The Role of Strategic Sourcing on Operational Performance of Maintenance, Repair & Overhaul (MRO); The case of Ethiopian Airlines Group

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DECLARATION

I hereby declare that the thesis entitled: **The Role of Strategic Sourcing in Operational Performance of MRO (Maintenance, Repair & Overhaul)– A Case Study of Ethiopian Airlines Group** which is submitted by me for the partial fulfillment for the award of Degree of Masters of Arts in Logistics and Supply Chain program at Addis Ababa University, School of Commerce is my own original work and has not been submitted earlier either to Addis Ababa University or to any other institution for the fulfillment of the requirement for any course of study.

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CERTIFICATE

This is to certify that this thesis is prepared by **Mekdes Tadele -** a student of the Degree of Master of Arts in Logistics and Supply Chain Program had been working under my supervision and guidance for her project entitled: **The Role of Strategic Sourcing in Operational Performance of MRO – A Case Study on Ethiopian Airlines Group.** She is submitting her genuine and original work and complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ABSTRACT

Strategic sourcing concept and practice is growing at a rapid rate throughout the world because organizations view it as a way to achieve strategic goals, improve customer satisfaction and provide efficiency and effectiveness to operations. This study was guided by the following general objectives: to investigate strategic sourcing current practice and its effect on ET-MRO's operational performance. Both descriptive & explanatory research designs were used to conduct this study. The target population for the study were the employees of Ethiopian MRO business unit and procurement & supply chain management team which are under chief financial officer of the Ethiopian Airlines Group. A sample size of 117 employees, were selected for data collection through questionnaire and additional 5 employees both from management and non-management staff were randomly selected for customized interviews. The collected data from questionnaires and interviews were analyzed using SPSS. To test the validity of the research instruments, the researcher sought expert's opinion from two senior management employees who were not included in the final study and a reliability test was also done using SPSS. The findings from the study were presented in detail using both descriptive as well as inferential statistics. The finding indicated that a gap between strategic sourcing best practice and Ethiopian Airlines current practice especially on supplier selection and management, contract management as well as total cost of ownership consideration. 83% of respondents agree to the question "luck of alignment of strategies while selecting part and service suppliers", showed that selection of suppliers based on company strategy lucks alignments. Based on the respondent's response to the questions and summarized results on the three strategic sourcing functions, the study concludes that ET-MRO'S operational performance is affected by the current strategic sourcing practices. The study pointed out opportunities for improvement on enhancing strategic souring practices. Accordingly, recommendations are provided both for practice and for future studies targeting better operational performance.

Index Terms (Key Words) – Strategic Sourcing, Operational Performance, Supplier Selection, Contract Management, Total Cost of Ownership.

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ACRONYM/ABBRIVIATIONS

AOG - Aircraft on Ground

CFO - Chief Finance Officer

ET - Ethiopian Airlines Group

Ethiopian Weekly –a news release everyday with updates in the Airline activities

KPI - Key performance indicator

MD - Managing Director

MRO - Maintenance Repair & Overhaul

OTP - On Time Performance

P&SCM - Procurement and Supply Chain Management

RFQ - Request for Quotation

TCO - Total Cost of Ownership

Vision 2025 - Ethiopian 20 year's roadmap with clearly defined targets

SS - Strategic Sourcing

TAT - Turn Around Time

CHAPTER ONE
INTRODUCTION

The purpose of this chapter is to introduce the research topic which is made on major strategic sourcing functions and their impact on ET-MRO's operational performance. It presents background information, the problem statement as well as general and specific purposes of the research. This chapter highlights the research questions which area used to get final results, major benefits of the study and its limitation as well as how the report is organized.

1.1 Background of the study

For most of its history, procurement has been focused primarily on transactional processing, with virtually no strategic decision-making responsibilities. The typical purchasing routine has been simple: receive a requisition from the user, place the purchase order with the supplier, expedite when necessary, and resolve invoice discrepancies. Today, this is certainly no longer the case; procurement has evolved into a strategic element in the competitive arsenal of most organizations. There is now a justifiable movement toward centralized control of corporate spending for cost reduction, compliance, and risk management. The recent trend is then the division and migration of the procurement/supply management group into strategic and tactical elements (Sollish and Semanik, 2011).

Strategic Sourcing is an approach to supply chain management that formalizes the way information is gathered and used so that an organization can leverage its consolidated purchasing power to find the right products and services at the right time, from the right source and with the right price. It is one among the critical challenges faced by many firms involved in the latest innovation of supply chain management.

Strategic sourcing is a coordinated effort between the different areas of the organization and external partners. It helps companies to focus on the smart way of investing their resources, in addition it helps to build strategic partnerships and alliances (Xurillo Xavier, 2010). In today's world, firms apply strategic sourcing in order to obtain or sustain competitiveness in world

market. Based on the data collected from 152 firms who are based in USA to study the sourcing capability and advantage, the result reveals that strategic sourcing positively affects firm's performance. (Gargeya & Su, 2012).

Airline industry is one of the toughest operation for success as it is highly affected by the world's highly dynamic environment. Society, Technology, Environment, Economy and Politics are drivers of change for the Airline industry (IATA, 2018).

As the main motive of an airline is to transport passengers and goods from one place to another it is directly affected by changes immerged from globalization, where global competition plays the major role. As a result in order to survive as well as be successful in the aviation industry, airlines usually align their strategy with the dynamic nature of the environment. Here, strategic sourcing plays a major role for better operational performance by considering total supply chain cost, with a good vendor relationship management as well as effective contract administration.

Ethiopian Airlines with its 70+ years of service is currently one of the leading Airline in Africa. As stated by the current Ethiopian Airlines Group CEO, Tewolde Gebremariam, during the year 2017/18 GC, the airline has reported exceptional performance which is also in line with its strategic plan and its vision for the year 2025 (August, 2018). In its history of more than 70 years, the Airline usually report good performance especially compared to its competitors. Although there is no serious failure in the history of Ethiopian Airlines the challenges for success are always there due to the dynamic environment (Ethiopian Weekly Report, 2016).

Ethiopian Maintenance Repair and Overhaul (ET-MRO) is one among the eight business units of Ethiopian Airlines Group which provides Maintenance, Repair and Overhaul support to Ethiopian owned fleets as well as customer owned fleets. ET-MRO is one among the eight business units with a large number of (2800+) employees who are engaged in different MRO activities. Based on the current organization structure, the business unit is composed of Six (6) directors which comes under the Managing Director of Ethiopian MRO. There are also

more than 31 managers under the Six (6) Directors were more than 2500 employees comes under these managers. The Procurement and supply chain management (P&SCM) division is under Chief Financial Officer (CFO), where strategic sourcing is one among eight managers under this division. Strategic sourcing is introduced in Ethiopian Airlines early 2015 with an objective of leading the tactical buying section in order to gain practically expected benefits of strategic sourcing concepts. There are more than 230 employees working under P&SCM where a line share is taken by employees under Warehouse & Inventory with a total of 110+ employees.

ET-MRO is a major segment of Ethiopian Airlines Group where its operational performance directly affects the services given to its customers in terms of safety, quality, time and cost. ET-MRO's Operational performance is measured with the four perspectives of the Balanced Score card: Financial, Customer, Internal Process and Learning & growth or Human Capital as developed by (Kaplan & Norton, 2001). Its performance is continuously measured with the international aviation safety & quality standards set by different international regulatory bodies.

This study suggested that one key strategy to achieve the expected quality as well as targeted OTP (On Time Performance) of ET-MRO's operations, is proper application of strategic sourcing. This is because strategic sourcing activities engaged mainly with creating partnership & alliances that collaborates and share strategies for better performance. Among major strategic sourcing activities; selecting the right supplier who can provide the right price, the right quality and the required product at the right time, creating long term partnership to maintain the required product support, concluding efficient agreements & proper administration of agreed SL (service level) as well Total Cost of Ownership (TCO) consideration by the strategic sourcing section are studied in relation to ET-MRO's operational performances.

Accordingly this study mainly considered timely delivery of aircraft parts, quality of aircraft parts and flexibility of parts support based on sourcing activities mainly supplier selection and management, contract management and total supply chain cost considerations.

1.2 Statement of the Problem

Organizations are operating in an environment characterized by countless economic and political disruptions to their sources of supplies and services. In order to survive in this turbulent marketplace, these organizations must continually monitor their competitive position as well as their internally controllable processes, especially the procurement process (Burt, Dobler & Starling 2003).

From researcher's own experience, ET-MRO's on time performance is usually affected by part related issues which creates delay and cancellation of aircrafts. With this insight the researcher collected a data to further check if there is a real problem on ET-MRO's operation which is created by sourcing practice. Based on the daily flight status report data from ETH line maintenance department it is found out that there are 442 number (322.8 Hr.) delays within six months, which means more than 2 delays per day. When the reasons are filtered to those issues related to material or service, it is found to be 17%. Although the line share of 83% delays and cancellations are created by other reasons mainly related to capacity and capability, this 17% part related problem is significant enough to do this research as the impact of delays and cancellations are directly related to passenger and existence of the Airline as a whole.

In addition to the delay report the information gained from warehouse section is found supportive to further justify the magnitude of part related problems. This is related to those aircraft components that ET-MRO has in-house capability to repair and overhaul them in-house for end use. Such components are usually hold in waiting for part (WFP) area until they get all the required parts (worn and to be replaced piece parts) and sent to different shops for repair and overhaul. Based on the six month data there were a total of 736 components waiting for parts that can be repaired under different maintenance shops. This is a very good indication for the researcher to work hard and identify major causes for the problems and to look for opportunities for improvement related to strategic sourcing activities and then to create a better operational performance.

Table 1.1- Six Months Delay Summary by Fleet Type (Sep. 2018- Feb.2019)

Fleet Type	B787	B777	B767	B737	A350	Total
Total Number of delay	315	1	76	194	50	442
Delays related to part failure	74	0	28	56	14	74
Delays due to other reasons	241	1	48	138	36	368
%	23%	0%	37%	29%	28%	17%
Total delay in hours	178	0	60	56.57	28.23	322.8

***Source –** ET-MRO Line Maintenance Portal

Table 1.2 - Six months WFP summary by respective maintenance shop (Sep. 2018- Feb.2019)

Shop Name (Cost center)	Number of components waiting for part (WFP) (each)
Emergency shop(566)	37
Electric Shop (574)	155
Instrument (575)	17
IFE & Radio Shop (573)	415
Fuel Shop (562)	23
Hydraulic Shop(563)	31
Pneumatic Shop (564)	37
Interior Shop (524)	9
Harness Shop (576)	12

***Source** - P& SCM Portal

Strategic sourcing which is a new strategic approach for procurement process is beyond simply focusing on minimizing the purchase price. Unlike the old purchasing, the new concept of strategic sourcing gives more consideration to total cost of ownership (TCO), sees the very big picture of the overall sourcing of products and services. In addition to sourcing the required part and services from the right supplier, it considers the logistics capacity and process, the partnership for timely support and strategic flexibility, the capability for reliable and the standard quality product, the commonality to standardize product and services. It also considers the long term strategy until alliance development. These all new insights of strategic sourcing, in addition to product and service prices have a greater contribution on the operational performance of firms (Wouters, Anderson, and Wynstra, 2005).

Considering best in class performance on SS, the researcher is very much interested to study on this problem and fill the gaps to identify opportunities for ET'MRO's operational performance improvement.

1.3 Research questions

The study tried to address the following research questions:-

1. How supplier selection affects ET-MRO's operational performance?
2. How contract management affects ET- MRO's operational performance?
3. How total cost of ownership affects ET-MRO's operation performance?

1.4 Research objective

1.4.1 General objective

The general objective of this study is to investigate the effect of strategic sourcing on ET-MRO's operational performance.

1.4.1 Specific objective

- To explain the effect of supplier selection on ET-MRO's operational performance.
- To determine the role of contract management on the quality and delivery of ET-MRO's operation.
- To assess the effects of total supply chain or ownership costs on ET-MRO's operational performance.

1.5 Definition of key terms

1. **Strategic Sourcing (SS) -** In this thesis, the term total cost of ownership is used to refer "*the process of evaluating, selecting and aligning with suppliers or consortiums of suppliers to achieve operational improvements in support to an organization's strategic objectives (Duffe and Koester, 2011)*
2. **Total cost of ownership (TCO)**: In this thesis, the term total cost of ownership is used to refer "*The costs associated to availing a part with 7 R's of procurement-right quality, right price, right quantity, right place, right source & right time "*
3. **Vendor management**: In this thesis, the term vendor management is used to refer *"management of vendors performance who are contracted with Ethiopian Airlines to supply parts and services"*
4. **Quality**: In this thesis, the term quality is used to refer *"The quality of parts and services as provided by part and service suppliers"*
5. **Operational Performance –** In this thesis, the term total cost of ownership is used to refer **"***is the performance of a company or organization against prescribed standards related to the major KPI's Quality, Cost, Time and Agility."*
6. **Maintenance. Repair and Overhaul (MRO):** In this thesis, the term total cost of ownership is used to refer "*is a company which specializes in performing maintenance actions on aircraft and their components, such as jet engines and landing gear (Mike, 2016)".*
7. **Ethiopian MRO:** In this thesis, the term total cost of ownership is used to refer **"***is a company organized and existing under the low of Ethiopia as a subsidiary of* ***Ethiopian Airlines Group*** *with address at Bole International Airport, Addis Ababa, Ethiopia."*

1.6 Significance of the study

The effect of any flight delay either directly or indirectly related to airline operating cost. Cost cutting is among the limited tools that an Airline uses as one strategy to survive on the highly competitive aviation industry. Proper implementation of Strategic Sourcing can help an airline

to save costs and improve operational performance. This study is expected to have practical significance to ET-MRO in this regard. The researcher highly believes that, the results of the study can be used as an input to further assess the impact of strategic sourcing activities towards its operational performance for better results especially in minimizing operational delays. The study can be used to revise or change the strategic sourcing operating procedures and policies considering the good results that can be generated from proper application of strategic sourcing function. The research will also have significance for practitioner and academicians who wish to replicate the study in other sectors engaged with operational activities or those who wants to fill the gaps that has been seen in this research.

1.7 Scope of the study

Geographically the scope of the study is limited to ET-MRO located in Addis Ababa, Ethiopia. The study doesn't include other Airlines in Ethiopia as well as outside of Ethiopia, due to capacity difference as well as proximity problems. Conceptually the study has focused on ET-MRO operational delays caused only due to aircraft part related issues where there are numerous other factors that can affect its operational performance. Accordingly, the study does not cover other reasons which has impacted the operational performance and resulted delay and cancellation of flights. More specifically, the study has focused on the selected three strategic sourcing activities: - supplier selection & supplier relationship management; contract management and total supply chain cost consideration in relation to time, quality and cost of sourced parts respectively. In measuring the operational performance of ET-MRO the study has used delivery (time), adaptability (flexibility) and reliability (quality) as major key performance indicator (KPI)'s.

1.8 Limitation of the study

This study considers total cost of ownership (TCO) as one strategic sourcing function where there are limited studies that consider TCO as one major function of strategic sourcing except taking it as a tool for supplier selection. In addition, most studies of TCO have been conducted in manufacturing firms, with little or no TCO research directed toward service organizations which also limit the study not to be well refined with previous studies to validate results (Krisje, Wendy

& Finn, 2006). On the other hand limiting the TCO concept only to total supply chain cost is also another limitation of the study since the results are based on the narrowed scope of TCO. Strategic Sourcing practices mainly vary between organizations and even with in different MRO's in the aviation industry, as a result the findings and recommendations of this study mainly apply only to ET-MRO's only. This is a limitation of the study that the result couldn't be directly applied to other aviation MRO's without further study.

1.9 Organization of the research report

This study is organized with five chapters. Chapter one is introduction part and it contains background of the study, statement of the problem, basic research questions, objective of the study, significance of the study, research design and methodology, scope of the study, limitation of the study as well as organization of the study. Chapter two is the review of related literatures. This chapter focuses on theoretical as well as empirical review of strategic sourcing and MRO operation related literatures, the conceptual framework used for the study as well as identified literature gaps. The related literatures are reviewed from published books, case studies, Journal articles, conference appears, research reports, Ethiopian Airlines periodically released news, ET-MRO and SS section reports and other internet sources. Chapter three discussed Method used for the study. It deals with type, approach and design of research; the participants of the research; source of data; the data collection instrument used; the procedure of data collection; and the methods of data analysis used. Chapter four is analysis and discussion. It presents the summary of findings from the study and interpreted results. The final chapter is summary, conclusions and recommendations part of the study. It include summary of interpreted results from the findings, the conclusion based on the result, limitation of the study and recommendation.

CHAPTER TWO
RELATED LITERATURE REVIEW

Related literatures about the role of strategic sourcing and its impact on operational performance are reviewed in this chapter. Both theoretical as well as empirical literatures are reviewed and conceptual framework for this study is developed. On the theoretical part of literature review Strategic Sourcing definition, the strategic sourcing concept development, and strategic sourcing significance for operational performance as well as major functions of strategic sourcing considered for this study are included. On the empirical part of the literature review different case studies on related topic are reviewed and summarized. Using this empirical evidences the conceptual frame work of this study is developed. A research gap is also identified and included in this study.

2.1. Theoretical review of strategic sourcing

2.1.1 What is strategic sourcing?

Defining the concept of strategic sourcing is critical in that it ensures various parties embrace a uniform concept of this commercial practice and that the public sector has the same, basic understanding. For this study definitions that are related to the study area are referred.

Strategic sourcing is defined as the collaborative and structured process of critically analyzing an organization's spending and using this information to make business decisions about acquiring commodities and services more effectively and efficiently (Johnson, 2005). A sourcing strategy identifies for a certain category from how many suppliers to buy, what type of relationship to pursue, contract duration, type of contract to negotiate for, and whether to source locally or globally (Van Weele, 2009).

Related to its major contribution to cost saving, Banfield, who led a successful strategic sourcing initiative with the Southern California Edison (SCE) electric company, who has saved more than $150 million per year, defines SS as a management process used to systematically assess purchasing requirements across definitions of strategic sourcing (Banfield's, 1999).

Duffie and Koester, defines strategic sourcing as the process of evaluating, selecting and aligning with suppliers or consortiums of suppliers to achieve operational improvements in support to an organization's strategic objectives. As per Duffie and Koester, 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 (Duffie & Koester, 2005). Strategic Sourcing is a method of managing procurement processes for an organization in which the procedures, methods, and sources are constantly re-evaluated to optimize value to the organization by allowing them to buy more effectively and efficiently. Strategic sourcing, which is considered a key aspect of supply chain management, involves elements such as examination of purchasing budgets and the landscape of the supply market, negotiation with suppliers, and periodic assessments of supply transactions. This process transforms the procurement function from a *tactical* operation to a *strategic* and competitive advantage for the organization (Office of State Procurement, 2015).

2.1.2. Development of strategic sourcing

As stated on the 89th annual international Supply Management Conference, by Engel: "over the past several decades, most of our supply chain profession have transformed from the "purchasing agent" mentality where staying in silos was the norm to evolving into a "supply chain management" atmosphere where working with cross functional and cross locational teams is vital to success. Strategic sourcing is organized since some type of methodology or process is needed; it is collaborative. One essential requirement for any successful strategic sourcing effort is that of getting functional elements other than procurement involved in the decision making and evaluation process (Engel, 2014).

On another relatively recent study made by White, Parfitt, Lee & Jones, the development process of strategic sourcing is explained in different models. These different models from different studies between 1989 and 2006 are summarized in a way that shows the steps from

Non–Strategic procurement to Tactical procurement then to the current Strategic procurement with the historical development of the studies made at different times. Accordingly the latest study stated the step by step development of the modern strategic sourcing which is engaged with value chain integration from the old transactional procurement. **Transactional Orientation -→ Commercial Orientation → Purchasing Coordination → Internal Integration → External Integration → Value Chain Integration** (White, Parfitt, Lee & Jones, 2016).

Based on a study publish on an International Journal of Management and Commerce Innovations, the strategic sourcing development is also reviewed and summarized with three theories as Resource based, Network based and System based theories (Carren, Esther & Antony, 2016).

In general, strategic sourcing which is relatively new supply chain concept is now in good practice by organizations and become their order of the day to achieve their targets, avail the right products and services, from right sources, at the right time and with a minimized total supply chain cost.

2.1.3 The need for strategic sourcing

Strategic sourcing is the most powerful tool a company can deploy to unlock profit, with a huge amount of return on investment. Gargeya & Su has reviewed and clearly indicates in their research that many organizations upgraded their purchasing function to be an integral part of the corporate planning process. These organizations recognized the benefits and competitive advantages associated with integrating purchasing in to strategic planning (Gargeya & Su, 2004).

The benefits of strategic sourcing are expressed by different authors as well as firms in different ways from different perspectives. Harvard Business Review analytical report stated that driving efficiency is among the key benefits that focusing on strategic sourcing brings. Traditionally the primary measure of sourcing effectiveness, achieving cost-savings targets

including hard-dollar savings and soft-cost savings gained through demand management, consolidation, or extraction of additional value (e.g., higher-quality goods, more extensive service or support) is now a baseline requirement for a high-performance sourcing and procurement function (Harvard Business Review, 2017).

Peep T (2018), has stated the benefits of strategic sourcing with the following four elements:-

Increase profit – Every dollar the company saves in procurement goes directly into the Profit/Loss bottom line and adds dollars to the profit. Strategic sourcing systematically looks for savings from the whole supply chain, providing the company with a competitive advantage.

Manage supply risks – Strategic sourcing requires every category of spend and all suppliers to be analyzed. Each existing supplier is evaluated separately for quality risk, financial risk, availability risk, and level of cooperation. Once the risks are identified, you can then take action to avoid or mitigate the risk.

Improve sustainability – Strategic sourcing is not a one-time project or initiative; it is a continuous cycle of activities. Dedicated category managers within the team keeps an eye on category and supplier performance. With every subsequent cycle, they can go deeper to find additional opportunities to bring value to the company.

Get more value out of procurement – Strategic sourcing does not mean you are looking solely for quick cost cuts. Every action taken during your strategy implementation is evaluated using the following criteria: Does it provide more value at the same cost, does it decrease operational costs, or does it increase operational speed? (Peep T, 2018).

In one way or another different authors and studies stated that proper application of strategic sourcing can helps firms who are engaged in different types of business to achieve their objectives.

2.1.4 Functions of strategic sourcing

As the concept and definition of strategic sourcing varies between firms, the functions are also stated in different books and studies in different steps as continuous process. Accordingly, on

this study different functions are reviewed from different authors and those commonly used and related to the study objective are stated as basic function of strategic sourcing.

As a function, sourcing professionals bring deep market insight, well-honed expertise in negotiating and managing supplier agreements, and a wide-angle view on supplier relationships across the company's business lines, functional areas, and activities across the globe (Harvard Business Review, 2017).

The Strategic Sourcing process requires an organized approach or method that allows a supply chain function to systematically work on spend areas or processes that can result in cost saving benefits. There are eight essential steps involved in the process beginning with identifying a spend area and culminating with selecting and managing a relationship with supplier(s) (Engel, 2014). Nishiguchi has defined the function of strategic sourcing as a step by step process with eight different steps: spend analysis, market analysis, total goods and services analysis, identification of suitable suppliers, sourcing strategy development, negotiation with suppliers, implementation of new supply structure, track results and restart assessment (Nishiguchi, 1994). Strategic sourcing function is also represented with ten steps process: Internal research, Supply market analysis, Current sourcing process analysis, Strategic Sourcing Methodology, Strategy selection, Vendor selection process, RFQ management Process, Sustained improvements, Strategic Sourcing Tool Box & Category Team selection. A slimmed down six step strategic sourcing process was defined by Payne & Dorn as : Data collection and spend analysis, Market Research, The RFx Process (also known as go-to-market), Negotiations, Contracting, Implementation and continuous improvement (Payne & Dorn, 2011).

Strategic sourcing includes activities such as alignment of plans to business objectives; supplier research, assessment, and development; contract negotiation; and supplier relationship management, including risk management (Harvard Business Review, 2017).

Although the functions of strategic sourcing are stated differently by different authors, they are all indicated as a step by step continuous process. For this study purpose the researcher focused on the two major activities: Supplier selection & relationship management and Contract

management and one additional function which is rarely indicted as strategic souring function but which is fundamental for this study. This is Total Cost of Ownership which has a border meaning but for this study it only considered total supply chain cost. Accordingly, these three strategic sourcing functions has been studied and their impact on ET-MRO's operational performance is assessed.

2.1.4.1 Supplier selection & relationship management

Supplier selection

The supplier selection is related to all activities, which are required to select the best possible supplier and includes determining on the method of the subcontracting, preliminary qualification of suppliers and drawing up the bidders' list, preparation of the request for quotation and analysis of the bids received and selection of the supplier (Van Weele, 2009).

As Gargeya & Su (2004) indicated on their study; given that over 50% of the cost of goods sold worldwide is derived from purchased materials, supplier selection is an important strategic decision and serves as a source of competitive advantage (Simpson, Siguaw, and White, 2002). Supplier selection becomes a central concern as the buyers look to form strategic partnerships (Spekmman, 1988; Mabert and Venkataramanna, 1998). A growing emphasis on establishing long-term channel relationships, driven by competitive pressures and business complexity, has encouraged many firms to become highly selective in their choice of supplier. To build more effective relationships with suppliers, organizations are using supplier selection criteria to strengthen the selection process. The results of Vonderembse and Tracey, indicate managers should focus on a set of supplier selection criteria that evaluates suppliers across multiple dimensions including product quality, product performance, and delivery reliability. Effective evaluation and selection of suppliers is considered to be one of the critical responsibilities of purchasing/sourcing managers. The evaluation process often involves the simultaneous consideration of several important supplier performance attributes that include price, delivery lead time and quality (Vonderembse & Tracey, 1999).

It's not enough merely to partner with a supplier in the hopes of getting the best possible price. Today, commitment and coordination with a cost-analysis mindset are needed to maximize the supplier-customer relationship. To build more effective relationships with suppliers, firms are using supplier selection criteria to strengthen the selection process, to improve decision making and upgrade supplier and manufacturing performance (Peter, 1996). Unambiguous supplier selection criteria provide a basis for the specific strategic and operational activities that are expected from the supplier. These strategic and operational activities by supplier drive supplier's strategic and operational performance (Mitchell, 1973; Schuler, 1980). Operational and strategic performance evaluation are positively inked with supplier selection criteria. Corresponding results has been shown that supplier selection criteria, positively influenced supplier performance evaluation on operational and strategic sub-criteria. The choice of appropriate supplier selection criteria on both operational and strategic sup-dimensions lead to goal convergence of the supplier with the expectations of the purchasing firm. Quality, delivery & cost are the most important supplier evaluation criteria's (Nair, Jayaram & Das, 2015).

On the other hand studies show that theoretically there are numerous supplier selection criteria's but only few of these criteria's are practically used for studies which are usually applied by firms. Supplier selection process vary between firms based on their level of technology. On Holm & Thi Vo study the findings shows that none of the sample companies used the supplier evaluation and selection models presented in theory; but have formed their own system for evaluating suppliers (Holm & Thi Vo, 2015). In support of this, Kar (2014) study has also showed over seventy-five generic supplier selection criteria which have been used by different purchasing contexts across industries; only a few evaluation criteria has been consistently used across studies. "Quality", "Warranties" and "Delivery Schedule" are critical evaluation factors among many others like "management capability", " Price", " Production Capability". Using Dickson's 23 different criterion; Kar (2014) classify them according to their importance as very high importance, great importance medium importance and low importance. Accordingly, Quality, Delivery Performance History and Warranties & Claims practices took the first importance. Although there are different authors used different supplier selection criteria's he has indicated that a group of authors concluded that quality, delivery and price prevail as dominant criteria (Kar, 2014).

Supplier relationship management (SRM)

Supplier relationship management is a relatively new concept emerging over the past few years. Recently, SRM has been perceived as a software tool as many enterprise resource planning systems contain SRM, but it is much deeper than just a software. When SRM is done correctly it becomes a systematic approach for the supply chain and all its contributors which will enrich business performance of suppliers and customers (Hughes & Wadd, 2012).

The first buyer-supplier relationship is Kraljic's portfolio model using the two factors; Profit Impact and Supply Risk (Kraljic, 1983). Imanipour, N., Rahimi, M. and Akhondi, N (2012), has studied seven different models including Kraljic's and classified supplier relationships in to two based on the common characteristics of portfolio models: Transactional & Friendly. The transactional type of buyer-supplier relationships are short term relationships, allocate limited resources to supplier, simple buy-sell relationship, change supplier easily, local suppliers , standard commodities, no need for innovation, stability of demand, lack of tendency to investment . On the other hand the Friendly type of buyer-supplier relationships are characterized by suppliers depend on buyers, multi suppliers for every product, high competition between suppliers, necessity of high-ranked engineering experiences (Imanipour, N., Rahimi, M. and Akhondi, N, 2012).

There are three driving factors that generally influence the relationships orientation with suppliers. First factor has to do with the buyer's perspective asserting that supplier performance will facilitate a closer relationship. The second factor has to do with the level of trust between buyer and supplier meaning long-term partnership and cost savings. The third and last factor is the supplier's capability to provide the necessary resources for the buyers operations. The buyer-supplier relationship has heavy emphasis on business performance which can help to influence the financial and market performance of either company having positive impacts. Aside from the economic upturn created by supplier relationships, it also impacts other aspects of business such as innovation, technology, and problem solving capabilities (Cannon, Doney, Mullen & Petersen, 2010).

2.1.4.2 Contract management

For this study, the third independent variable to review the strategic sourcing process and its impact on the operation is contact management. There are four pillars of strategic sourcing: - *spend analysis, sourcing, contract management and supplier performance management*. Contract management is a subset of the largest strategic sourcing process, and like the rest it is foundational for ultimate sourcing success. Contract management is a strategic sourcing pillar because much of the value that procurement delivers to the greater enterprise rests up on its foundation (Matthew, 2014).

Unless procurement teams follow contract management best practices and "connects the dots" from sourcing, negotiation to contract execution, they risk savings leakage. The risk saving leakage is the gap between identified and realized savings due to poor contract management, supplier on-boarding and a few other issues. At the end of the day, poor contract management can erode the value that procurement won for the enterprise during the strategic sourcing process, but effective contract management can preserve this value. That is why it is such a critical, foundational part of procurement and the entire strategic process. Contract management involves a number of sub-processes for procurement, including: Proposal development, Creating /authoring, Risk assessment, Negotiations, Approval/review (including final signatures), Analysis and reporting, Auditing (Matthew, 2014).

Best practices which can be taken as success factors in contract management include: Centralizing existing contracts, service level agreements (SLAs), and terms and conditions in to online repositories; Leveraging existing contracts and standard contract language whenever possible, Leveraging electronic signatures and automated workflows to further reduce approval times & Gaining greater visibility into the entire contract management process via monitoring and reporting functions (Matthew, 2014).

On another point, there are also contract management standards where an organization can uphold and find out areas to develop more effective process. Standardizing Contract Creation, Setting Contract Management KPIs, Conducting Regular Compliance Reviews, Balance

Storage Security and Visibility Requirements, Tracking Contract Approval Time, Automating Contract Communications, Reviewing Finances, Resolving Disputes Promptly, Anticipating Evolving Business Needs and Comparing Contract Trends against Market Insights (Lu, 2018).

2.1.4.3 Total cost of ownership (TCO)

Total cost of ownership (TCO) is a cost accounting application that enables purchasing decision-makers to combine value and price in making sourcing decisions (Wouters, Anderson & Wynstra, 2004). TCO analysis quantifies the costs involved in acquiring and using offerings, such as transaction costs related to purchasing activities (example:-. Ordering, freight, quality control), and the costs related to poor quality (example:-, rejection, rework, and warranties) (Carr and Ittner, 1992; Ellram, 1995). The TCO is a methodology developed to determine the total cost of ownership of a product or service provided by a particular supplier, through a complete investigation of the different cost items which composed the real cost of buying from a specific supplier. The criteria for the selection of suppliers are divided into thirteen categories: operating costs, quality, customer-related costs, logistics, technological advantages, starting price, opportunity cost, capacity and reliability, maintenance, inventory costs, transaction costs, lifecycle costs, and others (Afonso P., 2012).

According to Van Weele the procurement includes all activities required in order to get the product from the supplier to its final destination. It encompasses the purchasing function, stores, traffic and transportation, incoming inspection, and quality control and assurance, allowing companies to make supplier selection decisions based on the total cost of ownership (TCO), rather than price. Procurement is used when relating to buying based up on TCO in project environment (Van Weele 2009).

Strategic sourcing is a systematic process designed to reduce the total cost of ownership (TCO) of a product or service. TCO calculation is an advanced cost structure analysis where, in addition to product cost elements, other cost elements, such as acquisition (transportation, warehouse, and financing cost) and lifecycle (usage period, maintenance, and repair) are taken into consideration. TCO method helps the purchaser to compare different goods or service providers

with regard to total cost rather than choosing a supplier due to their lowest initial price alone (Noorbakhsh, A., Boehl, C. & Brown, K., 2019)

Andreson, Thomson & Wynstra (2004) demonstrated that purchasing managers seems to rely more on price information than on value information in making their decision. They investigate riskless choices between alternative market offerings, relative to a reference offering. Their results indicate that value and price are captured by separate utility functions, where monetarily-equivalent price changes and value changes represent different utility changes for the purchasing manager (Wouters, Anderson & Wynstra, 2005).

Michael illustrated the importance of quality assurance and total cost of ownership (TCO), on his experience with Source One Management Services, procurement's focus on short-term cost savings, instead of TCO, led to a hasty decision with damaging effects. Cost reduction cannot come at the expense of quality, and procurement cannot work in a silo. It must ensure alignment with the end users to understand the issues they are facing with category (Michael, 2016).

Accordingly, with the understanding that value considerations have a positive impact on operational performance, this study also focused on strategic sourcing practice of TCO consideration. By exploring the notion and use of TCO as a basis of supplier selection model, this study assessed and measured its impact on ET-MRO's operation.

2.1.5. Aviation maintenance, repair and overhaul (MRO)

An MRO is a Maintenance and Repair Organization. An aviation or aircraft MRO is a company which specializes in performing maintenance actions on aircraft and their components, such as jet engines and landing gear (Mike, 2016).

As stated in ET-MRO service procedure manual (Rev. 04, dated 08 january2017), **Ethiopian MRO (Maintenance, Repair and Overhaul)** is a company organized and existing under the low of Ethiopia as a subsidiary of **Ethiopian Airlines Group** with address at Bole International Airport, Addis Ababa, Ethiopia. ET-MRO, which is one business unit among

the seven business units under Ethiopian Airlines Group, is assigned to perform maintenance work in its Aircraft including Engines, Components and accessories. As a major classification the activities of Ethiopian ET-MRO are based on scheduled & unscheduled maintenances. Scheduled maintenance requirement includes all checks: - less than "A" check (line maintenance checks), "A" checks, Major modifications, engine change, landing gear change, Aircraft component change, Aircraft wash and Aircraft paint. Unscheduled maintenance is any discrepancy on the Aircraft that can be: fault, pilot write up and different defects and log book items. As per regulatory bodies' rules and procedure the ET- MRO is expected to be appropriately approved by Ethiopian Civil Aviation Authority (ECAA) per Ethiopian Civil Aviation Rules & Standards (ECARS) part 6 as an Approved Maintenance Organization (AMO) (ET-MRO service procedure manual, 2017).

MRO Performance Index

Operational performance refers to the measurable aspects of the outcomes of an organization's processes, such as reliability, production cycle time, and inventory turns. Operational performance in turn affects business performance measures such as market share and customer satisfaction (Voss, 1997). The MRO operation like other types of operations, its performances measurements are based on overall organization strategy as well as the purpose of the business.

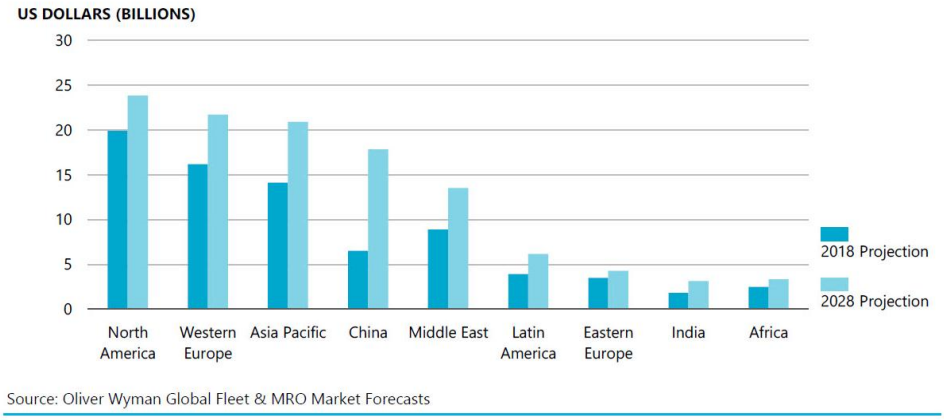
A multi-dimensional assessment of operations performance, the IATA index of aviation performance, is an international benchmarking tool focusing specifically on measuring the performance of Airlines as well as MRO's which has also assisting them to identify key barriers to, and opportunities for, improvement, sharing best practice. The IATA summarizes the performance of major Airlines through six dimensions that capture the most important aspects of the MRO environment: OTP, IATA – Published in 2016.

Reliability of Equipment, Quality of Speed of Execution/Response, Maintenance Costs, and Prediction of Failure are key performance indicators for the site maintenance on the MRO industry (Mike S., 2016). **Cost, quality and delivery** measures are often used to conceptualize purchasing performance (Krause, Pagell, & Curkovic, 2001)

MRO Spend index

Total MRO Spend by region based on Global Fleet & MRO Market forecasts (2018-2028) is indicated on Table III below. Regionally, as fleet growth shifts to Asia and other developing economies, MRO spend will also migrate to those regions. By 2028, the combined MRO demand in the Asia Pacific, China, and India will be more than double that in North America. North America MRO spend is forecast to shrink from $19.9 billion in 2018 to $19.4 billion by 2023, then rebound to $23.8 billion by 2028—overall, relatively flat growth with 1.8 percent compound annual growth rate (CAGR). Latin America MRO spend, which currently represents five percent of the total market, is expected to grow 4.7 percent annually, from $3.9 billion to $6.2 billion, and increase market share by less than half a point over the period. Although African covers less that 5% of the total market compared to the global market, when it comes to ET-MRO it covers more than % of the company's total spend and considering its vision 2025 to be African leading MRO, the corresponding spend is expected to grow accordingly (ET-MRO portal,2018).

Figure 2.1 – Global MRO spend index



Source: Oliver Wyman Global Fleet & MRO Market Forecasts

2.1.6. Link between strategic sourcing and operational performance

The potentials of procurement strategy in enhancing organizational performance have already been proven in a number of studies (Aberdeen Group, 2001). Strategic sourcing is a vital component, with real-world impact on all facts of a business, from supply chain to final product and service delivery. Strategic sourcing is a collaborative process that allows an organization to align purchasing power with its overall value proposition. It improves efficiency and quality through building a robust, diverse supply base.

There are important reasons why strategic sourcing is a smart move for organizational success. Strategic sourcing impacts the bottom line. Strategic sourcing streamlines procurement operations, controls costs, and maximizes the value of every dollar spent. It manages risk. Strategic Sourcing mitigates supply chain risk beyond compliance check. Sourcing with a strategy helps organizations prioritize performance metrics and goals, ensuring ongoing risk management across key procurement activities. Business may consider elements beyond cost, for example a supplier's sustainability, flexibility and innovation. Strategic sourcing builds relationship. Building a strong and trustworthy relationship with vendors is vital for success. Taking supplier operations and capabilities into consideration during the sourcing process can

open new opportunities. Suppliers have value-add capabilities and industry competencies that could prove beneficial in partnership programs with buyers. A supplier can influence a buyer's customs experience and expectation, but is usually not held accountable for possible problems or quality issues. Close relationships can result in faster lead-times, higher quality and more reliable fulfilment, with flexibility for negotiation (Charles P. 2009).

Generally, proper implementation of strategic sourcing creates a competitive advantage, where success on operational performance is one of the major benefits (Charles P. 2019).

2.2. Empirical literature review

As stated on the theoretical part of reviewed literatures, there is no one way of doing the strategic sourcing process, different organizations use different steps in the strategic sourcing process. Based on empirical studies reviewed by the researcher, different strategic sourcing principles are taken in to consideration to measure their impacts on organizations operational performance.

Based on Gargeya and Su empirical study they validated the fact that strategic sourcing can impact a firm's competitiveness of low cost, high quality, reliable delivery, flexibility, and quick response time, which are also major dimensions of customer satisfaction. Strategic sourcing also improve firm's financial performance and recognized as a key contributor to firm's success. On this study, supplier selection practices, supplier evaluation system and firm competitive position which includes cost, quality, delivery, dependability, flexibility and response time is used (Gargeya & Su, 2004).

On the other hand, Duffie & Koester stated on their research of Baker Hughes case study, an oil-field services company headquartered in Houston, has integrated strategic sourcing and e-procurement with good initial success. On this study proper structuring of the strategic sourcing initiatives, a benefit has been gained which was missed from the traditional approach of sourcing. In addition, concluding agreements with real commitments help to develop mutual trust and understanding which are keys for execution of agreements (Duffie & Koester, 2005).

On a case study made on Jomo Kenyatta University of Agriculture & Technology, quality of

goods and services, Cost of goods and services, supplier relationship, Timely delivery of goods & services, and effective procurement plan was considered as an independent variable to the dependent variable organizational performance. (Kihanya, Wafula, Onditi, & Munene, 2015). On another study made by Titus, Moses, Evans & Ambrose (2015); quality, time, cost of goods and services, supplier relationship and effective procurement plans are taken as the independent variable to measure the performance of an organization.

Few detailed studies exist of the trade-offs to be made when developing a comprehensive, strategically focused total cost of ownership (TCO) model. Moreover, most studies of TCO have been conducted in manufacturing firms, with little or no TCO research directed toward service organizations. On their study, TCO model with a primary objective to assist the firm in managing the ongoing performance of their supply base and making volume allocation decision. The study results that TCO is a useful tool to improve performance by uncovering the obvious as well as the hidden costs of conducting business with different suppliers (Krisje H., Wendy V. & Finn W., 2006).

TCO based performance review and reward means that improvements in the firm's total cost of ownership of acquired offerings – not just purchase price paid – are used as a significant component of performance review and reward. The occurrence of having success with TCO initiatives for sourcing decisions and relying on TCO analysis outcomes as a significant component of performance review and reward. It means that the organization has experience and success with TCO concept and has embedded the usage of this concept in organizational systems to direct decision making processes, (Wouters, Anderson & Wynstra, 2005).

When it comes to operational performance indicators, different researches made on similar topics gave considered the effect of strategic sourcing performance on operations. They have used different performance indicators like Return on Asset, Profit margin (using net income as a percent of sales), and market share (Boakye & Normanyo, 2016).

Table 2.1 –Summary of empirical studies considered in this study:-

Author name	Year of study	Strategic sourcing functions considered on the study	Major study area and finding
Gargeya & Su	2004, 2012	supplier selection practices & supplier evaluation system	SS impact on Firm's Financial performance or competitive position
Duffie & Koester	2005	Supplier Selection & Contract Management	SS proper structuring & application results better performance than the traditional approach
Krisje H., Wendy V. & Finn W.	2006	Total cost of ownership	Strategic decision making in the service sector
Oyuke, O.H & Shale,N.	2014	Cost Management, Information Technology, Supplier Relationships, & Records Management	Strategic sourcing practice contributes to Organizational Performance
Kihanya, Wafula, Onditi, & Munene	2015	Quality goods and services, cost of goods and services, Supplier relationship, timely delivery of goods and services, & effective procurement plan	Results better organizational performance
Titus, Moses, Evans & Ambrose	2015	Quality, time, cost of goods and services, supplier relationship, & effective procurement plan	Results better performance of an organization

Source: - Compiled by researcher from different studies

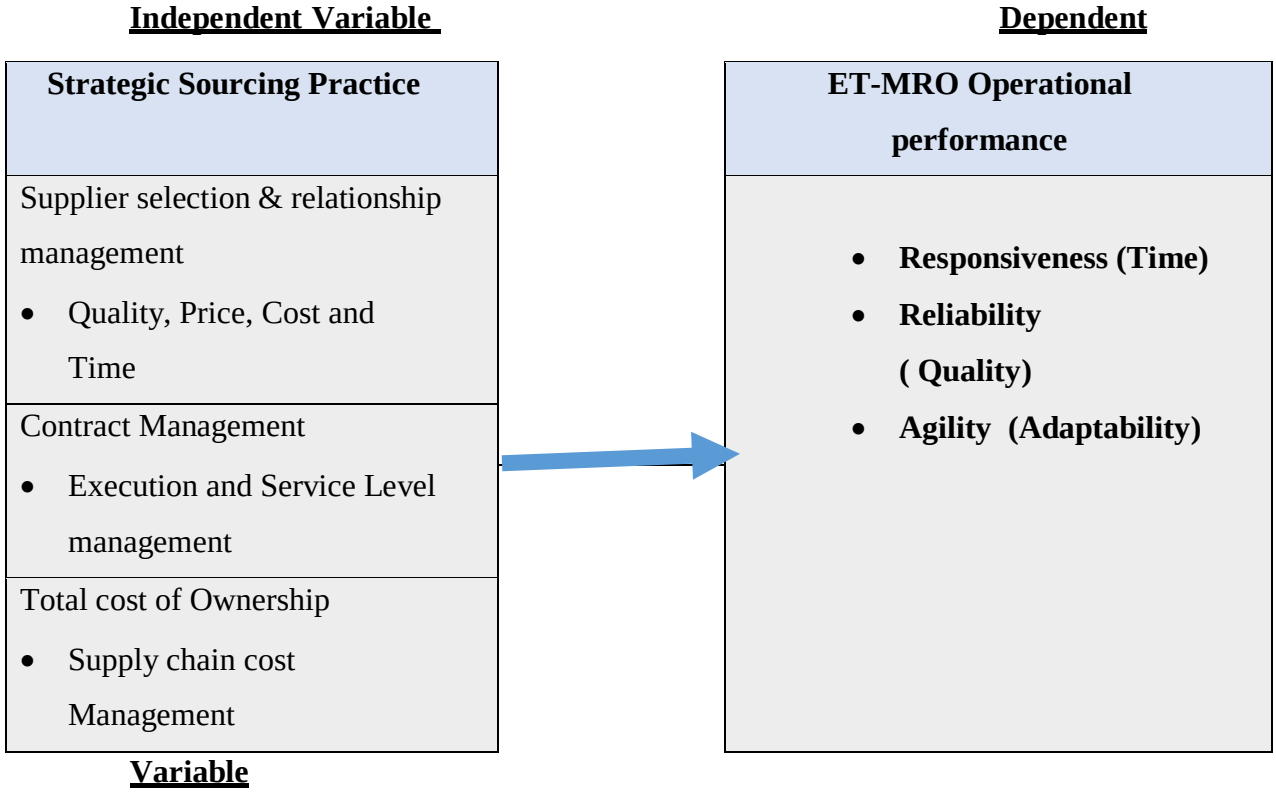
This study used three major indicators of strategic sourcing activities: Supplier selection and relationship management, Contract management & Total cost of ownership considerations to identify the effects on the MRO'S operation. The commonly used performance indicators Responsiveness (On Time delivery, Reliability (Quality of parts) & Agility (supply chain adoptability for changes) are used as a major performance indicator. TCO consideration of this study is limited to the costs associated to supply chain costs in part availing process, the performance attributes Cost and Asset management efficiency are not used in this study.

2.3. Conceptual framework

The conceptual framework of this study is taken from those strategic sourcing theories reviewed on the empirical literature and modified in a way that the researcher believes it will generate a

good result on the study area. Accordingly for this study the strategic sourcing involves three major functions as empirical evidences shown: based on Gargeya & Su, (2004); Duffie & Koester (2005) study; supplier selection is taken as one function and as its evidenced on their study by Kihanya, Wafula, Onditi, & Munene (2015) and Kihanya, Wafula, Onditi, & Munene (2015); Supplier relationship management is also taken as a sub-function. Contract Management is taken as another strategic sourcing function as evidences shown by Duffie & Koester (2005). As it is evidenced on the studies made by Krisje H., Wendy V. & Finn W. (2006); TCO is taken as supply chain cost management for this study purpose. Accordingly the conceptual frame work is developed as follows.

Figure 2.2: Conceptual fame work of the study: Adopted and developed by researcher (2018).



Source: - Modified & adopted from different studies summarized under Table 2.1

2.4. Identified literature gap

As the researcher tried to indicate on the literature part, different studies use different functions of strategic sourcing as dependent variables on their study to measure firm's operational performance. Some has included all the strategic sourcing activities which are commonly used as seven steps and some others selectively use among this steps few of them to measure operational performance of an organization. Majority of the studies has used cost, quality and time variables individually which can be part of the big function which is supplier selection. Supplier selection, supplier relationship management as well as contract management are major strategic sourcing activities used as a key indicators to measure operational performance of organizations by many studies. On this study the researcher has consolidated and included cost, price, time and quality under the supplier selection function and also separately include total cost of ownership strategy to specifically study the total supply chain cost consideration on the sourcing practice. The researcher has a great belief that identifying the impact of the total supply chain cost consideration on ET-MRO's operational performance will add a great value.

CHAPTER THREE
RESEARCH DESIGN AND METHODOLOGY

As stated in his book by Kumar (2019), an extremely important feature of research is the use of appropriate methods. Research involves systematic, controlled, valid and rigorous exploration and description of what is not known and establishment of associations and causation that permit the accurate prediction of outcomes under a given set of conditions. Accordingly, the methodology that is used to achieve the objective of the study is discussed in this chapter. The description of the study; the research approach, research design , unit of analysis, population of the study, sampling techniques, sample size, data collection instrument and data collection procedure are discussed. Finally, data analysis and presentation method is presented along with reliability and validity test of the research.

3.1 Description of the study area

The study area is strategic sourcing practice and its impact on ET-MRO's operation. The study mainly focused on the selected independent variables: - Supplier selection & management, contract management and total cost of ownership consideration with the aim of answering the questions: - how the supplier selection process is performed and how the supplier relationship is managed; what does the contract management practice looks like and how total supply chain costs are considered during sourcing and supplier selection process. The study targeted P&SCM managers and sourcing/ procurement officers and those direct customers of P&SCM who are under ET-MRO main respondents in order to find out the strategic sourcing practices and corresponding impacts on the operation. ET-MRO's operational performance mainly measured with commonly used performance indicator - the on time performance (OTP).

For this research to be successful the researcher needs to limit and focus only on the different sections under MRO which have a direct contact with P & SCM (Procumbent and Supply Chain Management). By limiting the focus to these sections the strategic sourcing impact on the MRO's operational performance can be well explained. Accordingly the study areas

focused on Parts and services issues that may contribute to the MRO's performance as it is measured in time, quality and cost (MRO's quarterly performance report, July 2018). Specifically, the study areas focused on the reasons of flight delays as reported by the differ managers from different divisions on their daily performance repot. The researcher believes that by doing so, the required data for different levels of performance can be collected with corresponding reasons.

3.2. Research approach

Among the three basic research approaches: - namely qualitative, quantitative and mixed methods, the mixed-method best fits this study in order to get more complete view of the research. By the early 1990s, mixed methods turned toward the systematic convergence of quantitative and qualitative databases, and the idea of integration in different types of research designs emerged. The researches chose the Triangulating data sources, which is a means for seeking convergence across qualitative and quantitative methods (Jick, 1979). In mixing of the quantitative and qualitative approaches, the researcher has used the quantitative approaches for the tangible and measurable variables of the study which are related to financial, quality and time factors. Survey using questioners are used for data collection and generation of statistical data. Therefore for the purposes of this research, the researcher chose the quantitative approach to review the current Ethiopian MRO part availing process and evaluate how timely parts and services are sourced; to review the current Ethiopian MRO quality control process and evaluate the quality of parts and services sourced and to review and determine the current Ethiopian MRO parts and services cost monitoring & control process and evaluate the impact of TCO (Total Cost of Ownership). On the other hand, phenomenological research approach is be used by conducting interviews of selected individuals.

3.3. Research design

According to Churchill (1999, P 98), there is no single perfect design of conducting research. For this study, both descriptive as well as explanatory research designs are used. Since a

descriptive study usually could not come up with a complete detail of the problem the researcher has used an explanatory design. This allowed the study to have a deep understanding of strategic sourcing practices and its impacts on ET-MRO's operation. The result from the research is explained in a way that the findings can easily be interpreted for necessary next action. As justified by the SPSS accuracy measure, the study has generated complete and accurate result from survey with close ended questioner and semi-structured interviews. The questioners are developed by the researcher in a way that best fits the variables used.

3.4. Population and sample

On this study ET-MRO and PSCM employees who are based in Addis Ababa are target study areas. Although ET-MRO and PSCM has more than 2800 employees, for this study the targeted population area under both sections is limited to sections that have a direct interdepartmental relationship with strategic sourcing which is part of P&SCM division. Accordingly only ET-MRO's management staffs and the whole P&SCM staffs are selected to meet the purpose of the study. Management staffs from ET-MRO's section has a total of 285 and all P&SCM staffs are 231 in total which brings the total are targeted population 516. Using normal distribution, considering + or - 8% margin of error, 92% confidence level and 50% response distribution, the sample population is determined as 117 using Cochran's random sampling formula (Warner, 1965).

$$n = \frac{n_0}{1 + \left(\frac{n_0 - 1}{N}\right)}$$

Where :-

n_0 is the sample size derived from the equation $n_0 = \frac{Z^2 pq}{e^2} = \frac{(1.96)^2 0.5 X 0.5}{(0.08)^2} = \frac{0.9604}{0.0064} = 151$

p is the estimated proportion of an attribute that is present in the population, $q = 1 - p$ and e is the desired level of precision & N is population size.

$$n = \frac{151}{1+(151-1)/516} = 117$$

Simple random selection technic is used to select and then distribute the questionnaire to those 117 employees from the total population. For the semi structured interview, both management and non-management staffs who are expected with more knowledge on the study area were selected randomly. Accordingly an interview is conducted with 3 Management and 2 non-management staffs.

3.5. Data collection instrument

In this study, both primary and secondary data sources were used. At the beginning of the study, preliminary interviews were done with few staffs of ET-MRO which is used as a primary source of information to get supporting data to measure the problem. Closed end questionnaires were used as major primary data source. The questionnaires were classified based on the variables to make them easily understandable to the respondents and in a way that an appropriate data analysis can be done.

Semi structured interviews were also used to get more qualitative information from few selected employees. Accordingly, data's or information's that are required for the purpose of the research project are collected. The primary data is specifically tailored to research needs. In addition, as a secondary data source: - related literatures, related projects & bench markings done by the company employees and different books were reviewed.

Questionnaires were partially sent via e-mails to those who have the access and prefers to fill and return them in softcopy and others were physically contacted using hard copies of questionnaires and briefed about the objective and motivated to provide the required data. Semi- structured interviews were also used to collect qualitative data from purposefully selected samples. As a secondary source, related literatures, periodical performance reports, books, journals and documents were reviewed. Using the primary and secondary data collection both descriptive and explanatory approaches were implemented in this study.

3.6.Reliability, Validity and response rate of the study

In order to ensure the quality of a research the data was tasted for reliability and validity. The reliability of the instruments was established following a pre-test procedure of the instruments before they are use with actual research respondents. Pilot study is done by distributing questionnaire to 12 management and non-management staffs who are finally excluded from the target.

The reliability test result generated from SPSS is presented below under Table 3.1. The calculated coefficient Cronbach's alpha for this study was found to be greater than 0.7 for all variables. According to Mohsen Tavakol and Reg Dennick (2011), Cronbach's alpha of less than 0.5 is unacceptable 50, α less than or equal to 0.6 is poor, α less than 0.7 is questionable, α less than 0.8 and greater than or equal to 0.7 is acceptable, α less than 0.9 and greater than or equal to 0.8 is good and finally α greater than or equal to 0.9 is excellent. Accordingly, it is confirming that, the variables to be internally consistent for each variable of SS and OP.

Table 3.1 Reliability Statistics

Construct	Variables	Cronbach's Alpha	N of Items
Strategic Sourcing	Supplier Selection & Management	.812	8
	Contract Management	.761	8
	TCO	.709	7
Operational Performance	Operational Performance	.801	18

Source: SPSS data, 2019

The questionnaire's Content and Construct was also tested to validate. Accordingly, two experts from senior management employees were requested for their opinion to evaluate the instrument in terms of addressing the problem as well as relevancy to determine SS current practice. Based on their comment, the questionnaire was amended for best fit of the study and easily determine the role of SS practice on OP.

From the randomly selected 117 sample respondents for questionnaire, 112 respondents were able to return complete questionnaires. This were believed sufficient to carry out an analysis

on the data. This resulted in a response rate of 98% is considered perfect based on Cooper and Schindler (2006) which shows more than 70% is deemed exceptional. The interview was done with selected management and non-management staffs including director component maintenance engineering and Manager strategic sourcing as purposefully selected by the researcher. This qualitative data collection was successful as respondent's personal opinion on the study area helped to strengthen the findings generated from quantitative data.

3.7 Method of data analysis

After all required qualitative and quantitative data's were collected from primary and secondary data sources, the collected data were organized, classified, analyzed and interpreted and reported on the next chapter. Based on the variables selected and the questions asked the collected data were analysed using both thematic and statistical methods. Thematic analysis is used for data collected from interview and statistical data analysis is used for those data collected from questionnaires. The statistical analysis was done using Statistical Package for Social Science (SPSS) version 23. Both descriptive and inferential statistics are used. Frequency distribution, Mean and Standard Division statistics are used to describe the study result and Assumption test, regression analysis and model summary are used to infer or explain relationships between dependent and independent variables.

As part of the inferential statistics the researcher conducted a multiple regression analysis so as to test the relationship among independent variables of SS (Supplier selection and management, contract management, and TCO consideration) and the dependent variable, ET-MRO's operational performance. This relationship is established by the model:

$$Y = B0 + B1*X1 + B2*X2 + B3*X3 + e$$

Where: Y, the response variable;
X1, the first predictor variable;
X2, the second predictor variable;
B0, the Y-intercept;
B1, the first regression coefficient;
B2, the second regression coefficient
e, the residual error, which is an unmeasured variable.

3.8. Ethical consideration

To undertake the research, necessary approval and permit is obtained from Addis Ababa University School of Commerce Graduate Studies which can be referred whenever required. A covering letter is attached to the questionnaire ensuring participant's anonymity and confidentiality that information obtained from them will not be disclosed to the third party. Consent, confidentiality, and anonymity is addressed individually including the incentive that the research will bring to future researches by the Airline as well as other researchers. Respondent's name and other identifying information is not used in the study.

On the other hand, intellectual properties were discussed frankly on the research and the researcher do her utmost to avoid any biasedness in reflecting the research decision. Finally, the appropriate acknowledgements were made for the use of numerous works of others.

CHAPTER FOUR
DATA PRESENTATION AND ANALYSIS

In this chapter the finding from collected questionnaire and interviews are presented in a way it helped to generate the conclusion and recommendation from the findings. The objectives established at the first chapter happened here. This chapter has focused on presenting the findings of the study, as well as analyzing each findings so as to enable the user of the study to thoroughly understand the results regarding the research topic. Using SPSS version 23, the data was analyzed based on descriptive statistics as well as inferential statistics. Frequency distributions, mean & standard deviation were used under descriptive statistics. Regression analysis, assumption test and confidence intervals were also used to indicate relationship between the independent variables to that of the dependent variable.

The first part of this chapter focuses on Reliability, then it presents the demographic data regarding the respondents while the third section provides the findings of the specific objectives of the research study.

4.1 Demographic data

The demographic data is crucial in understanding whether the given sample of the respondents in a specific research study represents sufficiently the target population. The demographic data also enables the researcher to find out the suitability of the respondents in providing answers to the research questions for the purpose of generalizing the results of the study. In this research, the demographic data consisted of gender, age, position, work experience and level of education.

4.1.1. Respondent gender

Table 4.1.1 Respondents gender

			Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male		84	75	75	75
	Female		28	25	25	100
	Total		112	100	100	

Source: Own survey. 2019

As Table 4.1.1 shows 25% of respondents are female where majority of respondents under ET-MRO as well as PSCM are male. This is especially because the type of the job under ET-MRO is mostly preferred by boys. But, due to the fact that Ethiopian Airline is very well known and recognized for equal opportunity employer (Annual report, 2016/17), a relatively high number of female participants can be found. The involvement of both genders on this research was a very good opportunity that the data was collected from both genders and all types of opinions are considered to come up with a result which is not affected by gender.

4.1.2. Respondent's job position

Table 4.1.2: Respondents job position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Management	74	66	66	66
	Non-Management	38	34	34	100
	Total	112	100	100	

Source: Own survey, 2019

Based on Table 4.1.2, 66% of the respondents are management staff. With the general understanding that management staffs have more experience on their respective sections activity due to empowerment, the collected data is reached in terms of quality as well as accuracy. This gives strength to the study due to the fact that more valuable information indicating improvement opportunities can be gathered from well experienced respondent on the study area.

4.1.3. Respondent's level of education

Table 4.1.3: Respondent's level of education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Certificate	0	0	0	0
	Diploma	1	0.90	0.90	0.90
	Degree	98	87.5	87.5	88.4
	Masters	13	11.6	11.6	100
			100	100	

Source: Own survey, 2019

Table 4.1.3 indicates that a majority of the respondents have first Degree (87.5%) followed by Masters (11.6 %) and then Diploma (0.90%). Considering the fact that those respondents with Degree & Masters represents a total of 99% from the total respondents, it is apparent that a majority of the respondents were well educated and able to respond to the questionnaires with good understanding and without difficulties which results reliable findings.

4.1.4. Work experience

Table 4.1.4: Respondents work experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5 yrs	40	36	36	36
	6-10 yrs	45	40	40	76
	11- and above	27	24	24	100
			100	100	

Source: Own survey, 2019

As indicated on Table 4.1.4, there is an even distribution of respondents work experience. Those who have relatively less experience as taken between 0 to 5 years of experience; are 36% of the total population and then those who has worked 6 to 10 years are 40% of the population and the rest 24% are the most experienced ones. This distribution is a very good distribution that avoids biasedness since an adequate information can be gathered from all different years of work experience respondents where the collected data is composed of respondents with different level of understandings.

4.2 Descriptive statistics on Aggregated Variables

All questions under the independent variables, supplier selection, contract management and TCO consideration are grouped under their respective construct to analyze the aggregated role, and accordingly all questions under the dependent variable operational performance were also categorized as operational performance to analyze the aggregated role. Table 4.2 below shows the results.

Table 4.2 Aggregated mean value of all variables:

Constructs	Mean	Std. Deviation
Supplier selection & Management	2.95	.335
Contract Management	3.62	.328
TCO	3.21	.434
Operational Performance	3.35	.330

Source: Source: Own survey, 2019

Based on the result of the analysis, supplier selection and relationship management (M=2.95) has the lowest mean value, which indicates that the supplier selection function is not practiced well by the sourcing officers. Following supplier selection, TCO (M=3.21) has the next low mean value which implies again that things that express TCO are not considered well during the selection process. It is not practiced well although it is better than the selection practice. Contract management on the other hand has a better mean value (M=3.62), but it still not satisfactory enough to conclude that it is good compared to best practices. The operational overall performance as measured with responsiveness, agility as well as reliability has a mean value of 3.35, which still indicates the gap that there are areas need much improvement to achieve excellence.

4.3 Strategic sourcing practice and impact on ET-MRO's OP

This part of the research aimed at assessing the current strategic sourcing practice and its impact on ET-MRO's operational performance. According to Charles P. (2019), proper implementation of strategic sourcing creates a competitive advantage, where success on operational

performance is one of the major benefits. The respondents were requested to state the degree (based on a scale of one to five) of the effect of strategic sourcing on the organizational performance from various perspectives including, their overall view through interview and the results are shown on below table.

Table 4.3 Strategic sourcing practice

Statement	Mean	Std. Deviation
Strategic sourcing practice enables to meet on time operational performance	3.61	.671
Flight delays are usually created due to unavailability, shortage and poor quality of parts	3.71	.590
The MRO operation is frequently affected by part related issues due to supplier poor performance interruption	3.07	.647
Reliability of MRO operation is affected by poor contract management	3.86	.467
Luck of TCO consideration during sourcing of parts exposed the MRO operation for additional indirect costs.	3.00	.374
Sudden demand changes create poor operational performance	3.31	.455
lack of strategic agreements impacts SC flexibility	3.56	.638

Source: Own survey, 2019

As shown on Table 4.3, The respondents agree that strategic sourcing is a good tool to meet operational performance targets (M=3.61, SD=0.671) and they also confirm that there is an operational delay because of AOG due to part shortage (M=3.71, SD=0.590) which is an indication that the strategic sourcing best practice need to be implemented to resolve part shortage issues which are related to strategic sourcing activities.

In addition to the data gathered using questionnaires, the information the researcher was able to get from interview has also supported the existence of part shortage and its impact on the operation interruption (AOG); especially because of strategic sourcing related activities poor practices. One of the respondent appreciates what has been done so far by the section as of its formation since 2015; but issues with some suppliers who are not reliable to meet agreed service levels both in terms of time and quality addressed with stress as it affects both on time performance which results AOG as well as reliability of MRO's products.

4.4 Strategic Sourcing practice - concept Level

4.4.1. Supplier selection & management

This part of the research aimed at answering the first objective of the research. The first objective was to assess the role of supplier selection on ET-MRO's operational performance. Effective evaluation and selection of suppliers is considered to be one of the critical responsibilities of purchasing/sourcing managers. Per Vonderembse & Tracey (1999), the evaluation process often involves the simultaneous consideration of several important supplier performance attributes that include price, delivery lead time and quality. Quality, Delivery and cost were the most important supplier evaluation criteria's (Nair, Jayaram & Das, 2015). Accordingly the respondents were needed to state the degree (based on a scale of one to five) of the effect of supplier selection & management on the organizational performance from various perspectives including, their overall view and the result is indicated below. The findings of the research in relation to research objective one are provided in Table 4.6 based on descriptive statistics.

Table 4.4.1: Supplier selection and management practice

Statement	Mean	Std. Deviation
Selection of suppliers based on company strategy	2.43	.617
Selection of suppliers based on spend analysis	2.44	.878
Selection of suppliers based on standard parameters	3.61	.512
Supplier performance measurement	2.87	.429
Selection of supplier for collaboration	3.77	.590
level of negotiation for supplier selection	2.76	.619
Corrective actions for poor supplier performance	2.71	.411
Strategic alignment	3.04	.534

Source: Own survey, 2019

Table 4.4.1 shows that the respondents disagree that strategic sourcing and supplier management has followed strategic sourcing best practices. Supplier selection and company strategy are not well aligned during the sourcing process (M=2.43, SD=0.617), this has a huge

impact on missing to consider other sections objectives & strategies which includes different sections under ET-MRO. On a study made at PwC firms as reported by Remko van Hoek, although open communication and information sharing is listed among challenges for vendor management, there is a positive correlation between the presence of supplier relationship management and increased market share, responsiveness to market changes, increased return on investment as well as shortening order fulfillment lead times (Remko van Hoek, 2013). This was also supported by the information gathered from the interview that there are cases where ET-MRO has no information at all while strategic sourcing officers are selecting suppliers which led to miss some major objectives related to its operational performance and ended up with choosing wrong suppliers. This usually creates performance problem as the suppliers either miss to supply the right support which needs to be considered during the sourcing process and sometime after sale support and required packages linked to the sourced product creates additional cost and wastage of time. On the other hand the respondents has agreed that there is a standard created by strategic sourcing to select suppliers (M=3.61, SD= .512). On the contrary there is no well-established performance measure taken or no tool and streamlined process to measure vendor's performance (M=2.87, SD=0.429 and M=2.71, SD=1.411). This is also supported by the information gathered from interview that whenever ET-MRO team faces problems related to part reliability or completely wrong part receipt or poor support from the supplier, they orally complain an give the feedback to P&SCM team but there is no streamlined process and responsible section that will take the action items and shows the progress of results from necessary actions.

In addition the respondents agreement to the availability and practice of using standards while selecting suppliers they are in between of agreement and disagreement for the strategic alignment question (M=3.04, SD= .534). On similar question from the interview, it is found out that there is a good understanding by the senior management on the gap of aligning strategies throughout different levels and there is a recent study and recommendation of re-structuring of strategic sourcing section where creating alignment with necessary sections for better outcome is one among the objectives.

4.4.2. Contract management

This section aims at meeting the second objective of the research study. In particular, this section aims at assessing the extent to which contract management best practices are implemented by strategic sourcing section. As stated by Matthew (2014), at the end of the day, poor contract management can erode the value that procurement won for the enterprise during the strategic sourcing process, but effective contract management can preserve this value.

Best practices by Matthew (2014), are referred and considered to this research questionnaire and respondents were requested to state the extent to which they agreed to the contract management best practices implementation in strategic sourcing section within a scale of one to five. The results in terms of descriptive statistics in relation to the extent in which contract management best practices are implemented among strategic sourcing department are shown in Table 4.4.2.

Table 4.4.2: Contract management practice on ET-MRO's OP.

Statement	Mean	Std. Deviation
Standard Operating Procedures (SOP)	3.60	.650
Clearly defined authority and responsibility	2.73	.415
Adequacy of contract management concept	3.92	.578
Standardization (quality) of contractual terms	2.78	.587
SL performance measurement	4.19	.412
completeness of information exchange system	3.32	.692
Quality of contracts	3.81	.544
adequacy of information exchange system	2.63	.524

Source: Own survey, 2019

As shown in the table, the respondents agree to the limitation or lack of clearly defined authority and responsibility as to how and to what extent to apply the agreed contracts between strategic sourcing and Tactical buyers (M=2.73, SD=0.415). Per ZUST (2014), Leveraging electronic signatures and automated workflows to further reduce approval times & Gaining greater visibility into the entire contract management process via monitoring and reporting

functions. This finding is also supported by the information gathered from interview on the its existence and negative result as it creates disagreement as well as in prober implementation of long term agreements which results lacks to generate intended benefits of agreements which are signed and aimed at total Supply Chain costs.

In addition, one of the interview respondent's states that a benchmarking was made to share information as how other MRO's are working on contract management find out that LHT (Lufthansa Technic MRO) strategic sourcing section has a dedicated contract management section and the employees have well streamlined process & system which allows them to exercise their authority and able to control as how and when the tactical buyers should apply the long-term part and product purchase agreements to generate the intended benefits. Here, as the respondents also agree on the lack of streamlined process and system (M=2.63, SD=0.524). On the other hand the respondents are more to the agreement that there are well defined standard operating procedures for the contract management handling (M=3.60, SD=.650), and there is an adequate concept on the contract management (M=3.92, SD=0.578) as well as they agree to the quality of concluded contracts (M=3.81, SD=.544).

4.4.3. TCO consideration

This section aims at meeting the third objective of the research study. In particular, this section aims at assessing the effects of total supply chain costs on ET-MRO's operational performance.

Strategic sourcing is a systematic process designed to reduce the total cost of ownership (TCO) of a product or service. TCO method helps the purchaser to compare different goods or service providers with regard to total cost rather than choosing a supplier due to their lowest initial price alone (Noorbakhsh, A., Boehl, C. & Brown, K., 2019). Accordingly, the questionnaires were prepared considering TCO cost structure in a way that allows the required information related to TCO consideration can be gathered.

The respondents were requested to state the extent to which they agree with parameters testing provided in the questionnaire within a scale of one to five. The results in terms of descriptive statistics in relation to the extent in which TCO is considered and implemented in the strategic

sourcing process by the strategic sourcing department are shown in Table 4.5.3.

Table 4.4.3. Role of TCO consideration in enhancing ET-MRO's OP

Statement	Mean	Std. Deviation
TCO consideration	3.07	.531
Benefit of TCO consideration	3.29	.496
Good level of TCO concept	2.33	.787
Order consolidation as TCO tool	3.00	.684
TCO consideration for supplier selection	3.54	.758
Adequacy of TCO consideration for supplier selection	3.89	.884
Adequacy of TCO standards	2.94	.862

Source: Own survey, 2019

As indicated on 4.4.3., majority of the answers by respondents are neither agree nor disagree to the questions, except the question to the level of TCO concept as it shows majority of them disagree as to a good level of TCO concept. This indicates, the TCO consideration and awareness is limited in general. On the TCO concept awareness level as well as completeness of standards used during TCO consideration, the results from respondent's shows that there is poor level of understanding the concept as well as practice of TCO standards in general.

This indication is also supported by the data gained from interview since the researcher explained the meaning of TCO which is considered on this study. Based on the information gathered from the interview, there are plenty of cases where part requirements become urgent, sourcing activities done right away like "firefighting". On such cases, costs other than the part or service price are not usually considered. This might leads the operation to continue without interruption but with additional Supply Chain costs. As stated on the literature, one of the benefits of strategic sourcing best practices is to allow the supply chain agility, which can resolve such "firefighting" situations by creating strategic partnership and forming alliance.

4.5 ET-MRO's operational performance – concept level

Under the Supply chain operations reference model (SCOR), performance is one among the four "P"s which is measured based on key performance indicators (KPI's):- reliability, Responsiveness, Agility, Cost and Asset Management. This study used the first three KPI's as

its focus is on operational performance. Accordingly these three KPI's data presentation and analysis is presented below.

4.5.1. Time (Responsiveness)

As presented in Table 4.5.1, the data collected for the assessment of the operational performance with respect to timeliness of ET MRO proves the existence of the research problem raised at the beginning of the study. The data showed that there is a huge gap in acquiring accurate information which helps to source the right parts (M= 1.80 & SD= .708) as well as delay in responsiveness to corrective actions whenever deviations are created (M=2.03, SD= .787). Based on the survey result, availing of required parts in the required time (M=2.93, SD=.640) as well as timely delivery to the right place (M=2.03, SD=.788), respectively are found affecting the operation as they are not happened in good time.

On the other hand, responsiveness to rejections and returns (M=3.46, .848) & Periodical performance measures (M=3.15, SD=.738) showed that ET-MRO has good quality control and assurance which can act timely to reject wrong parts and also there is a good performance measure done. These in general shows that the major problem is accurate and timely information exchange which directly links with poor strategic sourcing practice.

Table 4.5.1 Operational Performance: Time

Statement	Mean	Std. Deviation
Accuracy of information exchange	1.80	.708
Timely sourcing parts	2.93	.640
Timely delivery of sourced parts	2.03	.788
Responsiveness to returns and rejections	3.46	.848
Periodical performance measures	3.15	.738
Timely information for corrective actions	2.03	.787
On_Time_Performance__Delivery	2.97	.582
Valid N (listwise)		

Source: Own survey, 2019

4.5.2. Agility (Flexibility)

As presented in Table 4.5.2, the data collected for the assessment of the operational performance with respect to timeliness of ET MRO proves the existence of the research

problem raised at the beginning of the study. The data showed that there is lack of harmony and team work (M= 2.25, SD=.963) as well as poor plan and practice on the time to recover for a network point with in the supply chain, companywide and also between ET-MRO and suppliers (M=2.75, SD.85) which supports the mentioned gaps on the first KPI of responsiveness. Whenever there is limited harmony and teamwork accurate and timely information exchange couldn't be practical and network interruption will also add to this effect.

On the other hand, the reliability measure based on quality performance (M=4.22, SD=.998) as well as flexibility to sudden requirement increase (M=4.19, SD=1.018) shows good flexibility on the operational performance. These in general shows that the major problems indicated in the first paragraph are coordination as well as collaboration which indicated poor strategic sourcing practice.

Table 4.5.2 Operational Performance: Agility

Statement	Mean	Std. Deviation
Quality performance measures	4.22	.998
Flexibility for unplanned decrease of parts usage	3.16	.679
Flexibility for sudden increase in parts requirement	4.19	1.018
Risk management practice for any type of change	3.96	.890
Interdepartmental harmony and team work	2.25	.963
Adequacy of TTR for network interruptions	2.75	.854
Agility_SC_Flexibility	3.42	.598
Valid N (listwise)		

Source: Own survey, 2019

4.5.3. Quality (Reliability)

As presented in Table 4.5.3, the data collected for the assessment of the operational performance with respect to timeliness of ET MRO proves the existence of the research problem raised at the beginning of the study. The data showed that there is lack of harmony and team work (M= 2.25, SD=.963) as well as poor plan and practice on the time to recover for a network point with in the supply chain, companywide and also between ET-MRO and suppliers (M=2.75, SD.85) which supports the mentioned gaps on the first KPI of responsiveness.

Whenever there is limited harmony and teamwork accurate and timely information exchange couldn't be practical and network interruption will also add to this effect.

On the other hand, the reliability measure based on quality performance (M=4.22, SD=.998) as well as flexibility to sudden requirement increase (M=4.19, SD=1.018) shows good reliability on the operational performance. These in general shows that the major problem coordination as well as collaboration which again has indicated poor strategic sourcing practice.

Table 4.5.3 Operational Performance: Quality

Statement	Mean	Std. Deviation
Operational performance success	3.82	1.109
Accuracy of parts requirement fulfilment	3.28	.540
Completeness of part requirement fulfilment	4.04	.670
Quality of parts	3.79	.978
Quality of documents & certifications	2.18	.979
Defectiveness and deviation of sourced parts	2.19	.925
Reliability	3.35	.503
Valid N (listwise)		

Source: Own survey, 2019

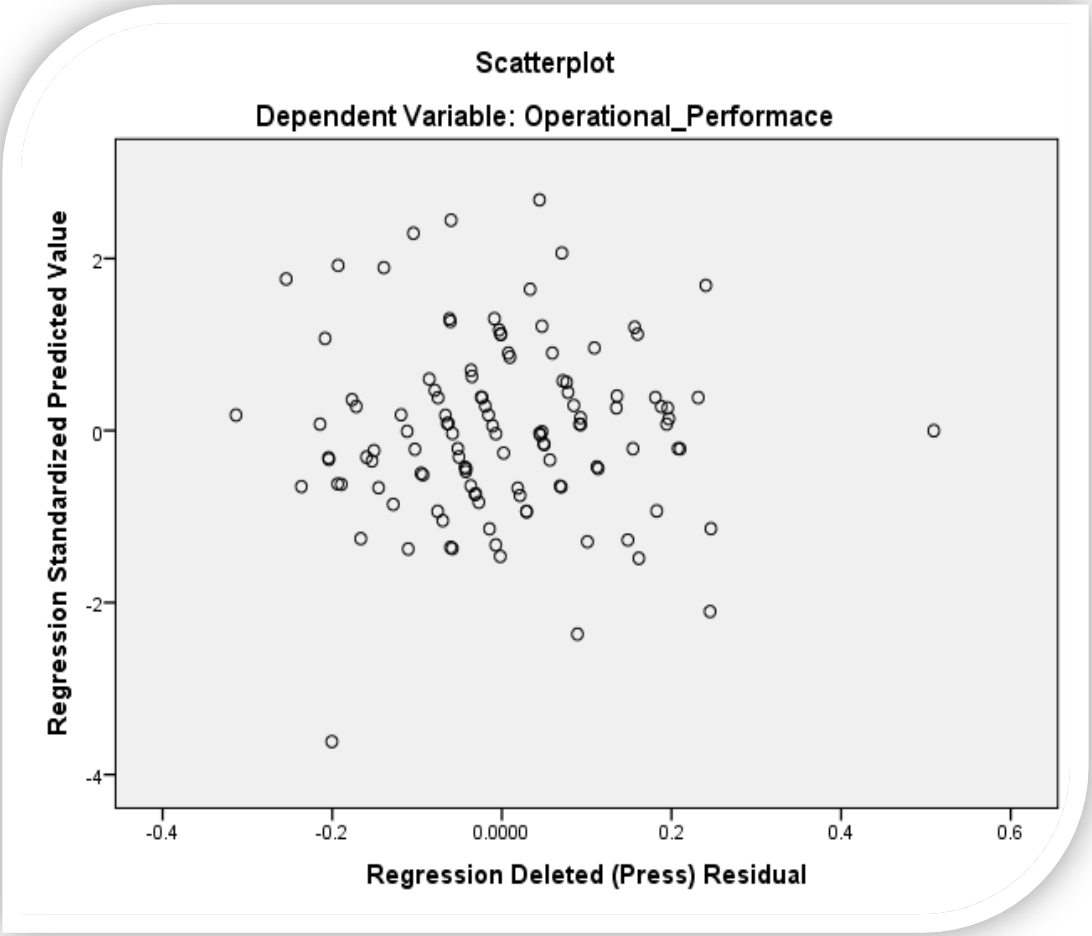
4.6 The Role of Strategic sourcing in the OP of ET-MRO: Statistical Analysis

4.6.1. Multiple Linder Regression Assumptions of the model

There are many assumptions used in multiple regression analysis to test the model. In this research, in addition to the reliability assumption indicated under research design and methodology (Table 3.1), the researcher has also used Linearity, Q-Q plot to test normality & Multicollinearity, to test the model.

4.6.1.1.Assumption of Linearity

The linearity assumption was tested with scatterplots. Figure 4.6.1 shows that the relationship between the independent and dependent variables are linear as they evenly distributed around the horizontal line.



4.6.1.2. Assumption of Multicollinearity

A regression model to be accepted as good, it should have a strong correlation among its independent variables and that the value of variance inflation factor (VIF) must have a value between 1 and 10 and the tolerance level should be more than 0.2 (SPSS Inc., 2017). As can be referred from table 4.12, the obtained VIF (the coefficient of collinearity statistics) value is

between 1 and 10 and the tolerance level is more than 0.2. Therefore, it can be concluded that there is no multi-collinearity problem on this regression model or the independent variables are not highly correlated with each other.

Table 4.6.1 Multicollinearity Test

Coefficients[a]

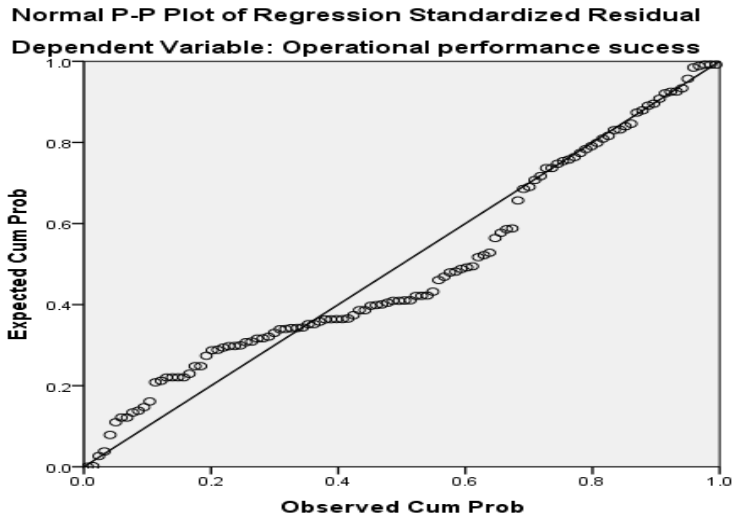
Model		Collinearity Statistics	
		Tolerance	VIF
1	Supplier_Selection_Practice	.978	1.023
	Contract_Managment_Practice	.667	1.977
	Total_Cost_of_Ownership_Consideration	.467	2.076

a. Dependent Variable: On_Time_Performance__Delivery

4.6.1.3. Assumption Normally Distribution of variables

As indicated on Figure 4.7.2 the residuals are normally distributed because the plotted residuals are fairly distributed around the diagonal straight line. Regression assumes that variables have normal distributions. Whenever there is no normal distribution or whenever there is a considerable number which are out of lines, it indicates an unclear relationship between variables.

Figure 4.7.2 P-P Plot of regression standardized residual



Source: SPSS data 2019

4.6.2. Results of the Regression Analysis

A regression analysis was used to find out the statistical relationship between strategic sourcing practices and operational performance. The regression analysis, as provided by Cooper and Schindler (2006), is a technique for establishing the statistical relationship between the independent and dependent variables. This relationship is established by a model which shows the relationship between dependent variable (operational performance) and independent variables (Strategic sourcing practices, supplier selection and management practice, contract management practice and TCO consideration), this research study embraced / to assess the relationship exists between the independent variable and dependent variable.

4.6.2.1.Regression Analysis Model summary

The adjusted R square, which is the coefficient of determination, shows the degree of variation of the dependent variables as a result of change in the predictable variable. The coefficient of determination is a measure used in statistical analysis that examines how well a model explains and predicts the future outcomes or the accuracy of the model.

Table 4.7.2. Statistical relationship Coefficients :Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.750a	.563	.546	.748

a. Predictors: (Constant), Total_Cost_of_Ownership_Consideration, Supplier_Selection_Practice, Supply_Chain_Practice, Contract_Managment_Practice

Source: Own survey, 2019

Based on the results of Table 4.7.2, of Adjusted R Square of 0.546, at least 54.6% of the variation in operational performance is explained by the model. In other words, 56.3% change in operational performance of Ethiopian airline is attributable to Effectiveness in strategic sourcing practice, supplier selection and management, contract management and TCO ownership considerations.

R stands for Regression coefficient indicates the relationship between the independent and dependent variables. Based on the results of Table 4.7.2, there is a strong and positive relationship between operational performance and strategic sourcing practices as illustrated by

a regression coefficient of 0.750. Based on the results of this study, there are 45.4% of other factors that impact operational performance, and such factors should be established by the future researches.

4.6.2.2.Regression Analysis ANOVA

Table 4.10. Statistical relationship – ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	57.291	3	19.097	34.103	.000b
	Residual	29.359	112	.190		
	Total	86.650	115			

a. Dependent Variable: Operational performance success
b. Predictors: (Constant), Supplier_Selection_Practice, Supply_Chain_Practice, Contract_Managment_Practice, Total_Cost_of_Ownership_Consideration,

Source: SPSS data, 2019

The ANOVA illustrates whether the model can predict organizational performance using the independent variables. Based on Table 4.9, the ANOVA test shows that the regression model has a significant impact on operational performance since the p-value (0.000) is less than 0.05 (0.000<0.05) and the F statistic (F=34.103) was significant at 92% confidence level. There existing a statistically significant relationship, hence; the regression model, which explains the relationship between the operational performance (dependent variable) and the strategic sourcing practices, (independent variables), is statistically significant.

4.7 Regression analysis- strategic souring and operational performance.

Using the established relationship of the model $Y = B0 + B1*X1 + B2*X2 + B3*X3 + e$, a regression analysis between strategic sourcing current practice and its operational performance is generated from SPSS as indicated below.

Table 4.11. Coefficients of Regression Model with OP as dependent variable

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.507	.185		-2.407	.002
Supplier_Selection_Practice	.327	.091	.195	2.775	.007
Contract_Managment_Practice	.339	.094	.236	3.512	.001
Total cost of ownership consideration	.241	.147	.234	1.736	.036

a. Dependent Variable: Operational performance success

Source: Own survey, 2019

Based on the results on Table 4.10, the relationship between effective strategic sourcing practice, contract management & TCO consideration; to operational performance are statistically significant having been measured at Beta value of 0.195, 0.236 and 0.234 and P value 0.007, 0.001 & 0.036 which is less than 0.05. Accordingly a unit change in operational performance is attributed by 19.5% change in supplier selection. 23.6% Contract management and 23.4% change by TCO consideration. Contract management with 23.6% is the most significant predictor for operational performance.

Implementation of strategic sourcing best practices leads to many strategic benefits in firm, including ensuring timely delivery of operational outputs, reliability of products and support, increased efficiency and agility to cop up with today's dynamic word. The research also implies that good practice of strategic sourcing and mainly the contract management best practice will help improve the operational performance in measurement of time, quality and flexibility. This findings are also supported by the information gathered from the current strategic sourcing manager; who has currently physically visited Lufthansa Technic MRO as best in class and find out gaps related to supplier selection as well as contract management.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

This chapter presents the summary of the study findings, conclusions and recommendations drawn from the study findings based on the research objectives.

5.1 Summary of findings

The research study found out that ET-MRO's operational performance as measured in terms of on time delivery, reliability as well as flexibility to meet fluctuating part requirements, is affected by strategic sourcing practice. Whenever required parts are missed to be availed in a right and timely manner from right suppliers, flights are delayed and cancelled and ET-MRO's missed to provide reliable and flexible services. This also exposed the operation to incur additional costs in the process of working to recover from such situations. The study result of Lenny Koh, Demirbag, Bayraktar, Tatoglu, and Zaim (2007) supply chain lean practice have direct positive and significant impact on operational performance and strategic sourcing plays the major role in supply chain lean practices. Based on Gargeya & Su (2012) study, strategic sourcing has a positive impact on firm performance as it is supported by path coefficient=0.35, $t=3.12$, $p<0.05$. There have been some other reports showing that integrating sourcing into strategic planning leads to higher business performance (González- Benito, 2010, 2007).

When it comes to ET-MRO's current strategic sourcing practice it is found out that, Ethiopian airlines introduced strategic sourcing section since 2015 with the aim of generating the advantages from the best practices, however there is a gap between the best practice and the practice by Ethiopian airlines. Based on the research finding both from questionnaire as well as interview, the supplier selection practice has a gap from the best practice. It is evidenced from the respondents that 73% of them (strongly disagree, disagree & neutral- Refer Appendix C-a) that the selection of suppliers is based on company strategy. This shows that there is lack of alignment of strategies during supplier selection & also indicates that most of the employees don't have the knowledge. Although the strategic sourcing section has a well-defined standard for supplier selection, the standard lacks creating awareness to consider some major parameters

like strategic goal alignment between different stockholders in the MRO. Such strategy misalignments exposed the sourcing activity to overlook the actual requirement from users section and affected the operation by missing to provide the required parts at the right time, quality and from the right source.

70% of respondents strongly disagree, disagree and neutral (Refer Appendix C -b) to the question related to knowledge and adequacy of sourcing officers assigned to review agreed SL's with vendors. This is a good indication that the vendor management has no dedicated section and responsible persons assigned to each long term agreements so as to evaluate agreed SL's and take necessary action based on the performance results. This also affected the operation in terms of time, quality as well as flexibility of availing parts and services to support the operation without interruption, with in the targeted service level and standard quality.

As it is also evidenced from respondents answer to the question related to the availability and applicability of system that allows for information transfer to provide feedback to sourcing officers, 71% (Refer Appendix C-c) of respondents answer as strongly disagree, disagree, and neutral results to the mean result of 2.63 which brings to the fact that ET-MRO different sections has no system that allows them to easily and directly report suppliers failure or good performance to give as a feed back to the sourcing team. As a result the right corrective actions couldn't be taken either. This mainly gives poor base for renewal as well as cancellation of existing agreements as well as lucks right consideration for upcoming agreements.

In addition, as it is evidenced from respondents; more than 80% (Refer Appendix C-d) of them disagree & strongly disagree to the question on the availability of clearly defined authority and responsibility, it is found out that the contract management practice lacks clearly defined authority and responsibility. This indicates that the tactical buyers who are responsible to release the purchase order and all the necessary transaction until the part gets used, have a system access which allows them to buy required parts from others sources too, while there are strategically concluded long-term agreements are at hand. As a result the tactical buyers overlook the very big picture which is expected to generate greater benefit to the company and they only consider the price of the part or service. Such transaction based activities usually least to operation interruption either due to lack of timely supply, poor quality of product or missing the right documents, etc. The impact of poor practice of both supplier selection & management

as well as contract management possibly expose the MRO operation for additional supply chain costs.

As TCO is stated by Wouters, Anderson, and Wynstra (2005), the modern supply chain management should include the mentioned components for best result. Evidenced from the data from interview with the current strategic sourcing manager, TCO considerations lack to see the very big picture of the company strategy and mainly consider part or service price, quality to some extent, logistics cost and consolidation. The costs that are related to inventory handling and management, timely supply, long term strategy sharing and additional supports for future development, commonality and to others are missed to be included in to the strategic sourcing operating procedures.

It is inevitable that ET-MRO has a good infrastructure, IT system, capacity, capability as well as operational performance compared to many other similar MRO's. But, there is always a room for improvement in any type of business and especially on such an aviation business filled with dynamic nature. Accordingly this research were to find out the challenges in implementing strategic sourcing best practice in ET-MRO among those many other reasons that are currently affecting ET-MRO's operational performance. As a result of luck of adopting the best strategic sourcing practices, the MRO operation is also affected.

5.2 Conclusion

Based on each findings the researcher reached to the following conclusions.

Although SS can't take the line share in impacting ET-MRO's operational performance, it is evidenced from the study result that SS has impacted ET-MRO's operation because it doesn't reach to the best level of its current practice.

As evidenced from the study result supplier selection and management practice is not practiced well and affected ET-MRO's operational performance. Lack of strategic alignment, lack of collaboration and poor system support contributed to shortage of parts then creates delays and AOG's.

Contract management is also poor as measured to best practices. Failure to evaluate SL's periodically and failure to take timely corrective actions affects the operation in terms of time, quality as well as flexibility.

The effect of TCO consideration has also impacted the operation based on all operational performance indicators used. There is lack of considering TCO beyond part and service cost, which creates lack of collaboration and alliance hence affects the operation in terms of Agility.

The qualitative data analysis also supported the result that SS practice is not to the level of today's best practices that ET-MRO operation are not getting the expected support to enhance operational performance and minimize delay's and AOG's. Hence, it is concluded that SS current practice is affecting ET-MRO's operation.

5.3 Recommendation

The implementation of an effective and efficient sourcing activity which aligns overall organization's strategy with suppliers or vendors strategy, leads to benefits which at the end increases the operational performance. This may include on time delivery of parts, sourcing the right quality, creating strategic partnership which can allow flexibility to support the dynamic nature of the operation with minimized AOG. Since sourcing activity is always there and mandatory, firms are recommended to perform the different functions of SS at the best level in order to generate a good operational performance.

Based on the conclusions reached in this study, the researcher has pointed out the following recommendations to be considered and applied as required in order to maximize the operational performance benefits that can be gained from strategic sourcing best practices.

- Strategic sourcing department should review and evaluate the current supplier selection standards and update the list based on recently applied best practices so as to get the best benefit out of it and then generate better operational performance. Working from the very beginning on the supplier selection part is one key sourcing activity to resolve part and service related issues which are continuously coming from user sections. Uninterrupted, right part supply is another key point for the success of the ET-MRO's operation to maintain as well as enhance targeted on time performances.

- In addition to supplier selection, supplier management is also another key tool to maintain what has been agreed during the selection process. Accordingly, Strategic sourcing should create a system and assign adequate manpower to each and every long term agreement. The assigned person should have the skill and ability to evaluate and control what has been agreed up on selection with that of actual support using the feedback gathered from user section.
- The contract management practice should be supported by system which can allow the sourcing officer a control over the tactical buyers to buy from right source in a way that confirms the agreed and expected benefits from strategic agreements can be gained.
- Based on the information gathered from interview, the current manager is working in identifying the gaps and then fill them with the best practices. Accordingly the best practices can be adopted to streamline the contract management system for proper and ease implementation. This needs a change in structure which allows the responsibility and control to the sourcing office, as it is evidenced that the current practice doesn't have such flexibility. By doing so, the expected benefit which has a direct positive impact on the operational performance can be generated.
- Supply chain cost in addition to what has been considered by the strategic sourcing team should be taken in to account so that the overall objective of the Airline can be meet instead of limited section wide or department wide strategies. In order to make this practical all stockholders needs to participate and play their part during the supplier selection process in good time. In addition, for newly discovered practices on selected suppliers performance and corresponding hidden costs, there should be a system which can create visibility of each practice to the strategic sourcing officer for continuous improvement while selecting suppliers and corresponding products. This in general needs a well-defined and streamlined system with an up-to-date standard operating procedure (SOP's).
- As stated in the literature part, strategic sourcing is a relatively new concept where selection and implementation of best sourcing function is not an easy task. To resolve this problem, the research recommends that value adding trainings should be given in a continuous bases to the staff to periodically update and develop the required skill level in a continuous basis. Hence, the sourcing team can be agile enough and proactively participate in the supply chain process and support the dynamic part requirements.

5.4 Suggestion for further studies

With the interest of resolving problems related to parts shortage, this study mainly focused on supplier selection and management, contract management and total supply chain cost considerations and studied corresponding current practices and impacts on ET-MRO's operational performance. There are many other factors that affect operational performances that are not included in this study. Further researchers can investigate other variables that affects operational performance and come up with their recommendations so that the results can be more valuable to resolve operational problem.

In addition, different MRO's have different existence and vary in capacity and capability so that the recommendations from this study which is specific to ET-MRO might not be applicable to all other MRO's. Future study can further consider other MRO's to generate a generic result that can be easily adopted by other MRO's. If this can be done, other MRO's can easily evaluate their practice and apply the study recommendations as required.

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Appendix;

Appendix A: Questionnaire

Dear respondents,

My name is Mekdes Tadele, a prospective graduate of this academic year from Logistics and Supply Chain Management department. Currently, I am conducting research on **"A Review of Strategic Sourcing in Operational Performance of MRO'S (Maintenance, Repair and Overhaul) Business unit, a case of Ethiopian Airlines"** as a partial fulfilment for Masters of Arts Degree in Logistics and Supply Chain Management Program. The main objective of the study is to identify the challenges and prospects of MRO's operation from strategic sourcing point of view and to determine the effect on the MRO's operational performance level. For the purpose of successful accomplishment of this study, your sincere cooperation in filling the questionnaire is extremely valuable.

Therefore, you are cordially asked to deliver your support in objectively filling the questionnaires provided. The researcher also wants to assure you that the data to be collected from you will be used for this academic research purpose only; and its confidentiality will strictly be kept. For any additional information, explanation and comment, you can leave your message through phone number: +251 115 17 8484, email: mekestadele@gmail.com.

Your coordination is highly appreciated!

Part I. General Information

Put tick mark (√) on your choice & write the specific answers for questions with no choices

1. Gender: Male Female
2. Department
3. Management staff Non Management Staff
4. Work Experience in the Airline (Year)
5. Level of Education
   a) Certificate
   b) Diploma
   c) Degree
   d) Masters
   e) Other (please specify) _____

Part II. Please rate your level of agreement with a tick mark **(√) using the following 5 point Scales of: 1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree**

- **The effect of the sourcing practice on ET-MRO's Operational Performance.**

No	Item	1	2	3	4	5
1	Strategic sourcing practice enables to meet on time operational performance					
2	Flight delays are usually created due to unavailability, shortage and poor quality of parts					
3	The MRO operation is frequently affected by part related issues due to supplier poor performance interruption					
4	Reliability of MRO operation is affected by poor contract					
5	Luck of TCO consideration during sourcing of parts exposed the MRO operation for additional indirect costs.					
6	The process allows strategic sourcing officers to get after purchase feedbacks on sourced parts directly or indirectly from user sections					
7	Companywide strategies are usually shared to streamline with strategic sourcing process					

Additional P &SCM related question

1. **How do you explain the extent of support that P &SCM is providing to ET-MRO's considering its operational performance?**

   _____

- **Strategic Sourcing functions related question**

- **Questions related to supplier selection & supplier management**

No	Item	1	2	3	4	5
1	Suppliers are usually approached in a way that long term partnership and company strategy is taken in to consideration					
2	Supplier selection is based on periodical spend analysis data and considering different volume of purchases					
3	The standard parameters used by the strategic sourcing team for supplier selection are complete and useful					
4	The vendor management tool which is used to measure vendors performance per agreed SL's is well defined and properly applied					
5	Collaboration with suppliers is usually considered while selecting strategic suppliers					
6	Negotiation as one process of strategic sourcing has given due attention and properly applied in a timely manner during supplier selection					
7	Timely and proper actions taken on poor vendor performance benefits ET-MRO in getting the right parts from the right source					
8	Higher level strategies are properly streamlined and applied to enable the strategic sourcing activity more effective and efficient.					

2. **How do you explain the relationship between strategic sourcing and tactical buying section in terms of long term part sourcing agreements implementation?**

   _____

   _____

   _____

- **Questions related to Contract Management**

No	Item	1	2	3	4	**5**
1	Standard Operating Procedures (SOP) enables the strategic sourcing team to manage all the agreements in a right manner					
2	The strategic sourcing team is authorized and responsible to enforce and control proper application of sourcing agreements.					
3	There is a clear section wide understanding and good practice that contract management is a key to gain all agreed benefits from strategic					
4	Well-defined & legally reviewed standard terms are usually used for the common legal related articles while reviewing contractual terms					
5	KPI's and Service Level (SL's) are periodically reviewed by strategic sourcing to insure the agreed support is provided by the suppliers					
6	The information system is created and practiced in a way that performance feedback can be easily communicated to strategic sourcing team for timely and appropriate action					
7	The contract review system allows technical points and corresponding terms to be reviewed by a responsible section with a technical knowhow					
8	The system design is useful in a way that it creates awareness and allows visibility of all concluded agreements by all user sections.					

3. **How do you explain the contract management practice considering periodical review and update of agreed time, quality and flexibility of service for sourced parts?**

_____

_____

- **Questions Related to Total Cost of Ownership (TCO)**

No	Item	1	**2**	**3**	**4**	**5**
1	TCO usually considered during supplier selection					
2	TCO consideration throughout the supply chain process generate a better result					
3	There is a good understanding of TCO by P & SCM as a whole that adds value on the Supply Chain process					
4	A consolidation approach is considered in terms of cost as well as partnership advantage without compromising quality					

5	Transaction costs related to purchasing activities like ordering, freight, logistics, quality control and the costs related to poor quality are considered on the supplier sourcing process					
6	When TCO is considered in supplier selection, storage, order fulfilment & quality costs are reviewed in detail					
7	TCO consideration usually includes indirect costs of the part like quality, aftersales service, handling or operating cost					

4. How do you explain TCO consideration and its impact during supplier selection

_____

_____

Operational Performance related question

Responsiveness

No	Item	1	2	3	4	5
1.	The system allows part requests to be sent to P&SCM team usually received in good time to process purchase order					
2	Sourcing of parts by P&SCM team usually done with in expected time frame					
3	Sourced parts are usually received with in expected Lead Time (LT) and Turn Around Time (TAT) and get ready for use					
4	Rejected parts due to different reason like quality, different part or excess part are returned on time and replacements can be processed as required					
5	A performance measure is implemented and periodically taken by each section where on time delivery is the major Key Performance Indicator (KPI)					
6	The maintenance personnel is well trained and fully aware about the information required by the P&SCM team for timely support					

Reliability

No	**Item**	**1**	**2**	**3**	**4**	**5**
1	Parts requirements are fulfilled perfectly and accurately as ordered					
2	Among periodically requested parts majority of them are fully availed all the time					
3	Aircrafts and Aircraft components repair works are not usually delayed due to the quality of sourced parts					
4	Ordered parts are usually received accurately with all necessary documents for timely receipt and use of parts as planned					

5	Ordered parts are usually received in perfect condition without any deviation or defects					
6	Quality Control and Assurance is properly applied for all sourced parts					
7	Rejection of parts due to poor quality properly recorded and feedbacks are periodically given to P & SCM section					

- **Agility**

No	Item	**1**	**2**	**3**	**4**	**5**
1.	The sourcing team is always ready to adopt changes in requirement where demand goes down than expected and able to avoid unnecessary costs related to inventory carrying					
2	The sourcing team is always ready to adopt changes in requirement where demand goes up than expected and avoid unnecessary costs related ordering					
3	The sourcing team has a good risk management practice for sourcing of parts for any deviations from expected (deviation can be due to time, quality, quantity, damage etc…)					
4	The system applied by ET-MRO with P&SCM to address planned part requirements, shortages and part related issues is well streamlined and properly applied to address issues in a timely manner					
5	There is good plan and practice on the Time To Recover (TTR) for a network point (with in the supply chain, companywide and also between ET and suppliers) to become fully functional after disruption					
6	Sourcing team plays a big role in creating and participating in supply chain alliances					

Additional ET-MRO operational performance related question

1. **How do you explain the extent of ET-MRO's operation affected by failure to avail the required parts?**

   _____

   _____

   _____

Appendix B: Interview questions

1. What is the sourcing process practiced under SS? How do you measure its performance towards supporting MRO?
2. What are the KPI's of strategic sourcing?
3. Does ET has predefined criteria's used for selecting suppliers?
4. How difficult is the supplier selection process?
5. Does ET has a vendor management system?
6. What is the contract management practice?
7. How is TCO considered in strategic sourcing?
8. What deliverables does P&SCM expected from strategic sourcing to support the MRO operation?
9. Since its establishment (Jan. 2015) does strategic sourcing generates the expected results?
10. If not, what are the reasons and what should be done to generate the expected result?

Appendix C: Respondents statistics to specific questions

Appendix C-a

Selection of suppliers based on company strategy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	5	4.5	4.5	4.5
	Agree	77	68.8	68.8	73.2
	Neutral	12	10.7	10.7	83.9
	Disagree	13	11.6	11.6	95.5
	Strongly Disagree	5	4.5	4.5	100.0
	Total	112	100.0	100.0	

Appendix C-b

Knowledge and adequacy of sourcing officers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	7	6.3	6.3	6.3
	Agree	27	24.1	24.1	30.4
	Neutral	7	6.3	6.3	36.6
	Disagree	56	50.0	50.0	86.6
	Strongly Disagree	15	13.4	13.4	100.0
	Total	112	100.0	30.4	

Appendix C-c

Adequacy of information exchange system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	11	9.8	9.8	9.8
	Agree	21	18.8	18.8	28.6
	Neutral	3	2.7	2.7	31.3
	Disagree	60	53.6	53.6	84.8
	Strongly Disagree	17	15.2	15.2	100.0
	Total	112	100.0	28.6	

Appendix C-d

Clearly defined authority and responsibility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	8	7.1	7.1	7.1
	Agree	13	11.6	11.6	18.8
	Neutral	1	.9	.9	19.6
	Disagree	69	61.6	61.6	81.3
	Strongly Disagree	21	18.8	18.8	100.0
	Total	112	100.0	100.0	