



Addis Ababa University School of Commerce

Department of Logistic and Supply Chain Management

**Factors Affecting Fuel Supply Chain Management and Their Relationship
with Fuel Supply Chain Performance in Addis Ababa.**

**A Thesis Submitted to the Department Of Logistics and Supply Chain Management,
School of Commerce, Addis Ababa University For Partial Fulfillment of the Requirements
for the Award of the Degree of Master of Arts in Logistics and Supply Chain Management.**

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May, 2018

Addis Ababa, Ethiopia

Addis Ababa University

School of Commerce

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Addis Ababa University

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This is to certify that the thesis prepared by Getachew Sibhat, entitled “Factors Affecting Fuel Supply Management And Their Relationship With Fuel Supply Chain Performance In Addis Ababa” and submitted in partial fulfillment of the requirements for the award of the Degree of Master of Arts in Logistics and Supply Chain Management compiles with the regulations of the University and meets the accepted standards with respect to originality and quality.

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This is to certify that the thesis entitles “Factors Affecting Fuel Supply Chain Management And Their Relationship With Fuel Supply Chain Performance In Addis Ababa”, submitted to Addis Ababa University for the award of the Degree of Master of Logistics and Supply Chain Management and is a record of bona fide research work carried out by Mr Getachew Sibhat Haile, under my guidance and supervision.

Therefore, I hereby declare that no part of this thesis have been submitted to any other university or institutions for the award of any degree or diploma.

Advisor’s Name

Date Signature

DECLARATION

I hereby declare that this thesis entitled “Factors Affecting Fuel Supply Chain Management and Their Relationship with Fuel Supply Chain Performance in Addis Ababa” has been carried out by me under the guidance and supervision of Matiwos Ensermu (PhD).

The thesis is original and has not been submitted for the award of any degree or diploma to any university or institutions.

Researcher’s Name

Date

Signature

Acknowledgements

First and foremost, I praise Lord for giving me the tenacity to complete this study. Secondly, I would like to express my deep sense of gratitude and appreciation to, Dr Matiwos Ensermu, for his consistent advices, precious suggestions, and unreserved encouragement in providing directions to work hard and the last but not the least I am very much grateful to my family and my friends for their support in every step I went through.

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Abbreviations

- **SCM** supply chain management.
- **NOC** National Oil Ethiopia.
- **YBP** Yetebaberut Beherawi Petroleum.
- **EPSE** Ethiopian Petroleum Supply Enterprise
- **EPE** Ethiopian Petroleum Enterprise
- **NPDA** National Petroleum Depot Administration.
- **SKU** Stock keeping unit.
- **PAT** The Principal-Agent Theory.
- **TCA** Transaction Cost Analysis.
- **NT** The Network Perspective.
- **RBV** The Resource-Based View.
- **EDI** Electronic Data Interchange.
- **ERP** Enterprise Resource Planning
- **EDT** Electronic Fund Transfer
- **ROI** Return on Investment.
- **VAN** Value Added Network.
- **LAN** Local Area Networks.
- **WAN** Wide Area Networks.
- **MRP** Material Requirement Planning.
- **MRPII** Manufacturing Resources Planning.
- **ERP** Enterprise Resource Planning.
- **OPEC** Oil Producing and Exporting Countries
- **GDP** Gross Domestic Product (GDP)

Abstract

Supply chain management plays a vital role in the distribution of fuel in the country for the customers. The purpose of this study is to assess factors that affect fuel supply chain management and their relationship with fuel supply chain performance in Addis Ababa. This research employed mixed (qualitative and quantitative) research approach and descriptive and explanatory research design. In Addis Ababa there are seven companies in fuel and oil supply retail operation and they have 111 fuel stations/outlets in total. The researcher has taken 111 fuel stations as the total population and had taken 32 sample sizes using Simple random sampling technique to select the respondents. The research utilized questionnaire and interview data collection instrument to collect data from the respondents. Descriptive and explanatory data analysis method used to analyze the collected data. The major finding of the research is among fuel supply chain dimensions, Information communication and technology, Government support and location had significant relationship with fuel supply chain performance. Based on the finding the researcher recommend to investors, government and other stakeholders work closely in order to minimize factors affecting fuel supply chain performance.

Key words: *supply chain, petrol, support, relationship, technology, location, performance.*

Chapter One

Introduction

1.1 Background of the Study

In today's highly unsteady and competitive markets, rivalry among companies is transformed from competing on the basis of own capabilities to competing with the whole supply chain (Ketchen and Hult, 2007). Different authors write about logistics, supply chain, and supply chain management in the last two decades. They have written the same idea in different words.

According to Alane, Reshaton, Phil Croucher and Peter Baker (2010), Logistics = Materials management + Distribution. An extension to this idea helps to illustrate that the supply chain covers an even broader scope of the business area. This includes the supply of raw materials and components as well as the delivery of products to the final customer. Thus: Supply Chain = Suppliers + Logistics + Customers

Logistics and the supply chain are concerned with physical and information flows and storage from raw material through to the final distribution of the finished product. Thus, supply and materials management represents the storage and flows into and through the production process, while distribution represents the storage and flows from the final production point through to the customer or end user. Major emphasis is now placed on the importance of information as well as physical flows and storage, and an additional and very relevant factor is that of reverse logistics – the flow of used products and returnable packaging back through the system,

Logistics is the positioning of resource at the right time, in the right place, at the right cost, at the right quality. (Chartered Institute of Logistics and Transport (UK), 2005)

Supply chain is the global network used to deliver products and services from raw materials to end customers through an engineered flow of information, physical distribution, and cash. Supply chain is Product life cycle processes comprising physical, information, financial, and knowledge flows whose purpose is to satisfy end user requirements with physical products and services from multiple, linked suppliers. The definition says that the supply chain is made up of processes. Processes in a manufacturer include sourcing material, designing products, manufacturing,

transporting, fixing, and selling physical products and related services according to (James B. Ayers 2010).

As cited by Matiwos Ensermu (2015), supply chain is a network of partners who collectively convert a basic commodity (upstream) into a finished product (downstream) that is valued by end-customers, and who manage return at each stage (Harrison and Hoek,2005).

There are a number of factors that affect fuel supply chain management practices. Smalley (1999); Dwivedi and Butcher, (2009); Ettlíe and Reza (1992) location , size of petrol station , Government support, information communication and technology and supplier relationships identified as major factors for fuel supply chain management.

Performance measures drive behavior in any system. The selection of performance measures is crucial inside a firm and throughout the supply chain. The ideal performance measure pushes every firm in the supply chain and all employees in each firm to direct all of their efforts to increasing the amount of money made by everyone in the supply chain.

The ultimate measure for each firm in the supply chain is their return on investment (ROI) or capital productivity, responsiveness and customer satisfaction The choice of performance measures in both the firm and the supply chain must be monitored (Fredend all, Lawrence D. and Ed Hill, 2001).

1.2 Background of the Organization.

In the years before 2001, only four companies SHELL, MOBIL, TOTAL and AGIP controlled marketing and distribution of Fuel and Lubricant in Ethiopia Market. Following measures taken by the government that encourage local and regional players to enter in to the market, more and more local and regional companies are joining this industry. As indicated in locally printed Newspapers Fortune March05, 2015 only 9 companies were working in fuel and lubricant industry. Oil Libya, TOTAL, NOC, and YBP were covered 90.4% oil and fuel distribution in the country.

According to the Fortune Newspaper Nov7, 2017currently, there are 17fuel and oil retail companies and 800 fuel stations throughout the country. Only Oil Libya, Total, National Oil Ethiopia (NOC), Yetebaberut Beherawi Petroleum (YBP), which accounts for 89pc of the total fuel distribution in the country and Kobil, Dalol Oil S.C., the Sudanese company Wadi Alsundus(WAS), and TAF Oil S.C., which account for the remaining 11pc. According to the interview the research made with Ato Danial Dalol oil S.C senior staff (2018) only seven

companies, oil Libya, Total Ethiopia, NOC, Kobile, YBP, Nile, and TAF do have fuel and oil retailing station in Addis Ababa.

According to Fortune Newspaper Dec.13, 2017, EPSE was established in 2012 by the Council of Ministers Regulation No. 265/2012. It is an amalgamation of the Ethiopian Petroleum Enterprise (EPE) and the National Petroleum Depot Administration (NPDA).

These companies are involved in distribution of fuel and lubricant through their retail outlets, reseller channel and are involved in direct sales to consumers. In Ethiopia price of fuel is regulated by the government and is revised every month. As per key informants, the margin that oil companies get on fuel in Ethiopia is not more than USD 5 per mc which is very small as compared with margin the companies get in other parts of the world. As per the same sources, the margin that the companies get on Lubricant is USD 1,000 per mc on average. So we can say the survival of oil companies in Ethiopia highly depend on sales of Lubricant (Petros Gulma , 2015).

1.3 Statement of the Problem.

Many organizations have begun to recognize that SCM is the key to building sustainable competitive edge for their products and/or services in an increasingly crowded marketplace and enhancing organizational and overall supply chain performance (Li *et al.*, 2006).

Ethiopian oil supply chain faced internal and external problems related with logistics and supply chain management. Different research findings revealed that Longer distances between supply points, higher lead times and variability in transportation, larger safety stock, frequent disruption in the logistics function, higher safety and in-transit inventories, high logistics costs, severe stock price fluctuation, a higher demurrage and Storage charge , stock out situation as it fails to position all in its warehouse due to delay on the activities along the supply chain are the major factors that affect industry's competitiveness (Atsede A.,2016)

The number of vehicles in the country has increased from 132,000 to 520,000 within the past 10 years, which cannot be accommodated by the existing nine distributors and 654 filling stations, according to Abdulmenan Mohammed(2017), the government used to monitor fuel inventories to reimburse, or charge, retailers for fluctuating revenues caused by government pump price adjustments. Since that practice was ended around a decade ago amid widespread corruption, dealers working on tiny margins have hoarded fuel towards the end of the month in anticipation of price increases, which has worsened shortages. If they expect a price reduction, they'll delay

orders and run down existing supplies at the higher price. “After clearing stock there is some days’ lag. This causes a lot of problems in the fuel supply,” on the other hand Abebe Begashew (2017) lists multiple reasons for the inconstant supply. Foremost, he believes, is heavy demand because the nearest gas station in one direction is a few kilometers away. He’s unsure why there are delivery delays, but thinks there’s a problem with a bridge on the road to neighboring Djibouti’s port, where the Ethiopian state-owned enterprise that monopolizes fuel-imports distributes to oil companies.

As described above there are internal and external factors that affect fuel supply chain industry. Most of the research findings focused on external factors and not directly related with supply chain management. On the other hand there is no research conducted on specific issues on internal capability of the firm and internal readiness for fuel supply chain improvement.

There is lack of comprehensive and documented empirical works on factors that affect fuel supply chain and relationship between fuel supply chain performances. Consequently, this research focused on identifying core fuel supply chain factors and their relationship with fuel supply chain performance.

Therefore, this research tried to answer the following basic research questions.

1.4 Research Questions.

- 1, How government support affects fuel supply chain managements?
- 2,How information and communication technology affects supply chain management?
- 3 How supply chain relationship affects fuel supply chain management?
- 4,How size of petrol station affects fuel supply chain management?
- 5, How location affect fuel supply chain management?
- 6, what is the overall supply chain performance?

1.5Objective of the Research.

General objective: the general objective of this study is to assess the factors that affect fuel supply chain management in Ethiopia fuel industry.

The specific objective: the specific objectives of this research are

- ✓ To describe the practice of government support in fuel supply chain industry.

- ✓ To explain the role of information and communication technology in fuel supply chain management practice
- ✓ To explain the effect of supply chain relationship on fuel supply chain management
- ✓ To describe the effect of size of petrol station on fuel supply chain management
- ✓ To describe the effect of location on fuel supply chain management
- ✓ To explain the overall fuel supply chain performance in relation to factors affecting fuel supply chain management practice.

1.6 Significance and Benefits of the study.

Shortage of fuel during the public holiday and at the end of the month is becomes common to observe in Addis Ababa. Identifying and knowing the core problem of the sector can be help the government to use it as input to alleviate the problem and for police amendment. And also it will be used as reference for researchers, practitioners and university students.

Fuel distributing companies also can use the result of the study to improve their performance and will help them to see their services.

1.7 Organization of the Study

The report is organized under five chapters. The first chapter represents background of the study, statement of the problem with basic research question, objective of the study, theory, significance of the study ,scope of the study and conceptual scope, limitation of the study. The second chapter deals with review of related literature. It includes theory as well as empirical evidences and conceptual frame work related to the study topic. The third chapter is about methods of the study. It describes the type and design of the research to be conducted, concepts adapted from previous studies, detail description of participants/sample/ of the study, data sources, data collection tools and procedures, methods of data analysis and the like. The fourth chapter presented results and discussions about the research topic based on the result of third chapter. Here, the results/findings of the study summarized and interpretation as well as discussion with the use of related literature review was explained. Finally, the fifth chapter about the summary, conclusion and recommendation part of the study.

1.8 Scope of the Study.

This research only focuses on to study and assesses the factors that affect the supply chain in Ethiopia, specifically in Addis Ababa. In this study the researcher tries to see the existing fuel distribution by considering the fuel distributor companies who do have branch in Addis Ababa. The research does not including the companies that don't have branch in Addis Ababa. The researcher also will not include other factors that affect the performance of the companies other than supply chain factors.

In this sub topic the researcher tries to identify the different factors that affect supply chain management in general and fuel supply chain management in particular. There are different factors that affect supply chain management. As noted by Henry Quesada, RadoGazo and Scarlett Sanchez (2012) Environmental uncertainty is one of the broad categories which hold company environment, government support, and uncertainty aspect from oversea under it.

Information Technology is the other category which holds communication tools and planning tools under it. Supply chain relationship and value added process (manufacturing) are also the other factors that affect supply chain management.

As noted by K.Sartorius, C Eitzen& J Hartan(2007) location, size of petrol station and price elasticity are the factors that affect fuel supply chain management.

According to Anthony Osoro (2015) fuel supply chain management can be affected by level of skills, and information and communication technology.

According to Anthony Osoro , Willy M. Muturi and Patrick K. Ngugi(2016) cost of crude oil affects supply chain management in fuel industry.

From these factors the researcher tries to see the effect of government support, supply chain relationship, size of petrol station, location and information and communication technology,

1.9 Limitation of the Study.

On this study the researcher tries to see and pass through different publication, but it is difficult to get related research in the petrol and fuel industry in the country. So that, the researcher limited to include many related empirical reviews.

Chapter Two

Review the Related Literature.

In this chapter the researcher tries to indicate in the following subsequent sub chapters.

2.1 Theoretical reviews

2.2 Empirical reviews

2.3 Conceptual frameworks

2.1 Theoretical Review.

2.1.1 Definition of Supply Chain Management.

Let us see the definition of supply chain management that are given by different institutions.

The Supply Chain Council's definition of Supply chain management is:

“Managing supply and demand, sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, and delivery to the customer”

The Council of Logistics Management defines supply chain management as:“... The systematic, strategic coordination of traditional business functions and the tactics across the business functions within a particular company and across businesses within the supply chain for the purpose of improving the long term performance of the individual companies and the supply chain as a whole.”

According to Martine Christo fore (2011) the definition of logistics is the task of coordinating material flow and information flow across the supply chain.

Logistics is the process of strategically managing the procurement, movement and storage of materials, parts and finished inventory (and the related information flows) through the organization and its marketing channels in such a way that current and future profitability are maximized through the cost-effective fulfillment of orders.

As cited by Matiwos Ensermu (2015), logistics is the process of planning, realization and control of the effective, cost effective flow and storage of row materials, semi-finished goods and finished products and the connected information from delivery point to received point according to the requirement of the customers (Harrison and Hoek, 2005).

The definition of supply chain management is Planning and controlling all of the business processes – from end-customer to raw material suppliers – that link together partners in a supply chain in order to serve the needs of the end-customer(Harrison and Hoek,2005).

Martine Christo fore(2011) defined supply chain management as management of upstream and downstream relationships with suppliers and customers in order to deliver superior customer value at less cost to the supply chain as a whole.

As cited by Matiwos Ensermu (2015) supply chain management is the systematic, strategic coordination of traditional business function and the tactics across the business functions within a particular company and across business within the supply chain for the purpose of improving the long term performance of the individual companies and the supply chain as a whole (the council of logistics management).

James B. Ayers (2010) defined as Supply chain management is The design, planning, execution, control, and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand, and measuring performance globally.

2.1.2 Fuel Supply Chain Management in Upstream and Downstream Sector.

Many authors categorize petroleum industry (the oil and gas industry) in to three sectors.

A, up-stream sector (exploration and production): includes searching for potential underground or underwater crude oil and natural gas fields, drilling exploratory wells and subsequently drilling and operating the wells that recover and bring the crude oil or raw natural gas to the surface.

B, midstream sector (internal): involves storing, marketing and transporting petroleum crude oil, natural gas, natural gas liquids and byproduct sulfur. Midstream operations are sometimes included in the downstream category.

C, downstream sector: includes the refining of petroleum crude oil and the processing and purifying of natural gas, as well as the marketing and distribution of products form crude oil and natural gas. The downstream sector reaches to the consumers through product such as gasoline or petrol, kerosene, jet fuel, diesel oil, heating oil, fuel oil, lubricants, waxes, asphalt, natural gas, and liquefied petroleum gas (LPG) as well as hundreds of petrochemicals.

According to Supply Chain Management in the Petroleum Industry: Challenges and Opportunities (International Journal of Global Logistics & Supply Chain.Vol.1,No.2,and1Novem

ber2006). By Raed Hussain, Tiravat Assavapokee, and Basheer Khomarwale, The supply chain of the petroleum industry is extremely complex compared to other industries. It is divided into two different, yet closely related, major segments: the upstream and downstream supply chains. The upstream supply chain involves the acquisition of crude oil, which is the specialty of the oil companies. The upstream process includes the exploration, forecasting, production, and logistics management of delivering crude oil from remotely located oil wells to refineries. The downstream supply chain starts at the refinery, where the crude oil is manufactured into the consumable products that are the specialty of refineries and petrochemical companies. The downstream supply chain involves the process of forecasting, production, and the logistics management of delivering the crude oil derivatives to customers around the globe. Challenges and opportunities exist now in both the upstream and downstream supply chains.

2.1.3 Theories of Supply Chain Management.

As cited by principle of supply chain management–modules (Addis Ababa University, 2015) Halldorson et al., (2007:287) tried to consolidate different organizational theories in to Supply chain management theories as follows:

a. SCM Mitigating Agency Problems- The Principal-Agent Theory (PAT)

Based on the separation of ownership and control of economic activities between the agent and the principal, various agency problems may arise, such as asymmetric information between the principal and the agent, conflicting objectives, differences in risk aversion, outcome uncertainty, behavior based on self-interest, and bounded rationality. The contract between the principal and the agent governs the relationships between the two parties, and the aim of the theory is to design a contract that can mitigate potential agency problems. The “most efficient contract” includes the right mix of behavioral and outcome-based incentives to motivate the agent to act in the interests of the principal (Eisenhardt, 1998; Logan, 2000).

b. SCM as Coordination of Transferred Rights of Disposals-Transaction Cost Analysis (TCA)

TCA offers a normative economic approach to determine the firm’s boundaries and can be used to present efficiency as a motive for entering inter-organizational arrangements (Williamson, 1997, 1985, 1996). A company may reduce its total transactions costs (ex ante¹⁴ and ex post costs of contact, contract, and control) by cooperating with external partners. The key question is: why do firms exist? In the context of SCM, this question is addressed as: which activities

should be performed within the boundary of each firm, and which activities should be outsourced?

c. SCM as Reciprocated Interactions between Institutions -The Network Perspective (NT)

The performance of a firm depends not only on how efficiently it cooperates with its direct partners, but also on how well these partners cooperate with their own business partners. NT can be used to provide a basis for the conceptual analysis of reciprocity (Oliver, 1990) in cooperative relationships. Here, the firm's continuous interaction with other players becomes an important factor in the development of new resources (Haakansson and Ford, 2002).

Relationships combine the resources of two organizations to achieve more advantages than through individual efforts. Such a combination can be viewed as a quasi-organization (Haakansson and Snehota, 1995; Haakansson 1987). The value of a resource is based on its combination with other resources, which is why inter-organizational ties may become more important than possessing resources per se.

d. SCM as Coordination of Relational Assets – The Resource-Based View (RBV)

Only a few articles have applied the resource-based view (RBV) to the field in focus in order to obtain the sources of competitive advantage through SCM (Lewis, 2000; Pandza et al., 2003; Rungtusanatham et al., 2003; Carr and Pearson, 2002) or to analyze the structure of chains and industrial clusters (Miller and Ross, 2003; de Olivera Wilk and Fensterseifer, 2003).

The RBV deals with competitive advantages related to the firm's possession of heterogeneous resources (financial, physical, human, technological, organization, and reputations) and capabilities (combination of two or more resources) (Grant, 1991; Penrose, 1959; Prahalad and Hamel, 1990). These resources and capabilities constitute the core competence of the particular firm and serve ultimately as its source of competitive advantage.

2.1.4 Components and Activities of Supply Chain Management.

As Chopra and Meindl (2001) define these areas as performance drivers that can be managed to produce the capabilities needed for a given supply chain.

Effective supply chain management calls first for an understanding of each driver and how it operates. Each driver has the ability to directly affect the supply chain and enable certain capabilities. The next step is to develop an appreciation for the results that can be obtained by mixing different combinations of these drivers. Let's start by looking at the drivers individually.

1. Production/Customer Service.

Production refers to the capacity of a supply chain to make and store products. The facilities of production are factories and warehouses. Factories can be built to accommodate one of two approaches to manufacturing:

A, Product focus—A factory that takes a product focus performs the range of different operations required to make a given product line from fabrication of different product parts to assembly of these parts

B, Functional focus—a functional approach concentrates on performing just a few operations such as only making a select group

As with factories, warehouses too can be built to accommodate different approaches. There are three main approaches to use in warehousing

1, Stock keeping unit (SKU) storage—in this traditional approach, all of a given type of product is stored together

2, Job lot storage—in this approach, all the different products related to the needs of a certain type of customer or related to the needs of a particular job are stored together

3, Cross docking—an approach that was pioneered by Wal-Mart in its drive to increase efficiencies in its supply chain. In this approach, product is not actually warehoused in the facility. Instead the facility is used to house a process where trucks from suppliers arrive and unload large quantities of different products.

2. Inventory

Inventory is spread throughout the supply chain and includes everything from raw material to work in process to finished goods that are held by the manufacturers, distributors, and retailers in a supply chain.

Again, managers must decide where they want to position themselves in the trade-off between responsiveness and efficiency.

There are three basic decisions to make regarding the creation and holding of inventory

A, Cycle Inventory—this is the amount of inventory needed to satisfy demand for the product in the period between purchases of the product.

B. Safety Inventory—Inventory that is held as a buffer against uncertainty.

If demand forecasting could be done with perfect accuracy, then the only inventory that would be needed would be cycle inventory. But since every forecast has some degree of uncertainty in it,

we cover that uncertainty to a greater or lesser degree by holding additional inventory in case demand is suddenly greater than anticipated.

C. Seasonal Inventory—this is inventory that is built up in anticipation of predictable increases in demand that occur at certain times of the year.

3. Location

Location refers to the geographical sitting of supply chain facilities. It also includes the decisions related to which activities should be performed in each facility. The responsiveness versus efficiency trade-off here is the decision whether to centralize activities in fewer locations to gain economies of scale and efficiency, or to decentralize activities in many locations close to customers and suppliers in order for operations to be more responsive

4. Transportation

This refers to the movement of everything from raw material to finished goods between different facilities in a supply chain. In transportation the trade-off between responsiveness and efficiency is manifested in the choice of transport mode.

5. Information

Information is the basis upon which to make decisions regarding the other four supply chain drivers. It is the connection between all of the activities and operations in a supply chain. To the extent that this connection is a strong one, (i.e., the data is accurate, timely, and complete), the companies in a supply chain will each be able to make good decisions for their own operations.

Information is used for two purposes in any supply chain:

1, coordinating daily activities related to the functioning of the other four supply chain drivers: production; inventory; location; and transportation.

2, Forecasting and planning to anticipate and meet future demands.

Available information is used to make tactical forecasts to guide the setting of monthly and quarterly production schedules and timetables.

Each of these drivers can be developed and managed to emphasize responsiveness or efficiency depending on the business requirements.

2.1.5 Factors Affecting Supply Chain Management.

According to Henry Quesada, Rado Gazo and Scarlett Sanchez (2012) critical factors affecting supply chain management can be categorized in to four broad sections.

1, Environmental Uncertainty.

As cited by Henry Quesada, Rado Gazo and Scarlett Sanchez (2012) Environmental uncertainty refers to the environmental issues in the product chain (Dwivedi and Butcher, 2009). Ettlle and Reza (1992) described this as the unexpected changes of customer, supplier, competitor, and technology. It was said by Yusuf (1995) that government support plays an important role for business success. Paulraj and Chen (2007a) mentioned that environmental uncertainty is an important factor in the realization of strategic supply management plans. The increase of outsourcing activities in the industry had augmented the awareness of the importance of strategic supply management, which leads to better relationship among organizations. Under this factor, three sub-factors were identified: environment, government support, and uncertainty aspects from overseas.

As cited by Henry Quesada, Rado Gazo and Scarlett Sanchez (2012), Dwivedi and Butcher (2009) government support plays important role in order to improve factors affecting fuel supply chain management .The level of support that the company receives from the government when importing raw materials or products from overseas or using domestic materials. It includes the use of norms, regulations, policies, and advice for the sector

As cited by Henry Quesada, Rado Gazo and Scarlett Sanchez (2012) The increase of international trade for acquiring resources from other countries introduces complicated matters such as language barriers, transportation, transportation costs, exchange rates, tariffs, and administrative practices (Quayle, 2006).

2, Information and Communication Technology.

Telecommunications and computer technology allow all the actors in the supply chain to communicate among each other. The use of information technology allows suppliers, manufacturers, distributors, retailers, and customers to reduce lead time, paperwork, and other unnecessary activities. And also as cited by them that managers will experience considerable advantages with its use such as the flow of information in a coordinated manner, access to information and data interchange, improved customer and supplier relationships, and inventory management not only at the national level but also internationally (Handfield and Nichols, 1999). As cited by Henry Quesada, RadoGazo and Scarlett Sanchez (2012) Li (2001) identified 14 such information technology tools, among them electronic data interchange (EDI), enterprise resource planning (ERP), internet, and extranets. Li grouped these tools into three groups in terms of their

primary purpose: communication tools, resource planning tools, and supply chain management tools. Given this classification, two sub-factors are considered in this research: communication and planning tools.

A, Communication tools

Communication tools are used to facilitate data transfer and communication between the trading parts and this might include EDI, electronic fund transfer (EFT), intranet, internet, and extranet (Li 2002). Electronic Data Interchange (EDI) is used for procurement (purchase orders, order status, and order follow-up). EDI serves as electronic catalogs for customers who can get information, dimensions, and cost about a specific product. EFT provides trading partners with an effective way to transfer funds from one account to another through a value added network (VAN) or the internet. Intranets are corporate local area networks (LAN) or wide area networks (WAN) that communicate through the internet and are secured by firewalls.

B, planning tools

Supply chain management planning tools are intended to integrate the resource planning activities in a firm or organization. Some of the most common planning tools are: material requirement planning (MRP), manufacturing resources planning (MRPII), and Enterprise Resource Planning (ERP). A MRP is a tool that allows an organization to schedule production activities to meet specific deadlines based on the bill of materials, inventory levels, and master production schedule. An improvement of MRP tools is MRPII which integrates manufacturing capabilities and capacities with the benefits of MRP. An ERP tool allows the organization to integrate all processing information tasks related to all processes in the value chain.

The bullwhip effect is one of key areas managed in applications of administration with chains of supplies of examinations. It is representing the phenomenon where orders are trending to deliverers for being more diversified than what is being sold to buyers but consumer demand is deformed (Lee, H., Padmanabhan, V., Whang, S., 1997). This distortion of demand is being spread too for higher stages in the amplified form. High levels of provisions and the weak level of using of the client are posing standard symptoms of the bullwhip effect in the chain of supplies. Keeping production costs and provisions stable and the increase in main times are proving it additionally while margins of the profit and availability of products are falling (Chopra, S., Meindl, P., 2001).

3. Supply Chain Relationships.

Supply chain relationships play an important role in achieving the firm's goals. The coordination and integration of activities with suppliers and understanding of customer's needs results in greater benefits for companies. As cited by Henry Quesada, RadoGazo and Scarlett Sanchez (2012), Fraza (2000), supply chain management is directly related to relationship management, which includes suppliers and customers. Strategic supplier partnerships and customer relationships are main components in the supply chain management practices (Li et al., 2005), leading to information sharing, which is one of the five pillars in achieving a solid supply chain relationship (Lalonde, 1998).

4. Location.

According to K.Sartorius, C Eitzen & J Hartan Examination of the Variables Influencing the Fuel Retail Industry (2007) the study that made in South Africa had tried to see three variables that affect fuel retail industry. These are Location, Size of Fuel Station (number of pumping bay) and Fuel Price.

As cited by K.Sartorius, C Eitzen & J Hartan the location of any retail business is an important factor affecting the performance and success of that business (Chan, Padmanabhan & See tharaman, 2005). Location may be important in relation to fuel retail stations if there is a correlation between the location of fuel stations and the demand for fuel. According to Chan *et al.* (2005), the demand for petrol can be expressly linked to local geographical and demographic factors such as; population, median income, number of cars, proximity to airport, downtown and highways. Therefore, the location of a fuel retail station in a rural area, for example, should influence a lower demand for petrol than an urban area due to a lower population, lower median income, fewer cars, and poorer proximity to an airport. As cited by K.Sartorius, C Eitzen & J Hartan, the proximity of a fuel retail station to major routes may also be an important driver of fuel demand (Netz & Taylor, 2002). In this regard, customers attempt to reduce travel time and distance when commuting or traveling longer distances and, therefore, select fuel retail stations which are in close proximity to these routes (Chan *et al.*, 2005).

5. Size of Petrol Station.

As cited by K.Sartorius, C Eitzen & J Hartan the size of the petrol station and the number of pumping bays available is an indication of the convenience of filling at a particular station (Smalley, 1999). Customer convenience is an important variable that has a significant influence

on sales volume. Although there are many variables influencing customer convenience, one important factor is the number of pumps that can refuel cars. This provides an indication of the number of cars that can refuel without negatively affecting the traffic flow on the site or delay the refueling time. As cited by K.Sartorius, C Eitzen & J Hartan Customers do not like to wait to refuel and tend to avoid stations where back up problems exist (Smalley, 1999). The number of pumping bays may provide a good indicator of the number of cars that can refuel without causing back up problems and provide an indicator of the volume of petrol that may be sold. As cited by K.Sartorius, C Eitzen & J Hartan Chan *et al.*, (2005) also confirmed that station characteristics such as the number of pumping bays affects the market share of a particular fuel station and, therefore, the fuel demanded by customers

2.1.6 Factors Affecting Supply Chain Performance.

There are two forces driving supply chain management. First, is that there is the new communications technology available now that allows managers to actively manage a supply chain. Second, customers are demanding lower prices and better products and services. To meet their customers' demands, firms are optimizing the entire supply chain. Supply chain management allows all the firms in a supply chain to look beyond their own objectives to the objective of maximizing the final customer's satisfaction. The payoff for supply chain members that can do this is increased profits for their shareholders (Fredendall, Lawrence D. and Ed Hill, 2001).

The key question in supply chain management is how to coordinate the efforts of every firm in the supply chain and every employee of those firms. The coordination must provide ever-increasing amounts of value added to those customers willing to pay for it.

Performance measures drive behavior in any system. The selection of performance measures is crucial inside a firm and throughout the supply chain. Managers coordinate behavior of their employees and of their partners in the supply chain by the use of performance measures. It is through the use of measures that we are able to determine if we are making progress towards our goals. Managers measure to improve productivity. Measurement is one step in the cycle of measure, evaluate, plan, improve, and then start measuring again.

The ideal performance measure pushes every firm in the supply chain and all employees in each firm to direct all of their efforts to increasing the amount of money made by everyone in the supply chain. The ultimate measure for each firm in the supply chain is their return on

investment (ROI) or capital productivity. But, over what horizon should this be evaluated? For one quarter at a time or over a decade? The problem is that there is no perfect performance measure which will always push firms and their employees in both the short and long term to make the best decision for the long-term benefit of the supply chain. The choice of performance measures in both the firm and the supply chain must be monitored (Fredend all, Lawrence D. and Ed Hill, 2001).

Predicting of demand is the significant tool in order the production planning and provisions, managing the surface or creating levels of personalized services. Predicting demand by many technologies is relying on earlier data and their importance is setting up from patterns utilized heretofore earlier of demand for near future. Of values predicted with regard to high responsiveness for of the ones most current, this approach is obtaining in general high (low) values of demand predicted in accordance to periods high (low) of demand. It is being transferred by demand of clients to wholesalers, distributors or producers in the form of the retail order which is current demand for partners of the chain of supplies of the higher mark at the same time. Forecasts of demand are rarely in practice when thorough and what's more they are still referring to the poor quality higher marks in the chain of supplies. In the majority of chains of supplies, individual participants in the chain are trying to rationalize sizes of one's orders in accordance to economic decisions, what the distortion of real demand of clients is being created, through as well as bad redirection of demand at members of the chain of supplies from upper of its levels. Promotions and price hesitation also have influence for distorting demand (Brzozowska, A., Nowicka-Skowron M., 2007; Miragliotta, G., 2006).

2.2 Empirical Review.

The 2016 edition of the International Logistics Performance Index has put Ethiopia 126 level and one of the top 10 low-income countries performers of logistics in the world. Actually, those high-income countries dominate the top 10 rankings in the performance of world logistics. The report clearly indicates that improving logistics performance is a core for the economic growth and competitiveness agenda of a country.

Furthermore; seamless and sustainable logistics mentioned as an engine for economic growth which originated from trade and integration of value chains. In line with this, the report underlined that inefficient logistics raises the costs of trading and reduces the potential for integration between buyers and sellers. As cited by international logistics performance index, the

finding of the report states inefficient logistics can be a burden for developing countries like Ethiopia that is trying to compete in the global marketplace by exporting commodities of its agricultural products (Arvis et al., 2014).

Anthony Osoro(2015) cost of crude oil, tendering system, and legal and regulatory environment are factors that affect the performance of supply chain management. Over the years, the oil industry has continued to face growing challenges, from stricter government regulation, political risks, competition, emergent new comers and political hostilities, which has affected growth and output.

According to Raed Hussain, Tiravat Assavapokee, and Basheer Khumawala(2006) supply chain management performance could be affected by Logistical Challenges and Other Challenges, it also cited by them that Integrated process management, information systems and information sharing, organizational restructuring, and cultural reorientation are as equally important (Ikram, 2004). The need for integrated processes all the way from procurement of raw materials to the delivery of the final product is crucial for a company's success.

A research conducted by Metters, R. (1997) indicated that the total elimination of the bullwhip effect is able to rise product profitability of about 10%-20%, however decrease in the bullwhip effect is making the possible profitability height of about 5%-10%. Linking the elimination or decrease in the bullwhip effect to the reduction of the other property (e.g. of seasonality) is possible to obtain profitability higher of about 15%- 30% in dependence on the specificity of the business environment.

Many organizations have begun to recognize that SCM is the key to building sustainable competitive edge for their products and/or services in an increasingly crowded marketplace and enhancing organizational and overall supply chain performance (Li *et al.*, 2006).

The ICT revolution is reaching new milestones and is stimulating growth in other services. As cited by Anthony Osoro ICTs play a major role in increasing productivity and cutting costs in many sectors of the economy (USDA, 2012).

As cited by Anthony Osoro ICTs and modern petroleum technologies (which are also becoming information intensive technologies) provide new opportunities to improve economic performance at all stages of the oil supply chain (Gist, 2013). These will be through the technologies of production of crude oil and downstream operations of oil product. For example, as cited by Anthony Osoro in upstream operations, ICTs and related technologies may provide possibilities

for expanding proven crude oil reserves, improving the rate of crude oil extraction from existing wells, and providing further means to discover new wells, and so forth (Foster et al, 2011).

Efficiency of logistics and supply chain can be source of distinct competitive advantage for an organization. However as per the Internal audit report of Libya Oil Ethiopia Limited (LOEL), the company has paid Br 7.3 million in year 2013 only as demurrage and Storage charge on Lubricant importation which has affected the company's profitability. The same report also disclosed that the company is exposed to stock out situation as it fails to position all Lubricant SKUs in its warehouse due to delay on the activities along the supply chain (Petros Gulma, 2015).

2.3 Conceptual Frame Work.

The conceptual frame work is tries to show how the dependent variable fuel supply chain management affected by the independent variables i.e. government support, information and communication technology, supply chain relationship and size of petrol station.

Figure 2.1 conceptual framework of the study

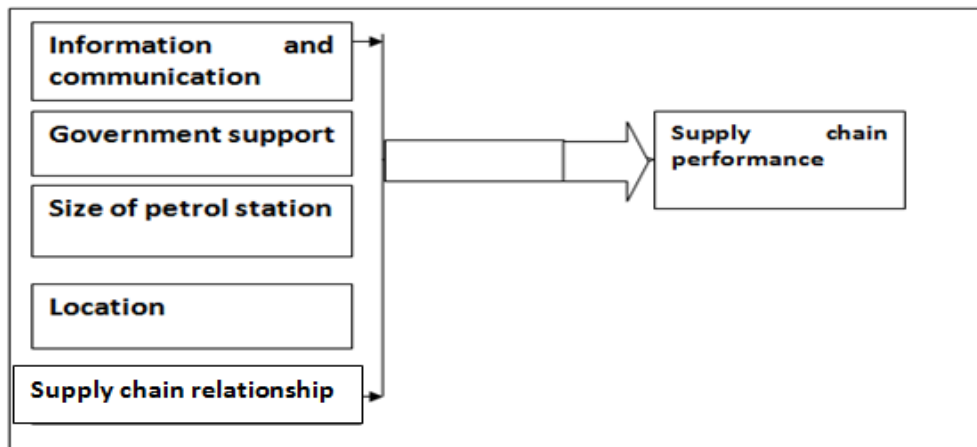


Figure 2.1 customized from Anthony Osoro (2015); Smalley (1999) and Foster et al, (2011).

Chapter Three

Research Design and Methods.

In this chapter the researcher tried to include the following subsequent sub chapters

3.1 Research design

3.2 Research approach

This chapter involves presenting and motivating the choice of method of collecting and analyzing data, from both a theoretical and practical point of view, compared to the relative advantages and disadvantages of other alternative methods that may be more or less appropriate to the context of the study.

3.1 Research Design

This study used mixed (quantitative and qualitative) research approach and descriptive and explanatory research design. Mixed research approach is the general term when both quantitative and qualitative data collection techniques and analysis procedures are used in a research (Saunders et al.: 2009). Mixed research design which includes descriptive and explanatory research type was apply in the study.

The objective of descriptive research is ‘to portray an accurate profile of persons, events or situations. This may be an extension of, or a forerunner to, a piece of exploratory research or, more often, a piece of explanatory research. It is necessary to have a clear picture of the phenomena on which you wish to collect data prior to the collection of the data (Saunders et al.:2009). The descriptive research design used to analyze demographic and the structured questionnaires.

Different authors suggest different mechanisms to use mixed approach method. The researcher tried to use Sequential explanatory strategy because this method is suitable and straight forward. Creswell, J. (2012) argues that the main purpose of the sequential explanatory design typically is to use qualitative results to assist in explaining and interpreting the findings of a primarily quantitative study. It can be especially useful when unexpected results arise from a quantitative study. Therefore, the researcher primarily collected the quantitative data through structured questionnaire and then the result packed by qualitative data to explore new things and to give professional opinion to the reader.

3.2 Research Approach.

3.2.1 Total Populations and Sampling Procedure.

This study was conducted to assess factors affecting fuel supply chain management and their contribution to the performance of the company and to the industry. Kothari (2004) suggests the first step in developing any sample design is to clearly define the set of objects, technically called the Universe, to be studied. The population for this study was includes fuel and oil distribution companies in Addis Ababa.

According to Ato Danial Dalol oil S.C senior staff interview(2018) only seven companies, Oil Libya, Total Ethiopia, NOC, Kobile, YBP, Nile, and TAF do have fuel and oil retailing station in Addis Ababa.

Each company has many outlets (branches) to deliver their product to the final user. There for the target populations of the study are all fuel stations (111 stations) of fuel and oil Distribution Companies those operas in Addis Ababa.

The unit of analysis for the purpose of this study was individual company (fuel and oil distribution outlets). The response collected from different department staff and manager to represent clearly company's fuel supply chain practice and company's performance due to the program. The response collected from each respondent was considered as potential performance of that company.

Sample sizes in business to business studies present a different problem than in consumer studies where the population almost always is very large. The acceptable sample size in this case is as small as 30% of the population or the final decision would be made after examining the profile of the respondents (Hair et a l: 2006). For the purpose of this study the researcher took 32 respondents from the total population considered as a sample size. The actual sample for this study was 32 fuel and oil distributing companies.

Thus, to determine the sample size the researcher preferred to use a method developed by: Carvalho (1984), as cited in Malhorta Naresh, K. (2007).

Table 3.1 Sample Size Determination

Population Size/ Sample size

Population Size	Sample size		
	Low	Medium	High
51-90	5	13	20
91-150	8	20	32
151-280	13	32	50
281-500	20	50	80
501-1200	32	80	125
1201-3200	50	125	200
3021-10000	80	200	315
1001-35000	125	315	500
35001-150000	200	500	800

(Source: Malhorta Naresh, *Marketing Research: an applied approach*, 2007)

The total numbers of oil and fuel distribution stations are 111 fuel stations in Addis Ababa. Therefore, 32 fuel stations are considered as a sample respondents as per the Malhora Naresh's sample determination method, considering the heterogeneity of sample respondents. In addition to this an interview held with management bodies and other professionals.

3.2.2 Sampling Design, Procedure and Techniques.

This research employed both probability sampling from the total population (111 outlets) of the company and non-probability sampling in a company level (from 5 companies) for the purpose of in-depth interview. Kothari (2004) suggested that good research design should be representative, with small sampling error, controlled systematic biases. Appropriately designed Probability sampling assured to generate viable, representative and generalize able data to the population.

The researcher used simple random probability sampling technique to select respondents for questionnaire. Whereas, to gather qualitative data the research employed non probability sampling design by using judgmental non probability sampling techniques. The researcher selected experts who have related expertise and professional background on oil and fuel distribution industry to give detail opinion for in-depth interview. To ensure randomness the

researcher selected a specific respondent in the basis of simple random technique by using a lottery method.

3.2.3 Data Source and Data Collection Method.

The researcher used both primary and secondary data sources for the study. The primary data collected from selected company and professionals in the field. These data collected through questionnaires and in-depth interviews. Pre structured questionnaire was prepared for the selected respondent in the company to collect quantitative data. Unstructured questions with probing question prepared to gather qualitative data. The researcher also used secondary data from organization report and from related research work in the sector to link with the concept.

3.2.3.1. Questionnaire.

Vohra (2008) defined questionnaire as a questionnaire in essence is a list of questions which researcher prepares beforehand. The questionnaire was developed to collect significant information relating to the fuel supply chain practice, extent and its significance to the performance of the company as well as industry level. A structured questionnaire was prepared on the major dimensions of fuel supply chain practice and performance measurement. The questionnaire was designed in a form of a five point Likers scale which was range from 1; “Strongly disagree”, 2. Disagree 3; “Neutral” 4. Agree and finally 5; “Strongly agree”. To collect quantitative data from randomly selected respondent.

3.2.3.2. Interviews.

Interviews have been recognized as the most appropriate method of collecting data in a qualitative research. The most common ways of conducting interviews is individual or face to face interaction or a group interview or a self-administrated questionnaire or just a questionnaire filling (Vohra : 2008).

The interview was conducted with respondents selected intentionally by using judgmental non probability sampling technique to gather qualitative data. The researcher planned to select 5 individuals in the industry and from academicians in the same field who has significant expertise and knowledge in the sector to collect qualitative data. The interview result may use after quantitative data collection to give detail insight about problem at hand. Finally the interview result was used to explore the potential opportunity or threat in the sector that arise due to

successful use of the program or failing to practice fuel supply chain program effectively and finally to make policy recommendation.

3.2.4 Validity and reliability.

The study was followed all appropriate scientific research method, procedure and techniques in order to produce valid and reliable output. According to Saunders et al. (2009) Reliability refers to the extent to which your data collection techniques or analysis procedures yield consistent findings. The reliability analysis was done to ensure internal consistency of the measurement tools using SPSS version 21.0.the researcher tried to show the internal consistency of data collection instrument. The researcher tried to see the result of Cronbach's Alpha test (which measures internal consistency) the result shows 74.6 which means all research instrument utilized to gather response are internally consistent and reliable.

Reliability

Table 3.2 Reliability Statistics

Cronbach's Alpha	N of Items
.746	6

Table 3.3 Item Statistics

	Mean	Std. Deviation	N
Spsall	3.9000	.75349	32
GSall	2.9375	.70104	32
SRall	2.5670	1.05883	32
ICTall	2.0268	.89431	32
LOall	3.3625	.63335	32
PERAL	3.0938	.53705	32
L			

Table 3.4 Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Spsall	13.9875	8.003	.267	.766
GSall	14.9500	6.812	.657	.667
SRall	15.3205	5.811	.544	.702
ICTall	15.8607	6.396	.556	.689
LOall	14.5250	7.771	.435	.724
PERAL L	14.7938	7.711	.573	.702

Validity refers to the extent to which a test measures what we actually wish to measure. Validity is the most critical criterion and indicates the degree to which an instrument measures what it is supposed to measure. Validity can also be thought of as utility. In other words, validity is the extent to which differences found with a measuring instrument reflect true differences among those being tested (Kothari: 2004) this researcher tried to measure external, construct and statistical technique validity test. The researcher makes considerable effort to maintain the validity of the research. Among many efforts the researcher advised academic professionals, industry practitioners and revised many literatures written in this topic. Finally the researcher made adjustments from the first draft.

3.2.5 Data Analysis Method.

In general there are two types of data analysis techniques namely: qualitative and quantitative where by the choice of these methods greatly depends on the type of information the researcher has at hand. When most of information collected contains numerical, the analysis calls for quantitative tools and descriptive statistics can be used to characterize the data. On the other extreme, when most of the data collected are in words which mean data gathered using individual interviews, open –ended questions and focus group discussion, it is logical enough to apply qualitative data analysis tools Nunnely et al., (1994).

Therefore, as determined in the data collection tool for this study, the researcher used different data analysis technique. All quantitative data collected from respondent has been analyzed using SPSS (statistical package for social science) .the researcher was organized the data using tables' frequency, percentage, mean, standard deviation used to describe the quantitative data. The researcher used inferential statistics (correlation) where necessary to show the relationship between variables and to infer the result of the sample to the population under study. The researcher has been presented the qualitative data collected from in-depth interview tried to incorporate as evidence or to show the extent to provide detail insight about the situation.

3.2.6 Ethical considerations

In this study all ethical considerations was considered. The major ethical issues like response confidentiality, source acknowledgement, data fabrication, deliberate intention to produce data based on the researcher vested interest... are the major issues that the researcher wants to protect during the course of action.

Chapter Four

Data Analysis and Presentation

4.1 Data Analysis and Discussion.

All collected data is analyzed as well summarized in order to achieve the aim or objective of the research. As mentioned earlier this study was held to assess factors affecting fuel supply chain management and their relationship with supply chain performance in Addis Ababa city. Hence, the demographic profile of the respondents, factors affecting fuel supply chain management, fuel supply chain performance and other associated sub topics are analyzed in detail. Finally, summarized findings followed by conclusions of the study are presented.

4.2 Demographic Profile of Respondents.

To observe what demographic trend the sample population had, the questionnaire started off with demographic characteristics of respondents. This part of the questionnaire requested limited amount of information related to personal and demographic status of the respondents. Accordingly, the following variables about the respondents were summarized and described in the subsequent tables. These variables included; Gender, Age, Educational Background, position and company.

Table 4.1 Respondent Profile

s.no	Respondents Profile	Response in Frequency	Response in Percentage
1	Gender	Male	21 65.6
		Female	11 34.4
2	Job position	Pumpist	4 12.5
		supervisor	17 53.1
		Managerial level	11 34.4
3	Job experience	Between 1-5 year	11 34.4
		Between 5-10 years	15 46.9
		Greater than 10 years	6 18.8
4	Name of company	NOC	10 31.3
		YBP	2 6.3
		TAF	2 6.3
		Kobil	1 3.1
		Total	7 21.9
		Oilibya	10 31.3
5	Age of respondent	Below 25 years	2 6.3
		25-35 year	15 46.9
		36-45 year	13 40.6
		46-55 year	2 6.3
6	Educational level	Below Certificate	7 21.9
		Certificate	7 21.9
		Diploma	9 28.1
		BA/Bsc Degree	9 28.1

Source: own survey result, 2018

The above table 4.1 shows the profile of the respondent which includes Gender, age, education, experience, position and company name. The result of the research indicated that 65.6 % of the respondents were Males and 34.4 % of the respondents were Females. As the data clearly indicates Males are the major players as employee in the fuel industry of Ethiopia. In view of age distribution, it was taken by the age group of 25-35 years with 46.9% followed by the age group

of 36-45 years by 40.6 and the other two below 25 years and above 46-55 age groups by 6.3% respectively. Age composition of the respondent shows that greater than 85% of the population in fuel and oil industry is between 25-45 age groups. In terms of job position, supervisor and manager comprises 87.5% of the respondent whereas, pumpists cover 12.5 % of the respondent. This means the majority of the respondents are familiar with the concept under study.

Work experience of the respondent comprises 46.9%, 34.4% and 18.8% for between 5-10 years, between 1-5 years and greater than 10 years respectively. Work experience of the respondent highlights majority of the respondent greater than 80% fall under 1-10 years range of work experience. Educational level of the respondent revealed that 21.9% and 28.1% for below certificate and certificate and for diploma and BA/Bsc level respectively.

In view of company of the respondent distribution, it was taken by NOC 31.3% and Oilibya 31.3% followed by TOTAL, TAF, YBP and Kobil (21.9%, 6.3%, 6.3% and 3.1%) respectively.

4.3 Descriptive statistics.

In this section the researcher tried to describe the major factor that hinder the performance of fuel supply chain management. Factors such as size of petrol station, Government support, supply chain relationship, information communication and technology and location of the company discussed in detail. The researcher used three ranges (good, moderate and poor) as a standard in order to group mean value. Cut off point $4/3 = 1.333$ mean value ranges from $3.667-5.00 =$ good mean value ranges from $2.334- 3.667$ moderate and mean value ranges from $1.00- 2.334$

4.3.1 Size of Petrol Station (Internal Capacity).

According to (Smalley, 1999) The number of pumping bays may provide a good indicator of the number of cars that can refuel without causing back up problems and provide an indicator of the volume of petrol that may be sold. As cited by K.Sartorius, C Eitzen& J Hartan Chan *et al.*, (2005) also confirmed that station characteristics such as the number of pumping bays affects the market share of a particular fuel station and, therefore, the fuel demanded by customers important factor is the number of pumps that can refuel cars. This provides an indication of the number of cars that can refuel without negatively affecting the traffic flow on the site or delay the refueling time.

Table 4.2, Size of Petrol Station

parameters	N	Mean	Std. Deviation
There is adequate fuel pumping bay	32	3.97	.782
The company use different queue discipline technique for different product	32	4.03	1.031
The storage capacity of the company is consistent with the number of its customer	32	3.69	1.030
There is adequate human resource with necessary facility to serve the customers	32	3.94	.840
The company uses modern pump which has the fastest speed per minute	32	3.88	1.129
Overall Grand mean	32	3.902	0.96

Source: own survey result, 2018

Table 4.2 reveals that the list of items comprising size of petrol station, the mean score for the item “The company use different queue discipline technique for different product” Scored the highest with a mean score of M=4.03 While the item " The storage capacity of the company is consistent with the number of its customer" scored the lowest with a mean score of M= 3.69. The overall grand mean score for the size of petrol station dimension is M= 3.902, which indicate that the respondents evaluation about the size of petrol station is good.

The above quantitative data regarding size of petrol station supported by the interviewee’s reaction. Most of the interviewee responded as size of petrol station is not major factor for the inconsistency in the industry.

4.3.2 Government Support

According to (Yusuf, 1995) that government support plays an important role for business success. As cited by Henry Quesada, Rado Gazo and Scarlett Sanchez (2012)The increase of international trade for acquiring resources from other countries introduces complicated matters such as language barriers, transportation, transportation costs, exchange rates, tariffs, and administrative practices (Quayle, 2006).

Table 4.3 Level of Government Support

parameters	N	Mean	Std. Deviation
The company receive up to date information from concerned government body	32	2.56	1.162
The company work closely with the government to improve infrastructure problems	32	2.19	1.091
The company protected by the government from illegal trade	32	3.62	1.129
The company receive adequate fuel from the concerned government depot every month	32	4.28	.683
The company participates on fuel capacity building training with the concerned government body	32	2.03	1.282
Over all Grand mean	32	2.936	1.07

Source: own survey result, 2018

Table 4.3 shows that the respondents scored the highest for the item “The Company receives adequate fuel from the concerned government depot every month” and “The company protected by the government from illegal trade” mean value M=4.28 and M=3.62 respectively. While, item The company receive up to date information from concerned government body, The company work closely with the government to improve infrastructure problems and The company participates on fuel capacity building training with the concerned government body mean M=2.56, M=2.19 and M=2.03 respectively score lowest mean value. The grand mean for this variable is M=2.936 which is moderate value.

The researcher tried to assess the cause of low government support through interview. Most of the interviewee agrees that they are not working closely with the concerned government body. The major reason are concerned government body gave less attention to improve supply chain related issues, concerned government body uses strict regulation related with profit margin , concerned government body not let them permit to import fuel from abroad .

4.3.3 Supply Chain Relationship

As cited by Henry Quesada, Rado Gazo and Scarlett Sanchez (2012), Fraza (2000), supply chain management is directly related to relationship management, which includes suppliers and customers. Strategic supplier partnerships and customer relationships are main components in the

supply chain management practices (Li et al., 2005), leading to information sharing, which is one of the five pillars in achieving a solid supply chain relationship (Lalonde, 1998).

Table 4.4 Supply Chain Relationship in Fuel Industry

Parameters	N	Mean	Std. Deviation
The company has ability to provide service for 24hours/7 days in a week	32	4.03	.999
The company involves on jointly planning practice with stakeholders	32	2.44	1.458
The company involves in information sharing with stakeholders continuously	32	2.50	1.368
The company plan with its concerned stakeholders together about fuel supply	32	2.44	1.243
The company involves on planning on customers demand forecast with its stakeholders	32	2.28	1.276
The company involves on working together to achieve common goal with stakeholders	32	2.28	1.350
The company involves on planning to improve the bottlenecks in the fuel industry in general	32	2.00	1.191
Overall Grand mean	32	2.57	1.27

Source: own survey result, 2018

The above table 4.4 indicates that moderate overall grand mean $M=2.57$ from the listed parameters some items the company has ability to provide service for 24hours/7 days in a week score highest mean $M=4.03$ on the other hand item The company involves in information sharing with stakeholders continuously, The company involves on jointly planning practice with stakeholders, The company plan with its concerned stakeholders together about fuel supply, The company involves on planning on customers demand forecast with its stakeholders, The company involves on working together to achieve common goal with stakeholders and The company involves on planning to improve the bottlenecks in the fuel industry in general mean score $M=2.50$, $M=2.44$, $M=2.44$, $M=2.28$, $M=2.28$ and $M=2.00$ respectively.

According to the result of the interview, all respondent agree that there is no communication between competitors and customers at all. They see competitors as rivals not as partner and there is no customer association to fix fuel supply chain problems.

4.3.4 Information communication and technology

The ICT revolution is reaching new milestones and is stimulating growth in other services. As cited by Anthony Osoro ICTs play a major role in increasing productivity and cutting costs in many sectors of the economy (USDA, 2012a).

As cited by Anthony Osoro ICTs and modern petroleum technologies (which are also becoming information intensive technologies) provide new opportunities to improve economic performance at all stages of the oil supply chain (Gist, 2013).These will be through the technologies of production of crude oil and downstream operations of oil product. For example, as cited by Anthony Osoro in upstream operations, ICTs and related technologies may provide possibilities for expanding proven crude oil reserves, improving the rate of crude oil extraction from existing wells, and providing further means to discover new wells, and so forth (Foster et al, 2011).

Table 4.5 Information Communication and Technology

Parameters	N	Mean	Std. Deviation
The company uses information technology effectively	32	1.97	1.031
The company records customers data in order to predict future demand	32	2.03	1.062
The company disseminate information for the stakeholders	32	2.19	1.176
The company frequently process data in to meaningful information	32	1.97	.999
The company utilize information for decision making process	32	1.97	1.092
The company use information technology in order to improve stakeholders relationship	32	1.94	1.045
The company uses information technology for inventory management at national and international level	32	2.13	1.212
Overall Grand mean	32	2.03	1.088

Source: own survey result, 2018

Table 4.5 shows the information communication and technology usage in fuel and oil industry has the lower overall grand mean $M=2.03$. which is poor value. There are some items that score relatively high score The company disseminate information for the stakeholders, The company uses information technology for inventory management at national and international level and The company records customers data in order to predict future demand mean score $M=2.19$, $M=2.13$ and $M=2.03$ respectively while , some items such as The company uses information technology effectively, The company frequently process data in to meaningful information, The company utilize information for decision making process and The company use information technology in order to improve stakeholders relationship $M=1.97$, $M=1.97$, $M=1.97$ and $M=1.94$ respectively scored the lowest mean.

The researcher identified the major reason through interview why most of companies are weak in relation to information communication and technology usage are they think they are not in a position of using advanced technology , the level of competition is not stiff , the business environment is not motivating.

4.3.5 Location

According to Chan *et al.* (2005), the demand for petrol can be expressly linked to local geographical and demographic factors such as; population, median income, number of cars, proximity to airport, downtown and highways. Therefore, the location of a fuel retail station in a rural area, for example, should influence a lower demand for petrol than an urban area due to a lower population, lower median income, fewer cars, and poorer proximity to an airport.

As cited by K.Sartorius, C Eitzen& J Hartan The proximity of a fuel retail station to major routes may also be an important driver of fuel demand (Netz& Taylor, 2002). In this regard, customers attempt to reduce travel time and distance when commuting or traveling longer distances and, therefore, select fuel retail stations which are in close proximity to these routes (Chan *et al.*, 2005)

Table 4.6 Location

Parameters	N	Mean	Std. Deviation
The company select the right location to build its fuel station based on certain international standard	32	4.31	.693
most of your fuel stations are convenient for the customers	32	4.31	.738
The company fuel station has competitors nearby by	32	2.84	1.298
The company fuel station are located at high traffic flow routes	32	3.44	1.190
The company fuel station located at a minimum distance from the depot	32	1.91	.818
Over all Grand mean	32	3.36	0.947

Source: own survey result, 2018

The above table 4.6 shows that the respondents scored the highest for the item “The Company select the right location to build its fuel station based on certain international standard” and “most of your fuel stations are convenient for the customers” for both item Mean=4.31 while the lowest score is “The company fuel station located at a minimum distance from the depot” Mean =1.91. This variable has the overall grand mean M=3.36 which is moderate value.

Most of the interviewee responded that they are so conscious in a location selection, some of the interviewee responded that they pay additional cost to select the right location and they hire location analyzer.

4.3.6 Fuel Supply chain performance

According to Raed Hussain, Tiravat Assavapokee ,and Basheer Khumawala (2006) supply chain management performance could be affected by Logistical Challenges and Other Challenges, a research conducted by Anthony Osoro , Willy M. Muturi and Patrick K. Ngugi (2016) argues that cost of crude oil affects performance of supply chain systems in the petroleum industries in Kenya. In addition, Anthony Osoro (2015)identified factors like cost of crude oil, Tendering system, and legal and regulatory environment are factors that affects the performance of supply chain management. Over the years, the oil industry has continued to face growing challenges, from stricter government regulation, political risks, competition, emergent new comers and political hostilities, which has affected growth and output

Table 4.7 Fuel Supply Chain Performance

Parameters	N	Mean	Std. Deviation
The company has greater goodwill compare with other companies in the industry	32	4.56	.619
The company has ability to supply service in a minimum price to the customers	32	2.34	1.004
The company achieved higher customers satisfaction	32	3.78	.975
The company has minimum probability for product stock out	32	3.34	1.066
The company has relatively good return on investment in the industry	32	2.22	1.070
The company operation cost decline overtime	32	2.31	1.091
Overall Grand mean	32	3.09	0.970

Source: own survey result, 2018

The above table 4.7 shows the performance of fuel supply chain. From the result we can see that item “The company has greater goodwill compare with other companies in the industry” score the highest Mean = 4.56 whereas, item “The company has relatively good return on investment in the industry” score low Mean=2.22. Overall grand mean result implies the existence of moderate fuel supply chain performance score M=3.09

4.4. Relationship between Factors of Fuel Supply Chain and Fuel Supply Chain Performance

This portion of the study has significant role in order to eliminate the major research questions raised in chapter one and it has role to achieve the research objective of the researcher. The researcher used different statistical tools to explore the relationship between dependent and independent variables.

4.4. a Correlation analyses

Table 4.8.a Factors of Fuel Supply Chain and Fuel Supply Chain Performance

	Pearson correlation	SPS all	GS all	SR all	ICT all	LO all	PER ALL
SPSall	r	1					
GSall	r	.337	1				
SRall	r	.107	.551**	1			
ICTall	r	.045	.403*	.638**	1		
LOall	r	.446*	.419*	.136	.204	1*	
PER ALL	r	.154	.470**	.349	.529**	.479**	1
	N	32	32	32	32	32	32

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

**. Correlation is significant at the 0.01 level (2-tailed).

According to (Cohen, 1988), to determine the strength of the relationship between variables He suggests the following guidelines: $r = .10$ to $.29$ or $r = -.10$ to $-.29$ small $r = .30$ to $.49$ or $r = -.30$ to $-.49$ medium $r = .50$ to 1.0 or $r = -.50$ to -1.0 large these guidelines apply whether or not there is a negative sign out the front of your r value.

Table 4.8.a Pearson partial correlation coefficients r shows between each pair of variables listed. The researcher tried to minimize the effect of missing value by using option exclude cases pair wise in the SPSS which enable to remove missing value from the analysis. The sig. (2-tailed) shows the distribution as normal not determined either positive or negative direction. To determine the relationship, their significance and direction of the variable it is better to see the value of each variable. Based on the data given above there is no negative relationship between variables. There is different degree of significance among variables in some variable there is strong correlation ($r = 0.551$, $r = 0.638$, and $r = 0.529$) between supply chain relationship to government support, Information Communication and Technology to supply chain relationship and supply chain performance to Information communication and technology respectively. Moderate correlation ($r = 0.403$, $r = 0.446$, $r = 0.419$, $r = 0.470$ and $r = 0.479$) between Information communication and technology to Government support, Location to supply chain relationship, location to government support, supply chain performance to Government support and supply

chain performance to Location respectively. This table shows the value of Pearson partial correlation coefficient value between all variables.

Correlation between supply chain performance and Information communication and technology, Government support and location is significant at $P = 0.01$ for information communication and technology while at $P = 0.05$ level for government support and Location. Performance to strategy, performance to people has statistically significance correlation because ($P < 0.05$)

4.4.b Regression Analysis

Table 4.8 .b Factors of Fuel Supply Chain and Fuel Supply Chain Performance.

Correlations

		PERALL	SPSALL	GSALL	SRALL	ICTALL	LOALL
Pearson Correlation	PERALL	1.000	.154	.470	.349	.529	.479
	SPSALL	.154	1.000	.337	.107	.045	.446
	GSALL	.470	.337	1.000	.551	.403	.419
	SRALL	.349	.107	.551	1.000	.638	.136
	ICTALL	.529	.045	.403	.638	1.000	.204
	LOALL	.479	.446	.419	.136	.204	1.000
Sig. (1-tailed)	PERALL	.	.200	.003	.025	.001	.003
	SPSALL	.200	.	.030	.280	.403	.005
	GSALL	.003	.030	.	.001	.011	.009
	SRALL	.025	.280	.001	.	.000	.229
	ICTALL	.001	.403	.011	.000	.	.132
	LOALL	.003	.005	.009	.229	.132	.

a. Dependent Variable: PERALL

b. All requested variables entered.

The above table Used to determine whether the correlation value violate the assumption of Multi co linearity and singularity in which predictors show at least some relationship with dependent

variable. The fact shows the score for Information communication and technology, Location, Government support and Supplier relationship ($r=.529$, $r=.479$, $r=.470$, and $r=.349$) are (above .30 preferable) in preferable range.

In this research most predictors are between ($r=0.30$ and $r=0.700$) so that it is preferable range because it satisfies multiple regression assumption.

Table 4.8.c Factors of Fuel Supply Chain and Fuel Supply Chain Performance. Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		Collinearity Statistics	
	B	Std. Error	Beta			Partial	Part	Tolerance	VIF
constant	1.427	.507		2.817	.009				
SPSALL	-.063	.118	-.088	-.533	.599	-.104	-.077	.761	1.315
GSALL	.178	.149	.232	1.194	.243	.228	.173	.555	1.802
SRALL	-.044	.107	-.087	-.414	.682	-.081	-.060	.474	2.110
ICTALL	.255	.115	.424	2.215	.036	.398	.321	.571	1.752
LOALL	.294	.147	.346	1.992	.057	.364	.288	.694	1.441

a. Dependent Variable: PERALL

Table 4.8.c the significance of this table is to diagnose co linearity problem for multi co linearity cases. This can pick up on problems with multi co linearity that may not be evident in the correlation matrix. Tolerance and VIF are tools to measure co linearity statistics, Tolerance level: Tolerance is an indicator of how much of the variability of the specified independent is not explained by the other independent variables in the model and is calculated using the formula $1-R^2$ for each variable. with its cut off less than 0.10 point and VIF(variance inflation factor with cut off above 10 point) for both less than 0.10 for tolerance value and greater than 10 point indicates the possibility of multi-collinearity. in this research case tolerance level indicates

(0.761, 0.555, 0.474, 0.571, and 0.694) for Size of petrol station (SPSALL), Government support (GSALL), Supplier relationship (SRALL), Information and communication technology (ICTALL), and Location (LOALL) respectively and VIF value of (1.315, 1.802, 2.110, 1.752, and 1.441) for Size of petrol station (SPSALL), Government support (GSALL), Supplier relationship (SRALL), Information and communication technology (ICTALL), and Location (LOALL) respectively. For both measurements there is no value less than 0.10 in tolerance level and there is no point greater than 10 point in VIF column value. These results enable to say the correlations of each independent value are consistent with the multi co linearity assumption.

Standardized coefficient Beta value evaluates the value of each independent variable. Beta value measures the contribution of independent variable for prediction of dependent variable. The output of this research shows (the largest Beta coefficient is .424 then .346, .232, -.088, and -.087) the largest value indicates higher contribution and by ignoring negative sign least Beta coefficient value indicates lower contribution.

In the SPSS output the sig. column (sig value <0.05) shows the variable's ability in making a statistically significant unique contribution to the equation. In this model information technology and communication has statistically significant unique contribution to explain the dependent variable. Whereas, size of petrol station, government support, supply chain relationship and location are not statistically unique significant contributor for the prediction of dependent variable. This can be due to overlap with other independent variables in the model.

This table also provides potentially useful piece of information in the Part correlation coefficients column. According to Tabachnick and Fidell, 2001 as cited by (Pallant, 2005) Part correlation coefficients referred to as semi-partial correlation coefficient and it provide an indication of the contribution of that variable to the total R squared. In other words, it tells you how much of the total variance in the dependent variable is uniquely explained by that variable and how much R squared would drop if it wasn't included in your model.

As indicated in this column (part correlation) part correlation result shows $.321^2 = 0.103$, $.288^2 = 0.0829$, $.173^2 = 0.0299$, $-.077^2 = 0.005929$, and $-.060^2 = 0.0036$ this indicates Information communication and technology 10.30%, Location 8.29%, Government support 2.99%, size of petrol station 0.593% and Supplier relationship 0.36% of unique contribution to the explanation of variance in fuel supplier chain performance.

Chart

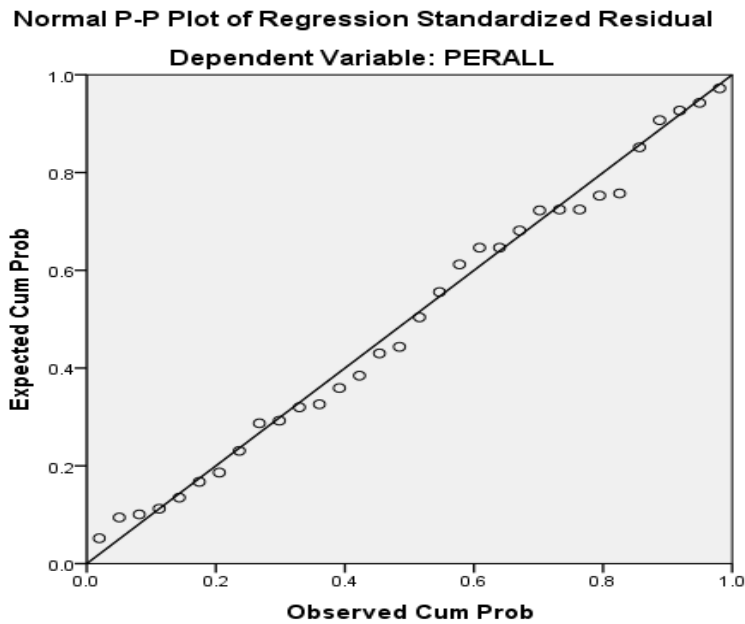


Chart 4.1

Normal Probability Plot of the regression standardized residuals indicates the normality assumption. As indicated by the above plot point's lie reasonably straight diagonal line from the left bottom to top right it indicates that there is no major deviation from normality.

Table 4.9 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.154 ^a	.024	-.009	.53940
2	.470 ^b	.221	.167	.49005
3	.482 ^c	.233	.151	.49496
4	.610 ^d	.372	.279	.45603
5	.675 ^e	.455	.350	.43287

a. Predictors: (Constant), spsall

b. Predictors: (Constant), spsall, GSall

c. Predictors: (Constant), spsall, GSall, SRall

d. Predictors: (Constant), spsall, GSall, SRall, ICTall

e. Predictors: (Constant), spsall, GSall, SRall, ICTall, LOall

The above table 4.9 shows that the prediction capability of the proposed model. Based on the result independent variables (size of petrol station, government support, supplier relationship, information communication and technology and location) are capable to predict the performance of fuel supply chain management this indicated by $r = 675$. On the other hand we can say that stated factors will affect the performance of fuel supply chain in 35% or effective management of stated factors can contribute to the supply chain performance by 35%.

Chapter Five

Summary, Conclusion and Recommendation.

In this chapter of the study, major findings are summarized and conclusion is presented.

5.1. Summary

The primary objective of this study was to assess factors affecting fuel supply chain management and their relationship with fuel supply chain performance in Addis Ababa city Administration. Nowadays the fuel and oil industry is composed of privately owned companies that are in stiff competition against each other to dominate the market. Hence, this study tried to identify which determinant has the highest factors to improve industries supply chain performance. In addition, this study also tried to answer the research questions raised in the first chapter of this study.

In order to evaluate factors affecting fuel supply chain management in fuel and oil industry, the study considered five major factors namely supplier relationship, Government support, location, information and communication technology and size of fuel station.

The major findings indicated that most of the factors of fuel supply chain management dimensions had been found influential factors on the supply chain performance.

- The overall grand mean score for the size of petrol station dimension is $M= 3.902$, which indicate that the respondents evaluation about the size of petrol station is good.
- The overall grand mean score for Location dimension is $M = 3.36$. Based on respondent's evaluation of location factor it has relatively moderate score compared with other factors.
- The overall grand mean score for Government support factor is $M=2.936$ so that government support factor has moderate score on fuel supply chain factors.
- The overall grand mean score for Supply chain relationship is $M=2.57$ hence, supply chain relationship dimensions has relatively moderate score among fuel supply chain factors.
- Information communication and technology overall mean result $M=2.03$. So that this dimension has relatively poor performance.
- The overall grand mean for supply chain performance score is $M=3.09$ which shows there is moderate fuel supply chain performance in Addis Ababa city petrol and fuel retail industry.

- In this research strong correlation observed between supply chain relationship to government support $r = 0.551$, information and communication technology to supply chain relationship $r = 0.638$ and supply chain performance to information and communication technology $r = 0.529$.
- Moderate correlation also observed between information and communication technology to government support $r = 0.403$, location to size of petrol station $r = 0.446$, location to government support $r = 0.419$, supply chain performance to government support $r = 0.470$ and supply chain performance to location $r = 0.479$.
- The research finding shows that only information and communication technology make statistically significant unique contribution for the prediction of dependent variable.
- The adjusted R square shows = 35%, that means these factors can affect the performance by 35% or managing these factors effectively can contribute 35% performance improvement.

5.2. Conclusions

Factors of fuel supply chain management and its associated supply chain performance in a fuel and oil industry were analyzed. The study found out dimensions of Information communication and technology, Government support and location had significant relationship with supply chain performance.

There for the researcher concluded that:-

- Government support has moderate positive relationship with supply chain performance.
- Information and communication technology has strong positive relationship on supply chain performance.
- Supply chain relationship has no direct relationship with supply chain performance but it has strong positive relationship with Information communication and technology dimensions.
- Size of petrol station has no direct relationship with supply chain performance but it has moderate positive relationship with location dimension.
- Location has moderate positive relationship on supply chain performance and correlation with government support and size of petrol station dimension.
- Government support and Information communication and technology dimensions are the major bottlenecks in order to improve supply chain performance.

- Factors of fuel supply chain management has statistically significant positive relationship with the overall supply chain performance.
- Strong correlation observed between supply chain relationship to government support, information and communication technology to supply chain relationship and supply chain performance to information and communication technology.
- Moderate correlation observed between information and communication technology to government support, location to size of petrol station, location to government support, supply chain performance to government support, and supply chain performance to location.
- Information and communication technology statistically unique significant contribution for the prediction of dependent variable.
- These fuel supply chain factors can affect the fuel supply chain performance by 35% or managing these factors effectively can contribute 35% performance improvement.

5.3. Recommendations

The factors affecting fuel supply chain management scale gives fuel and oil distributor structured approach for formulating their supply chain related strategies. It is straight forward approach illustrates how different components and their relations contribute to the company's supply chain performance improvement. As a stakeholder improving supply chain performance have limited resources in terms of money, time and other resources, this framework helps them:

- To the investors who wish to expand or launch new petrol station understanding the major factor such as using technology in order to integrate internal function, improving size of petrol station and working with competitor that Affect Company's performance helps to minimize potential losses. The investor should choose appropriate location, introducing new information communication and technology, maintaining good relationship with supplier and increasing size of petrol station. Since, understanding the major factors and their relationship with fuel supply chain performance provides competitive advantage to the investor.
- To the stakeholders supply chain creates value to all stakeholders. Improving fuel supply chain breaks cost; the industry became responsive and increase service reliability. There for, all stakeholders should work closely in order to remove factors affecting supply chain management such as information sharing, strengthening fuel and oil industry through

establishing strong membership, identifying major bottlenecks and acting on them. In doing so, each stakeholders will benefit from the value created.

- Government, as shown above government support has greater importance in order to improve fuel supply chain performance. So that, the concerned government body should work closely in providing up to date information, capacity building training , improving infrastructure problem e.t.c.

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Appendix-1 Questionnaire

Addis Ababa University

Master of Art in Logistics and Supply Chain Management

**Research Questionnaire form to be filled by the Employees of the Fuel
Distributor Companies.**

Dear respondent, this questionnaire is research instrument to know what are the right factors that affect fuel supply chain management and their relationship with performance in Addis Ababa. This research is a part of a study for Master of Art Degree in logistics and supply chain management at Addis Ababa University with the objective of to identify the right factors that affect Fuel Supply Chain Management and its performance.

Dear respondents, the researcher is in a position to requesting you to judge and respond genuinely. Your answers to the questions will be kept secret and needed for only academic purpose and genuine response for each question has a great importance for the research findings.

Thank you in advance!

Part one: Personal Data

Instruction, please circle the question below

1. Gender.

1. Male 2. Female

2. Age.

1. Below 25 2. 25-35 3. 36-45 4. 46-55 5. Over 55 years old

3. Educational Level

1. below certificate 2. Certificate 3. Diploma 4. Degree

5, Masters 6, PHD and above

4, work Experience,

1, <1 year 2. 1-5 years 3. 5-10 years 4, >10 years

5, your work position-----

Part Two-A-Factors Affecting Supply Chain Management

Instruction Two, please tick (/) mark in the box

As a stakeholder in the fuel industry please describes the extent of your agreement/disagreement while tick the associated number, as your response

(1 being strongly disagrees to 5 being strongly agreed).

S.N	Question	Response				
		SD (1)	D (2)	N (3)	A (4)	SA (5)
A	Size of petrol station (Internal capacity)					
1	Your company has adequate fuel pumping bay in order to serve the customer					
2	Your company uses different queue discipline technique to give service for the different product for customers.					
3	Your company storage capacity is consistent with your customers need.					
4	your company has adequate human resource with necessary facilities to serve customers					
5	Your company uses the modern pump which has the fastest speed per/hour.					
B	Government support					
6	Your organization receives up to date information from concerned government body.					
7	your organization works closely with the government to improve infrastructure problems					
8	your organization protected by the government from illegal trade.					
9	your organization receives adequate fuel from the concerned government depot every month.					
10	your organization participates on fuel capacity building					

	training with the concerned government body.					
C	Supplier Relationship					
11	your organization has ability to provide service for 24 hours/7 days in a week					
12	your organization involves on jointly planning practice with stakeholders.					
13	Your organization involves in information sharing with stakeholders continuously.					
14	your organization plan with its concerned stakeholder together about fuel supply					
15	your organization involves on planning on customers demand forecast with its stakeholders					
16	your organization involves on working together to achieve common goal with stakeholder					
17	your organization involves on planning to improve the bottlenecks in the fuel industry in general					
D	Information & communication Technology					
18	Your organization use information technology effectively.					
19	your company records customers data in order to predict future demand					
20	your company disseminate information for the stakeholder					
21	Your company frequently process data in to meaningful information.					
22	your company utilize information for decision making process					
23	Your company use information technology in order to improve stakeholder relationship.					
24	your company has used information technology for inventory management at national and international level					
E	Location					
26	your company selects the right location to build its fuel station					

	based on certain international standard					
27	most of your fuel stations are convenience for the customers					
28	your company's fuel stations have competitors nearby them					
29	your fuel stations are located at high traffic flow routes					
30	Your fuel company located at a minimum distance from fuel storage depot.					
Part Two-B						
Supply Chain Management Performance						
31	Your company has greeter Goodwill compare with other companies in the industry.					
32	Your company has ability to supply service in a minimum price to the customers					
33	Your company achieved higher customers satisfaction					
34	In your company there is minimum probability for product stock out					
35	Your company has relatively good return on investment in the industry					
36	Your company operation cost decline overtime					

Appendix-2 Descriptive Statistics

	Mean	Std. Deviation	N
PERAL	3.0938	.53705	32
SPSAL	3.9000	.75349	32
GSALL	2.9375	.70104	32
SRALL	2.5670	1.05883	32
ICTAL	2.0268	.89431	32
LOALL	3.3625	.63335	32

Appendix-3 Model Summary

Model	R	R Square	Adjusted R Square	Change Statistics		
				R Square Change	F Change	df1
1	.154 ^a	.024	-.009	.024	.730	1
2	.470 ^b	.221	.167	.197	7.347	1
3	.482 ^c	.233	.151	.012	.427	1
4	.610 ^d	.372	.279	.139	5.984	1
5	.675 ^e	.455	.350	.083	3.967	1

a. Predictors: (Constant), spsall

b. Predictors: (Constant), spsall, GSall

c. Predictors: (Constant), spsall, GSall, SRall

d. Predictors: (Constant), spsall, GSall, SRall, ICTall

e. Predictors: (Constant), spsall, GSall, SRall, ICTall, LOall

Appendix-4 ANOVA ^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.212	1	.212	.730	.400 ^b
	Residual	8.729	30	.291		
	Total	8.941	31			
2	Regression	1.977	2	.988	4.116	.027 ^c
	Residual	6.964	29	.240		
	Total	8.941	31			
3	Regression	2.081	3	.694	2.832	.056 ^d
	Residual	6.860	28	.245		
	Total	8.941	31			
4	Regression	3.326	4	.831	3.998	.011 ^e
	Residual	5.615	27	.208		
	Total	8.941	31			
5	Regression	4.069	5	.814	4.344	.005 ^f
	Residual	4.872	26	.187		
	Total	8.941	31			

a. Dependent Variable: PERALL

b. Predictors: (Constant), spsall

c. Predictors: (Constant), spsall, GSall

d. Predictors: (Constant), spsall, GSall, SRall

e. Predictors: (Constant), spsall, GSall, SRall, ICTall

f. Predictors: (Constant), spsall, GSall, SRall, ICTall, LOall