single freight forwarder for outbound CEP shipment contributes for the result of late return fee penalty.
- Multiple/flexible FF and Shipment POD:** referring to table 4.1, the correlation between Multiple/flexible FF and shipment POD is 43.23 percent. There is a direct relationship between these variables. This implies when usage of multiple FF increased shipment POD will also increase with 43.23 percent. Thus, using multiple freight forwarders will expedite proof of delivery for outbound CEP shipment.

### 4.3 Descriptive Statistics Data Analysis

Referring table 4.2 descriptive statics used to review the mean, standard deviation and variance of participant response for major variables. Analysis as follows;

Table 4.2 Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
Rush order	155	4	5	768	4.95	.208	.043
Late penalty	155	1	5	731	4.72	.642	.412
CEP damage	155	1	4	325	2.10	.579	.335
Document quality	155	1	5	490	3.16	.490	.240
Flexible FF	155	1	5	458	2.95	.607	.368
Shipment status	155	2	5	504	3.25	.609	.371
Shipment POD	155	1	5	573	3.70	.833	.693
Agreement evaluation	155	1	5	331	2.14	.675	.456

Valid N (listwise)	155						
--------------------	-----	--	--	--	--	--	--

- Referring to table 4.2, the mean value for rush order and improper planning is 4.95 out of 5. This indicates rush order and improper planning is the major contributor for shipment delay and late return penalty.
- The mean value for sourcing and logistics integration during CEP agreement evaluation is 2.14, which means most of the respondent disagree with the statement that logistics section is involved during CEP agreement evaluation. This demonstrate logistics section never participated in CEP agreement evaluation rather sourcing section evaluate the agreement by themselves.
- Referring to table 4.2, the mean value for late return penalty is 4.72. This tells us almost all participants believe Ethiopian airlines is paying huge late return penalty due to core return delay.
- The mean value for document quality is 3.16, which implies the average respondent has a neutral opinion on document quality. This justify that there is a quality problem during document preparation.

**Table 4.3 Level of cost effective Logistics service**

**Descriptive statistics**

Outbound logistics give cost efficient service	Frequenc y	Percent
Disagree	129	83.2
Neutral	10	6.5
Valid Agree	13	8.4
strongly agree	3	1.9
Total	155	100.0

As shown on table 4.3, 83.2 percent of the respondents believe the logistics service being provided by outbound logistics is cost ineffective. Which implies the aggregate logistics cost the company incurred is much higher than the value created.

**Table 4.4 Cost saving awareness**

**Descriptive statistics**

Outbound Logistics staff well aware of cost saving area but less sensitive		Frequency	Percent
Valid	Neutral	11	7.1
	Agree	143	92.3
	strongly agree	1	.6
	Total	155	100.0

Referring table 4.4, 92.3 percent of the respondents agree that outbound logistics staffs are well aware of cost saving area in the section. However, even though outbound logistics staff are well aware of cost saving areas they are less sensitive for logistics expenses.

**Table 4.5 Cost advantage from current Freight Forwarder**

**Descriptive statistics**

Ethiopian enjoy cost advantage from current Freight Forwarder		Frequency	Percent
Valid	strongly disagree	1	.6
	Disagree	129	83.2
	Neutral	9	5.8
	Agree	9	5.8
	strongly agree	7	4.5
	Total	155	100.0

From the total population, 83.2 percent of the respondents disagree with the fact that the current agreement with freight forwarders gives cost advantage for the company. This show Ethiopian is not enjoying cost advantage from the existing agreement with freight forwarders.

In addition, most of the respondents, i.e. 83.2 percent, believe freight forwarders selected for inbound and outbound CEP shipments are not similar. This is mainly because inbound shipments believed very critical and high priority logistics service bought from another freight forwarder.

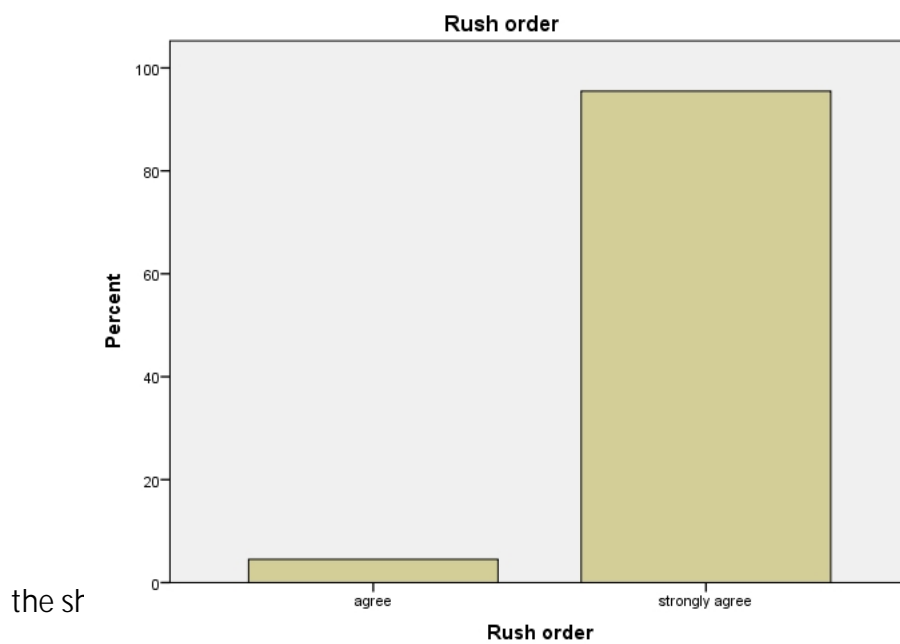


Chart 4.1 Rush Order

95.5% of the respondent strongly agree that improper planning and rush order lead Ethiopian airlines to unnecessary logistics cost. In aviation industry every rush orders result in additional logistics cost, sometimes even bigger than the value of

the st

Table 4.6 Logistics

**Information System**

**Descriptive statistics**

There is no logistics information system to track shipment status		Frequency	Percent
	strongly disagree	1	.6
	Disagree	133	85.3
Valid	Neutral	2	1.3
	Agree	9	5.8
	strongly agree	1	.6
	Total	156	100.0

85.5 percent of the respondents agree there is no logistics information system in place to track each and every logistics costs. Thus, lack of system to track logistics cost will result in omission of significant costs, which leads the company to financial loss

**Table 4.7 Late Return Penalty**

**Descriptive statistics**

Ethiopian airlines not paying huge late return fee for CEP core return delay.		Frequency	Percent
Valid	strongly disagree	127	81.9
	Disagree	1	.6
	Neutral	12	7.7
	Agree	6	3.9
	strongly agree	9	5.8
	Total	155	100.0

Most of the respondent, i.e. 81.9 percent, strongly disagree with the statement that Ethiopian airlines not paying huge late return fee for CEP core return delay. This illustrates that the company is being penalized huge amount of late return fee due to poor core return performance.

Underneath report generated by strategic sourcing technical department shows sections annual contribution for CEP delay and late return fee. According to the report, Ethiopian airlines paying average of 450,000 USD per year for late return penalty. Per the report, outbound logistics is the 2<sup>nd</sup> major contributor for late return fee next to maintenance section.

**Table 4.8 CEP delay contribution**

**CEP delay contribution**

Section	Late return fee in USD			Total Late return fee	Late return fee contribution in %
	2013	2014	2015		
Maintenance	180,042	190,000	210,000	580,042	43.45
Inbound Logistics	24,674	12,000	21,046	57,720	4.32
Outbound Logistics	156,243	149,676	164,910	470,829	35.27
Warehouse and Inventory	90,312	41,071	94,967	226,350	16.96
Total	451,271	392,747	490,923	1,334,941	100

**Table 4.9 Staffs competency level**

**Descriptive statistics**

Outbound logistics staff are competent	Frequency	Percent
disagree	1	.6
neutral	140	90.3
agree	14	9.0
Total	155	100.0

Based on the survey, 90.3 percent of the participant’s responded neutral, which implies the competency level of outbound logistics staffs, is average. Furthermore, below skill matrix chart illustrates the experience level of staffs at outbound logistics. As per chart 4.2, 50 percent of the staff in the section has less than one year experience, refereeing logistics management progression scheme employee with less than one year experience not qualified to handle CEP shipments. This demonstrates most of outbound CEP shipments being handled by junior staffs.

Chart 4.2 Outbound Logistics Employee Service Year

**Table 4.10 CEP shipment damage due to poor package**

**Descriptive statistics**

No CEP shipment damaged due to poor package	Frequency	Percent
Valid Strongly disagree	9	5.8
Disagree	132	85.2
Neutral	4	2.6
Agree	10	6.5
Total	155	100.0

Out of the total respondents, 85.2 percent of them disagree with the statement, no CEP shipment damaged due to poor package. Also, as shown on table 4.11 89.7percent respondents have neutral opinion regarding no CEP shipment delayed due to wrong labeling. This shows that there are CEP shipments damaged during transit because of poor package. Similarly there are CEP shipments delayed or lost in transit due to wrong labeling which puts the performance of outbound logistics in question.

**Table 4.11 Shipment Miss labeling**

**Descriptive statistics**

No shipment delay due to mislabeling	Frequency	Percent
Valid strongly disagree	1	.6
Disagree	9	5.8
Neutral	140	89.7
Agree	1	.6
Total	156	100.0

As shown on table 4.12, 82.7 percent of the respondents believe CEP shipments are also delayed due to pre alert message and documents not being provided to freight forwarders and destination offices

in timely manner. This problem has also been raised and discussed through the structured interview with team leaders and managers.

**Table 4.12 Pre alert Document**

**Descriptive statistics**

No shipment delay due to lack of pre alert document		Frequency	Percent
Valid		1	.6
	strongly disagree	10	6.4
	Disagree	129	82.7
	Neutral	13	8.3
	Agree	3	1.9
	Total	156	100.0

**Table 4.13 Paper Work Quality**

**Descriptive statistics**

Quality of paper work prepared by outbound logistics staff		Frequency	Percent
Valid	strongly disagree	9	5.8
	Disagree	2	1.3
	Neutral	8	5.2
	Agree	133	85.8
	strongly agree	3	1.9
	Total	155	100.0

As shown on table 4.13, majority of the respondents, i.e. 85.8 percent, agree with the statement, quality of paper work prepared by outbound logistics (AWB, DGD, and shipping documents) for CEP shipments are good. However, comment from some respondent’s shows that there are still some CEP shipments delayed at destination due to wrong paper work. This implies quality of paper work has contribution for CEP delay.

**Table 4.14 Shipment Follow Up**

**Descriptive statistics**

End to end shipment follow up		Frequency	Percent
Valid		1	.6
	strongly disagree	9	5.8
	Disagree	1	.6
	Neutral	136	87.7
	Agree	4	2.6
	Total	151	100.0

strongly agree	4	2.6
Total	155	100.0

87.7 percent of the respondents had reservation on the statement that outbound logistics have end to end CEP shipment follow up and replied neutral for the statement. This implies there is a gap in following outbound CEP shipments, which increases the transit time. Beside shipment followup, some participant raised their concern about limited working hour at outbound logistics. CEP shipments require 24/7 service for follow up and physical movement. However, the section works standard office hours and this result in some CEP shipments being treated as stranded until section resume works at the normal schedule.

**Table 4.15 Shipment status**

**Descriptive statistics**

Shipment status updated for user timely		Frequency	Percent
Valid	Disagree	1	.6
	Neutral	127	81.4
	Agree	14	9.0
	strongly agree	13	8.3
	Total	155	99.4
Missing	System	1	.6
Total		156	100.0

Referring table 4.15, 81.9 percent of the respondents have a reservation on the statement that CEP shipment status is updated to user in timely manner and replayed neutral. This implies mostly CEP shipment status is provided to user upon demand and delay in replaying for customer request observed. In this regard, system underutilization also observed.

**Table 4.16 Customer Complain Handling**

**Descriptive statistics**

Customer complain handled properly	Frequency	Percent	
strongly disagree	10	6.5	
Disagree	130	83.9	
Valid	Neutral	12	7.7
	Agree	3	1.9
	Total	155	100.0

Referring to table 4.16, 83.9 percent of the respondents believe customer feedback collected with structured survey and real time feedback. However, there is no established system to address identified gaps and customer requests in timely manner. This implies customer complaints are not being addressed on time, which affects the sections customer satisfaction level.

**Table 4.17 POD Update on the System**

**Descriptive statistics**

Proof of delivery updated on the system	Frequency	Percent
strongly disagree	9	5.8
Disagree	8	5.2
Neutral	6	3.9
Agree	130	83.9
strongly agree	2	1.3
Total	155	100.0

Majority of the respondents i.e. 83.9 percent agreed with the fact that proof of delivery is updated on Maintenix system immediately after CEP shipments are delivered to service providers and freight forwarder avail the POD. However, some respondent comment, sometimes there is a time gap between shipment delivery to service provider and securing POD from freight forwarder. This implies communication gap between freight forwarder and outbound logistics.

**Table 4.18 CEP agreement**

**Descriptive statistics**

All CEP stakeholder know and effectively utilize CEP agreement	Frequency	Percent
strongly disagree	134	86.5
Disagree	5	3.2
Neutral	11	7.1
Agree	4	2.6
strongly agree	1	.6
Total	155	100.0

86.5 percent of the respondents strongly disagree with the statement; all CEP stakeholders know and effectively utilize CEP agreement with service providers. This disagreement supports the idea of strategic sourcing and outbound logistics disintegration.

The survey result also illustrates, most CEP stakeholders have limited awareness about core return delay and late return penalty. Accordingly, these disintegration and lack of awareness resulted in huge late return penalty fees for the past five years.

**Table 4.19 Sourcing and Logistics Integration**

**Descriptive statistics**

Logistics and sourcing department work together during supplier evaluation		Frequency	Percent
Valid	strongly disagree	10	6.5
	Disagree	129	83.2
	Neutral	13	8.4
	Agree	2	1.3
	strongly agree	1	.6
	Total	155	100.0

As shown on table 4.19, majority of the respondent i.e. 83.2 percent disagree with the idea of logistics and sourcing department working together during supplier evaluation. This signifies logistics department is not involved in CEP service provider evaluation and sourcing department conducts the evaluation on their own.

**Table 4.20 Area of focus during agreement evaluation**

**Descriptive statistics**

Logistics is one of the major focus area while supplier evaluation sourcing		Frequency	Percent
Valid	strongly disagree	9	5.8
	Disagree	131	84.5
	Neutral	2	1.3
	Agree	11	7.1
	strongly agree	2	1.3
	Total	155	100.0

In addition, per the feedback from the survey, 84.5percent of the respondents believe logistics is not sourcing department major focus area while evaluating service provider. During the review of secondary data the researcher learnt that, there is no standard procedure that enforce sourcing department to consult logistics department during supplier evaluation. This implies logistics and sourcing integration is very poor.

## Chapter Five

### Summary, Conclusion and Recommendation

#### 5.1 Summary of Findings

- 100% of the participants believe 7days is not feasible to return core unit to service provider since a lot of activities need to be performed at each section. If we sum up the processing time required at each section strictly, the required turnaround time is more than 7days. Accordingly the average suggested turnaround time for the return of core unit is 10days.
- Per the feedback from logistics management staffs, the delivery term stipulated on the agreement doesn't consider the cost implication and capability of outbound logistics. Even

some delivery locations are out of our logistics coverage area, which require additional transit time and logistics cost. To this effect the delivery term for CEP shipments impact the performance of outbound logistics.

- CEP agreement not accessible for all stakeholders and as a result concerned stakeholders doesn't know what is their duty and responsibility.
- All participants believe sourcing and logistics integration has a significant impact on core return delay and late return penalty. Since outbound logistics contribution for core return delay is very significant, disintegration between sourcing and logistics will result in core return delay and penalty. Most participants from logistics section underline lack of logistics participation at the initial stage of CEP agreement evaluation is the major reason for core return delay and subsequent penalty.
- Majority of participants believe there is a wide range of awareness gap at different sections that are involved directly or indirectly in CEP process. This lack of awareness contributed for the overall delay of CEP shipments. As a process owner, CEP awareness is supposed to be conducted by strategic sourcing department in coordination with major CEP stakeholders.

## 5.2 Conclusion

CEP sourcing strategy is one of the best sourcing strategy in aviation industry in terms of fulfilling MRO part requirement within short time window, sometimes even within hours. In addition the best of this strategy is its swift response for AOG requirement without holding spare inventory, which increase the company financial solvency by avoiding inventory carrying cost.

Despite the fact that CEP sourcing strategy is one of the best sourcing strategy in aviation industry, which offered operational efficiency and financial benefit to the company, yet terms and conditions stipulated in the agreement affecting outbound logistics performance which intern lead the company to pay hundreds of thousands of dollars as late return penalty.

Based on the collected data and analysis made the researcher draw the below conclusion.

Due to the disintegration between sourcing and logistics department, CEP service providers are evaluated and selected by sourcing department alone, even logistics terms and condition of the agreement are evaluated and approved without consulting logistics department. As a result of this disintegration, Ethiopian airlines committed to return core unit within 7 days and accordingly outbound logistics forced to finalize its tasks within 2 days. However, the research result show 2days is not enough to perform all outbound logistics tasks and outbound logistics performance hampered as a result of this CEP agreement. Below are major outbound logistics performances that are affected due to CEP agreement;

- Multiple rush-orders handled every day which contributes for error in document preparation, labeling, packing and missing pre alert messages and documents.
- Failure to meet the target 2 days which makes outbound logistics the second major contributor for late return penalty amounting to 156,000 USD every year.

Another term of agreement that affect outbound logistics is the delivery location. Since some CEP service providers are located at offline stations, additional logistics charge is incurred. As a result, below major outbound logistics activities are affected;

- Additional transit time required to deliver the shipment at the agreed destination, which create delay and finally late return fee
- Delay in POD, which result late return penalty
- Unnecessary additional logistics cost

Beside the disintegration in sourcing CEP service provider and evaluating agreement there are weakness observed from outbound logistics side, these are;

- There is no check point to inspect outbound CEP shipments from possible error in documentation, packing and labeling
- Staffs lack of attention due to 50% of workforce in the section is junior.
- CEP shipments processed during office hour only, as a result CEP shipments ready for shipments during off hour and weekend will be stranded until the section resume work.
- Multiple freight forwarder not being used, only one forwarder used to handle outbound CEP shipments.

Therefore, the researcher believes due to the misalignment between sourcing and outbound logistics section the later sections performance is highly affected and sequentially resulting in Ethiopian airlines paying 450,000 USD every year in the form of late return penalty.

### 5.3 Recommendation

- Existing SOP for strategic sourcing department should be revised to include; 1) logistics department should participate in supplier evaluation and evaluating logistics term and endorse the final draft before signature. 2) Logistics should be included as one major selection criteria and certain weight should be allocated.
- Whenever there is agreement revision or supplemental agreement required, logistics term must only be reviewed and qualified by logistics department.
- To avoid misinterpretation of CEP agreement awareness session should be conducted by sourcing department for all stakeholders that are directly or indirectly involved in CEP process.
- Disseminate all sourcing agreement to all concerned for their easy of reference and proper utilization.
- Approach existing CEP service providers and negotiate to increase core return date from 7 days to 10 days and above. If service providers are not willing to lift the lead-time to 10 days and above then look for another service provider who can meet the call.
- To provide off hour support and expedite outbound CEP shipment, working hour for outbound logistics should be maximized from office hour to 24/7.
- Multiple freight forwarders should be used for outbound CEP shipments like that of inbound CEP shipments.
- Based on Cost and efficiency, freight forwarders should be selected and agreement signed for each CEP destination.
- Outbound logistics should use special logistics service with extra fee if logistics cost is cheaper than late return penalty.
- Outbound logistics should use EDI (electronic data interface) with freight forwarders to get real-time shipment status and proof of delivery (POD)
- Outbound logistics should alert all logistics chain members including freight forwarders.
- Before shipment leaves outbound logistics dock, packing and labeling integrity, document quality and pre alert message should be inspected and confirmed.

## Reference

- Bowersox, D. J., Closs, D. J. and Stank, T. P. (1999) 21st Century Logistics: Making
- Coyle, J. J., Bardi, E. J. and Langley, C. J. (2006) the Management of Business, Logistics; A Supply Chain Perspective. 7th Edition. South-Western pp 442.
- Cp. Pfohl, H.-Chr. (2004), Council of Logistics Management, Oak Brook, IL.p. 167.
- Daugherty, P. J., Ellinger, A. E. and Gustin, C. M. (1996) Integrated logistics:achieving logistics performance improvements. Supply Chain Management, Vol. 1,No. 3, pp. 25-33.

- Ellinger, A. E., Daugherty, P. J. and Keller, S. B. (2000) The relationship between marketing/logistics interdepartmental integration and performance in U.S. manufacturing firms: An empirical study. *Journal of Business Logistics*, Vol. 21, No.1, pp. 1-22.
- Ethiopian airlines, logistics management progression scheme, (2016).
- Gustin, C. M., Daugherty, P. J. and Stank, T. P. (1995) The effects of information availability on logistics integration. *Journal of Business Logistics*, Vol. 16, No. 1, pp.1- 21 .
- Hertz, S. (2001) Dynamics of alliances in highly integrated supply chain networks. *International Journal of Logistics; Research and Applications*, Vol. 4, No. 2, pp. 237-256.
- Kahn, K. B. and Mentzer, J. T. (1996) Logistics and interdepartmental integration. *International Journal of Physical Distribution & Logistics Management*, Vol. 26, No.8, pp. 6-14.
- Kahn, K. B. and Mentzer, J. T. (1998) Marketing's integration with other departments. *Journal of Business Research*, Vol. 42, No. 1, pp. 53-62.
- Kemppainen, K. and Vepsäläinen, A. P. J. (2003) Trends in industrial supply chains and networks. *International Journal of Physical Distribution & Logistics Management*, Vol. 33, No. 8, pp. 701-719.
- Kotabe, M. and Swan, K. S. (1994) Offshore sourcing: Reaction, maturation, and consolidation of U.S. multinationals. *Journal of International Business Studies*, Vol.25, No. 1, pp. 115-140.
- Larson, P. D. (1994) An empirical study of inter-organizational functional integration and total costs. *Journal of Business Logistics*, Vol. 15, No. 1, pp. 153-169.
- Levy, D. L. (1995) International sourcing and supply chain stability. *Journal of International Business Studies*, Vol. 26, No. 2, pp. 343-360.
- Lisa Terry, (2012) , *Airbus Aerospace Logistics, Global Market Forecast 2013-2032*
- Matiwos Ensermu (2013) *Logistics and supply chain management*, pp 45-61
- Morash, E. A. (2001) Supply chain strategies, capabilities, and performance. *Transportation Journal*, Vol. 41, No. 1, pp. 37-54.
- Morash, E. A. and Clinton, S. R. (1998) Supply chain integration: Customer value through collaborative closeness versus operational excellence. *Journal of Marketing Theory and Practice*, Vol. 6, No. 4, pp. 104-120.
- Moxon, R. W. (1975) The motivation for investment in offshore plants: The case of the U.S. electronics industry. *Journal of International Business Studies*, Vol. 6, No. 3, pp. 51-66.

- Samli, A. C., Browning, J. M. and Busbia, C. (1998) The status of global sourcing as a critical tool of strategic planning: Opportunistic versus strategic dichotomy. *Journal of Business Research*, Vol. 43, No. 3, pp. 177-187.
- Spekman, R. E., Kamauff, J. W. and Myhr, N. (1998) An empirical investigation into supply chain management: A perspective on partnerships. *International Journal of Physical Distribution & Logistics Management*, Vol. 28, No. 8, pp. 630-650.
- Stank, T. P., Daugherty, P. J. and Ellinger, A. E. (1999) Marketing/logistics integration and firm performance. *The International Journal of Logistics Management*, Vol. 10, No. 1, pp. 11-24.
- Stank, T. P., Keller, S. B. and Daugherty, P. J. (2001) Supply chain collaboration and logistical service performance. *Journal of Business Logistics*, Vol. 22, No. 1, pp. 29-48.
- Stock, G. N., Greis, N. P. and Kasarda, J. D. (2000) Enterprise logistics and supply chain structure: the role of fit. *Journal of Operations Management*, Vol. 18, No. 5, pp. 531-547.
- Supply Chain Integration a Reality.
- Swamidass, P. M. (1993) Import sourcing dynamics: An integrative perspective *Journal of International Business Studies*, Vol. 24, No. 4, pp. 672-690.
- UPS supply chain solution publication (2005)
- William M.K Trochim, (2006 Liam Healy & association 2010) Chopra, S., 39(2), 123-140, 2003