ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

ASSESSING THE PRACTICE AND CHALLENGES OF FUEL SUPPLY CHAIN IN ETHIOPIA, ADDIS ABABA

BY

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JULY, 2019

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DECLARATION

I, the undersigned, declare that this thesis is my original work; prepared under the Guidance of Getachew Habtamu (PhD).All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institutions for the purpose of earning my degree.

_____ _____

Name Signature

Saint Marry University, Addis Ababa July, 2019

ENDORSEMENT

This thesis has been submitted to St. Mary's university, school of graduate studies for examination with my approval as a university advisor.

_____ _____

Advisor Signature

Saint Marry University, Addis Ababa July, 2019

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LIST OF ABBREVIATIONS/ACRONYMS

BPR	Business Process Reengineering
CRM	Customer Relationship Management
CRS	Coordination and Resource Sharing
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
EPSE	Ethiopian Petroleum Supply Enterprise
MoMP	Ministry of Mines and Petroleum
ICT	Information Communication Technology
II	Information Integration
M	Mean
NT	Network Theory
ORL	Organizational Relationship Linkage
PAT	Principal Agent Theory
PLM	Product Lifecycle Management
RBV	Resource Based View
SC	Supply Chain
SD	Standard Deviation
SCI	Supply Chain Integration
SCM	Supply Chain Management
SPSS	Statistical Package for Social Science
TCA	Transactional Cost Analysis
TQM	Total Quality Management

Abstract

Supply chain has received in recent years a great deal of attention by researchers and practitioners. Effective Supply chain will lead to a lowering of the total amount of resources required to provide the necessary level of customer service to a specific segment and improving customer service through increased product availability and reduced order cycle time (Banomyong & Supatn, 2011), The purpose of this study is to assess the practice and challenges of fuel supply chain in Ethiopia specifically in Addis Ababa. The study deployed descriptive research method with a non-probability convenience sampling was chosen for the survey Hence, by using convenience sampling, 9 major oil companies will be taken as a sample. Again from 100 gas stations, 50 gas stations will be taken as a sample by using random sampling. Finally 100 customers, two from each gas station, will be taken as sample respondents by using simple random sampling. A self-developed questionnaire adopted from respondents from the three segments (Oil Company, Fuel stations and consumers) were used as a research tool for collecting data. The collected data was analyzed using SPSS V.20 software by using both descriptive and inferential statistics (mean, and standard deviation). The main findings of the study shows that, the respondents in the oil company suggest that fuel supply chain in Ethiopia from the expectation of the consumers are evaluated below the average mean value of 2.5, therefore it indicates at low level, regarding the challenges of full supply chain in the three dimension (in the oil company, fuel station and consumers) were indicates there is agreement with the existence of those challenges. Moreover, according to the respondents, the extent of fuel supply chain integrated to provide efficient service to the consumer and the fuel stations providing fuel distribution service to the consumers were indicates in active performance. also, the study recommends EPSE has responsible for the incoming fuel and , always check whether there is enough product at EPSE terminals (Djibouti &Port Sudan) or not and strengthen the man power in the area for the betterment of the controlling system. As well as the oil companies develop suitable fuel storage capacity & fuel stations in the industry, furthermore EPSE & its Ministry should strengthen, develop and amend the rule and regulation of the industry.

***Keywords**: supply chain, fuel, supply chain integration*

CHAPTER ONE

INTRODUCTION

This chapter discusses the background of the Study, Statement of the problem, Research Questions, Research Objectives, and Significance of the Study, Scope of the Study, Limitation of the Study, Definition of Terms and Organization of the Study.

1.1 BACKGROUND OF THE STUDY

Supply chain has received in recent years a great deal of attention by researchers and practitioners. Effective Supply chain will lead to a lowering of the total amount of resources required to provide the necessary level of customer service to a specific segment and improving customer service through increased product availability and reduced order cycle time (Banomyong & Supatn, 2011); engage in information exchange (forecasting techniques, inventory management, delivery) and structural collaboration (just-in-time system, outsourcing, vendor-managed inventory and co-locating plants) (Henry & Barro, 2009; Raja, Mazlan & Ali, 2006); relationships with downstream supply chain partners to create end-customer value (Iyer, 2011) and maximize benefits and minimize costs along the supply chain (Chima, 2007).

In highly competitive markets, the simple pursuit of market share is no longer sufficient to ensure profitability, and thus, companies focus on redefining their competitive space or profit zone by giving due attention to customers‘ needs and providing those needs as fast as possible. The key to growing business is not only your strategies, your technology, or your people. It is your ability to manage the chain of vital inputs that you need to create your product and services. Every company has one, and every company relies on one for its survival but not every company realizes that the secret to its long-term success lies in its ability to improve and perfect its supply chain (Mebratu, 2013)

The concept of supply chain conceived through human mind since people started building pyramids, obelisks and temples; furthermore, the practice of supply chain management is guided by some basic underlying concepts that have not changed much over the centuries. Even if the concept of supply chain conceived into human mind, but the term supply chain management

arose in the late 1980s and came into widespread use in the 1990s. Prior to that time, businesses used terms such as logistics and operations management instead (Hugos, 2005).

Recently, the rapid advancements of technology such as Globalization, wireless and internet networks, the basic supply chain is rapidly evolving into what is known as a Supply Chain Network. To cope with these fast-growing challenges manufacturing industries are implementing different systems like TQM, ERP, and BPR etc. But the integration of supply chain is still in low level to develop the competitive advantage of the organizations (Fasika et al., 2014).

The oil industry works as a global supply chain involving exploration, material handling, domestic and international transportation, use of technology, and so on. The industry offers a strong model for implementing supply chain process. Supply chain involves providing maximum satisfaction to end users (consumers), in other words, delivering the right product to the right person at the right time while still maximizing profits. Today, there are many opportunities for the coordination of activities across the supply chain even in the ever complex oil and gas sector. This is largely due to the development of information systems and communication technologies within the sector. Integrating supply management with other factors of operations allows all functions to be involved in the management decisions (Chima, 2007).

Moreover, the nature of the commerce in the fuel supply chain requires high level of supply chain to success and satisfied the consumer. This research focused on assessing the practice and challenges of supply chain management in Ethiopia.

1.2 FUEL INDUSTRY IN ETHIOPIA

The generic supply chain of fuel includes upstream sectors (companies involved in exploration and extraction of crude oil), midstream sectors (companies involved in transportation, processing, storage & distribution), and downstream sectors (companies involved in refining, marketing, distributing and transporting of petroleum product)

Since Ethiopia does not produce oil, to meet the country's oil requirement, the country imports fuels from oversea. Accordingly, the study focuses on downstream petroleum sector of the supply chain, particularly in purchase and distribution of petroleum product to customers.

Ethiopia buys 100 percent of the country's jet fuel consumption, 60 percent of diesel, from state-owned Kuwait Petroleum Corporation (KPC) that supplies the products directly from Kuwait using its own fuel tanker vessels. 30%-80% percent of Ethiopia's benzene consumption is bought from Sudan. The remaining is bought from international oil trading firms through an international open tender process.

Over the past 50 years, the fuel supply chain management of Ethiopia had been regulated by government, including the price of fuel and the transport rate to be paid for Bulk Road Vehicle owners. At present, Ethiopia spends 2.5 billion USD annually on imported petroleum products (EPSE 2017/18 importation data), The country consumes daily 1.2 million liters of benzene, 6.8 million liters of diesel and 2.2 million liters of jet fuel and kerosene.

The country's annual fuel consumption has been growing at a rate of ten percent per year.

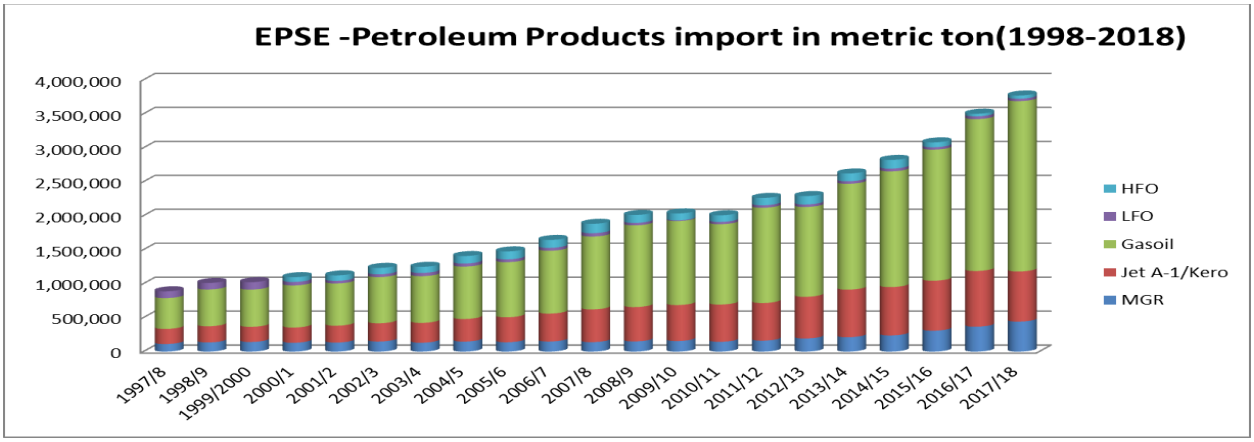


Fig 1.1 Petroleum products import Source:EPSE

Fuel Supply chain in Ethiopia

International Oil Suppliers: They supply oil through an international open tender process. **Ethiopian Petroleum Supply Enterprise (EPSE):** EPSE is a government agency as a bulk supplier. EPSE imports oil, stores and sells petroleum products to Oil Companies.

Bulk Distribution Companies (Oil Companies): These companies have been licensed by the MoT as bulk distributors. They purchase oil from EPSE and distribute the product either through their Retail Network or directly to commercial customers.

Fuel Stations: They procure oil from Oil Companies and sell to bulk consumers and the general public through fuel stations.

Consumers: End users of the product.

Fig 1.2 Fuel Supply Chain (Retail Consumers)

1.3 STATEMENT OF THE PROBLEM

Currently, there have been distresses and many have claimed that the oil and gas trade might have moved in an era of very scarce resources. Yet, in reality, the resources are not the cause of supply constraints, rather putting these reserves into production and delivering the final products to consumers. Hence, supply chain process will enhance this objective (Christopher 2007).

The supply chain process refers to the resources needed to deliver goods and services to a consumer. Not surprisingly, the importance of supply chain is an integral part of most businesses and is essential to company success and customer satisfaction.

However, the oil industry mechanism as a global supply chain involving exploration, material handling, domestic and international transportation, use of technology, and so on. The industry offers a strong system for implementing supply chain process since; supply chain involves providing maximum satisfaction to end users (Chima, 2007)

At present, it has been witnessed a periodic shortage of supply of fuel in Ethiopia. Even though the level of intensity of the shortage has reduced to a certain extent, the problem still continues. The more scarcity occurs, the more customers suffer. Therefore, fuel supply chain has to solve a

lot of challenges caused by the nature of the supply chain in the oil industry capacity and unexpected actions resembling political or economic changes. In this case, limited studies on the practice and challenges of fuel supply chain including (Melaku, 2017) challenge of integration of fuel supply chain in Ethiopia who conducted a study and focused on the integration process of full supply chain. Also another study by (Fahad, 2013) revealed that factors affecting supply chain management by oil companies in Kenya, however, this study focused on only the challenges of supply chain management .However the above studies did not concentrate on the practice and challenges of fuel supply chain in Ethiopia. It is for these research gaps that the study wishes to consider to assess the practice and challenges of supply chain in the fuel industry in Ethiopia.

1.4 RESEARCH QUESTIONS

The research guided by the following main research questions

- To what extent is the supply of fuel in Ethiopia to the expectation of the consumers?
- To what extent is the fuel supply chain integrated to provide efficient service to the consumer?
- What are the challenges related to fuel supply chain in Ethiopia?
- To what extent are the fuel stations providing fuel distribution service to the consumers?

1.5 OBJECTIVE OF THE STUDY

1.5.1 GENERAL OBJECTIVE OF THE STUDY

The general objective of this study is to assess the practice and challenges of fuel supply chain in Ethiopia specifically in Addis Ababa.

1.5.2 SPECIFIC OBJECTIVES OF THE STUDY

The specific objectives of the study are:

- To assess the supply of fuel and the expectation of the consumers in Ethiopia
- To determine the extent of fuel supply chain integrated to provide efficient service to the consumer
- To find out the challenges of fuel supply chain from International oil companies to EPSE in Ethiopia.
- To determine fuel distribution service to the consumers.

1.6 SIGNIFICANCE OF THE STUDY

Assessing the practice and challenges of fuel supply chain in Ethiopia has significant importance for an organization particularly for EPSE. It's significant to operate the supply chain proses effectively. The study is also expected to have a contribution for oil companies to improve their supply chain system through providing a solution for discovered problems and this study can initiate other researchers to make further study on fuel supply chain. Generally, the finding and the recommendation of the study may help in decision making of EPSE and oil companies understanding the existing supply chain problems to improve or fill the gap.

1.7 SCOPE OF THE STUDY

The study is delimited on the practice and challenges of fuel supply chain in Ethiopia. The study also delimited geographically in Addis Ababa. Time wise, data for this study was on fuel related practices and challenges collected in 2019.

1.8 ORGANIZATION OF THE STUDY

This study arranged by five chapters. Chapter one comprise introduction , statement of the problem, research questions, objectives of the study, significance of the study, scope of the study, limitation of the study and definition of key terms. Chapter two related literature review on the practice and challenges of fuel supply chain discusses. In this chapter, the researcher focus

on related empirical and theoretical literatures in development of supply chain, benefit and challenges of fuel supply chain management and integration of supply chain. These issues enhance and assist to strength statement of the problem as well as the conceptual frame work of the study. In chapter three the research design and methodologies presented. Sample and sampling techniques, source of data, procedures of data collection, methods of data analysis, explained. In chapter four results and discussion stated. The findings also interpreted based on related literature review. Finally, in chapter five summary of the research findings, conclusion and recommendation made.

1.9 DEFINITION OF KEY TERMS

Supply chain - A network of autonomous and semiautonomous business entities collectively responsible for the procurement, manufacturing and distribution activities associated with one or more products to satisfy ultimate customer needs (Swaminathan 1996)

Supply chain management- The management of upstream and downstream relationships with suppliers and customers in order to deliver superior customer value at low cost to the supply chain as a whole. (Christopher, 2011)

Fuel - A fuel is any material that can be made to react with other substances so that it releases energy as heat energy or to be used for work. The concept was originally applied solely to those materials capable of releasing chemical energy but has since also been applied to other sources of heat energy such as nuclear energy (encyclopedia)

CHAPTER TWO

RELATED LITRATUR REVIEW

In this chapter, different relevant literatures have been reviewed related to the practice and challenges of fuel supply chain management in Ethiopia to develop the conceptual framework of the research. The main areas of the literatures reviewed are supply chain which leads to come up the good understanding of the practice and challenges of fuel supply chain management.

2.1 DEVELOPMENT OF SUPPLY CHAIN

Since 1980s, there has been a marked shift in the focus of operations strategy (Frohlich & Westbrook, 2001). In 1980s, the focus were about vertically aligning among the functional departments of operations with business strategy of an organization (Robert & Steven, 1984), the 1990s have been about horizontally aligning operations across processes among external organization along the supply chains (Chrostopher & Sumantra, 1995). As Award and Nassar (2010) stated, it is not enough simply to optimize internal structures and infrastructures based upon business strategy in most industries today. The most successful manufacturers seem to be those that have carefully linked their internal processes to external suppliers and customers in unique supply chains.

Even though the concept of supplier and customer relationship got great attention since 1980s, Globalization, environmental factors and intense business market put great pressure to the business organization to develop extremely close relationships with selected clients, or strategic customers. These situations create significantly more emphasis to place in the position on improving working arrangements towards collaboration with suppliers and customers (Award & Nassar, 2010)

The driver behind such collaboration was the desire to extend the control and co-ordination of operations across the entire supply process, replacing both the market and vertical integration as the means of managing the supply chain process (Larsen, 2003). According to Lee and Whang (2001), supply chain integration described as the existence of collaboration and coordination among partners to develop competitiveness in the business. Accordingly their description, supply chain integration has four basic dimensions; Information integration synchronized planning, workflow coordination and new business model. (Hau & Seungjin, 2001)

2.2 SUPPLY CHAIN MANAGEMENT DEFINITION

The concept supply chain has been described by different scholars in different ways. (Mentzer et al., 2001) defined the supply chain in terms of either in terms of management philosophy, the implementation part of philosophy or as a set of processes.

As (John et al., 2001) describe supply chain management as a strategic and systematic integration of functions and strategies of business organizations for sustainable performance of the business by satisfying the ultimate customer. Supply chain management also described as a network of different autonomous and semiautonomous business organization in the upstream and downstream supply chain partners who are responsible for the supply of inputs, conversion to finished and semi-finished product and distribution of product to create value at the hands of the ultimate customer.

Supply chain management also described from management perspective as *"The management of Materials, Information and funds from the initial raw materials supplier to the ultimate consumer* (Deloitte, 1999)*"* It also described by (Christopher, 2011) as *"The management of upstream and downstream relationships with suppliers and customers in order to deliver superior customer value at low cost to the supply chain as a whole"* (Christopher, 2011). Stevenson (2009) also defined supply chain as value chain and in terms of coordination of business functions in an organization or throughout the supply chain for the purpose of demand management.

2.3 SUPPLY CHAIN MANAGEMENT THEORIES

Literatures pointed out the advance of different theories are the fundamental foundations of business studies (Lagat, 2013). The most theories in which supply chain management literatures explored are Transactional cost analysis, resource based view, network perspective and principal-agent theory. These theories describe supply chain management in different views which no one of them can be considered as right and the other is wrong (Holldorsson et al., 2007). They suggest transactional cost analysis (TCA) and Principal Agent Theory (PAT) to well describe how to structure of the supply chain when it is perceived as a collaboration of institutions within the supply chain while adopting Resource Based View (RBV) and network Theory (NT) will help us to insight what is needed to manage a particular structure of the supply chain.

Applying Resource based view and network theories in the supply chain concept used to identify the resources required to stay competitive and to show the dynamics of inter organizational relationship.

2.3.1 TRANSACTION COST ANALYSIS

As Clemons and Row (1992) analysis, transactional Cost theory answers why the business organization exists. In supply chain context, the main objective of transactional cost theory is, reducing the cost associated with decision with respect to transaction. Transactional cost theory describes the reason tasks are performed in different parts of the supply chain. Transaction costs can be divided into coordination costs and transaction risk. They also described Coordination costs as the direct costs of integrating decisions between economic activities while Transaction risk is linked within the relationship of the partners in the supply chain.

The main factors which affect the components of the transactional cost theory are Uncertainty, frequency and asset specificity; which these factors can influence the coordination cost and transactional risk on make-or-buy decision (Williamson, 1985).

In supply chain management, organization implemented Transactional Cost Theory claimed that different control mechanism have to be implemented as a mechanism to mitigate the risk of opportunistic behavior of supply chain partners (Pala, 2013).

2.3.2 NETWORK THEORY

Even though the management of buyer and seller relationship is not a new issue in the market, with the emergency of supply chain management, the network perspective it becomes a hot topic in both academics and business which replacing the traditional markets to networks of interrelated firms (Möller & Halinen, 1999). Network theory is a useful framework for analysis of a business situation, and it adds a new level of complexity to understanding the relationship perspective of business firms in the supply chain (Jarillo, 1988). As per Mikkola's (2008)study, Network relations is the most important element to create the mechanism for information sharing that enables both buyers and sellers to have access to resources and knowledge beyond their abilities which it will help the partners to have long-term relationships. Harland (1996) also described Network theory as the most important theory for supply chain management to describe the relationships in which partners within the supply chain interact each other. Network theory helps researchers to define supply chain in network perspectives. As Harland (1996) *defines the*

network as a specific type of relation linking a defined set of persons, objects or events. In addition, *Supply chain network is a complicated network model, and its specific context depends on the relationships among the network members* (Chang et al., 2012).

As Mills et.al. (2004) highlighted the contribution of Network perspective on supply chain management that; it could underlines as mechanism to lead supply chain partners to develop competitive advantage that companies share information and knowledge with their partners. The network theory is also applicable to the most important decision points in the supply chain activities. Business partners in the network also develop trustworthy among them and can add value in supply chain decision strategy. The Network perspective also encourages long term contracting among the supply chain partners.

2.4 FUEL SUPPLY CHAIN

Commodities such as oil, gas, and petrochemicals are transported using different mode of transportation such as pipe-lines, vessels or tankers, roads, and railroads. These commodities are produced in limited places of the world, yet they are demanded all over the globe since they are an essential source of energy and raw material for many other industries (Raed, Tiravat, & Basheer, 2006).

The boom in global demand of oil along with the ease of international trade and the inflexibility involved in the petroleum industry's supply chain has made its management more complex and more challenging (Coia 1999, as cited in Barua, 2010).

A supply chain consists of all stages involved, either directly or indirectly, in fulfilling a customer's request (Chopra & Meindl, 2001). As John etal. (2013) described supply chain as an extended enterprise that crosses the boundaries of individual firms to span the related activities of all the companies involved in the total supply chain. There is a tremendous need to get everyone to pull together in the same direction (Handfield, 2016); should attempt to execute or implement a coordinated, two-way flow that bring products or services to market It includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. Organizations have realized that effective and efficient management of supply chains is essential for present and future survival (Olhager, Perssom, Parborg & Rosén 2002 as cited in Gupta; Abidi & Bandyopadhayay 2013).

State that, a typical petroleum industry supply chain is composed of an exploration phase at the wellhead, crude procurement and storage logistics, transportation to the oil refineries, refinery operations, and distribution and transportation of the final products.

As Christopher (2007) states in a supply-chain, a company will link to its suppliers upstream and to its distributors downstream in order to serve its customers. The links shown below represent the major supply-chain links in the oil and gas industry. The links represent the interface between companies and materials that flow through the supply-chain. Currently, more opportunities exist for coordinating supply chain activities across oil and gas operations due to improved information and communication systems and technologies (Christopher 2007 cited in Richard & Francis 2014).

Exploration → Production → Refining → Marketing → Consumer

A hiccup in one of links early in the supply chain can have a ripple effect on a link further down the chain (Norman 1996). Thus, a breakdown anywhere in the supply chain has the potential of bringing production to a halt. Supply chain participants must individually and collectively assess the probability of production-stopping events and their tolerance for risk, which must be balanced against the savings from increased sole-sourcing, tighter integration with the remaining suppliers, and reduced inventories and production capacities (National Research Council 2000).

2.5 CHALLENGES OF SUPPLY CHAIN

As per Barratt (2004) discussion on supply chain barriers, the significant challenges on supply chain arises due to lack of visibility of demand, inventory holding status across the supply chain and adversarial relationship between the trading partners(Barratt, 2004). Companies are mainly focusing on their core competencies rather than looking the overall capability of the supply chain, as the result the vertical integration is happening (Sweeney, 2012).

The implementation of supply chain is not as simple as we are thinking. It would face different challenges internally as well as externally, with respect to process of supply chain specific strategies with the overall corporate business strategy (Award & Nassar, 2010). In recent years, along with the change in business realities related to globalization and modernization, the supply

chain has got the first priority on top management of the business entities and they pay attention to cut costs and to bring their competitive advantage to satisfy their customers (Award & Nassar, 2010).

According to researchers, supply chain challenges classified in different ways. According to Stanley *et al.*(2005), supply chain challenges classified as challenges of system relationships between sub systems in an organization and relationship between supply chain systems (Stanley et al., 2005)

The internal supply chain challenges could be due to organizational policies and procedures, lack of proper forecasting and supply chain planning practice, poor collaboration planning between partners in the supply chain, inconsistent availability, reliability and quality of transport infrastructure and service to address the goods and services to the ultimate customer.

Nassar *et al.* (2010) classified challenges of supply chain into different perspectives as technical, Managerial and relationship perspectives (Award & Nassar, 2010). They proposed to all challenges to comprehensive source to bring benefits to the supply chain in such a way that; challenges can help supply chain partners to decrease the complexity of the challenges; prioritizing the challenges effectively; for better allocation of resources and introducing a comprehensive source that contains all challenges stated above.

2.6 BENEFITS OF SUPPLY CHAIN

As (Kittipong et al., 2013) describes the flow of information from customer to supplier while the flow of material from Supplier to customer. The flow of information is from customer to retailer, then to agent, then to manufacture then to the supplier. They also emphasize on their research that, in the supply chain, while the information flows as described above, all parties of the supply chain informed simultaneously. The idea of such partners in the supply chain informed simultaneously is the basic characteristics of supply chain process.

In modern supply chain process as information flow, material flow has to be coordinated among all partners in the supply chain. In this regard, it implies activities should be coordinated upstream and downstream.

In order the organization to fully benefit and implement supply chain management concepts and it is important to integrate efficiently with suppliers, manufacturers, warehouses and other intermediate value-adding partners. Lambert (2000) showed the importance of cross-functional

integration via marketing with examples of several cases (Douglas & Martha, 2000). Hugo *et.al*(2004) also emphasize on manufacturers to give high attention to supply chain so as to insure the main supply chain activities like sourcing, production and distribution are synchronized with customer demand, as the result the overall costs will be decreased and high level of customer service will be achieved (Hugo et al., 2004).

2.7 INTEGRATING SUPPLY CHAIN

Successful supply chain management requires a high degree of functional and organizational integration. Even though supply chain integration has significant importance to the whole supply chain partners, such integration cannot be achieved overnight. (Krajewski & Ritzman, 2003)

A fundamental principle of SCM is the development of collaborative and partnership relationships throughout the supply chain, including with customers and suppliers. The most important sign of which shows the degree of supply chain integration in firms relates to the extent of customer and supplier involvement in supply chain activities (Sweeney, 2009).

The term integration defined in Webster dictionary as ‘‘the unified control of a number of successive or similar economic or especially industrial processes formerly carried on independently (Webster's , 1966).”

Thus, supply chain integration (SCI) can be referred as, the degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages intra and inter organizational processes, in order to achieve effective and efficient flows of products and services, information, money and decisions, to provide maximum value to the customer.

Integration is the quality of collaboration that exists among clusters to achieve an effective, efficient and united system. SCI defined as the degree to which a manufacturer strategically collaborates with its supply chain (SC) partners and collaboratively manages throughout the supply chain. The ultimate goal of SCI is to achieve effective and efficient flows of products and services, information, money and decisions, to provide maximum value to the end customers (Barbara et al., 2010).

The supply chain integration involves not only implementing ERP systems and ensuring they communicate or interface with legacy systems, but it also involves integrating ERP and SCM systems with Customer Relationship Management (CRM), Product Lifecycle Management

(PLM), and e-procurement and e-marketplaces, as well as making them available over the Web to foster cooperation and collaboration across the entire value chain. (Award & Nassar, 2010)

Traditionally organizations have been segmented in to three categories to ensure the flow of material or service as Supply of materials, Production and Distribution. Purchasing is responsible for the acquisition of goods and services as an input and production is responsible for the transformation of inputs into semi-finished and finished goods and distribution is responsible for addressing the finished goods to ultimate customers (Krajewski & Ritzman, 2003).

2.8 TYPE OF SUPPLY CHAIN INTEGRATION

According to (Flynn, Huo and Zhao 2010) supply chain integration is the extent in which the manufacturer (Internal integration) and the extended forms in both directions (Upstream and downstream) strategically collaborate for achieving mutual beneficial goals (Barbara et al., 2010). On this definition they highlighted importance of strategic collaboration as an ongoing partnership to achieve mutually beneficial strategic goals. It provokes mutual trust, increases contract duration and encourages efficient conflict resolution and sharing of information, rewards and risks.

Supply chain integration is the basic tool to successfully attaining supply chain management (Grham & Mark, 2016).

As John Mangan *et.al* (2011) illustrate on their book, Global logistics and supply chain management, there are four primary model of supply chain integration. Back ward integration, forward integration, forward & back ward integration and internal integration (John et al., 2011).

Kanter (1994), described five type of integration in collaborative relationships that include: strategic integration, tactical integration, operational integration, interpersonal integration and cultural integration (Coughlan et al., 2003).

Supply chain integration mainly classified into two main category; internal integration and external integration (Upstream or supply integration and downstream customer relationship). In the context of supply chain integration, internal integration and external integration play different. Internal integration recognizes that the functions of each department in the organization should be activated as part of an integrated process. However, external integration acknowledges the importance of developing close, interactive relationships with customers and suppliers (Barbara et al., 2010).

2.8.1 INTERNAL INTEGRATION

Internal integration is the creating coordination among functional departments within an organization. The internal integration, the function to function integration within the business organization can be considered as the first step of operational integration as the bases of effective supply chain integration as the benefits of external integration (Harrison & Hoek, 2008).

Identify fundamental information requirement of each functional department and creating an access of information among these department is the process of creating internal integration. This is often accomplished through a company-wide ERP system, which links internal groups via a single integrated system. ERP software applications support the re-engineering of business processes and form the foundation for an integrated organizational value system (Robert & Ernet, 2002).

Harrison *et al,* (2008) demonstrated the impact of internal integration on external integration as; "high internal integration can reach a level of collaborative internal operation‖, with which the whole firm works like an integrated system that results in better performance and better interdepartmental effectiveness, such as cycle time reduction, better in-stock performance, increased product availability levels, and improvement in order-to delivery lead times (Harrison & Hoek, 2008)."

2.8.2 EXTERNAL INTEGRATION (UPSTREAM AND DOWNSTREAM)

"The supplier base is really an extension of the enterprise. As such, supplier relationships (face-to-face, telecommunications, or the Internet) need to be developed as aggressively and strategically as customer relationships (Frazelle, 2002)". This implies that the upstream supply chain integration which give high emphasize to the supplier should be equal to downstream supply chain integration.

External integration also refers to the systems that coordinates and crates collaboration among all stakeholders with on the value chain (the supplier, manufacturer and the customer). External integration allows all partners to share critical information such as forecast demand, actual orders, and inventory levels across the supply chain. Systems used to integrate supply chain members include advanced planning systems, Internet linkages, network communications, and Electronic Data Interchange (EDI) (Robert & Ernet, 2002).

Bowersox *et al.*, (1989) demonstrate external supply chain integration as "Downstream supply chain integration involves core competencies derived from coordination with critical customers, whereas supplier integration involves core competencies related to coordination with critical suppliers" (Donal & Edward, 1989).

High level of collaboration and information sharing activities with key customers in the downstream supply chain, providing the business entity with strategic insights into market expectations and business opportunities, and enabling a more efficient and effective response to the end customer. (Germain *et al.* 2008) argue that downstream integration reduces unpredictable demand and leads to better financial performance (Germain et al., 2008)

Effective external integration with customers may enable organizations to reduce demand-side risks, and to minimize potential occurrences of anything that may affect the business firm ability to meet the requirements of customers and end-users. Through integration with customers, companies can better understand customer needs and respond more quickly to them. Integration with consumers contributes to demand planning, greater visibility in sharing information, and a consequent increase in the level of service (Thomas & Alcantra, 2013).

2.9 SUPPLY CHAIN INTEGRATION DIMENSIONS

Different authors study supply chain integration in deferent perspective due to lack of clarity on the concept of supply chain integration; Some examined supply chain integration with single dimension while others with multiple dimensions (Rafaela et al., 2012). By analyzing supplier and customer relation management with in the supply chain, (R. Lee, 2000) recommended that supply chain integration has three main dimensions: information integration (II), coordination and resource sharing (CRS) and organizational relationship linkage (ORL) (Lee, 2000).

2.9.1 INFORMATION INTEGRATION

Information is one of the most important element in supply chian management cooperation. It can be considered as a fasten which holds together different parts of the supply chain, structure, process and entire supply chain (Moharana et al., 2012). According to Lee (2000), information integration defined as the sharing of information among the supply chain partners which include,

customers' demand, inventory status, promotion plans, sales forecasts and production schedules (Rafaela et al., 2012). In information integartion, memebrs of the supply chain collaborate each other to establish production and sales forecaste.

For sucessful supply chain improvement, the integration of business firms in the supply chain should start with the exchange of information (Frohlich & Westbrook, 2001). In the current dynamic market, the ability of the business firm to share information among the supply chain develops the competitive advantge for many organization. To develop competitve advantage on information integartion, most orgaization implimented information technology to redesign their process (Phan, 2003). Responsivness of the business firm for custmer demand in the market will be enhanced when there is effeicient information integartion throughout the supply chain partners. Inaddition the suply chain perfomance as a team is highly dependant on the information system impimented to share information and the information technology utilized among them (Rafaeli & Ravid, 2003).

2.9.2 COORDINATION AND RESOURCE SHARING

Coordination and resource sharing CRS refers to the realignment of decisions and resources intra- and inter-organisationally (Rafaela et al., 2012). On the other side, coordination and coordinated decision making is described as separated entities that work together for decision making to enhance overall supply chain perfomance (Moharana et al., 2012). If separate companies coordinate, it is referred as combination or integration. Coordination is an active cooperation among partners so as to harmonize different activities or interactions to achieve a disired goals.

Coordination is the fundamental mechanism to improve supply chain perfomance . (Chopra and meindl 2007) Sugeted that, profitablity of the supply chain as a whole can be maximized when all atages of the supply chain are coordinated (Chopra & Meindl, 2007). Information is a mechnism to creat coordination among supply chainpartners to maximize profit and high level of customers's satisfaction interms of quality of goods and sevices delivered (Moharana et al., 2012). In other words, coordination in supply chain can be achieved through different entities work together by sharing information as well as resources to maximize customer value and reducing deamnd uncertenities like bullwhip effect for the entire supply chain (Arshinder et al., 2007; Lee, 2000)

Coordination among the supply chain partners not only improve product perfomance but also creats strategic alliance for the success of the overall supply chain partners through sharing information, resources, risks and benefits (Pyke, 1998; Pyke & Johnson, 2004)

Reource sharing is one of the most critical factor for effective coordination in supply chain management (Arshinder et al., 2008).

2.9.3 ORGANIZATIONAL RELATIONSHIP LINKAGE

Inter organization realtions defined as formal arrangements that bring together tangeble and intangebele assets diffrent legally independent organizations with the aim to produce joint value added to the ultimate customers (Benchmann & Witteloostuijn, 2006). Organizational Relation Linkage ORL involves well established relations and transparent interactions among the supply chain members, which demands common visions and objectives, ideas and organizational culture and integarted performance measures, incentive schemes and sharing of skills (Rafaela et al., 2012).

Organizational relationships are networks of resource interdependencies. The organizational relation linkage includes all participants in the supply chain including manufactures, buyers, suppliers, customers, government agencies, and other external organizations like third party logistics service providers that are critical to the success of the supply chain (Tillquist, 2002). Organizations relation linkage is the key instrument to share critical resources like inputs, skill and knowledge, idea, information, technology and logistical equipment. Information and Information Technology is a key component for the successful implementation and management of organizational linkage in the supply chain (Pfeffer, 1992; Tillquist, 2002).

2.10 DRIVERS FOR SUPPLY CHAIN INTEGRATION AND COLLABORATION

Collaboration is about organisations and enterprises working together and can be viewed as a concept going beyond normal commercial relationships. Collaboration existes when organizations in the value chain recognise where working and operating alone is not sufficient to resolve common problems and to achieve the desired goals (Matopoulos et al., 2007).

Supply chain collaboration is a powerful tool to develop and impliment an agile and lean supply chain management (Leeuw & Fransoo, 2009). As (Yunus, 2013) description, The main drivers of supply chain integration can be classified as Internal drivers (anticipation of the benefits from

the supply chain integartion and Customer orentation) and external drivers (Supply uncertainity, customer uncertainity and technology uncertainity).

2.11 EMPIRICAL REVIEW

In these review there is researchers conducted by (Melaku .M, 2017) entitled challenge of integration of fuel supply chain in Ethiopia. In his study, the findings indicate that there is lack of information sharing (such as on stock position, daily sales, etc.) among the supply chain partners of the Oil Industry in Ethiopia. The study also reveals that there is significant difference on the monthly demand forecast provided to EPSE and the actual amount uplifted by Oil Companies; in most cases it was inflated. This is mainly since Oil Companies are not using a forecasting system/model that forecasts the demand based on the actual trend and other seasonal parameters; but rather using intuition and experience of individuals. In addition, the study indicated that in the play field, each partner attempts to ensure that it has full filled its own obligation as an autonomous entity; rather than as a supply chain partner with unified objective of adding value to end customers. According to the respondents, although they have some meetings, they are more focused on firefighting or just to discuss monthly or annual performance, not on looking for improvements on the overall processes as a system.

Moreover, recently, the supply of Gasoline coming from Sudan started to reduce abruptly and subsequently causing depletion of the stock at Djibouti unexpectedly, besides, the finding point outs that in some of the areas of the supply chain there is capacity and resource constraints that hinders the smooth flow of product in the supply chain, such as: 1) the tank capacity of Addis Ababa stations as well as the number of stations available in some areas of the city is not enough to support the need of the customers. 2) Storage and loading capacity problem of Horizon Terminal and NPRDA depots. 3) The shortage of trucks in the industry.

More importantly, the study found out that although the main intention of a strategic reserve is to serve as a safety stock (i.e. to ensure there is continues supply to customers when there are events that inhibit the normal supply process), the approval process to uplift from the strategic reserve depot is lengthy and time taking. Usually, the approval is obtained after most of the station already runs out of product.

Also, another study by (Fidel, 2005) entitled supply chain practices in the petroleum downstream. In his study the objective of this work is to perform an industry overview, covering the internal and external factors influencing the industry of petroleum downstream. The analysis focused on supply chain past and current practices. Also the study elaborates a case study about

one of the main players in the industry, ExxonMobil. In order to do this, the study focuses with some aspects of the petroleum downstream supply chain for ExxonMobil.

The finding revealed that, the petroleum downstream supply chain would highlight that this industry is confronted with an extremely challenging and highly volatile environment. The traditional silos approach prevalent in the industry has generated local suboptimal structures in the downstream supply chain. Even if much advancement has been made in the development of a true supply chain management culture, also, there is still much room for improvement. The industry cannot only rely on technology investments even if they are a basic condition of success. **A** more develop "pull" paradigm leading to more demand-driven operations will be needed to achieve significant profitability gains from supply chain enhancements.

Following this route, the industry will need to carefully align the supply chain structures and processes with the overall company strategy. As part of these efforts, a successful supply chain strategy development will need to carefully establish plans for process re-engineering, change management, and information technologies design and implementation (Lewin, 2003).

The actual progress will be dependent on a combination of the mentioned business process improvements and the channeling of existing expertise of industry professionals into a common effort for value creation.

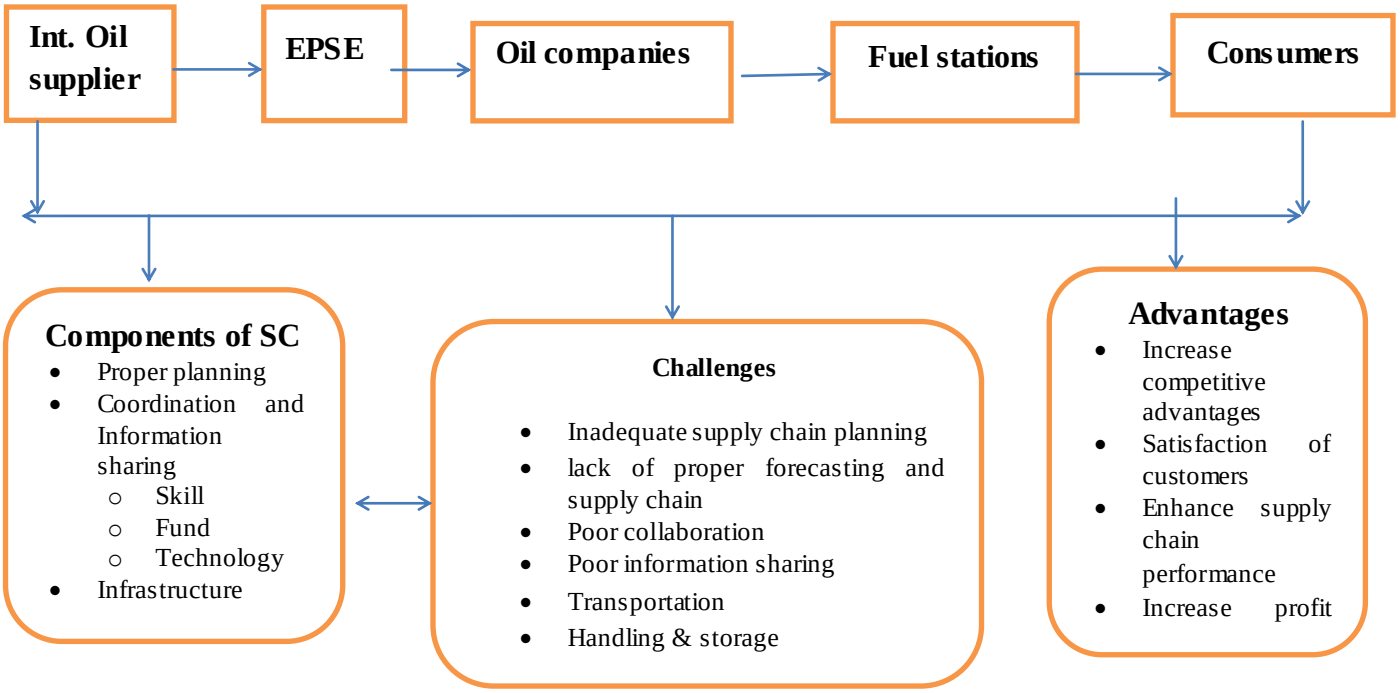
2.12 CONCEPTUAL FRAMEWORK

The benefit of supply chain process will be maximized when the companies (Suppliers, Customers and other intermediate value adding enterprises) within the chain is efficient and effective. In this regard, many research suggested that the higher level of chain with suppliers and customers in the process benefits all at greater extent (Fasika et al., 2014)

Supply chain requires technological combination primarily with main supplier and customer which has positive impact on overall monitoring and collaboration among the business entities within the supply chain. Supply chain can also encourage business firms for information sharing, collaboration and cooperation among them which enhance ultimate customer satisfaction (Akkermans et al., 1999).

In this supply chain, proper planning, information sharing, coordination and resource sharing and infrastructure are the main issues to be considered.

Fig. 2.1 Conceptual framework adapted from (Zenebe, 2017) with modification



CHAPTER THREE

RESEARCH METHODLOGY

Kothari (2004) defined research methodology as a science of studying how research is done scientifically. It contains details about the research approach ,research design, sample size and sampling techniques, data source, data collection instruments, data analysis, reliability and validity of the study, and finally ethical considerations. The methodology used in this study is described below.

3.1 THE RESEARCH APPROACH AND DESIGN

The research adopted a mixed method approach was used to gain much understanding of the study. Thus, both qualitative and quantitative approach and methods of data analysis were used. Moreover, the study used descriptive research design. The main reason to select descriptive type of research is the research intention was to assess the facts in the supply chain process and needs to show what is happening on the supply chain based on the facts observed (Kotheri, 2004). Thus, the research operated an observed analysis that tried to assess a current phenomenon of supply chain in the country.

3.2 SOURCES OF DATA

The study used both primary and secondary sources of data. Primary methods are those that collect data for the first time while secondary methods are those where the researcher uses data collected by other people. Secondary data includes documents, data, and information from previous studies that a researcher might use in a new study (Oates, 2006:234). According to Bryman and Bell (2007:10), secondary data collection methods refer to the ability of the researcher to carry out an analysis of the data that has already been prepared by other researchers.

3.3 SAMPLING DESIGN

Since EPSE is the only importer and bulk supplier in the country, data will be gathered from EPSE about the practice and challenges that EPSE has with International Traders and Oil Companies. In Ethiopia there are 29 Oil Companies, 800 gas stations from which only 100 gas stations were found in the Addis Ababa. There are more than 800,000 registered vehicles out of which 480,000 of them are concentrated in Addis Ababa.

A non-probability convenience sampling was chosen for the survey; a sample of convenience is the terminology used to describe a sample in which elements have been selected from the target population on the basis of their accessibility or convenience to the researcher. The main assumption associated with convenience sampling is that the members of the target population are homogeneous. That is, there would be no difference in the research results obtained (Ross 2005). Furthermore, if a non-probability sampling was applied, we don't have specific method in determining sample size. But, it is not practical to collect data from the entire target population, so the researcher used a sample instead (Field 2005, p.35). According to Loo (1983), a minimum sample size of 100 to 200 is often recommended. Accordingly, by using convenience sampling, 9 major oil companies taken as a sample again from 100 gas stations, 50 gas stations taken as a sample by using random sampling. Finally 100 customers, two from each gas station, taken as sample respondents by using simple random sampling .

Proportinate sample from service stations

Company	Total	Oil Libiya	NOC	YBP	TAF	Kobil	Others(3)	Sum
Population	35	27	18	9	3	5	3	100
Sample	17	13	9	4	2	2	3	50

Table 3.1 proportionate sample from service stations

3.4 INSTRUMENT OF DATA COLLECTION

In this study, the primary data was collected through questionnaires from the sample respondents. The questionnaires consisted of closed ended questioned designed in a 5-point Likert-Scale, with "1" standing for "Strongly Disagree" and "5" for "Strongly Agree". The secondary source of data include EPSE documents, data and information from previous studies such as existing official reports and documents from the named entities, journal articles, other empirical researches in the area and other relevant documents.

The data were analyzed using Statistical Package for Social Science (SPSS v.20). Based on the methodologies, research design and tools of the proposal the data was collected from 159 respondents. From the total 159 questionnaire distributed 143 were returned from which 16 were not correctly filled and rejected. Therefore 143 were effectively used for analysis that shows response rate of 89.9%. According to Fowler (2002), a 75% response rate is considered as

adequate. Accordingly, Demographic data and frequency of respondents, analysis, interpretation and discussion on the results are presented in the subsequent headlines

3.5 DATA ANALYSIS AND PRESENTATION

The study uses mainly quantitative and qualitative data analysis techniques. The data gathered from primary and secondary sources will be analyzed using both qualitative and quantitative data analysis tools. The study employed descriptive statistics such as mean, percentage and frequency tables to describe and analyze the quantitative data. Apparently, mean as a specific analysis tool. Furthermore, the data encoded, processed and analyzed using SPSS.V20.

3.6 ETHICAL CONSIDERATION

First the respondents informed about the purpose and intention of the study and verbal consult obtained for better participation engaged in the study. Participants also informed their right not to participate in the study at any time. Similarly, Participants informed the benefit of the research and thus research has no risk. Participants have the right to ask the question for clarification and refuse to give information in any time in the research process.

3.7 RELIABILITY AND VALIDITY

3.7.1 RELIABILITY

Reliability measures to what extent data collection instrument addresses uniform result throughout repeated trials while validity measures the consistency of the information in which the instrument yields (Leady P.D, 2010). Chronbach Alpha Statistics is the most important tool preferred to the reliability and stability the findings. Chronbach Alpha result has to be above 0.70 to obtain a reliable scale and any scale with Chronbach Alpha which is less than 0.70 has to be excluded (Sekaran & Bougie, 2013).

Accordingly, Table 3.1, shows below the Chronbach alpha statistics based on pilot surveys made on 20 respondents.

Table 3.2 Reliability test

Reliability test			
Items	Cronbach's Alpha	Cronbach's Alpha	No.of Items
Fuel supply chain from the expectation of the consumers	.831	.862	4
Fuel supply chain integration to provide efficient service to the consumer	.710	.765	3
Fuel distribution services to the consumers	.824	.843	5
Challenges related to fuel supply chain	.820	.870	8
Total			20

Source: own survey

3.7.2 VALIDITY

Validity is categorized into internal and external validity where is to the level to which its design and the data it yields allow the researcher to come up intended and accurate conclusions about cause-and-effect relationship within the data while external validity refers to the level to which the research results apply to situations beyond the research.

The draft research question had been reviewed by different individuals who have expertise knowledge and practitioners directly involved in the EPSE products' in supply chain. The research framework also constructed by reviewing different related published literatures.

For this research, the respondents selected from the top management of EPSE. Accordingly, the researcher got reliable response which reacted the research question stated at the beginning of the study. In this study, the respondents were clearly communicated on the contents of the questioner as well as the objectives of the research. That is the researcher followed techniques that helped sustaining the validity and reliability of the question by avoiding leading questions.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

This chapter presents the analysis and interpretation of results; data were collected through questionnaire from Oil Company, full stations and consumers to assess the practice and challenges of fuel supply chain in Ethiopia.

4.1 DEMOGRAPHIC DATA PRESENTATION AND ANALYSIS

Observing the demographic trend or characteristics of sample population before starting the data analysis is useful to make the analysis more meaningful for the reader. This part of the questionnaire requested limited amount of information related to personal and demographic status of respondents.

The purpose of demographic analysis in this research is to describe the characteristics of the sample such as proportion of male and female in the sample, position of respondents, academic qualification of respondents and experience of respondents. Accordingly, these variables are summarized and described in tables shown below.

4.2.1. Gender of the respondents

Table 4.1 Gender of respondents

Source: own survey

Items		Frequency	Percent	Valid Percent	Cumulative Percent
Oil company	Male	6	75	75.0	75.0
	female	2	25	25.0	100.0
	Total	8	100.0	100.0	
Fuel station	Male	27	65.9	65.9	65.9
	female	14	34.1	34.1	100.0
	Total	41	100.0	100.0	
Consumers	Male	77	81.9	81.9	81.9
	female	17	18.1	18.1	100.0
	Total	94	100.0	100.0	

As can be seen in Table 4.1 above, 6 (75%) of respondents from oil companies were male and 2 (25%) were female. About 66% of respondents from fuel stations were male and 25% were female. Regarding consumers, male were 77 (81.9%) and female 17(18.1%). From the above table of respondents, the majority of the respondents (74.2 %) were male and the remaining (25.8 %) were female respondents.

4.2.2. Educational level of respondents

Table 4.2 Educational level of respondents

Oil company	Educational level	Frequency	Percent	Valid Percent	Cumulative Percent
	Degree	5	62.5	62.5	62.5
	Masters	3	37.5	37.5	100.0
	Total	8	100.0	100.0	
Fuel station	College Diploma	17	41.5	41.5	41.5
	Degree	18	43.9	43.9	85.4
	Masters	1	2.4	2.4	87.8
	Others	5	12.2	12.2	100.0
	Total	41	100.0	100.0	
Consumers	College Diploma	15	16.0	16.0	16.0
	Degree	56	59.6	59.6	75.5
	Masters	21	22.3	22.3	97.9
	PHD	2	2.1	2.1	100.0
	Total	94	94.0	100.0	
		100	100.0		

Source: own survey

As shown in Table 4.2 their qualification level of the respondents, in the oil company indicate that, the degree holder's accounts 62.5% and the masters holder 37.5% and in fuel station majority of the respondents were degree and diploma holder which accounts 41.5% and 43.9% respectively .were as from the consumer majority of the respondents were degree and masters holder which accounts 59.6% and 22.3% respectively .On average most of the respondents were degree holders which is 55.3%.

4.2.3 Current positions in the organization

Table 4.3 current position in the oil companies

Positions	Frequency	Percent	Valid Percent	Cumulative Percent
Manager	6	75.0	75.0	75.0
Supervisor	1	12.5	12.5	87.5
Others	1	12.5	12.5	100.0
Total	8	100.0	100.0	

Source: own survey

As can be seen in Table 4.3, the current position in the organization (oil companies), managers 75%, and supervisor 12.5% and other 12.5%. Besides, the large number of respondents who participated in the study was in managerial position 75%.

4.2.4 Work experience of the respondents

Table 4.4 Work experience of the respondents

Items		Frequency	Percent	Valid Percent	Cumulative Percent
Oil company	less than 5 years	2	25.0	25.0	25.0
	5-10 years	3	37.5	37.5	62.5
	More than 10 years	3	37.5	37.5	100.0
	Total	8	100.0	100.0	
Fuel station	less than 5 years	19	46.3	46.3	46.3
	5-10 years	13	31.7	31.7	78.0
	More than 10 years	9	22.0	22.0	100.0
	Total	41	100.0	100.0	
Consumers	less than 5 years	57	60.6	60.6	60.6
	5-10 years	29	30.9	30.9	91.5
	More than 10 years	8	8.5	8.5	100.0
	Total	94	100.0	100.0	

Source: own survey

The above table shows that, there were three categories of work experience; less than 5 years, 5 to 10 years, and. Accordingly, in the oil company the first category accounts 25%, fuel station 46.3% and consumers driving experience 60.6% of the respondents; the second group who had 5 to 10 years of experience in the oil company were 37.5%, fuel station 31.7% and consumers driving experience 30.9% of the respondents. The third category of the respondents had experience more than 10 years which accounts in Oil Company 37.5%, in fuel station 22% and consumers 8.5% respondents were found. Moreover, the work experience of the respondents indicate that, majority of the respondents had between less than 5 years and 5 to 10 years work experience which is they had acceptable exposure to the work area .

4.3 DESCRIPTIVE ANALYSIS

The mean statistical values of the items were based on the 5 point Likert scale and demonstrated through the following assumptions: if the mean (M) score is below 2.5 it implies that the respondents disagree with the respective statement, if the mean score is equal to 2.5 it indicates that the respondents prefer Neutral, and if the mean score is above 2.5 it implies that the respondents

agree with the respective statement, where the range belongs 1 “strongly Disagree” to 5 “Strongly Agree”. Standard deviation of <1 means that there were no significant variations in response while that >1 implies that there were significant variations in responses.

Accordingly, the mean scores and standard deviations have been computed for all variables that included the extent of fuel supply in Ethiopia from the expectation of the consumers, Fuel distribution services to the consumers, Fuel supply chain integration to provide efficient service to the consumer and challenges related to fuel supply chain in Ethiopia, were assessed from the response of oil company, fuel stations and consumers.

4.3.1. Oil companies

Fuel supply chain in Ethiopia from the expectation of the consumers

Table 4.5 Fuel supply chain in Ethiopia from the expectation of the consumers

Fuel supply chain in Ethiopia from the expectation of the consumers	N	Mean	Std. Deviation
There is adequate supply of fuel to satisfy consumer needs	8	2.3750	1.06066
The Ethiopian petroleum supply enterprise always holds sufficient quantity of fuel.	8	2.0000	1.06904
There is always enough product at EPSE terminals (Djibouti &Port Sudan)	8	1.8750	.64087
There is suitable fuel storage capacity in the industry	8	2.5000	.75593
EPSE has effective distribution strategies	8	2.2500	.46291
There is a fair distribution of fuel from EPSE to oil companies according to their capacity	8	2.7500	1.28174
There is adequate fleet in the industry	8	2.8750	1.45774
Average mean	8	2.07812	2.96966

Source: own survey

As can be seen in Table 4.5, there were disagreement in the adequate supply of fuel to satisfy consumer needs (M=2.3, SD= 1.06). However, The Ethiopian petroleum supply enterprise always holds sufficient quantity of fuel is at low level as it indicated (M=2.0, SD=1.03).

Also, enough products at EPSE terminals (Djibouti &Port Sudan) and effective distribution strategies were stayed at low level (M=1.87, SD=0.64) and (M=2.25, SD 0.46) respectively. Besides, suitable fuel storage capacity in the industry (M=2.50, SD=0.75) which lies in neutral

level. Furthermore, fair distribution of fuel from EPSE to oil companies according to their capacity and adequate fleet in the industry lies in agree level (M=2.75, SD=1.28) and (M=2.87, SD=1.45)

From the table as shown, the respondents in the oil company suggest that fuel supply chain in Ethiopia from the expectation of the consumers indicates at low level which is the average mean score (M=2.07, SD=2.96).

4.3.2 Challenges related to fuel supply chain in Ethiopia

Table 4.6 Challenges related to fuel supply chain in Ethiopia

Challenges related to fuel supply chain	N	Mean	Std. Deviation
Lack of clear organizational policies and procedures	8	3.3750	1.30247
Lack of proper forecasting and supply chain planning practice	8	3.3750	.74402
Poor collaboration in planning between partners in the supply chain	8	3.6250	.91613
Inconsistent availability of product	8	4.1250	.64087
There is problem in quality of transportation and infrastructure	8	3.8750	.99103
Poor facility to address the goods and services to the ultimate customer.	8	3.5000	1.06904
Inadequate supply chain planning	8	3.7500	.70711
Lack of proper forecasting and supply chain	8	3.0000	.92582
Poor information sharing	8	3.5000	.75593
Lack of proper handling and storage at the ports (Djibouti and Sudan)	8	3.3750	.74402
Average mean	8	3.5500	.36645

Source: own survey

As shown in Table 4. 6, the respondents agreed with all the challenges related to fuel supply chain in Ethiopia as the mean scores were in the range of (M=3.0 – 4.12, SD=0.36 – 1.30). They agreed that there is lack of clear organizational policies and procedures (M= 3.37, SD =1.30), Lack of proper forecasting and supply chain planning practice (M= 3.3, - SD=0.7), Poor collaboration in planning between partners in the supply chain (M= 3.62 - SD=0.91), Inconsistent availability of product (M= 4.12, - SD=0.64), problem in quality of transportation and infrastructure (M= 3.87, - SD=0.99), The respondents also agreed that there is poor facility

to address the goods and services to the ultimate customer (M= 3.50, - SD=1.06), inadequate supply chain planning (M= 3.75, - SD=0.70), lack of proper forecasting and supply chain (M= 3.00, - SD=0.92), poor information sharing (M= 3.50, - SD=0.75) and lack of proper handling and storage at the ports (Djibouti and Sudan) (M= 3.37, - SD=0.74), The overall mean of (M=3.55,SD=0.36) also indicates agreement with all the challenges related to fuel supply chain in Ethiopia and the standard deviation show that there were no significant variations in the responses.

However, According to Stanley et al.(2005), supply chain challenges classified as challenges of system relationships between sub systems in an organization and relationship between supply chain systems (Stanley et al., 2005).The internal supply chain challenges could be due to organizational policies and procedures, lack of proper forecasting and supply chain planning practice, poor collaboration planning between partners in the supply chain, inconsistent availability, reliability and quality of transport infrastructure and service to address the goods and services to the ultimate customer.

4.3.3. Fuel supply chain integrated to provide efficient service to the consumer

Table 4.**7** fuel supply chain integrated to provide efficient service to the consumer

Fuel supply chain integration to provide efficient service to the consumer	**N**	**Mean**	**Std. Deviation**
Information is available to all partners for Collaborative Planning in the supply chain	8	2.7500	1.38873
There is immediate information practice directly from the end customer for demand forecast to avoid disruption	8	2.6250	1.30247
Every member of partner realizes joint action to achieve common objective	8	3.2500	1.03510
Partners in the supply chain involves in designing and development of packaging to facilitate handling in transport and reduce cost	7	2.2857	1.11270
There is agreement on delivery frequency throughout the supply chain	8	3.2500	1.38873
There is active communication channel with members of the supply chain	8	3.3750	1.18773
Joint Objectives have been established among supply chain members	8	3.5000	.92582
There is practice of Sharing of skill, Ideas and institutional culture along the supply chain	8	3.1250	1.24642
Average mean	7	3.1071	1.06171

Own survey

From the result table 4.7 indicates that, the respondents agreed with all components of fuel supply chain integrated to provide efficient service to the consumer except the issue of partners in the supply chain involves in designing and development of packaging to facilitate handling in transport and reduce cost which accounts (M= 2.28 - SD=1.11).The other components exist in agree level which are, the practice of information is available to all partners for collaborative planning in the supply chain (M= 2.75 - SD=1.38), there is immediate information practice directly from the end customer for demand forecast to avoid disruption (M= 2.62 - SD=1.30), every member of partner realizes joint action to achieve common objective (M= 3.25 - SD=1.03),similarly, there is agreement on delivery frequency throughout the supply chain (M= 3.25 - SD=1.38), there is active communication channel with members of the supply chain (M= 3.37 - SD=1.18), joint objectives have been established among supply chain members (M= 3.50 - SD=0.92) and there is practice of Sharing of skill, Ideas and institutional culture along the supply chain(M= 3.12 - SD=1.24).

However, as Moharanan*et.al* (2012) emphasized the importance of information for supply chain integration as the main fastener of business firms process, structure and activities among the partners for their sustainability (Moharana *et al.*, 2012). In addition the success of the supply chain also enhanced while the supply chain integration supported by information integration (Frohlich & Westbrook, 2001). In the current dynamic market, one of the most significant input to develop the competitive advantage is capability of accessing information due time. In this situation Fasika*et.al* (2014)research also shows the information integration level in developing countries rated at low level and mainly supported by traditional way of information communication like letter, telephone and fax and verbal instructions (Fasika et al., 2014) .

As Rafaeli & Ravid (2003) research indicted, information sharing among the supply chain partners is highly dependent on the use of information technology and the existence of information system that supported the real time information access from the end consumer (Rafaeli & Ravid, 2003)

4.3.2 Fuel Station

4.3.2.1 Fuel supply in Ethiopia is done to the expectation of the consumers

Table 4.8 fuel supply in Ethiopia is done to the expectation of the consumers

Fuel supply chain in the expectation of the consumers	N	Mean	Std. Deviation
Placing fuel order is easy and not time taking.	41	4.2195	.65239
The delivery truck arrives early.	41	3.1951	.95445
The daily average sales vary significantly.	41	3.6585	.85469
The tank capacity has no impact on fuel order you want to place.	41	3.8293	1.44745
There is trust on the overall business activities	41	3.8780	1.16609
Average mean	41	3.7561	.44612

The results in Table 4.8 above revealed that all respondents agreed with all the statements about the expectation of the consumers about fuel supply in Ethiopia is done and the mean scores were Placing fuel order is easy and not time taking (M= 4.21, SD=0.65), the delivery truck arrives early (M= 3.19, SD=0.95), the daily average sales vary significantly which accounts (M= 3.65, SD=0.85), similarly, the tank capacity has no impact on fuel order you want to place (M= 3.82, SD=1.44) and there is trust on the overall business activities (M= 3.87, SD=1.16). And the average mean score of expectation of the consumers about fuel supply in Ethiopia is (M= 3.75, SD=0.44) the overall standard deviation also indicates there were no significant variations in the responses.

4.3.2 .2 Challenges in fuel station

Table 4.9 Challenges in fuel station

Challenges in fuel station	N	Mean	Std. Deviation
Absence of appropriate organizational policies and procedures	41	3.7317	1.07295
Lack of proper forecasting and supply chain planning practice	41	3.7073	.81375
Poor collaboration planning between partners in the supply chain	41	4.2439	.69930
Inconsistent availability of product	41	3.8293	.83374
Quality of transportation and infrastructure	41	3.2439	1.28024
Poor facility to address the goods and services to the ultimate customer.	41	3.0976	1.09098
Inadequate supply chain planning	41	3.8780	1.14445
Poor collaboration with EPSE and other stakeholders.	41	3.2927	.95509
Lack of proper forecasting and supply chain	40	2.8500	.86380
Poor information sharing	41	2.8780	1.20820
Absence of capacity in handling and storage	41	1.9024	1.24107
Poor quality of product /Adulteration	41	3.5610	1.02588
There is financial problem	41	3.4878	.81000
Average mean	40	3.3596	.35073

The result from Table 4.9 presented that, there were a predictable variable that are perceive to have challenges in fuel station the first challenge which the respondents gave higher mean score was the question supposed that, Poor collaboration planning between partners in the supply chain which is the mean score of (M=4.24, SD=0.69), absence of appropriate organizational policies and procedures (M=3.73, SD=1.07), lack of proper forecasting and supply chain planning practice (M=3.70, SD=0.81),inconsistent availability of product (M=3.82, SD=0.83),quality of transportation and infrastructure (M= 3.24, SD=1.28), poor facility to address the goods and services to the ultimate customer (M=3.09, SD=1.09), Inadequate supply chain planning (M=3.87, SD=1.14), poor collaboration with EPSE and other stakeholders (M= 3.29, SD=0.95), Lack of proper forecasting and supply chain (M=2.85, SD=0.86), Poor information sharing (M= 2.87, SD=1.20) Poor quality of product /Adulteration (M=3.56,SD =1.02) and financial problem(M=3.48 ,SD =0.81) ,and these all are shows that ,the respondents were agree with those challenges as indicated above. Furthermore, there is disagreement in the absence of capacity in handling and storage accounts (M=1.90, SD=1.24) moreover, Average mean score of the challenges in full station were (M=3.35, SD= 0 .35) therefore, the grand mean indicates that the above challenges were the most predictable variables that are imagine having problems on the fuel station and the overall standard deviation also indicates there were no significant variations in the responses.

4.3.3 CONSUMERS RESPONSE

4.3.3.1 The supply of fuel in Ethiopia to the expectation of the customers

Table 4.10 Supply of fuel in Ethiopia to the expectation of the customers

Supply of fuel in Ethiopia to the expectation of the customers	N	Mean	Std. Deviation
The accessibility of service in the stations is very good.	94	3.2660	1.03877
Getting fuel is easy and satisfied	94	2.7447	1.21758
The services meet my needs and expectations regarding performance	94	3.0000	.96163
There is fair distribution of fuel to all consumers.	94	2.9681	1.23089
Average mean	94	2.9947	.88823

The result from Table.10 shows that, all of the respondents were agreed with the inquiry of Supply of fuel in Ethiopia to the expectation of the customers. The first assessment which the respondents gave response was the question raised about the accessibility of service in the stations is very good which is the mean score of (M= 3.26, SD=1.03), getting fuel is easy and satisfied (M= 2.74, SD=1.21) also the question rose about the services meet consumers' needs and expectations regarding performance which is the mean score of (M= 3.0, SD =0.96), and regarding fair distribution of fuel to all consumers accounts (M =2.9681, SD=1.23) moreover, the average mean for supply of fuel in Ethiopia to the expectation of the customers had mean score of (M= 2.99, SD=0.88) which is almost the score of this assessment falls in the agree level.

4.3.3.2 Challenges related to fuel supply chain in Ethiopia

Table 4.11 Challenges related to fuel supply chain in Ethiopia

Challenges related to fuel supply chain in Ethiopia	N	Mean	Std. Deviation
carelessness for the consumer	94	2.8830	1.18100
Irregularity in supply of fuel	94	3.5745	1.17765
Lack of enough fuel stations	94	3.3191	1.10923
Have no enough machine to serve customers	94	3.2447	1.21537
Lack of comfortable area for the vehicles	94	3.3191	1.19329
Average mean	94	3.2681	.85938

The above Table 4.11 presented that ,all responses fall in agree level, hence according to the consumer view there were challenges related to fuel supply chain in Ethiopia and the first challenge which the respondents gave higher mean score was the question supposed that, irregularity in supply of fuel which is the mean score of (M=3.57, SD=1.17), Lack of comfortable area for the vehicles which is the mean score of (M=3.31, SD=1.19), Lack of enough fuel stations (M=3.31, SD=1.10), Have no enough machine to serve customers (M=3.24, SD=1.21) and Carelessness for the consumer As a result, the average mean score shows that (M=2.88, SD=1.18), which indicate the score of this variable nearly assign of agree level

4.3.3.3 Fuel distribution services to the consumers

Table 4.12 Fuel distribution services to the consumers

Fuel distribution services to the consumers	N	Mean	Std. Deviation
Confortable Place/area of fuel stations	94	3.0426	1.18153
Good service hours of fuel station	94	3.2447	1.21537
Waiting time to get service	94	3.5000	1.05494
There is adequate quantity/amount of fuel	92	3.0652	1.15601
Availability of payment options/cash/pose machine/mobile banking is good	94	3.2766	1.31496
Average mean	92	3.1957	.80054

The result from Table 4.12 indicates an assessment of fuel distribution services to the consumers. The first contest which the respondents attain was Place/area of fuel stations which is the mean score of (M= 3.0, SD =1.18), following response about service hours of fuel station which is (M= 3.2, SD =1.21), similarly the issue state about waiting time to get service accounts (M=3.5, SD=1.05), Adequate quantity/amount of fuel (M=3.2, SD =1.15), and availability of payment options/cash/pose machine/mobile banking accounts (M=3.06, SD =1.31) in addition the average mean for investment recovery had a means score of(M=3.19, SD =0.80) Hence, the analysis shows that fuel distribution services point out in the agree level.

However, fuel management systems and distribution is a crucial to maintain, control and monitor fuel consumption and stock in any type of industry that uses transport, including rail, road, water and air, as a means of business. Fuel management systems are designed to effectively measure and manage the use of fuel within the transportation and construction industries. They are typically used for fleets of vehicles, including railway vehicles and aircraft, as well as any vehicle that requires fuel to operate. They employ various methods and technologies to monitor and track fuel inventories, fuel purchases and fuel dispensed. This information can be then stored in computerized systems and reports generated with data to inform management practices. Online fuel management is provided through the use of web portals to provide detailed fuelling data, usually the back end of an automated fuel management system. This enables consumption control, cost analysis, consumers satisfaction and tax accounting for fuel purchases.(Lange, H.B.1992).

CHAPTER FIVE

SUMMARY CONCLUSION AND RECOMMENDATION

This final part of the research paper provides summary of the main findings, conclusions and recommendations drawn from the findings of the data collected by questioner.

5.1 SUMMARY OF THE MAJOR FINDINGS

The findings from the study indicate that there is a problem in adequate supply of fuel to satisfy consumer needs, there is always lack of sufficient quantity of fuel supply in the Ethiopian petroleum supply enterprise and their terminals of (Djibouti &Port Sudan), also there is no suitable fuel storage capacity and absences of effective distribution strategies in the industry.

In addition, the study indicated that, from the oil company , fuel stations and from consumers assessments, there is lack of clear organizational policies and procedures, proper forecasting and supply chain planning practice, there is Poor collaboration in planning with partners in the supply chain, inconsistent availability of product, also the study indicates problem in quality of transportation and infrastructure in the supply chain, Poor facility to address the goods and services to the ultimate customer, Poor information sharing and Lack of proper handling and storage at the ports (Djibouti and Sudan) are the major challenges indicated by the respondents in the oil company. Similarly, poor collaboration with EPSE and other stakeholders, poor quality of product /Adulteration and financial problem were other challenges indicated by the respondents. Moreover, in addition to those challenges, the respondents from consumer's side indicate that, there is carelessness for the consumer in providing service, irregularity in supply of fuel, lack of enough fuel stations in the city, have no enough machine to serve customers and lack of comfortable area for the vehicles are major constraints indicated by respondents.

On the contrary, the respondents of full station agreed with the question regarding supply of fuel in Ethiopia to the expectation of the customers and the finding indicate that, placing fuel order is easy and not time taking, the delivery truck arrives early, the daily average sales vary significantly, the tank capacity has no impact on fuel order you want to place, and there is trust on the overall business activities. Likewise, the consumers agreed and satisfied with accessibility of service in the stations, getting fuel is easy, the services meet consumer needs and expectations regarding performance, and there is fair distribution of fuel to all consumers.

More importantly, the study found out that, fuel distribution services to the consumers has confortable Place/area of fuel stations, there is good service hours of fuel station, less waiting time to get service, there is adequate quantity/amount of fuel and there is different means of payment options/cash/pose machine/mobile banking is available.

Therefore, this study indicates that, the fuel supply chain practice and challenges in in Ethiopia specifically in Addis Ababa. The study was conclude that the following research questions which is to what extent is the supply of fuel in Ethiopia to the expectation of the consumers indicated that, the oil company respondents point out that, the consumers expected there is a problem of supply of fuel in Ethiopia whereas, from fuel station and consumer response this research question lies in positive side.

The second research question to what extent is the fuel supply chain integrated to provide efficient service to the consumer, in these regard, the result showed that there is in a good condition hence, there no problem in the integration process of fuel supply chain.

Concerning the third research question, the challenges related to fuel supply chain in Ethiopia, All respondents indicates there is challenges in fuel supply chain in Ethiopia. And finally, the extent of the fuel stations providing fuel distribution service to the consumers, the response indicates that fuel distribution service in the fuel station is in the good manner.

5.2 CONCLUSION

Under this study, the major issues for the research were to assess and identify the practice and challenges of fuel supply chain in Ethiopia precisely in Addis Ababa. And the assessments were raises about fuel supply chain from the expectation of the consumers, fuel supply chain integration to provide efficient service to the consumer, fuel distribution services to the consumers and challenges related to fuel supply chain. From the result, the respondents in the oil company suggest that fuel supply chain in Ethiopia from the expectation of the consumers indicates at low level and challenges related to fuel supply chain in the three dimension means in the oil company, fuel station and consumers indicates at the agreement level of the respondents on the existing challenges in full supply chain in Ethiopia.

And the result shows that, the respondents in the oil company suggest that fuel supply chain in Ethiopia from the expectation of the consumers are evaluated at low level, regarding the

challenges of full supply chain in the three dimension (in the oil company, fuel station and consumers) were indicates there is agreement with the existence of those challenges. Moreover, according to the respondents, there are no problems in the extent of fuel supply chain integrated to provide efficient service to the consumer and the fuel stations providing fuel distribution service to the consumers.

Therefore, this study indicates that, the fuel supply chain practice and challenges in Ethiopia specifically in Addis Ababa. The oil company respondents indicate, there is problem of supply of fuel in Ethiopia. However, from fuel station and consumer reaction fuel supply from the expectation of consumers prove it in encouraging side. Similarly, fuel distribution service in the fuel station also shows the capacity is in the good manner. Also, there no problem in the integration process of fuel supplies chain. Furthermore in this research all respondents indicate that, there is challenges in fuel supply chain in Ethiopia.

5.3 RECOMMENDATION

By relying on the study findings, the researcher suggests the following points as credible recommendations to the problem. Based on the finding achieved and conclusions drawn the following recommendations are forwarded;

For the oil company and fuel station:

The issue of Fuel is the global issue therefore, it's difficult to say it should have adequate supply of fuel to satisfy consumer needs but the oil companies have a duty to work together with their stakeholders will be rather recommended.

EPSE has responsible for the incoming fuel therefore, always check whether there is enough product at EPSE terminals (Djibouti &Port Sudan) or not and strengthen the man power in the area for the betterment of the controlling system.

Also the oil companies develop suitable fuel storage capacity in the industry, moreover EPSE should control and check whether the oil companies have enough capacity to store the fuel properly and should develop and amend the rule and regulation.

EPSE should established clear organizational policies and procedures and durable mechanisms for effective distribution strategies and at the end satisfy consumers need.

To enable the service by providing fair distribution of fuel from EPSE to oil companies according to their capacity, set the rules and regulation that EPSE follows with oil companies, and exercise proper forecasting and supply chain planning practice. Also, the EPSE should establish deep control over oil companies for balanced distribution of Fuel.

Finally to solve the problem of transportation and infrastructure the oil company establishes system by using outsourcing the fleet management sector.

For the consumers

The government should maximize and proportionate the number of vehicles with the supply of fuel and the fuel stations by preparing enough machines to serve consumers.

Regarding information availability, information availability is highly integrated with information technology. To cope up the dynamics of the current market competition, information has to be accessible with all critical partners of the supply chain members. In addition real time information from end consumers and channels has to be accessed by the EPSE company as well as fuel stations for their effective distribution.

5.4 LIMITATION OF THE STUDY

Although this study was subjected to different literatures and data analysis tools, it has its own limitations and should be mentioned in order to provide a path for further studies. The first limitation of this study is generalization of the finding, since the study was limited to only Addis Ababa. In carry out this study, considerable constraint was limited literatures or secondary source available on Fuel supply chain management practices in Ethiopia. The other important challenge was unwillingness of the respondent to fill the questioner due to lack of time and most of the respondents were busy also the distance between the stations are the major limitation for these study.

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APPENDIX

ALL TYPES OF QUESTINNAIRS

ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF BUSINESS ADMINISTRATION

FOR OIL COMPANIES

Dear respondents:

The intent of this questionnaire is gathering data for a thesis to be conducted with regard to **ASSESSING THE PRACTICE AND CHALLENGES OF FUEL SUPPLY CHAIN IN ETHIOPIA.** For the partial fulfillment of the requirements for the Master of business administration Degree, your honest reply is highly appreciated and will contribute a lot to the accuracy of this research paper. The information collected from this questioner will only be used for academic purpose and will be treated with strict confidentiality. Thank you for your time and consideration! Your kind participation is much appreciated.

Instruction: Please, put a tick (√) mark in which you want to select

Part I. Demographic characteristics of the respondent

1. **Gender**: Male ☐ Female ☐

2. Educational level:

College Diploma ☐ Degree ☐ Masters ☐ PHD ☐

Others please specify ----------

3. Your current position in the organization:

Manager ☐ Supervisor ☐ Admin staff ☐ Technical ☐

Others please specify----------

4. Work Experience

Less than 5 years ☐ 5-10 years ☐ More than 10 years ☐

Part II: The following questions are about how the supply of fuel in Ethiopia to the expectation of the consumers? Please indicate the level of your agreement or disagreement using (✓) on the following statements based on your experience for the following questions. The rating is

1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5=Strongly Agree as shown below.

S.N	Description	1	2	3	4	5
SFEEC	**To what extent is the supply of fuel in Ethiopia**					
SFEEC 1	organization has attained effective procedures in the importation of oil products					
SFEEC 2	supply chain management is key to operational effectiveness in the company					
SFEEC 3	organization goals are done towards achievement of operational effectiveness					
SFEEC 4	The organization has effective distribution strategies					
SFEEC 5	There are highly qualified employees to having effective supply chain management					
SFEEC 6	Organization has attained effectiveness in the overall gaining of oil products.					
SFEEC 7	Provide demand forecast to EPSE on a regular interval.					
SFEEC 8	Share orders placed by your customers to EPSE daily.					
SFEEC 9	Considers your company as a partner.					
SFEEC 10	Have a frequent meeting with EPSE.					
SFEEC 11	Placing loading request to EPSE & getting the product is easy and not time taking.					
SFEEC 12	There is adequate fleet in the industry.					

The following questions are about Challenges related to fuel supply chain in Ethiopia? Please indicate the level of your agreement or disagreement using (✓) on the following statements based on your experience for the following questions. The rating is

1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5=Strongly Agree as shown below

S.N	Description	1	2	3	4	5
CRFSC	**Challenges related to fuel supply chain in Ethiopia?**					
CRFSC 1	organizational policies and procedures					
CRFSC 2	lack of proper forecasting and supply chain planning practice					
CRFSC 3	poor collaboration planning between partners in the supply chain					
CRFSC 4	inconsistent availability					
CRFSC 5	quality of transportation and infrastructure					
CRFSC 6	Facility to address the goods and services to the ultimate customer.					
CRFSC 7	Inadequate supply chain planning					
CRFSC 8	Poor collaboration					
CRFSC 9	lack of proper forecasting and supply chain					
CRFSC10	Poor information sharing					
CRFSC11	Handling and storage					

The following questions are about how fuel supply chain integrated to provide efficient service to the consumer. Please indicate the level of your agreement or disagreement using (✓) on the following statements based on your experience for the following questions. The rating is 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5=Strongly Agree as shown below.

S.N	Description	1	2	3	4	5
	How fuel supply chain integrated to provide efficient service to the consumer?					
1	Information is available to all partners for Collaborative Planning in the supply chain					
2	There is immediate information practice directly from the end customer for demand forecast to avoid disruption					
3	Every member of partner realizes joint action to achieve common objective					
4	Partners in the supply chain involves in designing and development of packaging to facilitate handling in transport and reduce cost					
5	There is agreement on delivery frequency throughout the supply chain					
6	There is active communication channel with members of the supply chain					
7	Joint Objectives have been established among supply chain members					
8	There is practice of Sharing of skill, Ideas and institutional culture along the supply chain					

THANK YOU
FOR YOUR VALUABLE INPUT, TIME AND UNLIMITED COOPERATION.

ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF BUSINESS ADMINISTRATION

FOR THE FUEL STATIONS

Dear respondents:

The intent of this questionnaire is gathering data for a thesis to be conducted with regard to **ASSESSING THE PRACTICE AND CHALLENGES OF FUEL SUPPLY CHAIN IN ETHIOPIA.** For the partial fulfillment of the requirements for the Master of business administration Degree, your honest reply is highly appreciated and will contribute a lot to the accuracy of this research paper. The information collected from this questioner will only be used for academic purpose and will be treated with strict confidentiality. Thank you for your time and consideration! Your kind participation is much appreciated.

Instruction: Please, put a tick (√) mark in which you want to select

Part I. Demographic characteristics of the respondent

1. **Gender**: Male ☐ Female ☐

2. Educational level:

College Diploma ☐ Degree ☐ Masters ☐ PHD ☐

Others please specify ----------

3. How many years' experience in this sector

Less than 5 years ☐ 5-10 years ☐ More than 10 years ☐

Part II:

The following questions are about how the supply of fuel in Ethiopia to the expectation of the consumers? Please indicate the level of your agreement or disagreement using (✓) on the following statements based on your experience for the following questions. The rating is

1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5=Strongly Agree as shown below.

S.N	Description	1	2	3	4	5
1	Placing fuel order is easy and not time taking.					
2	The delivery truck arrives early.					
3	The daily average sales vary significantly.					
4	The tank capacity has no impact on fuel order you want to place.					
5	There is trust on the overall business activities					

Challenges related to fuel supply chain in Ethiopia?

S.N	Description	1	2	3	4	5
CRFSC 1	organizational policies and procedures					
CRFSC 2	lack of proper forecasting and supply chain planning practice					
CRFSC 3	poor collaboration planning between partners in the supply chain					
CRFSC 4	inconsistent availability					
CRFSC 5	quality of transportation and infrastructure					
CRFSC 6	Facility to address the goods and services to the ultimate customer.					
CRFSC 7	Inadequate supply chain planning					
CRFSC 8	Poor collaboration					
CRFSC 9	Poor information sharing					
CRFSC10	Handling and storage					

THANK YOU
FOR YOUR VALUABLE INPUT, TIME AND UNLIMITED COOPERATION

ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF BUSINESS ADMINISTRATION

FOR THE CONSUMERS

Dear respondents:

The intent of this questionnaire is gathering data for a thesis to be conducted with regard to **ASSESSING THE PRACTICE AND CHALLENGES OF FUEL SUPPLY CHAIN IN ETHIOPIA.** For the partial fulfillment of the requirements for the Master of business administration Degree, your honest reply is highly appreciated and will contribute a lot to the accuracy of this research paper. The information collected from this questioner will only be used for academic purpose and will be treated with strict confidentiality. Thank you for your time and consideration! Your kind participation is much appreciated.

Instruction: Please, put a tick (√) mark in which you want to select

Part I. Demographic characteristics of the respondent

1. **Gender**: Male ☐ Female ☐

2. Educational level:

College Diploma ☐ Degree ☐ Masters ☐ PHD ☐

Others please specify ----------

3. Driving Experience

Less than 5 years ☐ 5-10 years ☐ More than 10 years ☐

S.N	Description	1	2	3	4	5
SFEEC	**To what extent is the supply of fuel in Ethiopia to the expectation of the customers?**					
SFEEC 1	How do you rate the accessibility in commerce with you?					
SFEEC 2	How do you rate the efficiency in dealing with you?					

S.N	Description	1	2	3	4	5
SFEEC	**To what extent is the supply of fuel in Ethiopia to the expectation of the customers?**					
SFEEC 3	How do you rate the services and did they meet your needs and expectations regarding performance?					
SFEEC 4	How do you rate THE FUEL distribution?					

The following questions are about Challenges related to fuel supply chain in Ethiopia? Please indicate the level of your agreement or disagreement using (✓) on the following statements based on your experience for the following questions. The rating is

1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5=Strongly Agree as shown below

S.N	Description	1	2	3	4	5
CRFSC	**Challenges related to fuel supply chain in Ethiopia?**					
CRFSC 1	Liability for the consumer					
CRFSC 2	Irregularity in supply of fuel					
CRFSC 3	Lack of service provider					
CRFSC 4	Have no enough machine					
CRFSC 5	Lack of comfortable area for the vehicles					

THANK YOU
FOR YOUR VALUABLE INPUT, TIME AND UNLIMITED COOPERATION.