



THE EFFECT OF E-PROCUREMENT PRACTICES ON THE SUPPLY CHAIN
PERFORMANCE OF THE ETHIOPIAN AIRLINES GROUP.

By

DERBO BIMREW FENTAW

(ID No. GSE/1012/14)

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ADVISOR: SHIFERAW MITIKU (PHD)

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Addis Ababa University
School of Commerce

This is to certify that the thesis carried out by Derbo Bimrew Fentaw, entitled “*Effect Of E-Procurement Practices On Supply Chain Performance Of Ethiopian Airlines Group*” and submitted in partial fulfillment of the requirements of the Degree of Master of Arts in Logistics and Supply Chain Management complies with the regulations of the University and meets the accepted standards for originality and quality.

By
Derbo Bimrew

Approved by a board of examiners and advisors:

Shiferaw Mitiku (PhD)

Advisor

Signature

Date

Kirubel Biruk (PhD)

Internal examiner

Signature

Date



Goitom Gebremedhin (PhD)

External examiner

Signature

Date

DECLARATION

I, hereby signed, declare that this thesis entitled: “*Effect of e-procurement practices on Supply Chain Performance of Ethiopian Airlines Group*” which I submitted to the partial fulfillment of the degree of Master of Arts in Logistics and Supply Chain Management to the Addis Ababa University School of Commerce is my original work and has not been submitted earlier either to Addis Ababa University or any other institution for the fulfillment of the requirement for any course of study. I also declared that no chapter of this manuscript in complete or in partial is lifted and incorporated in this report from any earlier work done by others or me.

Name: Derbo Bimrew

Enrolment number: GSE/1012/14

Date: June 2024

Addis Ababa, Ethiopia

Signature: _____

CERTIFICATE

This is to certify that this thesis is done by Derbo Bimrew a student of Master of Arts in Logistics and Supply Chain Management have been working under my supervision and guidance for his project entitled: “*Effect of e-procurement Practice on Supply Chain Performance of Ethiopian Airlines Group*”. He submitted his genuine and original work that complies with the regulations of the University and meets the accepted standards concerning originality and quality.

Advisory: Shiferaw Mitiku (PhD)

Addis Ababa, Ethiopia

Date: June 2024

Signature: _____

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LIST OF ACRONYMS AND ABBREVIATIONS

ICT	Information and Communication Technology
IT	Information Technology
EP	Electronic Procurement
P&SCM	Procurement and Supply Chain Management
PSCM	Procurement and Supply Chain Management
SCM	Supply Chain Management
MRO	Managing Director of Maintenance Repair and Overhaul
RFQ	Request for Quotation
ET	Ethiopian Airlines
CIPS	Chartered Institute of Purchasing and Supplies
EDI	Electronic Data Interchange
PLC	Product Life Cycles
SC	Supply Chain
ACE	Achieving Competitive Excellency
GCFO	Group Chief Financial Officer
GPSCM	Group Procurement and Supply Chain Management

ABSTRACT

Electronic procurement platform adoption enables the organization to improve its supply chain performance. However, the advantages of electronic procurement have varied depending on the implementation context. The title of the study was Effect of Electronic Procurement Practices on Supply Chain Performance of the Ethiopian Airlines Group. The study aimed to assess the association between E-procurement practices and Ethiopian Airlines Group's Supply Chain performance. In this study, the Supply Chain performance in terms of cost, quality, and delivery were the dependent variables and E-procurement practices consisting of E-sourcing, E-information, E-ordering, E-invoicing, and E-payment were the independent variables. The scope of the study was limited to Ethiopian Airlines Group Procurement and Supply Chain Management, Addis Ababa Ethiopia. The study utilized explanatory and descriptive research designs and a quantitative approach. Regarding sample size, 172 respondents were selected and approached from the total number of 301 populations. The primary source of data was used, the data were gathered through questionnaire surveys. The data was analyzed by using inferential statistics, SPSS version 25 software. Content validity was addressed by involving expert respondents, reviewing the literature, adopting previously used instruments, and pretesting the questionnaire before releasing it. Cronbach's alpha statistics were conducted for the reliability test. The result revealed E-sourcing, E-information, E-ordering, E-invoicing, and E-payment are highly practiced by the Ethiopian Airlines Group's Supply Chain department. Furthermore, the hypothesis testing result showed that E-ordering and E-invoicing positively and significantly affect Ethiopian Airlines' supply chain performance. E-sourcing, E-information, and E-payment have less effect on the supply chain performance. The study recommends that Ethiopian Airlines focus on the fully effective and efficient automated E-ordering, and E-invoicing of e-procurement practices, as well as exhaustively work on the E-sourcing, E-information, and E-payment aspects to minimize the supply chain gaps and entirely enhance the supply chain performance in terms of cost, quality, and delivery. Besides, the study recommends further research assessing the effect of E-procurement practices on the SC performance in other case organizations by including other SC performance indicators and fixed research methods.

Keywords: *E-procurement, Supply Chain Management, and performance.*

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CHAPTER ONE

INTRODUCTION

This chapter covered the background of the study, statement of the problem, objectives of the study, research questions, significance of the study, scope of the study, limitation of the study, definition of key terms, and organization of the study.

1.1 BACKGROUND OF THE STUDY

Electronic procurement refers to the use of ICT for procurement processes such as electronic advertising, e-payment, e-tendering, e-information, and e-submission (Makoba, et al., 2017). Since procurement is the primary pillar of the supply chain, switching from manual to electronic procurement automatically alters the performance of the supply chain (Ngeno & Kinoti, 2017). E-procurement increases buy volume, enhances logistics and delivery, lowers costs, offers a greater selection of suppliers, brings better quality, reduces paperwork, and lowers administrative costs (Thomson & Singh, 2001). All of these factors contribute to increased efficiency in the business-to-business environment.

Globally, the adoption of e-procurement has led to increased efficiency, reduced lead times, and improved inventory management across diverse industries (Handfield & Nichols, 2022). Globally, companies are implementing e-procurement platforms to optimize their procurement procedures, curtail expenses, and enhance supply chain efficiency (Chen & Paulraj, 2004). Research globally indicates that e-procurement adoption leads to cost reduction through process efficiencies, improved quality through better supplier management, and enhanced delivery performance through faster order processing and fulfillment (Zhang, et al., 2018).

In the global airline industry, e-procurement practices have become vital for improving supply chain performance by optimizing procurement processes, reducing costs, and enhancing collaboration with suppliers (Mazzarol, et al., 2011). Airlines worldwide are leveraging e-procurement solutions to streamline their purchasing activities, manage supplier relationships more efficiently, and ensure timely delivery of goods and services (Bakanauskas, et al., 2018).

In Africa, the adoption of e-procurement practices has been slower compared to other regions due to infrastructure challenges, limited internet access, and concerns regarding data security (Hove, 2017). However, several African countries are making efforts to modernize their procurement systems through the implementation of e-procurement platforms to enhance transparency, reduce

corruption, and improve supply chain efficiency (Ssebuggwawo, et al., 2018). African countries are gradually investing in e-procurement infrastructure and capacity-building initiatives to overcome these challenges and realize the advantages of cost reduction, quality improvement, and delivery enhancement associated with e-procurement adoption (Mangeni & Mwesigwa, 2019).

In Africa, the airline industry faces unique challenges such as limited infrastructure, regulatory constraints, and geopolitical instability, which impact supply chain performance (Gebreyesus & Iizuka, 2019). Despite these challenges, African airlines are increasingly adopting e-procurement practices to overcome logistical hurdles, improve inventory management, and enhance operational efficiency (Oke, et al., 2018). E-procurement platforms offer opportunities for African airlines to optimize their procurement processes, negotiate better deals with suppliers, and reduce operating costs (Ben-Nasr & Baccar, 2020).

In Ethiopia, e-procurement adoption has been a focus area for the government to modernize public procurement practices and enhance transparency. The Ethiopian government has implemented various initiatives and regulations to enhance transparency, efficiency, and accountability, and promote the use of e-procurement systems in both the public and private sectors. However, challenges such as limited ICT infrastructure and capacity constraints have hindered the full-scale implementation of e-procurement practices in the country (Ministry of Finance of Ethiopia, 2022). The introduction of the e-procurement system in Ethiopia aims to reduce bureaucratic delays, improve accountability, and enhance the overall performance of the supply chain (Mulugeta, 2019). Despite initial challenges such as limited internet infrastructure and resistance to change, the adoption of e-procurement in Ethiopia is gradually increasing, with promising results in terms of improved procurement processes and supply chain performance (Getahun, et al., 2020). Ethiopian businesses and government agencies are investing in e-procurement systems to streamline procurement processes, improve supplier management, and ensure timely delivery of goods and services, ultimately leading to improved supply chain performance (Abate & Getahun, 2021).

In Ethiopia, the airline industry, represented by Ethiopian Airlines, plays a significant role in the country's economy and connectivity to the rest of the world (Berhe, et al., 2021). By implementing e-procurement systems, Ethiopian Airlines aims to improve procurement efficiency, reduce lead times, and enhance the quality of goods and services procured (Getachew, et al., 2020).

1.2 STATEMENT OF PROBLEM

Realizing the importance of electronic procurement, globally, electronic procurement has gained popularity, especially with the advent of technology. Since the 1960s, many governments in the world have been struggling to promote transparency, accountability, and efficiency and reduce corruption in public procurement through electronic adoption. For example, early in 2000 reports from the United States of America noted the rapid development of electronic procurement, including online bidding (Reddick, 2004). The lack of case studies or real-world examples illustrating effective implementation techniques, difficulties encountered, and lessons gained by airlines may be the practical gap in research on the impact of e-procurement on supply chain performance in the airline business. Practical insights are essential for guiding other airlines in adopting e-procurement practices effectively (Bakanauskas, et al., 2018). Danga1, *et al.* (2021) point out that an electronic public procurement system is important for increasing the government's performance. Despite the importance of adopting a public procurement system, the most highlighted challenges were lack of trustiness and system security, lack of ICT, and inadequate information communication technology (ICT) facilities. Likewise, Suhery, *et al.* (2019) aver that electronic procurement has positive effects on public sector performance since the system provides transparency, efficiency, and fairness, enhances effective competition, and reduces corruption in procurement activities.

Empirical evidence confirms the importance of using electronic procurement for increasing performance. For example, Yano & Nondi (2018) studied the variables influencing the adoption of electronic procurement at Mombasa's Kenya Ports Authority. The findings demonstrated the influence of staff ICT proficiency, top management support, budgetary allocation, and the condition of technology infrastructures on the electronic procurement system. Furthermore, Alphonse (2020) researched the efficiency of Tanzania's adoption of electronic procurement. The study's conclusions showed that using electronic procurement could improve public sector performance.

The lack of comprehensive theoretical frameworks or models that fully explain how e-procurement practices affect airline supply chain performance is known as the "theoretical gap." Current theories may not adequately describe the complex dynamics and interdependencies inherent in airline supply chains (Gebreyesus & Iizuka, 2019). Adoption of electronic procurement systems in the airline industry can effectively reduce administrative costs by up to 30% due to streamlined processes and less paperwork; reduce procurement process costs by approximately 25%; and

purchase costs by 10-15% through improved bulk purchasing, price negotiations, and waste minimization; improve supplier compliance and product quality metrics and order processing by 20%; and minimize payment and invoicing error by up to 60%, ensuring higher accuracy and quality in procurement transactions; reduce lead times by 30–40% to maintain operational schedules and minimize aircraft downtime; and enhance on-time delivery rates by 25%, guaranteeing the availability of necessary components when needed (Hallikas, et al., 2021) and (Chang, et al., 2013). The cost of material input is the largest component, accounting for between 35% and 57% of total airline expenses (Oum & Yu, 1998). Although supply chains work better when e-procurement is used, some discrepancies are mostly caused by difficulties with implementation, problems with integration, and security issues. While e-procurement has significant theoretical benefits, these inconsistencies imply that actual results may differ based on organizational preparation, technology compatibility, and the particular implementation situation (Hallikas, et al., 2021) ; (Chang, et al., 2013).

The knowledge gap refers to areas within the literature where there is limited understanding or consensus on specific aspects related to the effect of e-procurement on aviation sector supply chain performance. This could include gaps in understanding the impact of cultural factors, regulatory frameworks, supplier relationships, or technological capabilities on e-procurement adoption outcomes in airlines (Oke, et al., 2018).

Citizens frequently criticize the procurement process, which they perceive as one of the main causes of corruption due to its complicated legal structure, delayed progress, and general lack of openness (Thai, 2004). The policy gap involves the absence of coherent policies or regulatory frameworks at the organizational or governmental level that facilitate adopting and effectively implementing e-procurement practices in the airline industry. Policymakers may need to develop industry-specific guidelines and incentives to encourage e-procurement adoption and address potential barriers (Zewdie & Gachino, 2018).

Ethiopian Airlines' procurement department procures essential materials and services from both domestic and international markets, including a wide range of supplies valued at millions of dollars. Procurement is now acknowledged to impact the organization's performance significantly, and the department's inefficiency in acquiring goods and services or carrying out routine tasks will affect other departments, particularly those that interact with users. Ethiopian Airlines Group is among the airline industries facing relative challenges in the competitive airline market. Furthermore, the aviation industry is encountering difficulties as a result of weak supply chain

networking in Africa and around the world, according to the Managing Director of Ethiopian MRO and aviation experts speaking at the 2024 African MRO conference.

It has been reported in the Ethiopian MRO 2023 annual performance evaluation report that it has encountered many issues. The following are listed as major issues: extending the schedules for aircraft maintenance and redelivery; lengthy turnaround times for component maintenance; lengthy lead times for product or service delivery; excessive late core return fees; problems with on-time part availability; protracted payment procedures; past due payment penalties; loss of potential suppliers and customers; inadequate supplier database; lengthy sourcing procedures; project delays; irregular supply; and service interruption. This study fills the gaps by examining e-procurement practices and their effect on supply chain performance in the aviation industry, particular focus on Ethiopian Airlines Group.

1.3 RESEARCH QUESTIONS

This study aimed to provide the best possible answer to the following question:

- How does the E-procurement practice in the SCP of Ethiopian Airlines?
- How does E-Sourcing affect the Supply Chain performance?
- How does E-Information affect the Supply Chain performance?
- How does E-Ordering affect the Supply Chain performance?
- How does E-Invoicing affect the Supply Chain performance?
- How does E-Payment affect the Supply Chain performance?

1.4 OBJECTIVES OF THE STUDY

1.4.1 General Objectives

The general objective was to assess the linkage between E-Procurement practices and the Supply Chain performance at Ethiopian Airlines.

1.4.2 Specific Objectives

1. To examine the effect of E-Sourcing practices on the Supply Chain performance.
2. To examine the effect of E-Information practices on the Supply Chain performance.
3. To examine the effect of E-Ordering practices on the Supply Chain performance.
4. To examine the effect of E-Invoicing practices on the Supply Chain performance.
5. To examine the effect of E-Payment practices on the Supply Chain performance.

1.5 SIGNIFICANCE OF THE STUDY

This study provided helpful information to stakeholders, mainly Ethiopian Airlines, to understand the effects of E-procurement practices. The study's findings may be useful in providing additional knowledge to existing and future organizations to understand E-procurement practice in the Aviation industry. The study enriched the existing literature and served as an avenue for further studies by forming a strong and rich source of information for substantive publication in academia.

1.6 SCOPE OF THE STUDY

This study examined the effects of the five primary pillars of e-procurement; e-sourcing, e-information, e-ordering, e-invoicing, and e-payment, and their effect on supply chain performance. Since the problem occurred in the aforementioned elements, the study did not focus on other factors of E-procurement practice. Only the Cost, Quality, and Delivery dimensions were considered concerning the Supply Chain performance measuring parameter in this study.

Since the study area population is huge and difficult to cover all Ethiopian Airlines Group staff to conduct this research paper, the study was limited its case study only to the Procurement and Supply Chain Management (PSCM) department office of Ethiopian Airlines Group district, (Addis Ababa, Bole International Airport headquarter, which is found under MRO division). The study did not consider non-aircraft-related procurements, operational disruptions caused by non-avoidable factors such as natural disasters, strike actions, civil unrest and other causes not related to procurement activities under a normal circumstance.

1.7 LIMITATION OF THE STUDY

The study focused on Ethiopian Airlines, Supply Chain department; hence the findings are limited to the case organization. The study also focused on E-Sourcing, E-Information, E-Ordering, E-Invoicing, and E-Payment perspectives as the indicators of e-procurement practice henceforth the findings are based on these considered indicators within the context of Supply chain performance. In addition, other organizations will also use e-procurement platforms and therefore they are not limited to aviation MRO only. However, the findings of this study were only limited to the Supply Chain which was found under the MRO Division and may not be generalized to other organizations or sectors.

1.8 DEFINITION OF KEY TERMS

Procurement: All of the processes involved in acquiring goods from a supplier are together referred to as procurement. For instance, buying, shipping, and storing the goods. From a strategic standpoint, the activities of requisitioning, transportation, warehousing, and inbound reception are all included in the procurement (Nevalainen, 2001).

E-Procurement: According to Lysons & Farrington (2006), the Chartered Institute of Purchasing and Supplies (CIPS) defines e-procurement as the combined use of information and communication technology through electronic means to enhance external, internal purchasing, and supply management processes.

E-Sourcing: This involves buyers searching for suppliers using Internet technology (Knudsen, 2003).

E-Information: Using internet technology to acquire and disseminate purchasing data from and to internal and external parties, such as purchasing management data on an extranet that can be accessed by internal customers and suppliers, is referred to as e-Information (Sharma, 2012). To put it another way, e-information is the collection, dissemination, and purchasing of data through the Internet (Madzimure, et al., 2020); (Ombat, 2015).

E-Ordering: Kim & Shunk (2003) argue that E-ordering is the process of creating and approving purchasing requisitions, placing purchase orders, as well as receiving goods, and services ordered by using a software system based on internet technology which greatly improves the supply chain performance.

E-Invoicing: This is the document that defines and ultimately leads to payment. E-procurement should be capable of accepting and processing electronic invoices for those suppliers who do not have systems that automatically generate electronic invoices; besides, it should provide an easy means of online creation either through a supplier portal or document scanning (Brun, 2007).

E-Payment: It is a monetary transaction between the buyer and seller using an electronic system to perform transactions including payment, internet payment, E-cards, PC Banking, and E-cash in the supply chain (Munyao & Moronge, 2018).

Supply Chain Management: It can be defined as a global network of organizations that cooperate to improve the flows of material and information between suppliers and customers at the lowest cost and the highest speed (King'ori, 2013).

Supply Chain Performance: The phrase "supply chain performance" means the tangible (cost and quality) and intangible (capacity and resource utilization) outcomes that can be achieved via effective Supply Chain Management (Pattanayak & Punyatoya, 2020); (Presutti, 2003).

1.9 ORGANIZATION OF THE STUDY

The thesis was organized into five chapters. Chapter one contained the introduction part (background of the study, statement of the problem, research questions, objectives, significance, scope and limitations of the study, and definition of key terms). Chapter two covered the related literature review; conceptual, theoretical, empirical, gaps, and conceptual framework. Chapter three encompassed the methodology; research approach, research design, and sampling techniques. Chapter four was about data presentation, analysis, and interpretation. Finally, chapter five included a summary of findings, conclusions, and recommendations.

CHAPTER TWO

RELATED LITERATURE REVIEW

INTRODUCTION

This chapter covered a related literature review. Specifically, it discussed the theoretical related literature review, related empirical literature review, conceptual framework, and research gap of the study.

2.1 THEORETICAL LITERATURE

Procurement is the act of acquiring, and buying goods, services, or works from an external source, often via a tendering or bid process (Laffont & Tirole, 1993). It consists of all the activities required for obtaining items from a supplier to the warehouse. Businesses have historically used paper-based systems to order goods and services by looking through paper catalogs that vendors have sent by fax and phone. Numerous paper papers are created, copied, and transferred during the traditional material purchase procedure (Heng Li, et al., 2002).

2.1.0 The Concepts of E-procurement

In business-to-business purchasing, electronic commerce (E-commerce) is used in E-Procurement (Chopra, et al., 2001) to find possible suppliers, buy products and services, send money, and communicate with them. Neef (2001) posited that Electronic Procurement (E-Procurement) represents a significant advancement in the enterprise's development since it involves the process of linking customers and business partners. The use of internet-based integrated information and communication technologies to carry out any or all steps of the procurement procedure, including negotiation, search, sourcing, receipt, ordering, and post-purchase review, is known as e-procurement. Croom & Brandon-Jones (2004) firms can easily contact individuals and look for vital information by connecting with a large network of firms through e-procurement.

2.1.1 E- Sourcing

It is the process that identifies new suppliers for a specific purchasing category which can be achieved by utilizing the Internet technology as usual the internet itself. A purchaser can, by identifying new suppliers, maximize the competitiveness during the process of tendering in the case of this procurement category. In addition, the supply risk associated with this category can be decreased through E-sourcing (Kraljic, 1983). E-sourcing has emerged as a crucial instrument for procurement, enabling businesses to engage, evaluate, and select suppliers regardless of their

physical presence. This facilitates category managers in achieving superior results compared to conventional negotiations. According to the Chartered Institute of Procurement and Supply CIPS (2012), the Internet, like many other online activities, puts suppliers and providers closer together, enabling lower costs, greater communication, and a more efficient process, which is why e-sourcing has become so popular. Traditional geographical limitations are no longer present in E-sourcing since sending and receiving E-mail and other information from the World Wide Web is fast and efficient. With E-sourcing, organizations can increase the sources of their potential suppliers at no cost as they do not only depend on those vendors and suppliers, but they can also physically visit their premises since they interact online, and they can get whatever information that they need with the pressing of a button of their computers. They can source their inputs from any part of the world in the comfort of their offices. They interact via the Internet and partner with suppliers and buyers online, and this enhances their operations (Dinda, 2010).

2.1.2 E-Information

E-Information: Using internet technology to acquire and disseminate purchasing data from and to internal and external parties, such as purchasing management data on an extranet that can be accessed by internal customers and suppliers, is referred to as e-Information (Sharma, 2012)). To put it another way, e-information is the collection, dissemination, and purchasing of data through the internet (Madzimure, et al., 2020); (Ombat, 2015).

2.1.3 E-Ordering

It is defined as a formal electronic request for a product or for services which is inclusive of all the phases from need identification, purchasing, and payment for the services or goods received to after-sales services including management of the contract and supplier (Ibem & Laryea, 2015). It is the process of creating and approving procurement requisitions, placing orders, and receiving goods and services ordered. It is underpinned by automation of the E-procurement cycle, integrating the functional procedures and the management of purchase (Barngetuny & Kimutai, 2015).

2.1.4 E-Invoicing

It describes how a business sends bills and other information to its customers using electronic mail, mostly the Internet. According to Hernández-Ortega, (2011), this type of information system service collects transaction data and sends it across a network. Maintaining company information across the supply chain is essential in this era of e-business (Chang, et al., 2013). Initially, only commercial sectors were able to exchange electronic data (EDI). Subsequently, the internet was

used as the foundation for e-commerce, carrying E-invoices between people, companies, and the government. There are several advantages to e-invoicing, including substantial cost savings, process streamlining, quicker payment processing, improved data security, and several environmental advantages. Government agencies and businesses that currently utilize it attest to this (Lian, et al., 2014).

2.1.5 E-Payment

It is a form of financial commitment that involves the buyer and sellers facilitating transactions using electronic platforms. It is a monetary transaction between the buyer and seller by use of the electronic system to perform transactions including payment, internet payment, E-cards, PC Banking, and E-cash in the supply chain (Mun Yao & Moronge, 2018).

Generally, this theoretical framework illustrates how different e-procurement practices may influence various dimensions of supply chain performance, including cost, quality, and delivery.

2.1.6 Definitions of Supply Chain Performance and Indicators

The phrase "supply chain performance" means the tangible (cost and quality) and intangible (capacity and resource utilization) outcomes that can be achieved via effective Supply Chain Management. (Pattanayak & Punyatoya, 2020); (Presutti, 2003).

Madzimore, et al. (2020); Srinivasan, et al., (2011) defined supply chain performance as the performance of several processes inside a company's supply chain function. Cooperation and shared decision-making among trading partners are critical components of a successful supply chain (Madzimore, et al., 2020).

Costs, delays, adaptability, diversity, and traceability are all factors that companies strive to improve. As they contribute to performance, collaborative practices and information sharing between partners become vital in any supply chain. An effective performance evaluation is crucial to SCP because it lays the groundwork for understanding the system and communicating the impact of systematic efforts to supply chain partners (Madzimore, et al., 2020); (Bhagwat & Sharma, 2007). The Supply Chain Council developed the Supply Chain Operations Reference (SCOR) model, which bases all supply chain activities on planning, sourcing, manufacturing, delivery, and return procedures.

Supply chain performance is measured using various approaches and dimensions including issues of performance to productivity measures, lead-time measures, quality measures, inventory

measures, utilization, time, speed, cost, efficiency, and effectiveness (Birech, 2011). Hayes and Wheelwright (1984) proposed that quality, lead-time, cost, and flexibility are the primary competitive priorities that businesses use to compete in the market. Whilst volatility in the aviation market is present, also as important is the unpredictability inherent in aviation operations leading to stochastic tasks and this requires that the production and service systems are flexible to meet customer demands without compromising on the other aspects of its competitive priorities which are cost, quality, and delivery (Aitken, et al., 2002).

Cost: Neely and Platts (2005) have identified the manufacturing cost, value-added cost, selling price, running cost, and services cost as the measures of cost performance.

Quality: Quality is the degree to which a commodity meets the requirements of the customer at the start of its life (ISO 9000).

Delivery: The proportion of on-time delivery, the percentage of deliveries made by the deadline, the percentage increase in the portion of delivery promises fulfilled, and the perceived relative reliability to competitors have all been suggested by White (1996). Delivery reliability metrics include the percentage of orders that are incorrectly sized, schedule attainment, average delay, lead time reduction per product line, output improvements, lead time reduction in purchasing, and average service turnaround per warranty claim.

2.2.THEORETICAL FRAMEWORK

This section addresses the four theories that make up this dissertation on digital procurement; operational cost theory; E-technology perspective Theory; Agency Theory, and resource-based theory.

2.2.1. Operation Cost Theory

The field of operations cost economics highlights that companies have opportunistic obstacles when they engage in negotiations with other companies. In light of the procurer's independence from any demanding suppliers, the next group of vendors is many and reduces risk while enabling the company to negotiate attractive purchase offers (Dedrick, et al., 2008). In addition, the suppliers chosen by the company have the highest consistency when it comes to the following primary transaction factors: aggressive, synchronization costs, and risk opportunism (Dedrick, et al., 2008).

Due to the uniform and computerized acquisition processes, IT has the potential to reduce synchronization costs and, consequently, the cost of managing numerous vendors. The purchasing company usually benefits from this, especially when it comes to products like copper pipes. According to (Dedrick, et al., 2008), information technology enables businesses to reduce the number of vendors they work with, focus on low-cost suppliers of common products, and centralize their purchases to receive bulk savings. Utilizing IT makes it easier to minimize synchronization expenses. For example, the cost of locating and obtaining information about item prices and help is reduced by using an online marketplace that has been streamlined by IT (Bakker, et al., 2008). Alliances enable businesses to minimize their supply chain risk and, consequently, their contracting costs, which streamlines the exchange of information. For example, if a seller cannot accurately predict the price of its goods, it will not be motivated to enter into a contract that locks in the price for a long period (Arrow smith, 2002).

E-procurement practices such as e-sourcing and e-payment can help reduce transaction costs by streamlining procurement processes, improving information flow, and facilitating efficient transactions between buyers and suppliers (Williamson, 1985). Hence, this theory provides valuable insights into the mechanisms through which e-procurement practices influence supply chain performance in terms of cost minimization.

2.2.2. The E-Technology Perspective Theory

In terms of order administration, stock management, and factory planning, electronic procurement enables buyers and sellers to increase connection control via online sources (Lee, et al., 2003). The papers Min & Galle (2002) highlighted the broad landscape of electronic procurement, viewing it as a transaction-to-transaction acquisition process that leverages online purchasing to identify important suppliers for product acquisition, establish relationships with vendors, and handle payment transfers. Businesses have generally embraced the Internet's ability to improve organizational performance through both internal and external means. The benefits of online shopping in a B2B setting are significant, even though it is true that B2B trade has survived electronically longer than B2C (Barratt & Rosdahl, 2002), (Min & Galle, 2002).

Previous studies have suggested that electronic procurement has become a tool that allows businesses to pool their SC with mutual performance, accessibility, and pricing data from vendors to users. This enables both procurers and vendors to operate at their best and at prices that benefit both parties (Morris, et al., 2000). Businesses commonly allow EPS to handle their purchases of goods and services (Min & Galle, 2002). In summary, it was widely known that the elements of e-

procurement implementation are still being determined and fall short of the level of e-sourcing and e-cooperation (Morris, et al., 2000). In general, this framework highlights the importance of technological factors, organizational characteristics, and external environmental factors in shaping the outcomes of e-procurement adoption on supply chain performance (Tornatzky & Fleischer, 1990).

2.2.3. Agency Theory:

Agency theory examines the principal-agent relationship between buyers and suppliers in supply chains and the associated challenges of aligning interests and mitigating agency costs. E-procurement practices such as e-invoicing and e-payment can help reduce agency costs by increasing transparency, enforcing contractual agreements, and facilitating prompt payment processes, leading to improved supply chain performance (Jensen & Meckling, 1976).

2.2.4. Resource Based Theory

Lambert (2005) asserts that an organization's resource base can produce significant improvements. The corporation has more financial and stock resources to support its operations. A company's internal capacity is extremely important. When the company is financially stable, it can innovate and find creative solutions to problems that arise in the business. In purchasing and SCM, looking for IT is essential (Presutti, 2003). Resources base theory was acknowledged as a novel approach to studying the origins and upkeep of IT in the field (Baily, et al., 2008). Caridi, et al. (2010) IT can be quantified as a financial return on investment from prearranged inputs. Because the resources that underpin IT are scarce, costly, non-replaceable, and unreplicable, (Bales & Fearon, 2006) see IT as consistency. Furthermore, Guinipero (2008) reiterated that the foundation of resource base theory is the idea that an organization's resources are varied and generally stable.

E-procurement is considered in this study to be a tactic that maximizes the utilization of available resources to enhance the efficacy and efficiency of the supply chain and, as a result, gives an advantage over competitors. Using their special resources and skills, such as e-procurement technologies, the sustainable competitive advantage in this case demonstrates improved lead times, cost-effectiveness, customer happiness, and overall supply chain efficiency. An efficient purchase process that impacts SC performance is achieved by electronic procurement, which closely coordinates and maximizes the use of purchasing resources. Based on this, the study chose to include this theory as it best explained the e-procurement practices as a business strategy for Ethiopian Airlines Supply chain performance.

2.3. EMPIRICAL LITERATURE

2.3.1. E-Procurement Practices

The empirical literature study on e-procurement and supply chain performance was the emphasis of this part. Electronic procurement has risen in popularity across the world because of technological advancements. Madzimore, et al. (2020) for example, conducted several research on e-procurement and supply chain performance in various enterprises and nations. E-procurement is the use of information technology to ease business-to-business transactions for goods and services. According to a recent study, owing to fast technological development and market globalization, businesses, particularly small and medium-sized firms (SMEs), require assistance in adapting to technology and implementing e-procurement functions to establish competitive advantages. Information technologies like electronic procurement have been more tightly connected with other business operations like supply chain integration to help SMEs expand (Madzimore, et al., 2020).

E-procurement practices refer to the use of computer-internet-based systems to carry out individual or groups of the procurement process, including search, sourcing, negotiation, ordering, receipt, and post-purchase review (Asumba, 2010). Krawiec (2010) described three types of e-procurement practices systems which are buyer e-procurement practices systems; seller e-procurement practices systems; and online intermediaries. Krawiec (2010) defined three categories of e-procurement practices systems: online intermediaries, seller e-procurement practices systems, and buyer e-procurement practices systems. However, Barasa, et al. (2017) study, E-sourcing, E-information, E-ordering, E-invoicing, and E-payment are the most common E-procurement practices.

E-procurement, according to Nandankar & Sachan (2020) is the use of modern IT systems for procurement processes such as planning, negotiating, ordering, receiving items, and post-purchase assessment. Electronic procurement is becoming more widely acknowledged as a useful tool for cutting costs and optimizing operations. The reduction of order processing times is another benefit of e-procurement for a business (Zhao, et al., 2011).

Madzimore, et al. (2020) observed that successful organizations or firms that use e-procurement systems effectively have superior supply chain performance. Supply chain performance refers to how well certain procedures within a company's supply chain function execute (Madzimore, et al., 2020). Companies strive to reduce cost, delay, flexibility, variety, and traceability in their manufacturing processes. Collaboration and information exchange among partners have become essential elements of every supply chain, as they improve performance (Madzimore, et al., 2020).

Effective supply chain performance assessment is critical because it provides the framework for understanding the system as well as data on the results of systematic efforts to discover supply chain partners (Bhagwat & Sharma, 2007). The efficacy of a company's supply chain is widely recognized as a key factor in attaining a competitive advantage (Madzimore, et al., 2020).

2.3.2. Relationship of the Variables

2.3.2.0. *The Effect of E-Procurement Practices on Supply Chain Performance*

Recently, e-procurement is become an important department in any organization. The rise of electronic procurement worldwide has enhanced procurement processes with so many benefits for the organization, including effective and efficient supply chain performance. For a company to have a competitive advantage over other competitors, it must have a very effective and reliable supply chain, as competition between companies is between supply chain performance rather than cost reduction. These are activities or processes that are carried out by an organization to ensure that all procurement processes within the organization and its suppliers are carried out smoothly and successfully. E-tenders, e-procurement, e-negotiation, e-valuation, e-auctions, e-catalogs, and e-invoices are some of the most common e-procurement instruments in the public sector (McCue & Roma, 2012). Researchers stated the benefits of E-procurement as categorized and presented in Table 1.1.

The effect of E-procurement methods on Ethiopian Airlines Group's Maintenance, Repair, and Overhaul Performance was examined by (Shewarga, 2020) and concluded that Ethiopian MRO had adopted E-Procurement practices to a small extent. This study did not focus on the Ethiopian Airlines procurement and supply chain performance.

Million (2017) examined the role of maintenance repair overhaul supply chain management in operational and organizational performance and revealed that SCM practice in ET-MRO facilities affects both operational and SCM-related organizational performances. However, it did not emphasize the E-procurement practice on Supply Chain performance.

Matunga & Okibo (2023) examined E-procurement practices and effective procurement in communal health centers, both researchers did not focus on Airlines.

Table 1: E-procurement benefits summary

Potential Benefits Of E-Procurement	Literature Supporting
-------------------------------------	-----------------------

Reduce order cycle time	(Min & Galle, 2003); (Davila, et al., 2003)
Simplify purchase payment	(Min & Galle, 2003); (Davila, et al., 2003)
Reduce paperwork	(Min & Galle, 2003); (Davila, et al., 2003)
Eliminate order errors	(Min & Galle, 2003);(Zheng, et al., 2008)
Inventory reduction	(Min & Galle, 2003); (Zheng, et al., 2008)
Productivity and/or service	(Gunasekaran, et al., 2009)
Save time	(Gunasekaran, et al., 2009); (Kim & Shunk, 2003)
Reduce cost	(Gunasekaran, et al., 2009); (Kim & Shunk, 2003)

Source: Adopted from Hatice Cali Pinar & Mehmet Soysal, (2012).

2.3.2.1 The Effects of E-sourcing on Supply Chain Performance

This is the process of identifying new potential suppliers using the internet to shorten the time it takes to discover them. It uses internet technology to find new suppliers for a certain category of purchasing needs beyond geographical borders. Increased decision-making flexibility and cheaper costs are two benefits of e-major sourcing (Ombat, 2015). Electronic sourcing is the process of selecting suppliers through electronic procurement (Bahambari & Kelidbari, 2015). A web-based platform supports every step of the procurement process, including spending analysis, requirements summaries, requirements formulation, supplier search, negotiations (request for move-in, offer, or offer), auctions, offer assessments, and contract administration. In recent years, the definition of e-sourcing has evolved significantly, from a narrow focus on e-auctions to what is now widely recognized as e-sourcing, namely the sourcing process associated with web-based, collaborative technology to facilitate the entire procurement lifecycle for both buyers and suppliers. Bialas, et al.(2016) e-Sourcing is the strategic activity of a procurement expert in designing, maintaining, and managing a compliance contract. All parts of the purchasing process should be monitored and covered, including specs, e-RFx, e-tender, e-auction, tracking, forecasting, and savings tracking.

Companies may use basic e-sourcing technologies to benefit from strategic sourcing in a scalable manner in areas that have historically been handled via buying. While e-sourcing offers a high return on investment, it should be used as part of a larger plan to enhance the purchasing function by addressing all areas of change, including strategy, structure, systems, processes, and people. As a result, because it automates and simplifies strategic sourcing procedures like RFxs and reverse auctions, e-Sourcing is recognized as the backbone of contemporary strategic sourcing. It also increases supply chain efficiency inside the company, as well as the buyer-seller relationship's flexibility and openness.

The operational benefits of e-sourcing, according to research by (Bialas, et al., 2016) Hamilton include: (a) Streamlining procedures through easier / faster ordering, less paperwork, easier online

comparison, fewer human mistakes, and cheaper storage costs. (b) Purchasing expenses are decreased because of enhanced transparency, purchasing aggregation, improved compliance, fewer non-contractual individual purchases, comparability and competition, efficient market and pricing processes, data for strategic purchasing, and virtual purchasing organizations. Just a few of the advantages include a 5 to 20% decrease in material prices, a 25 to 30% reduction in procurement cycle times, and a 10 to 15% reduction in time to market (Presutti, 2003). Buyers are increasingly asking that vendors utilize online negotiating and trading applications, such as e-RFx and e-auction systems, because of these anticipated benefits (Ivang & Sorensen, 2005).

However, e-sourcing poses significant challenges to a company, including the required change management, the resulting new organizational roles, the expected implementation speed, the management of existing suppliers, the definition of the right content management strategy, and integration with back-office systems (Bialas, et al., 2016). Furthermore, suppliers' reluctance to e-sourcing can be a key cause of failure since they feel it is dependent on their established links with their partners of personal contact and communication, which weakens when compared to rivals only based on price.

Asrat (2017) examined the role of strategic sourcing in the operational performance of the organization and found that supply chain optimization, supplier relationship management, contract management, and supply base rationalization have the greatest effects on ET-MRO's operational performance. But not about the E-procurement practice.

Fasil (2017) examined the effect of strategic sourcing practice on operational efficiency and concluded that to overcome and be competent in the existing market leadership challenge that Ethiopian is facing, working on and improving the level of strategic sourcing practice will enable the Airline to improve its internal operational efficiency and can be able to achieve its plan. The study focused on the manual sourcing practice which is electronic sourcing. Samuel (2017) examined the effects of sourcing strategy on outbound logistics performance and concluded that due to the misalignment between sourcing and outbound logistics sections, the later sections' performance is highly affected sequentially resulting in Ethiopian paying 450,000 USD every year in the form of late return penalty. It did not focus on the supply chain performance.

H_{1a}: *E-Sourcing has a positive and significant effect on the Supply Chain performance.*

2.3.2.2 The Effects of E-information on Supply Chain Performance

This is when Internet technology is used to collect and distribute purchase information from and to internal and external parties, such as information about purchasing management on an extranet that internal customers and suppliers can access (Madzimure, et al., 2020). To put it another way, e-informing entails obtaining, sharing, and purchasing information (Ombat, 2015). E-information facilitates communication between organizations, as information is transmitted at any time without delay and can be called up for the necessary measures and corrections. If information is exchanged frequently between companies and their suppliers, this improves the supply chain process, and products/services are delivered on time with the correct specifications. Communication and information sharing are very important in any relationship building, and to achieve the desired goals with suppliers, e-information is the best form of communication. It should be used to make supply chain performance efficient and effective.

Daniel (2017) examined the effects of inventory management practices on organizations' operational performances and revealed that the organization has good infrastructure, IT technology, and support from the management. However, demand uncertainty, inefficient internal processes, and Lack of awareness are the challenges in implementing the inventory management practice in ET.

H_{1b}: *E-Information has a positive and significant effect on the Supply Chain performance.*

2.3.2.3 The Effects of E- Ordering on Supply Chain Performance

It has contributed to great savings in basic procurement costs incurred by various firms worldwide and thus technology use is a key strategy for many firms (Munyao & Moronge, 2018). E-ordering, according to Kim & Shunk (2003), is the process of generating and approving buy requisitions, placing purchase orders, and receiving requested products and services through the use of an internet-based software system that significantly enhances supply chain performance. Online ordering systems are E-commerce features that enable businesses to accept orders from clients for goods and services through their websites (Petersen, et al., 2005). Considering how easy it is for people to order products and services online, having an online ordering system might help increase sales to some degree in this era of technological boom. Individuals can place orders using their homes if they have a computer/laptop with an internet connection thus improving supply chain performance.

H_{1c}: *E-ordering has a positive and significant effect on the Supply Chain performance.*

2.3.2.4 The Effects of E-invoicing on Supply Chain Performance

It offers lots of advantages; great cost reduction, the process also made simple, reduced time for making payment, great data security, and a lot of environmental benefit (Nafula & Namusonge, 2017). Invoicing generally involves the process of creating and sending out invoices for work that has been completed. It is an itemized bill for goods sold or services provided, containing individual prices, the total charge, and the terms (Hernández-Ortega, 2011). E-invoicing refers to the sending and receiving of invoices by electronic means. E-invoicing has been recognized as one of the most important sources of profitability increases in organizations (Brun, 2007). It's essential for keeping company data up to date across the supply chain in this era of e-business (Chang, et al., 2013).

H_{1d}: *E-invoice has a positive and significant effect on the Supply Chain performance.*

2.3.2.5 The Effect of E-Payment on Supply Chain Performance

It minimizes the real distance between the participants and makes the world appear as a small village with ease of access. The use of E-payment is influenced by its ability to introduce value in a quick, efficient, and effective manner (Singh & Punia, 2011).

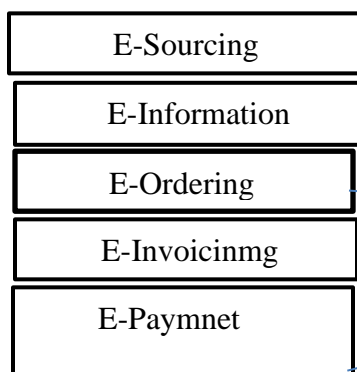
H_{1e}: *E-payment has a positive and significant effect on the Supply Chain performance.*

2.4. CONCEPTUAL FRAMEWORK OF THE STUDY

Based on the reviewed theoretical and empirical literature, the researcher has adapted E-sourcing, E-information, E-ordering, E-invoicing, and E-payment as an independent variable. The dependent variable is supply chain performance which is operationalized by cost, quality, and delivery.

Independent variable

E-PROCUREMENT



Dependent variable

SUPPLY CHAIN PERFORMANCE

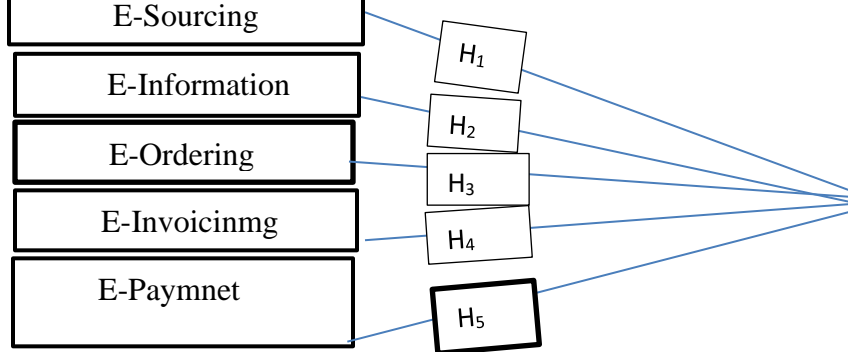
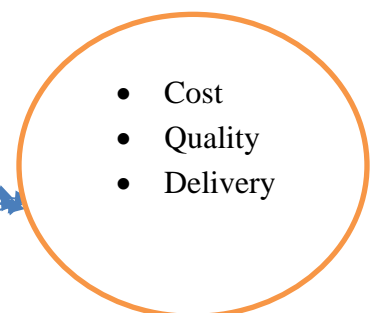


Figure 1.1: The conceptual framework has been adapted from Michael Musyoki (2018)

2.5. RESEARCH HYPOTHESIS SUMMARY

H₁: E-sourcing positively and significantly affects the SC performance.

H₂: E-Information positively and significantly affects the SC performance.

H₃: E-ordering positively and significantly affects the SC performance.

H₄: E-invoicing positively and significantly affects the SC performance.

H₅: E-payment positively and significantly affects the SC performance.

2.6. IDENTIFIED LITERATURE GAP

A lot of research has been conducted in the same case organization/ Ethiopian. Still, they have not focused on E-procurement practice and its effect on the Supply Chain performance. Those studies focused on the Ethiopian Logistics and MRO performance, not the Ethiopian Airlines supply chain performance. Besides, Procurement & Property Administration Agency Ethiopia (2018) stated that E-procurement has never been implemented in Ethiopian public procurement at a country level.

While there is substantial literature highlighting the benefits of e-procurement in various industries, there is a notable gap in current research regarding its specific impact on SC performance in the airline industries. Despite the critical role of procurement in ensuring the efficiency and reliability of aviation supply chains, there is limited empirical evidence on how e-procurement practices directly influence key performance metrics such as on-time delivery, quality, and cost efficiency in this context.

Similarly, as it has been mentioned in the statement of the problem there are real problems related to procurement activities such as long sourcing process, too many past due payment penalty fees and wrong payments, long maintenance schedules, turnaround time, losing potential suppliers, irregular supply, project completion delays and service interruption.

This research gap highlights the need for further empirical studies to better understand the specific implications of electronic procurement practice on SC performance within the aviation sector. This is therefore since there is no conducted study regarding E-procurement practice in Ethiopian Airlines' Supply Chain performance and problems related to procurement activities exist, this study focused on the practices of electronic procurement on Ethiopian Airlines' Procurement and SC performance.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 INTRODUCTION

A broad way of thinking, a general approach to researching subjects, or a comprehensive research plan is called methodology (Mligo, 2016). The Chapter comprised the research approach, research design, targeted population, unit of analysis, sample size, sampling technique, data collection methods, data analysis, validity, reliability of data, and research ethics. This was because research methodology directed the researcher on which instruments, and type of design that was needed to be followed in the study.

3.1 DESCRIPTION OF STUDY AREA

Ethiopian Airlines Group referred to as Ethiopian is Ethiopia's flag carrier, which is completely 100% owned by the Ethiopian government. It was founded on December 21, 1945, and commenced operations on April 8, 1946, expanding to international flights in 1951. Ethiopian currently serves over 136 international and domestic destinations in five continents operating the newest and youngest 150 fleet and over 100 fleet on order (Source: Ethiopian Fact Sheet, 2023). Ethiopian fleet includes ultra-modern and environmentally friendly aircraft such as the B767, Boeing 787, Boeing 777- 300ER, Boeing 777-200LR, Boeing 777-200 Freighter, Airbus A350-900 &1000, B737-700 &800, B737-Max 8, and Bombardier Q-400 double cabin with an average fleet age of five years. Ethiopian Airlines Group has various big business divisions; Ethiopian International Service, Ethiopian Domestic /Regional Service, Ethiopian Cargo Service, Ethiopian Ethiopian Catering Service, Ethiopian Ethiopian Ground Service, Ethiopian Aviation Academy, and Ethiopia MRO Service.

During the past seventy-plus years, it has become one of the continent's leading carriers, incomparable in Africa for efficiency, operational success, and in turning profits for almost all the years of its existence and it has now charted out a more ambitious strategic roadmap called Vision 2035 (Ethiopian Fact Sheet, 2023). Ethiopian Airlines is a big company and spends Millions of dollars on the acquisition of different aircraft and non-aircraft related goods, work, and services every year making it the largest and most complex purchasing organization in Ethiopia.

Ethiopian has a designated Procurement and Supply Chain Management (P&SCM) section, which is managed by the director level, and provides services to a companywide under a matrix

organizational structure administratively under the Managing Director of Maintenance Repair and Overhaul (MRO) and functionally under the Group Chief financial officer (GCFO) respectively. It is charged with the responsibility of maintaining and operating an efficient and effective Supply chain. The supply chain division handles both direct and indirect procurement.

Ethiopian Procurement entirely performs procuring, leasing, repairing, and, exchanging of Aircraft and non-aircraft parts through spend analysis extracting, planning, Sourcing, request for quotation (RFQ), proposal evaluation, supplier selection, negotiation, signing contracts, receiving invoicing, facilitating Payment, warehousing, contract administration, Surplus management customer database management and logistics management mechanisms.

The main strategic goal of Ethiopian P&SCM stands to constantly deliver without any supply chain interruption and support all Ethiopian and non-Ethiopian (ET-customer fleet) aircraft operations effectively and efficiently by providing the best turnaround time, better price, delivery, right quantity, shorter lead time, quality maintenance service and products.

3.2 RESEARCH APPROACH

In this study, the quantitative approach was employed. The quantitative research approach used for statistical procedures to analyze and develop inferences from data that's statistical models such as means, standard deviations, correlations, and regressions analysis were used.

3.3 RESEARCH DESIGN

Among the different types of research designs, the study used both explanatory and descriptive research designs. Descriptive research design was used to describe and interpret trends of events as they exist at present and causal/explanatory research was used to explain and discover the effect of the independent variable on the dependent variable. In explanatory research, the purpose is to develop and evaluate causal theories.

3.4 POPULATION AND SAMPLING DESIGN

3.4.1 Population

A population is defined as a complete set of individual cases or objects with some common observable characteristics (Mugenda & Mugenda, 2012). This study targeted on Ethiopian Airlines group; procurement and Supply Chain Management (P&SCM) department. In this study, the population consists of all Procurement and Supply Chain Management (P&SCM) teams, the

P&SCM department stakeholders (closer user sections) like MRO Managers and directors, Finance (Manager Payables Control and Disbursement), and IT teams. Because other employees of MRO are devoted only to daily task-level activities, they have no access and are unable to evaluate the overall performance of Supply Chain and procurement practice. The P&SCM team has the expertise and exposure to the procurement practice, which makes them the right sources of the research. In addition, the Finance (Manager Payables Control and Disbursement) has more exposure regarding the payment process of Supply chain-related purchases and the IT team has detailed experience since they daily support the PSCM team. Similarly, MRO division Managers and Directors have exposure to procurement practices since they are users/internal customers and have a bird's view on the supply chain performance and procurement practices as well as they daily provide the requirements and communicate with procurement managers, director team, and engaged in ordering, bid and sourcing activates as well.

According to Ethiopian Human Resource January 2023-employee record, An Ethiopian P&SCM has 222 employees, Users (MRO has 38 Management members; 5 Directors and 33 Managers), Finance and Accountant (Manager Payables Control and Disbursement) team has 25 employees, and IT support desk team has 16 employees who are considered as valid target population of the study. Thus, the study's target group consisted of 301 workers from the P&SCM, Finance, IT, and Users (MRO) departments (N=301).

3.4.2 Sampling Design

Sampling design involves selecting some of the elements in a population from which a researcher may conclude the whole population. The sample frame of the study (list of the employees in the organizations) was obtained from the procurement and Supply Chain department as well as the mentioned MRO division, Finance, and IT departments.

3.4.3 Sampling Frame

According to (Kothari, 2008), the study-sampling frame is a list of the target population from which the sample size was chosen. The sampling frame is obtained from lists of staff from MRO, Finance, IT, and procurement & Supply Chain departments.

3.4.4 Sample size

The total population of the ETG, procurement, and supply chain division was 301 staff, but the study selected 172 staff as a sample using the scientific formula of Tayro Yamen's (1967) formula

below. Then, to establish the study's sample size at 5% acceptable error.

$$N = \frac{N}{1+N(e)^2} \quad \text{Where, } n = \text{sample size}$$

$$n = \frac{301}{1+301(.05)^2} \quad N = \text{Total population size}$$

$$n = \frac{301}{1.75} \quad e = \text{level of precision /sampling error (usually .10, .05 and .01 acceptable error)}$$

^ = raised to the power

n = 172 (Source: Ethiopian Airlines Group, human Resource portal, 2023).

Accordingly, from the total 301 populations, the researcher approached 172 respondents.

Table 2: Sample Size Determination

Departments	Target population	Sample size	Percentage
GP & SCM	222	127	42%
Users	38	22	7%
Finance and Accountant	25	14	5%
IT Support Team	16	9	3%
Total of respondents	301	172	57%

Source: Ethiopian Airlines Group, HR Employee Record (December 2023).

3.4.5 Sampling Technique

There exist multiple methods for selecting a sample, contingent upon the characteristics of the population and the data sought from the sample drawn (Schreuder, et al., 1993). The study assumed this technique gave better insight for the study to take appropriate male and female respondents who had direct exposure, and more concern with Procurement, Finance, IT, and MRO helped to get supportive data for this research. In the study, simple random sampling from probability sampling design was conducted specifically by using the random number table for the prepared questionnaire.

3.5 DATA TYPE AND SOURCE

The study used primary sources to collect data. Primary data is the information that the researcher finds out by him/herself regarding a specific topic. The main advantage of this data collection was that it was collected with the research's purpose in mind so it was more consistent with the research questions and purpose.

The source of primary data for this study was employees of Ethiopian Airlines Procurement and Supply Chain staff. Primary data were collected employing questionnaires. A well-designed questionnaire was used as the best instrument to collect the primary data. For the study, a close-ended questionnaire was used as the measuring instrument.

3.6 DATA COLLECTION METHOD

Data for this study were gathered using a structured, closed-ended questionnaire instrument using a five-point Likert scale. Since it was less expensive and time-consuming than other measuring tools, the closed-ended questionnaire was employed. The constructs in the questionnaire were developed from the literature review.

The questionnaire contains three parts. The first part was on demographic information of the respondents. The second part constituted a questionnaire on each of the independent variables and the third part consisted of questions on the dependent variable.

Self-administered questions were conducted to acquire background information of respondents relevant to the study. Respondents were asked to provide information concerning their sex, age, educational level, and work experience.

The second part of the questionnaire consisted of questions on each of the independent variables of E-Sourcing, E-Information, E-Ordering, E-Invoicing, and E-Payment.

The third part of the questionnaire consisted of questions on the dependent variable which was Supply Chain performance in terms of Cost, Quality, and Delivery. The responses to each of the items were rated using a five-point Likert scale comprising strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1).

Finally, the set of closed-ended questionnaires was distributed electronically to 172 selected respondents to give out the intended information as per the study objective.

3.7 DATA ANALYSIS METHOD

To facilitate the interpretation of the study inferential statistics was used in analyzing the data. To analyze the result, the Statistical Package for Social Sciences (SPSS version 25.0.) was adopted. Frequency tables were used to summarize the respondents' profiles in the form of frequency and percentages whereas the descriptive statistics such as mean and standard deviations of employees'

answers to E-procurement practice and Supply Chain performance scales were calculated to determine employees' perceptions.

The model of multiple regressions in this study was generally built around the dependent variable which was Supply Chain performance in terms of cost, quality, and delivery, and the dimensions of the independent variables (E-Sourcing, E-Information, E-Ordering, E-Invoicing, and E-Payment). Therefore, the general formula used for the model is $Y_i = \alpha + \beta x_i + e$.

The left-hand variable Y_i denotes the dependent variable Supply Chain performance, α is the intercept term which gives the mean or average effect on Y of all the variables excluded from the equation, although its interpretation is the average value of Y when the stated independent variables are set equal to zero; the coefficient of x variables, or independent variables, is denoted by β . It quantifies the variation in the average value of Y for each unit change in the corresponding independent variables, x_i is the different independent variables which are E-Sourcing, E-Information, E-Ordering, E-Invoicing, and E-Payment and e is the error term.

Finally, the above general least square model is converted to incorporate all the variables to test the hypothesis and address the research questions of the study as follows: (E-Sourcing, E-Information, E-Ordering, E-Invoicing, and E-Payment).

$$SCP = \beta_0 + \beta_1 ES + \beta_2 EI + \beta_3 EO + \beta_4 EIV + \beta_5 EP + e$$

Where;

SCP = Supply Chain Performance

β_0 = Constant (Intercept)

β = slope (gradient) showing rate dependent variable is changing for each unit change of the independent variable.

ES = E-Sourcing;

EI = E-Information;

EO = E-Ordering

EIV = E-Invoicing

EP = E-Payment

e = Error Term

3.8 Validity and reliability

3.8.1 Validity Test

Bryman & Bell (2007) defined validity as how much any measuring instrument measures what it is intended to measure. They suggest that the important issue of measurement validity relates to whether measures of concepts measure the concept or not. This study addressed the content validity through the review of literature, pretesting by expert opinions & advisor comments, and adapted instruments used in previous studies (Aitken et al., 2002), (Barasa & Fredrick, 2017), (Michael, 2018) and (Shewarga, 2020).

3.8.2 Reliability Test

Reliability refers to the stability of findings (Altheide & Johnson, 1994). A reliability analysis was employed. An internal consistency technique and homogeneity of groups of items and questionnaires (Crowther & Lancaster, 2008) was applied using Cronbach's Alpha. The alpha value ranges between 0 and 1 with reliability increasing with the increase in value. In this study, 0.7 Cronbach's Alpha was considered acceptable. A commonly accepted rule of thumb for describing internal consistency using Cronbach's alpha is as follows (George & Mallery, 2003).

Cronbach's alpha statistics rule with a range of $\alpha \geq 0.9$ is Excellent, $0.8 \leq \alpha \leq 0.9$ is Good, $0.7 \leq \alpha \leq 0.8$ is Acceptable, $0.6 \leq \alpha \leq 0.7$ is Questionable, $0.5 \leq \alpha \leq 0.6$ is Poor and $\alpha \leq 0.5$ is Unacceptable.

Below table 3.2 reveals that Cronbach's alpha figures of 0.728, 0.910, 0.830, 0.944, 0.850, 0.942, and 0.968 are greater than the recommended threshold of 0.7. All the independent variables scored good alpha results. As compared to the independent variables, the dependent variable 'supply chain performance' has a high reliability with $\alpha = 0.942$, this shows that Cronbach Alpha lies where $\alpha \geq 0.8$, so has acceptable reliability. This generally indicated that the questionnaire was reliable.

Table 3: Reliability test result

Variable	Cronbach Alpha	Number of items
E-Sourcing	0.728	5
E-Information	0.910	3
E-Ordering	0.830	7
E-Invoicing	0.944	5
E-Payment	0.850	4
Supply Chain Performance	0.942	10
Overall	0.968	34

Source: Research data (2024)

3.9 ETHICAL CONSIDERATION

Considering the significance of ethics in research work, ethical issues were considered. To this effect, the researcher let the respondent know that the questionnaire was only for academic purposes, and was highly confidential. In addition, the questionnaire was filled out based on the respondents' willingness. The analysis was then done based on the explicit responses of the respondents.

CHAPTER FOUR

RESULT, DISCUSSIONS AND INTERPRETATION

4.0 INTRODUCTION

The major aim of the study was to find out the effects of E-procurement practices on Supply Chain performance. This chapter, therefore, presented a discussion of the ultimate results and the process through which the results were obtained. In addition to this, background information of respondents was presented. Finally, the statistical methods of analysis were discussed, which encompassed a descriptive analysis, a correlation analysis, and a multiple regression analysis through Statistical Package for Social Science (SPSS version 25.0).

To achieve the objective of the study and tackle the key research questions, the study tried to conduct a detailed and technical investigation related to the study matter. In doing so the study collected relevant and reliable data from primary sources. Thus, the gathered data have been analyzed and finalized meaningfully.

The data from the respondents were collected using a five-point Likert scale questionnaire measuring at an ordinal level and it is usually in nature non-parametric. In analyzing, correlation and multiple regressions, between supply chain performance (the response variable) and E-procurement practice (the predictor variables), the averages of the responses were calculated since this conversion helped the data to be changed into continuous form and hence took the nature of parametric data for statistical manipulation (Creech, 2009).

Generally, as basic analysis methods, the study used descriptive statistics, regression analysis, and multiple regression analysis for the quantitative data to find out the relation between the independent and dependent variables. The correlation analysis between each of the predictor variables and supply chain performance has been examined based on measures of connection and descriptive adjectives using SPSS. The facts of the study have been presented in tables. The relative influencing degree of each predictor and hypothesis test acceptance or rejection have been tested. Multiple regression analysis was adopted to discuss and express the effect of the E-procurement practice in one equation.

Assumptions of normality, linear relationships, homoscedasticity, independence of errors, and multicollinearity were analyzed using SPSS. To find out all the necessary relationships between supply chain performance (dependent variable) and predictors (independent variables), a model summary of regression results, the ANOVA, and standardized and unstandardized beta (β) coefficient were used.

4.1 Response Rate

Table 4: Response Rate of Questionnaire

Target Number of Responded	No.of Questionnaire Returned	No.of Questionnaire Unreturned	Response Rate(%)
172	148	24	86.05

Source: Own Survey (2024)

Table 4.1 above revealed that a total of one hundred seventy-two (172) questionnaires were distributed to the respondents of Ethiopian Airlines Procurement and Supply Chain staff. Out of which a total of 148 questionnaires were fully completed and returned. The total response rate was 86.05%. Therefore, the number of questionnaires collected, which suggested a decent response rate, served as the basis for this study's analysis.

4.2 Descriptive statistics

In this part, the basic information of the respondents was discovered. Table 5 below was about the demographic characteristics of the respondents. These data were presented to make the reader understand the size of the population taken, the gender, age, education level, and working experience of respondents.

Table 5: Demographic Characteristics

Demographic Information		Frequency	Percent
Gender	Male	100	67.6
	Female	48	32.4
	Total	148	100.0
Age	Below 20 years	6	4.0
	Between 20 to 40 years	113	76.4
	Above 40 years	29	19.6
	Total	148	100.0
	Certificate	6	4.1

Education Level	Diploma	12	8.1
	Degree	82	55.4
	Masters and above	48	32.4
	Total	148	100.0
Working Experience	Less than 5 years	38	25.7
	Between 6 to 10 years	69	46.6
	Above 10 years	41	27.7
	Total	148	100.0

Source: Own Survey(2024)

Table 4.2 above shows that out of the total 148 respondents, 48 employees (32.4%) are female and the remaining 100 employees (67.6%) are male respondents. It simply indicated the number of male employees is greater than female staff.

From the total, 113 employees are under the age group of 20 – 40 (76.4%). The second highest score was for the age group above 40 years, with 29 (19.6%) employees. 96.0% of the respondents are equal to or under the age group of 40. The remaining 4.0% (6) of the respondents are above 40. The age category result demonstrated that most of the respondents are from the productive age, which covered 96.0% of the population.

Table 4.2 also shows the level of qualification each respondent has. Respondents that 82 (55.4%) Degree level have the highest level of frequency which shows that almost all Ethiopian Airlines Supply Chain employees are first-degree holders. Next came Masters and above holders 48 (32.4%), diploma holders 12 (8.1%), and Certificates 6 (4.1%). These results show that Ethiopian Airlines Supply Chain employees' qualification level is high and that most of the employees are educated with more than a diploma certificate.

Regarding service years of respondents in the Ethiopian Airlines Supply Chain, 69 (46.6%) of the respondents have 6-10 years of experience, 41(27.7%) respondents are above 10 years of experience, and 38(25.7%) are under 5 years of experience. From this, we can understand that almost all the respondents have more than 6 years of experience, and under 5 years of experienced respondents are the lowest as compared to others.

4.3 E-procurement practices: Descriptive statistics

Descriptive statistics in the form of arithmetical means and standard deviation for the respondents were computed for the multiple dimensions of E-procurement practice that had been examined

through the questionnaires collected from employees in Ethiopian Airlines. Hence, this descriptive analysis was used to look at the data collected and to describe data captured through the questionnaire and it was also desired to determine the employees' perception of E-procurement practice and Supply Chain performance. Five indicators of E-procurement practice were considered for the study. These five broad antecedents were E-Sourcing, E-Information, E-Ordering, E-Invoicing, and E-Payment. Each predictor has incorporated their sub-statements. These statements enabled to explanation of the broad dimension (E-Procurement Practice), while interpreting the results of frequency, mean, and standard deviation the scales were reallocated as follows to make the interpretation easy and clear. 1-1.8 = Not practiced, 1.81–2.6 = Practiced at the minimum level, 2.61–3.4 = Moderately practiced, 3.41–4.20 = Highly practiced, and 4.21–5 = Very highly practiced (Best, 1977, as cited by Yonas, 2013). On the other hand, measurements that are within the range of plus or minus two Standard Deviation (SD) are closer to the true value than those that are within the range of more than \pm two SD, according to statisticians.

Table 6: Descriptive Statistics of E-Procurement Practices (N=148)

E-procurement practices	Descriptive statistics	
A. E-Sourcing Practice	Mean	Std. Deviation
The organization has a vendor management platform and pre-qualified supplier lists using an E-procurement system.	3.61	1.147
The organization uses online search engines/part locators and receives online notifications from various suppliers.	3.87	.843
The organization uses E-sourcing Software, prepares, publishes documents, screens, negotiates and selects the supplier via an online electronic system.	3.51	.951
The organization has an electronic contract signature and documentation system.	2.47	1.072
The organization uses online supplier performance assessment.	3.53	1.059
Grand Mean	3.41	
B. E-Information Practice	Mean	Std.
The E-procurement practice has enabled access to records simplified, secured, and fast in the organization.	3.67	1.033
The organization has effective online record management that determines performance outcomes.	3.70	.822
There is effective electronic record management practice in the organization.	3.77	.889

Grand Mean	3.71	
C. E-Ordering Practice	Mean	Std. D.
The organization's internal procurement requisitions are online.	3.54	1.097
The organization uses an online order management electronic system.	3.86	.865
The organization has online suppliers' stock information.	3.82	.833
The organization has an automated inventory monitoring system.	2.49	1.198
The organization has an online order information history.	3.89	.804
The organization uses an online order-processing electronic system.	3.95	.811
The organization has an online return process for defective parts/shipments.	2.73	1.210
Grand Mean	3.47	
D. E-Invoicing Practice	Mean	Std. D.
The organization uses electronic overdue invoice reminders.	2.23	1.011
The organization uses automatic vast online electronic system invoice processing.	3.53	1.013
The organization accesses its vendor's invoice online electronic system.	3.78	.823
The organization has an invoice verification software solution.	2.38	1.006
The organization has a centralized and common electronic system platform to receive invoices.	3.54	1.103
Grand Mean	3.092	
E. E-Payment Practice	Mean	Std. D.
The organization ensures that Vendors have access to their online regular supply account.	3.53	1.072
The organization uses online wire transfers to make payments to Suppliers.	3.95	.798
The organization uses online electronic payment notifications.	3.68	.969
The organization has a centralized electronic data-retaining platform.	3.96	.718
Grand Mean	3.78	

Source: Own Survey (2024)

As revealed in table 4.3.1, the respective scored mean value results (3.87,3.51, 3.53, and 3.61) display that these mentioned E-sourcing activities are highly practiced by Ethiopian Airlines. It indicated that the respondents highly practiced it. On the other hand, the electronic contract signature and documentation system is practiced at the minimum level (2.47). The standard deviation is low, meaning that there are no extremes in the positive and negative scores and this implied that there was no big variation in response among the respondents and the variation is

acceptable. The overall average mean result (3.41) indicates that E-Sourcing is highly practiced in the organization. Increased decision-making flexibility and cheaper costs are two benefits of e-major sourcing (Ombat, 2015).

As displayed in table 4.3.1, the respondent's respective mean value results (3.67, 3.70 and 3.77) indicate that E-Information is highly practiced in Ethiopian Airlines. It indicated that the respondents highly practiced it. The standard deviation is low, meaning that there are no extremes in the positive and negative scores, and this implies that there was no variation in response among the respondents, and it is acceptable. Thus, the overall average mean result (3.71) indicated that E-Information is highly practiced in the organization. Maintaining company information across the supply chain is essential in this era of e-business (Chang, et al., 2013).

As revealed in table 4.3.1, the respective mean value results (3.54, 3.86,3.82,3.89, and 3.95) indicate that they are highly practiced in Ethiopian Airlines. It indicated that the respondents highly practiced it. Whereas, the automated inventory monitoring system (2.49) is practiced at the minimum level, and the online return process for defective parts/shipments (2.73) is moderately practiced in the organization. It indicated that the respondents practiced it at the minimum level. The standard deviation is low, meaning that there are no extremes in the positive and negative scores, and implies that there was no variation in response among the respondents and is acceptable. While seeing the overall average mean value result (3.47), E-Ordering is highly practiced by the organization. E-ordering, according to (Kim & Shunk, 2003), is the process of generating and approving buy requisitions, placing purchase orders, and receiving requested products and services through the use of an internet-based software system that significantly enhances supply chain performance.

As revealed in table 4.3.1, The respective mean value results (3.53,3.78, and 3.54) indicate that they are highly practiced in Ethiopian Airlines. It showed that the respondents highly practiced it. Whereas, the electronic overdue invoice reminders (mean value of 2.23) and invoice verification software solution (mean value of 2.38) are practiced at the minimum level in the organization. It indicated that the respondents practiced it at the minimum level. The standard deviation is low, meaning that there are no extremes in the positive and negative scores, and means that there was no variation in response among the respondents and is acceptable. Thus, the overall average mean value result (3.092) reveals that E-Invoicing is moderately practiced by the organization. E-

invoicing has several advantages, including substantial cost savings, process simplicity, quicker payments, improved data security, and several environmental advantages. Businesses and government agencies who currently utilize it attest to this (Lian, et al., 2014).

As the table 4.3.1 above, the respective mean value results (3.53,3.95,3.68, and 3.96) indicate that E-Payment is highly practiced in Ethiopian Airlines. It revealed that the respondents highly practiced it. The standard deviation is low, meaning that there are no extremes in the positive and negative scores, and implies that there was no variation in response among the respondents, and it is acceptable. Thus, the overall average mean result (3.78) indicated that E-Payment is highly practiced in the organization. It is a monetary transaction between the buyer and seller by use of the electronic system to perform transactions including payment, internet payment, E-cards, PC Banking, and E-cash in the supply chain (Munyao & Moronge, 2018).

Table 7: E-Procurement Practice Summary

E-procurement practices	Mean	Rank
E-Sourcing Practice	3.41	4 th
E-Information Practice	3.71	2 nd
E-Ordering Practice	3.47	3 rd
E-Invoicing Practice	3.092	5 th
E-Payment Practice	3.78	1 st
Grand Mean of E-Procurement Practices	3.4924	

Source: Own Survey (2024)

As shown in table 4.3.2, E-sourcing, E-Information, E-Ordering, E-Invoicing, and E-payment were highly practiced by Ethiopian Airlines as indicated by their respective average mean values of 3.41,3.71,3.47,3.092 and 3.78. It reflects that respondents highly practiced it. Generally, the average mean response of the respondents about the E-Procurement practices in Ethiopian Airlines is 3.4924. It indicates that electronic procurement is highly practiced in the organization. According to (Barasa, *et al.*, 2017) study, E-sourcing, E-information, E-ordering, E-invoicing, and E-payment are the most common E-procurement practices. (Madzimore, *et al.*, 2020) observed that successful organizations or firms that use e-procurement systems effectively have superior supply chain performance.

4.4 Supply Chain Performance: Descriptive Statistics

Table 8: SC Performance (N=148)

Supply Chain Performance	Descriptive statistics	
A. Cost	Mean	Std. D.
The Supply Chain has acquired products and services at an affordable cost due to E-procurement practice.	3.57	1.125
The Organization's Aircraft On Ground, expedited, penalty for due invoices, maintenance, inventory carrying, disposal, and administrative costs/fees have been reduced with better effectiveness and efficiency due to E-procurement practice.	2.51	1.116
The supply chain's e-procurement system has adequate security measures concerning the E-Procurement system to avoid potential costs concerning system failure and fraud.	3.82	.716
Grand Mean	3.3	
B. Quality	Mean	Std. D.
The Supply chain has electronically standardized documentation that assures quality.	3.66	1.008
The Supply chain has reduced the level of quality defects and the part removal rates due to E-procurement practice.	2.45	1.090
The Supply chain has reduced paperwork and re-work due to E-procurement practice.	3.90	.657
The Supply chain assures to provide world-class service due to E-procurement practice	3.89	.792
Grand Mean	3.475	
C. Delivery	Mean	Std. D.
The supply chain has reduced the products or services' lead time or Turn-Around Time, and Aircraft on-ground time and also improved the availability of parts, handling, and project completion time due to E-procurement practice.	2.49	1.181
The organization's e-procurement system is well integrated with the other systems in operation and improves procurement process time.	2.52	1.163
The supply chain's order, invoice, and payment processing time is minimized due to E-procurement practice.	4.01	.804
Grand Mean	3.0067	
Grand Mean of Supply Chain Performance	3.261	

Source: Own Survey (2024)

As shown the cost in table 4.4.1, the mean response of the respondents on the Supply Chain has acquired products and services at an affordable cost, and adequate security measures to avoid potential costs concerning system failure and fraud are highly practiced in the organization as indicated by their mean values of 3.57 and 3.82 respectively which E-procurement practices acquired products and services at affordable cost, enabled adequate security measures to avoid potential costs in Ethiopian Airlines. Whereas, the Organization's Aircraft On Ground, expedited, penalty for due invoices, maintenance, inventory carrying, disposal, and administrative costs/fees have been reduced with better effectiveness and efficiency due to E-procurement practices which the mean value (2.51) reflected that there is practiced at the minimum level in the organization, that reflected the respondents had disagreed. The overall mean value of 3.3 indicated that the Ethiopian Supply Chain performance in terms of cost was moderately practiced and affected by e-procurement practices. Neely and Platts (2005) have identified the manufacturing cost, value-added cost, selling price, running cost, and services cost as the measures of cost performance.

As revealed in the quality in table 4.4.1, the electronically standardized documentation, paperwork, and re-work reduction, and world-class service were highly practiced in Ethiopian Airlines as indicated by the mean values of 3.66, 3.90, and 3.89 respectively. Whereas the level of quality defects and the part removal rates reduction was practiced at the minimum level in the organization as a mean value of 2.45 indicated. The overall mean of 3.475 showed that the quality performance of the Ethiopian supply chain was highly practiced and affected by e-procurement practices. Quality is the degree to which a commodity meets the requirements of the customer at the start of its life (ISO 9000).

As displayed in the delivery in table 4.4.1, the supply chain's order, invoice, and payment processing time is minimized due to E-procurement practice, in which the mean value (4.01) was very highly practiced. This indicated that respondents very highly practiced supply chain performance in terms of delivery and that E-procurement practices minimized the ordering, invoicing, and payment long processing time in Ethiopian Airlines. The minimization of products or services lead time or Turn-Around Time, Aircraft On Ground time, and the availability of parts, handling, and project completion time improvement due to E-procurement practices; the organization's e-procurement system is well integrated with the other systems in operation and improves procurement process time, which had respective mean values (2.49 and 2.52) are

practiced at the minimum level in the organization, that revealed the respondents practiced at the minimum level. The overall mean value (3.0067) indicated that the Ethiopian Supply Chain performance in terms of delivery was moderately practiced and affected by e-procurement practices. The proportion of on-time delivery, the percentage of deliveries made by the deadline, the percentage increase in the portion of delivery promises fulfilled, and the perceived relative reliability to competitors have all been suggested by White (1996).

Generally, as table 4.4.1 displayed, the average granted mean response of the respondents about the Supply Chain performance of Ethiopian Airlines Supply Chain was moderately practiced (mean value 3.261). This indicated the respondents moderately practiced Supply chain performance in terms of cost, quality, and delivery by comparing E-procurement practice against actual achievements and responsibilities from the perspective of the judging party observed in Ethiopian Airlines. Since the positive and negative ratings do not exhibit extremes, the low standard deviation suggests that there was no big variation in response among the respondents, the variation is acceptable and supply chain performance is moderately practiced in the organization.

Table 9: Supply Chain Performance Summary

Supply Chain Performance	Mean
Cost	3.3
Quality	3.475
Delivery	3.0067
Grand Mean of Supply Chain Performance	3.261

Source: Own Survey (2024)

As shown in table 4.4.2, cost and delivery were moderately practiced by Ethiopian Airlines. It reveals that respondents moderately practiced them in the supply chain performance as indicated by their respective average mean values of 3.3 and 3.0067. The respondents also highly practiced the quality in the supply chain performance.

Generally, the average mean response of the respondents about the supply chain performance of Ethiopian Airlines is moderately practiced. It indicates that the supply chain performance in terms of cost, quality, and delivery is moderately practiced in the organization. Madzimore, et al.(2020); Srinivasan, et al. (2011) defined supply chain performance as the performance of several processes inside a company's supply chain function. Whilst volatility in the aviation market is present, also as

important is the unpredictability inherent in aviation operations leading to stochastic tasks and this requires that the production and service systems are flexible to meet customer demands without compromising on the other aspects of its competitive priorities which are cost, quality, and delivery (Aitken, et al., 2002).

4.5 Inferential Analysis

4.5.1 Pearson Correlation Analysis

In this section, correlation analysis was conducted in light of each research question mentioned in the introductory part. The relationship between E-procurement and Supply Chain Performance was investigated, using Pearson Correlation Analysis. This provided correlation coefficients which indicated the strength and direction of the relationship. The p-value also indicated the probability of this relationship's significance.

4.5.2 Assessment of Autocorrelation

Data were assessed to ensure that the autocorrelation is not a threat to the use of Ordinary Least Squares (OLS) for analysis. This assumption can be tested with the Durbin-Watson test which tests for serial correlation between errors and a value closer to 2 is acceptable (Field, 2009). Positive serial correlation is demonstrated if the Durbin-Watson is noticeably less than 2. Thus, the Durbin-Watson statistics value is 1.643 suggesting that there is no severe autocorrelation among error terms.

The interpretation was made based on the following measurement scale intervals or ranges:

Table 10: Correlation Interpretation

Correlation Result	Interpretation
0	Neutral
0.1-0.35	Poor (Positively)
0.36 -0.5	Moderate (Positively)
0.51-0.7	Strong (Positively)
0.71-.0.99	Very strong (Positively)
1	Perfect

McDanail and Gates (2006).

The correlation analysis result is presented in the following table 4.5.2.

Table 11: Correlation analysis result

E-Procurement Practices		Supply Chain Performance
E-Sourcing	Pearson Correlation	.568**
	Sig. (2-tailed)	.000
E-Information	Pearson Correlation	.463**
	Sig. (2-tailed)	.000
E-Ordering	Pearson Correlation	.712**
	Sig. (2-tailed)	.000
E-Invoicing	Pearson Correlation	.606**
	Sig. (2-tailed)	.000
E-Payment	Pearson Correlation	.581**
	Sig. (2-tailed)	.000
**. Correlation was significant at the 0.01 level (2-tailed).		

Source: Own Survey (2024)

E-Sourcing Practices and Supply Chain Performance Correlation

Table 4.5.2 shows that there is a strong and significant correlation between E-Sourcing and Supply Chain performance at Ethiopian Airlines ($r= 0.568^{**}$; $p\text{-value}<0.01$). E-procurement practices such as e-sourcing and e-payment can help reduce transaction costs by streamlining procurement processes, improving information flow, and facilitating efficient transactions between buyers and suppliers (Williamson, 1985).

According to Barasa, et al. (2017) study, E-sourcing, E-ordering, E-invoicing, and E-payment are the most common E-procurement practices. According to the Chartered Institute of Procurement and Supply (CIPS,2012), the Internet, like many other online activities, puts suppliers and providers closer together, enabling lower costs, greater communication, and a more efficient process, which is why e-sourcing has become so popular. By using e-sourcing, businesses can expand their pool of potential suppliers at no cost because they don't have to rely solely on those suppliers and vendors; since they communicate online, they can also physically visit their locations and obtain any information they require by simply clicking a button on their computers.

E-Information Practices and Supply Chain Performance Correlation

Going through the above table 4.5.2 displayed that there is a moderate and significant correlation between E-Information and Supply Chain performance at Ethiopian Airlines Supply Chain ($r = 0.463^{**}$; $p\text{-value} < 0.01$). According to Madzimore, et al. (2020); Ombat (2015) e-information is the collection, dissemination, and purchasing of data through the Internet. E-information facilitates communication between organizations, as information is transmitted at any time without delay and can be called up for the necessary measures and corrections. If information is exchanged frequently between companies and their suppliers, this improves the supply chain process, and products/services are delivered on time with the correct specifications. Communication and information sharing are very important in any relationship building, and to achieve the desired goals with suppliers, e-information is the best form of communication and should be used to make supply chain performance efficient and effective.

E-ordering Practices and Supply Chain Performance Correlation

Table 4.5.2 also revealed that a strong and significant correlation was found between E-Ordering and Supply Chain performance at Ethiopian Airlines ($r = 0.712^{**}$; $p\text{-value} = 0.01$). E-ordering, according to Kim & Shunk (2003), is the process of generating and approving buy requisitions, placing purchase orders, and receiving requested products and services through the use of an internet-based software system that significantly enhances supply chain performance.

E-Invoicing Practices and Supply Chain Performance Correlation

Table 4.5.2 indicated that a strong and significant correlation was found between E-Invoicing and SC performance ($r = 0.606$; $p\text{-value} < 0.01$). This is supported that E-invoicing has been recognized as one of the most important sources of profitability increases in organizations (Brun, 2007). It is essential for preserving company data in the current e-business era across the supply chain ((Chang, et al., 2013).

E-Payment Practices and Supply Chain Performance Correlation

Table 4.5.2 revealed that a strong and significant correlation was found between E-Paymnet and Supply Chain performance ($r = 0.581^{**}$; $P < 0.01$), where E-Paymnet acts, such as engaging in paying payments as per agreed terms and conditions, working to avoid the overdue payments of the

suppliers to improve their quality in the on-time payment, among others are positive and significant relationship to how Ethiopian Airlines performs in assuring reduced cost of purchasing, improved materials quality, on-time delivery, and overall satisfaction of its internal user organs. According to Barasa, *et al.* (2017) study, E-sourcing, E-information, E-ordering, E-invoicing, and E-payment are the most common E-procurement practices. The use of E-payment is influenced by its ability to introduce value in a quick, efficient, and effective manner (Singh & Punia, 2011).

4.5.3 **Assumptions Testing/Diagnosis Tests**

Making sure the data being analyzed can be evaluated using linear regression is one step in the process when someone decides to use this method of data analysis. This was necessary because, for linear regression to produce a legitimate result, it was only permissible to utilize it if the necessary data "passes" four assumptions. Let us see whether the following assumptions are met or not. One can check assumptions using SPSS Statistics and linearity assumptions should be checked first, before moving into others assumptions.

4.5.3.1 **Multi Collinearity**

Multicollinearity describes the situation in which the independent variables are highly correlated in a way that has undesirable implications on the outcome of regression analysis. According to Robert (2006), if collinearity is discovered then one can either remove one of the variables or create a new variable that combines the previous two that were highly intercorrelated because when the predictor variables are highly correlated, they share essentially the same information and together, they may explain a great deal of the dependent variable, but may not individually contribute significantly to the model. Thus, the impact of multicollinearity is to reduce any individual independent variable's predictive power by the extent to which it is associated with the other independent variables (Beyan, 2014).

Accordingly, Tolerance and Variance Inflation Factor (VIF) values were calculated to check multicollinearity and the result is presented in Table 4.5.3.1 below. The Tolerance value is an indication of the percentage of variance in the predictor that cannot be accounted for by the other predictors implying the fact that very small values indicate overlap or sharing of predictive power (Robert, 2006).

Table 12: Multicollinearity Test

Variables	Collinearity Statistics	
	Tolerance	VIF
E-Sourcing	.439	2.277
E-Information	.453	2.209
E-Ordering	.468	2.137
E-Invoicing	.460	2.175
E-Payment	.431	2.319

Source: Own Survey (2024)

As shown in the table above, the Tolerance values for all the independent variables are within the acceptable level of greater than 0.1, the VIF values are also less than the cut value of 10. If the VIF values of independent variables are beyond 10, then it is suggested that further investigation is required (Robert, 2006). As implied by the Tolerance and VIF values, in this particular case, multicollinearity is not a problem.

4.5.3.2 Test of Normality (Skewness and kurtosis Test)

The assumption of normality shows the distribution of the errors for any given combination of values on the predictor variables (independent variables) (Matt, Carlos, and Deson, 2013). One way of measuring the normality of distribution is by checking the level of skewness and kurtosis. Usually, the value of skewness and kurtosis for normal distribution is between -2 to 2, and -7 to 7 respectively (Bryne,2006).

As shown in Table 4.5.3.2, the results of skewness in construct dimensions of E-procurement, against the factors affecting Supply Chain performance were within the acceptable range of normality (-2 to +2) and the results of Kurtosis in predictors dimensions of E-procurement, against the factors affecting Supply Chain performance were within the acceptable range of normality (-7 to +7). Hence, the normality assumptions are satisfied for the obtained data (Field, 2006).

Table 13: Skewness and Kurtosis Test

		Statistics					
		ESourcing	EInformation	EOrdering	EInvoicing	EPayment	Supply Chain Performance
N	Valid	148	148	148	148	148	148

	Missing	0	0	0	0	0	0
Skewness		-.254	-1.238	.354	-.212	-.926	.168
Std. Error of Skewness		.199	.199	.199	.199	.199	.199
Kurtosis		-.289	1.218	.893	.859	.945	-.003
Std. Error of Kurtosis		.396	.396	.396	.396	.396	.396

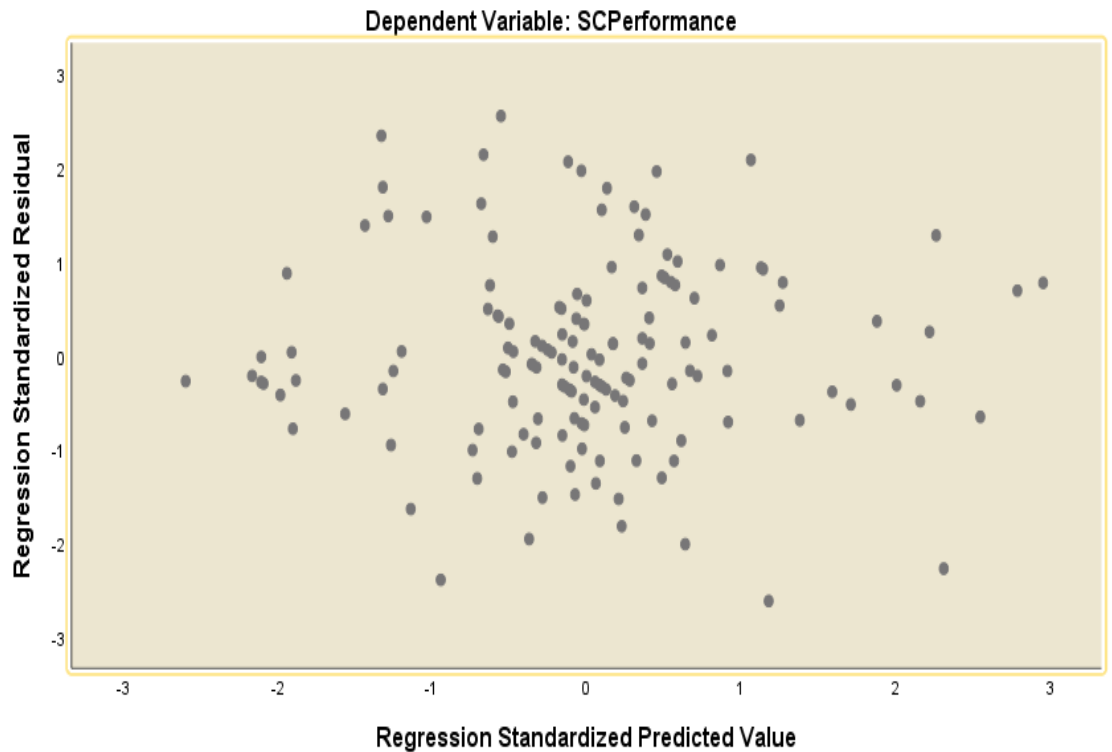
Source: Own Survey (2024)

The normality assumption is based on the shape of normal distribution and gives the study knowledge about what values to expect. Once the sampling distribution of the mean is known, it is possible to make predictions for a new sample. The figure below the annex shows a histogram with normal distribution from the SPSS software. It indicates the Bell-Shaped as Annex III shows.

Linearity defines the dependent variable as a linear function of the predictor (independent) variables. Multiple regression can accurately estimate the relationship between dependent and independent variables when the relationship is linear. Annex III shows a normal P-plot with normal distribution from the SPSS software. Multiple regression assumes that variables have normal distributions. This means that errors were normally distributed and that a plot of the values of the residuals approximated a normal curve.

4.5.3.3 **Linearity test**

A linearity test is necessary because correlation, regression, and other members of the General Linear Model (GLM) assume linearity. The study checks for patterns in scatter plots of E-procurement (E-sourcing, E-information, E-ordering, E-invoicing, and E-payment) against supply chain performance if they have linear relation and the assumption has been met or not. The scatter plot below depicts that the dimensions of E-procurement practices and supply chain performance have a linear relationship. Figure 2: **Scatter Plot: Homoscedasticity**



Source: Own Survey (2024)

In regression as a rule of thumb, an indicator of possible linearity is when the standard deviations of the residual exceed the standard deviations of the dependent. Therefore, residual statistics in the descriptive statistics table below show that the standard deviation of the residual exceeds the standard deviation of the dependent variable (Supply Chain performance). Therefore, there is a linear relationship between E-procurement variables and Supply Chain performance.

Table 14: Residual Statistics

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	22.02	45.12	32.82	4.163	148
Residual	-9.728	9.488	.000	3.654	148
Std. Predicted Value	-2.594	2.956	.000	1.000	148
Std. Residual	-2.617	2.552	.000	.983	148

a. Dependent Variable: Average Score Supply Chain Performance

Source: Own Survey (2024)

4.6 Multiple Regression Analysis

Multiple regression analysis was employed to assess the effect of E-procurement practices (E-Sourcing, E-Information, E-Ordering, E-Invoicing, and E-Payment) on Supply Chain performance.

Multiple regression analysis was chosen because it helps to predict the linear relationship of a dependent variable. Here, the dependent and the independent variables were regressed, which show the effect on the relationship of these variables one another. Before explaining the table, the effects of values of the coefficient, R- square are discussed briefly.

Coefficient value: It shows the negative or positive effect of the variables. If the coefficient value is positive, it reveals that the independent variable is positively affecting the dependent variable. If the sign is negative, it shows that the effect is negative.

R-square: R-square is the coefficient of determination; it describes how much variation in the dependent variable is taking place due to the E-procurement variables.

Constant: Constant is the intercept. Therefore, the value of constant cannot be ignored but it does not affect the result directly or indirectly. It just reflects that even if the independent variable has zero value, there will be still some value of the dependent variable.

Probability: Probability and t-statistics show the same results. Either both of them or just one of them can be taken because in any way the results reveal similar indications overall.

Table 15: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.752 ^a	.565	.550	3.718	.565	36.865	5	142	.000	1.643

a. Predictors: (Constant), Average Score for E-Payment, E-Sourcing, E-Invoicing, E-Ordering, E-Information
b. Dependent Variable: Average Score for Supply Chain Performance

Source: Own Survey (2024)

Table 4.6.1 displays the variation of variables used in the analysis. R-square which is the coefficient of determinant tells how much variation is taking place in Supply Chain performance (dependent variable) due to E-Sourcing, E-Information, E-Ordering, E-Invoicing, and E-Payment (independent variables). When the table is analyzed, it depicts that the value of R-square is 0.565, which means 56.5% change taking place in Supply Chain performance is due to the E-Sourcing, E-Information, E-Ordering, E-Invoicing, and E-Payment.

Table 16: Analysis of variance (ANOVA)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2547.527	5	509.505	36.865	.000 ^b
	Residual	1962.547	142	13.821		
	Total	4510.074	147			

a. *Dependent Variable: Average Score for Supply Chain Performance*
b. *Predictors: (Constant), Average Score for E-Payment, Average Score for E-Sourcing, Average Score for E-Invoicing, Average Score for E-Ordering, Average Score for E-Information*

Source: Own Survey (2024)

Table 4.6.2 shows the results of the analysis of variance (ANOVA) for these data. A value of F ratio greater than 0.05 and a probability less than 0.05 indicate statistical significance (Saunders, 2012). The F-statistic for every independent variable is thus greater than 5 at 36.865. This suggests that the model fits the data well overall and is statistically significant at $p < 0.05$. It follows that supply chain performance is generally and significantly predicted by the regression model.

To determine whether there is a significant difference in the mean of one dependent variable between the categories of another independent variable, analysis of variance, or ANOVA, was utilized. The results of the significance test for R and R^2 using an F-statistic were presented in the ANOVA table. There is a correlation between the independent variables (the predictors) and dependent variable (Supply Chain performance) in the population since the test result is significant, with a P-value less than 0.01 (Field, 2006).

Table 17: Regression Coefficients Result

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		Beta	Std. Error	Beta			Tolerance	VIF
1	(Constant)	5.899	2.136		2.762	.007		
	ESourcing	.180	.141	.107	1.279	.203	.439	2.277
	EInformation	-.169	.210	-.066	-.805	.422	.453	2.209
	EOrdering	.638	.111	.463	5.726	.000	.468	2.137
	EInvoicing	.300	.135	.181	2.220	.028	.460	2.175
	EPayment	.371	.191	.164	1.941	.054	.431	2.319

a. *Dependent Variable: Supply Chain Performance*

Source: Own Survey (2024)

Based on table 4.6.3, the regression coefficient result table, we can formulate the regression equation (as per Model: $SCP = \beta_0 + \beta_3E\text{-Ordering} + \beta_4E\text{-Invoicing} + e$) as:

$$\mathbf{SCP = 5.899 + 0.463EO + 0.181EIV + 0.05e}$$

From the Beta Coefficient table, the study highly concentrated on the values of the standardized Beta coefficient to figure out the relative importance of each independent variable, in predicting the dependent variable and on the unstandardized Beta coefficient to formulate the linear regression equation.

A. Standardized Beta Coefficient

Standardized beta coefficients are sometimes called relative importance weights and can be used to compare scores like Z-scores since they all are measured in standard deviation and are not dependent on the unit of measurement of the variables (Field, 2006). Relative importance weights are the proportionate contribution from each predictor to R² correcting for the effects of the inter-correlations among predictors (Lorenzo-Seva et al., 2010). This method is recommended when the researcher examines each predictor variable's relative contribution to the dependent variable (Johnson, 2004).

Based on the relation observed in Table 4.6.3, we can see that the contribution of E-ordering, E-Invoicing, E-Payment, and E-Sourcing as 46.3%, 18.1, 16.4%, and 10.7% respectively for the variation observed in the dependent variable (Supply Chain performance). The highest contributor to the variation in Supply Chain performance according to the responses of employees was E-Ordering. The second important predictor that contributed more, to the supply chain performance was E-invoicing, and the third important predictor that contributed to the supply chain performance was E-Payment.

In proportion to the questionnaire survey made on employees of selected predictors of Ethiopian Airlines, the least affecting/contributor predictor for the supply chain performance from the given predictor was E-Sourcing. Therefore, supply chain performance increases by 0.107 standard deviations for every standard deviation increase in e-sourcing provided by the organization (Field, 2006). All other predictors are similarly applicable.

B. Unstandardized Beta Coefficient

The unstandardized beta coefficient, often known as the beta weight, provides information on the correlations between the independent and dependent variables. A positive value indicates a favorable correlation between the predictor and the outcome. A negative coefficient shows a negative association (Field, 2006). Pedhazur (1997) states that a β weight coefficient tells us how much of a change in the predictor variables that is, e-sourcing, e-information, e-ordering, e-invoicing, and e-payment we might expect with a one-unit change in the criterion variable (in the case, supply chain performance), keeping all other predictor variables constant. According to Field (2006), Table 4.6.3 indicates that when the company improves its e-sourcing by one unit, the supply chain's performance increases by 18.0%, provided that all other aspects remain the same.

4.7 Hypothesis Testing

Table 18: Hypothesis Testing Results

Hypothesis	Unstandardized β Coefficient	P.Value	Decision
E-Sourcing positively and significantly affects the Supply Chain performance	.180	P = 0.203 >0.05	H1: Rejected H0: Accepted
E-Information positively and significantly affects the Supply Chain Performance.	-0.169	P = 0.422 >0.05	H1: Rejected H0: Accepted
E-ordering positively and significantly affects the Supply Chain performance.	0.638	P = 0.00 <0.05	H1: Accepted H0: Rejected
E-invoicing positively and significantly affects the Supply Chain performance.	0.300	P = 0.028 <0.05	H1: Accepted H0: Rejected
E-payment positively and significantly affects the Supply Chain performance.	0.371	P = 0.054 >0.05	H1: Rejected H0: Accepted

Source: Own Survey (2024)

Hypothesis 1

Ha:1 E-Sourcing positively and significantly affects the Supply Chain performance.

H₀:1 E-Sourcing does not positively and significantly affect the Supply Chain performance.

Table 4.7 shows that the unstandardized coefficient beta and p-value of E-Sourcing positively and insignificantly affect with (beta = .180, $p > 0.05$). So, this hypothesis is rejected.

However, theoretical and empirical studies support the E-Sourcing practice significantly affects the supply chain performance as follows;

Theoretically, E-procurement practices such as e-sourcing and e-payment can help reduce transaction costs by streamlining procurement processes, improving information flow, and facilitating efficient transactions between buyers and suppliers (Williamson, 1985).

Empirically, according to Barasa, et al. (2017) study, E-sourcing, E-ordering, E-invoicing, and E-payment are the most common E-procurement practices. According to the Chartered Institute of Procurement and Supply (CIPS,2012), the Internet, like many other online activities, puts suppliers and providers closer together, enabling lower costs, greater communication, and a more efficient process, which is why e-sourcing has become so popular. With E-sourcing, organizations can increase the sources of their potential suppliers at no cost as they do not only depend on those vendors and suppliers, but they can also physically visit their premises since they interact online, and they can get whatever information that they need with the pressing of a button of their computers. They can source their inputs from any part of the world in the comfort of their offices. They interact via the Internet and partner with suppliers and buyers online, and this enhances their operations (Dinda, 2010).

Hypothesis 2

H_a:2 E-Information positively and significantly affects the Supply Chain performance.

H₀:2 E-Information does not positively and significantly affect the Supply Chain performance.

Table 4.7 shows that the unstandardized coefficient beta and p-value of E-Information negatively and insignificantly affect with (beta = -.169, $p > 0.05$). So, this hypothesis is rejected.

While, according to Madzimore, et al. (2020); Ombat (2015) (e-information is the collection, dissemination, and purchasing of data through the Internet. Thus, the researcher fails to accept the directional hypothesis and establishes that E-Information negatively and insignificantly affects

Supply Chain performance. Therefore, concerning Ethiopian Airlines Supply Chain its contribution to Supply Chain performance is insignificant.

The statistically non-significant relationship between E-Information and Supply Chain performance is unexpected. On scrutinizing the result, we see that the result is in the right direction as the path coefficient was negative and insignificant at $p = 0.422$.

Respondents suggest that to ensure high Supply Chain performance, E-information facilitates communication between organizations, as information is transmitted at any time without delay and can be called up for the necessary measures and corrections. If information is exchanged frequently between companies and their suppliers, this improves the supply chain process, and products/services are delivered on time with the correct specifications. Communication and information sharing are paramount in any relationship building, and to achieve the desired goals with suppliers, e-information is the best form of communication. It should be used to make supply chain performance efficient and effective.

Hypothesis 3

H1:3 E-ordering positively and significantly affects the Supply Chain performance.

H0:3 E-ordering does not positively and significantly affect the Supply Chain performance.

The result of Table 4.7 showed that the unstandard coefficient of beta and p-value of E-Ordering positively and significantly affects at ($B = .638$, at 99% confidence level ($p < 0.01$)). This implied that, if E-Ordering increases by 1 percent, Supply Chain performance will increase by 63.8%. This result is supported by (Kim & Shunk, 2003) argue that E-ordering is the process of generating and approving buy requisitions, placing purchase orders, and receiving requested products and services through the use of an internet-based software system that significantly enhances supply chain performance.

Hypothesis 4

H1:4 E-Invoicing positively and significantly affects the Supply Chain performance.

H0:4 E-Invoicing does not positively and significantly affect the Supply Chain performance.

Table 4.7 shows that E-Invoicing positively and significantly affects Supply Chain performance with a B value ($B = .300$), and confidence level ($p < 0.05$). This implied that, if E-Invoicing increases by 1 percent, Supply Chain performance will increase by 30.0%. This result supports that E-invoicing has been recognized as one of the most important sources of profitability increases in organizations (Brun, 2007). Maintaining company information across the supply chain is essential in this era of e-business (Chang, et al., 2013). Therefore, the researcher rejects the null hypothesis and E-Invoicing positively and significantly affects Supply chain performance.

Hypothesis 5

H1:5 E-Payment positively and significantly affects the Supply Chain performance.

H0:5 E-Payment does not positively and significantly affect the Supply Chain performance.

Table 4.7 revealed that the unstandardized coefficient beta and p-value of E-Payment positively and insignificantly affect with ($\beta = .371$, $p > 0.05$). Accordingly, this hypothesis is rejected.

However, theoretical and empirical studies support the E-Payment practice significantly affects the supply chain performance as follows;

Theoretically, E-procurement practices such as e-invoicing and e-payment can help reduce agency costs by increasing transparency, enforcing contractual agreements, and facilitating prompt payment processes, leading to improved supply chain performance (Jensen & Meckling, 1976). E-procurement practices such as e-payment can help reduce transaction costs by streamlining procurement processes, improving information flow, and facilitating efficient transactions between buyers and suppliers (Williamson, 1985).

Empirically, according to (Barasa, et al., 2017) study, E-ordering, E-invoicing, and E-payment are the most common E-procurement practices. The use of E-payment is influenced by its ability to introduce value in a quick, efficient, and effective manner (Singh & Punia, 2011).

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary of Findings

This chapter discussed conclusions, limitations, and recommendations. The main aim of the study was to examine the effects of E-procurement on the Supply Chain performance of Ethiopian Airlines. To realize the objective of the study, relevant kinds of literature were reviewed and quantitative data were collected through questionnaires filled by employee respondents. The data collected through questionnaires were presented, analyzed, interpreted, and discussed using the statistical package for social science (SPSS 25.0) version. Thus, based on the analysis, the following summary, and conclusion were drawn, and recommendations were forwarded for the practitioners of the E-Procurement program in Ethiopian Airlines and researchers who are interested in conducting an in-depth study on this issue in the same organization or other sectors in the country. The following summary was suggested as follows.

The mean scores of E-Sourcing (3.41), E-Information (3.71), E-Ordering (3.47), E-Invoicing (3.092), E-Payment (3.78), and Supply Chain performance (3.261) indicated that most of the employees moderately practiced with E-Procurement practices variables such as E-Sourcing, E-Information, E-Ordering, E-Invoicing, and E-Payment. Thus, the respondent perception indicates that the existing E-Procurement activities are effective. The average mean value of the respondents about the E-Procurement practices in Ethiopian Airlines was 3.4924, which indicates electronic procurement is highly practiced in the organization.

The correlation analysis reveals a strong and favorable link between supply chain performance and e-procurement, including e-sourcing, e-information, e-ordering, e-invoicing, and e-payment. The finding further indicated that the highest relationship was found between E-Ordering and Supply Chain performance ($r=0.712^{**}$, and $P < 0.05$) respectively. However, the lowest relationship existed between E-Information and SC performance ($r=0.463^{**}$ and $P < 0.01$) consecutively.

Regarding the regression result, the findings show that E-Ordering positively and insignificantly explains 18.0% of the variation in SC performance. Therefore, H1: The significant effect of E-Sourcing on Supply Chain performance is rejected, and concluded that E- has a statistically insignificant impact on SC performance.

E-Information negatively and insignificantly explained -16.9% of the variation in Supply Chain performance. Therefore, hypothesis H1: there is a significant effect of E-Information on Supply Chain performance is rejected and concluded that E-Information has a statistically insignificant impact on Supply Chain performance.

E-ordering was found to significantly explain 63.8% of the variation in Supply Chain performance. Therefore hypothesis H1: there is a significant effect of E-Ordering on Supply Chain performance is supported and concludes that E-ordering positively and significantly affects Supply Chain performance.

E-invoicing was found to significantly explain 30.0% of the variation in Supply Chain performance. As such, hypothesis H1: there is a significant effect of E-Invoicing on Supply Chain performance is accepted and concludes that E-Invoicing positively and significantly affects Supply Chain performance.

E-payment positively and insignificantly explains 37.1% of the variation in supply chain performance. Therefore, hypothesis H1: there is a significant effect of E-Payment on supply chain performance is rejected and concluded that E-Payment has a statistically insignificant impact on Supply Chain performance.

Generally, the overall, results show that all independent variables accounted for 56.5% of the variance in Supply Chain performance ($R^2 = 0.565$). Therefore, the five dimensions of e-procurement practices account for 56.5% of the diversity in supply chain performance, with the remaining 43.5% being explained by other factors that have not yet been investigated.

5.2 Conclusion

The study revealed that E-sourcing, E-information, E-ordering, E-invoicing, and E-payment are highly practiced by the Ethiopian Airlines Group's Supply Chain department.

Besides, the grand mean value of the respondents indicated that the supply chain performance in terms of cost, quality, and delivery is moderately practiced in the organization.

The correlation result indicated positive and significant relationships between E-procurement practice and supply chain performance in cost, quality, and delivery perspectives. The hypothesis

results of E-sourcing and E-Information are statistically insignificant, whereas E-Ordering, E-invoicing, and E-payment are statistically significant.

Generally, the study reveals that electronic procurement practices have positive and significant effects on the supply chain performance from the cost, quality, and delivery perspective.

5.3 Recommendation

Based on the findings and conclusion of the study, the following recommendations are forwarded to alleviate or at least minimize currently encountered problems in Ethiopian Airlines that are related to the effects of E-procurement practices on Supply chain performance in terms of cost, quality, and delivery;

- The study strongly recommends that Ethiopian Airlines should focus and invest in the fully effective and efficient automated E-ordering, and E-invoicing of e-procurement practices as well as exhaustively work on the E-sourcing, E-information, and E-payment to minimize supply chain gaps and entirely enhance the supply chain performance due to improve the long payment process, reduce the turnaround time (TAT) of component maintenance, improve lead time, fix the much-late core return fee, resolve the issue of on-time part availability, eliminate past due payment penalties, avoid losing potential suppliers and customers, have an adequate supplier database, and enhance sourcing procedures and process.
- The researcher remarks that it is difficult to generalize the results based on this single case study. Therefore, suggests further research to demonstrate and discover the models on a diversified portfolio of companies including different sectors based on their business activities, different sizes, and different current E-procurement practices.
- Besides, it is recommended to see the impact of E-procurement practices outside Ethiopian Airlines since in this dynamic and complex business environment; it will help to realize the variation between the airline industry and other sectors' supply chain performance.
- The study found a gap in Ethiopian Airlines concerning the variables like; E-sourcing and E-information are statistically revealed as insignificant by Ethiopian Airlines. Therefore, future researchers can study those that fill the gap to the maximum very high practice and check if the company has filled its gap thereafter.
- Finally, by adding additional performance metrics and taking a fixed approach method into

consideration, future researchers might compare Ethiopian Airlines with other well-known Ethiopian company sectors regarding the impact of e-procurement practices on supply chain performance.

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ANNEX II: QUESTIONNAIRE

This questionnaire is divided into four sections. Part I will be used to obtain general information about the respondents. Part II will be used to obtain information on the E-procurement practice. Part III is about the Ethiopian Airlines Supply Chain Performance.

For part I, II and II, please respond your answer by placing a check mark (✓) in the answer box that corresponds to your response and/or fill in the blank where indicated.

Your assistance in completing this questionnaire will be highly appreciated.

Part I: Demographic Data

1. Age?

- Below 20 Yrs (), 20-40 Yrs (), Above 40 Yrs ()

2. Gender?

- Male () Female ()

3. Working experience in this organization?

- Less than 5 years () , Between 6 to 10 years (), Above 10 years ()

4. Education Level?

- Certificate () , Diploma (), Degree (), Masters and above
()
- Other, please specify _____

Part II: E-procurement practices

1. Kindly identify the E-procurement practices adopted by Ethiopian Airlines.

Please respond to your answer by placing a check mark (√) in the answer box that corresponds to your response using a 5 Point Likert Scale, where 1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree

E-Procurement Types	Scale				
	1	2	3	4	5
E-Sourcing					
The organization has a vendor management platform and pre-qualified supplier lists using E-procurement system.					
The organization uses online search engines/part locators and receives online notifications from various suppliers.					
The organization uses E-sourcing Software, prepares, publishes documents, screens, negotiates, and selects the supplier via online electronic system.					
The organization has electronic contract signature and documentation system.					
The organization uses online supplier performance assessment					
E-Information	1	2	3	4	5
The E-procurement practice has enabled access of records simplified, secured, and fast in the organization					
The organization has effective online record management that determines performance outcomes.					
There is effective electronic record management practice in the organization.					
E-Ordering	1	2	3	4	5
The organization's all internal procurement requisitions are online.					
The organization uses an online order management electronic system.					
The organization has online suppliers stock information.					
The organization has automated inventory monitoring system.					
The organization has online order information history.					
The organization uses an online order processing electronic system					
The organization has online return process for defected parts/shipment.					
E-Invoicing	1	2	3	4	5
The organization uses electronic overdue invoice reminder.					
The organization uses automatic vast online electronic system invoice processing.					
The organization accesses its vendor's invoice online electronic system.					
The organization has invoice verification software solution.					
The organization has centralized and common electronic system platform to receive invoices.					
E-Payment	1	2	3	4	5

The organization ensures that Vendors have access to their online regular supply account.					
The organization uses online wire transfers to make payments to Suppliers.					
The organization is currently using online electronic payment notifications.					
The organization has a centralized electronic data-retaining platform					

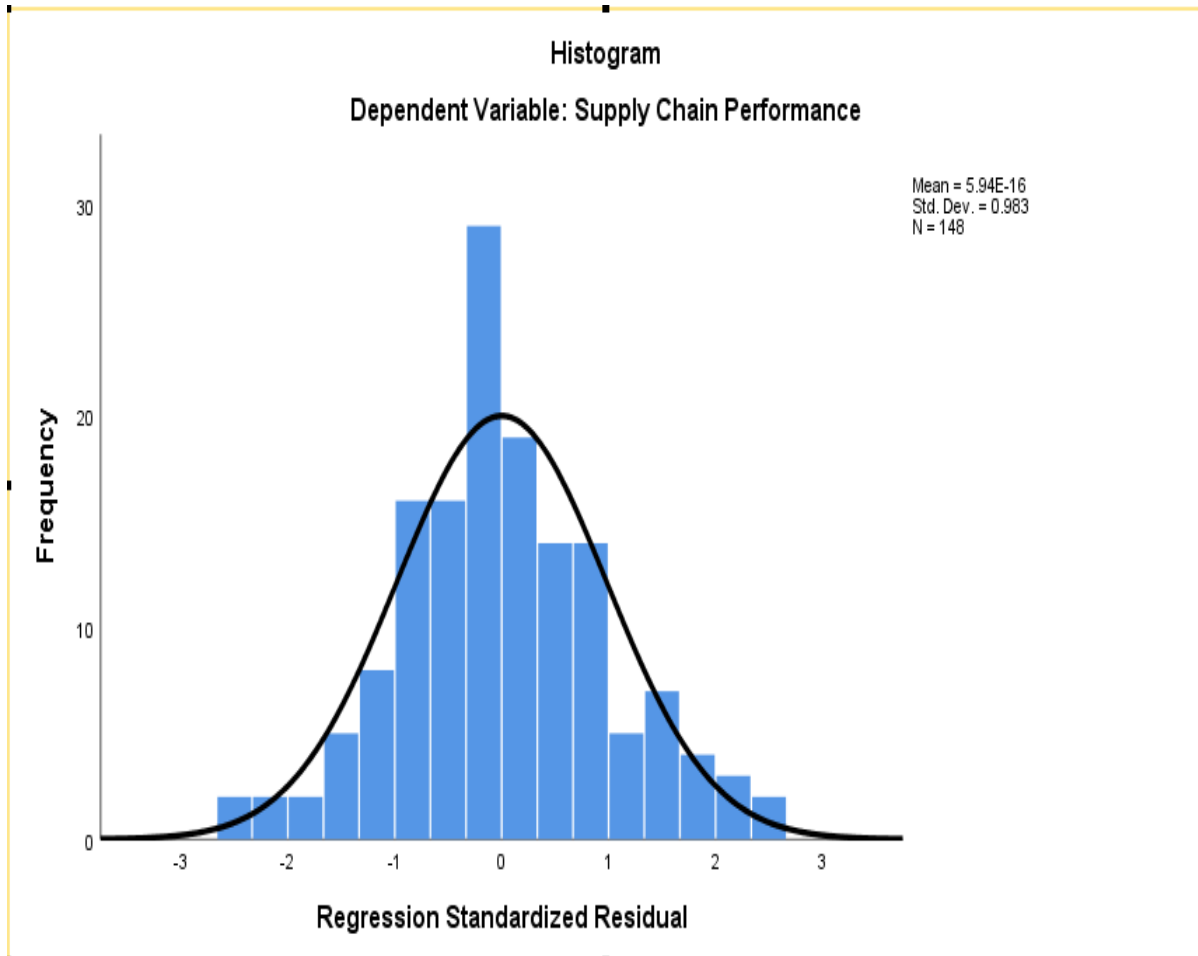
Part III: The Ethiopian Supply Chain Performance

2. To what level practice E-Sourcing, E-Information, E-Ordering, E-Invoicing, and E-payment affect the Ethiopian Supply Chain Performance in terms of cost, quality, and delivery. Please respond to your answer by placing a check mark (√) in the answer box that corresponds to your response using a 5 Point Likert Scale, where 1: Strongly Disagree, 2: Disagree 3: Neutral, 4: Agree, 5: Strongly Agree

Ethiopian Airlines Supply Chain Performance	Scale				
Cost	1	2	3	4	5
The Supply Chain has acquired products and services at an affordable cost due to E-procurement practice.					
The Organization's Aircraft On Ground, expedited, penalty for due invoices, maintenance, inventory carrying, disposal, and administrative costs/fees have been reduced with better effectiveness and efficiency due to E-procurement practice.					
The supply chain's e-procurement system has adequate security measures with regard to the E-Procurement system in order to avoid potential costs in relation to system failure and fraud.					
Quality	1	2	3	4	5
The Supply chain has electronically standardized documentation that assures quality, and provides world-class service.					
The Supply chain has reduced the level of quality defects and the part removal rates due to E-procurement practice.					
The Supply chain has reduced paperwork and re-work due to E-procurement practice.					
The Supply chain assures to provide world-class service due to E-procurement practice					
Delivery	1	2	3	4	5
The supply chain has reduced the products or services lead time or Turn-Around Time, and Aircraft On Ground time and also improved the availability of parts, handling and project completion time due to E-procurement practice.					
The organization's e-procurement system is well integrated with the other systems in operation and improves procurement process time.					
The supply chain's order, invoice and payment processing time is minimized due to E-procurement practice .					

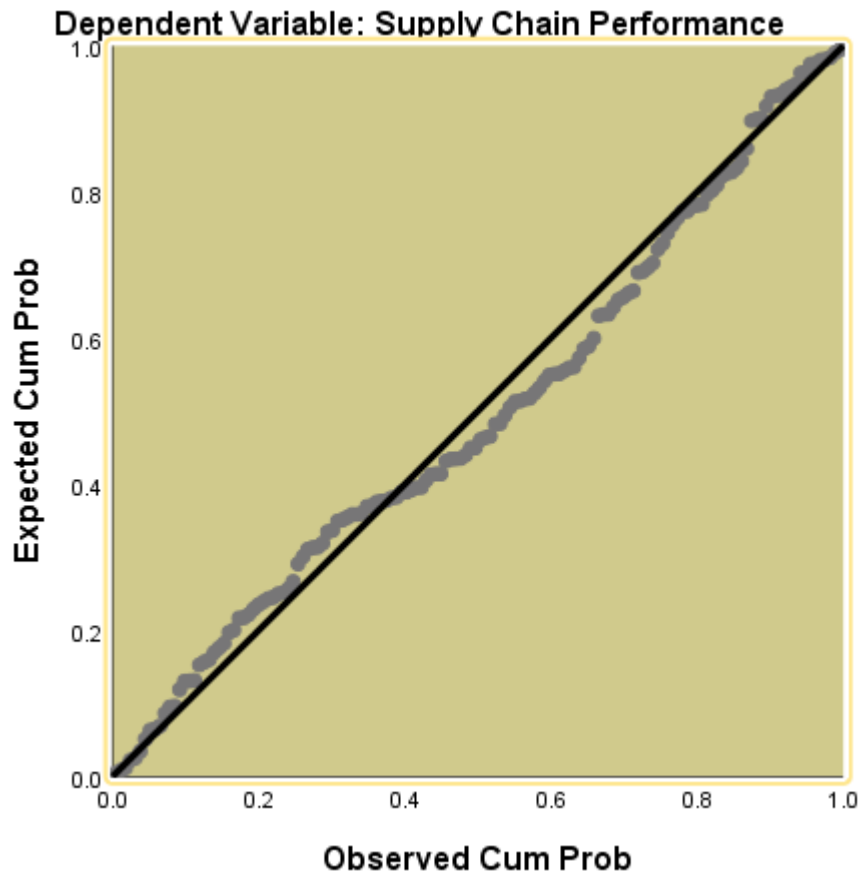
ANNEX III: SPSS Analysis Diagrams

Figure 3: Histogram:- Normality



Source: Own Survey (2024))

Figure 4: Normal P-P Plot of Regression Standardized Residual (Linearity)



Source: Own Survey (2024)