Addis Ababa University School of Commerce

Department of Logistics & Supply Chain Management

Challenges of Supply Chain Management in the Petroleum Supplier Company. The Case of Total Ethiopia S. Co

By

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A research thesis submitted to Addis Ababa University School of Commerce in Partial Fulfillment of the requirements for the Award of the Masters of Arts Degree in Logistics and Supply Chain Management.

Advisor: Matiwos Ensermu (PhD)

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Declaration

I the undersigned, Yakob Asfaw: declare that this work entitled "Challenges of Supply Chain Management in the Petroleum Supplier Company. The Case of Total Ethiopia S.Co" is an outcome of my own effort and all the sources of materials used for the study have been duly acknowledged. I have produced it independently except for the guidance and suggestion of the Research Advisor.

This study has not been submitted for any degree in this University or any other University. It is offered for the partial fulfillment of the requirements for the award of Degree of Masters of Art in Logistics and Supply Chain Management.

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Signature: _____

June, 2017

Statement of Certification

This is to certify that the thesis carried out by Yakob Asfaw on the topic entitled; "Challenges of Supply Chain Management in Petroleum Supplier Company; the Case of Total Ethiopia S.Co" is his original work and is suitable for submission for the award of Masters of Arts Degree in Logistics and Supply chain Management.

Advisor: Matiwos Ensermu (PhD)

Date and Signature

Addis Ababa University
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Yakob Asfaw

TABLE OF CONTENTS

List of Tables

List of Figures

List of Acronyms

EPSE – Ethiopian Petroleum Supply Enterprise

TM- Transportation Management Activity (TM)

CSM - Customer Service Management Activity (CSM)

IM - Inventory Management Activity (IM)

SM - Supply Management Activity (SM)

DM - Distribution Management Activity (DM)

DDM - Demand Management Activity (DDM)

ECS - Ensure Continuous Supply (ECS)

OOS - Avoid Stock Out at Stations (OOS)

ICS - Improved Customer Service (ICS)

OTDRTC - On Time Delivery & Reduced Transport Cost (OTDRTC)

GDF - Good Demand Fulfillment (GDF)

EFD - Ensure Fair Distribution (EFD)

Abstract

This study has measured the challenges of supply chain management in petroleum supplier company; the case of Total Ethiopia S.Co. The study is undertaken based on the perspective of transport and supply, marketing and customer service work forces of Total Ethiopia S.Co who are the key actors directly involved in the supply chain management operation and challenges of the company. The data for the study were collected from all the corresponding target population. The small size of the total number of the transport and supply, marketing and customer service which is 40 allows the researcher to consider all of them. Moreover, these populations were also purposely considered since they have possessed the required knowledge, specialization and various experiences in the different supply chain management activities. Then, a questionnaire was distributed to all of the transport and supply, marketing and customer service workforces who are 40 in number. Out of 40 questionnaires distributed to the respondents, all of the questionnaires were returned (accepted) and from the accepted responses, all responses received were found valid and used for the analysis. Thus, the response rate accounts 100%. The data collection instrument used was a questionnaire. The study were employed a combination of both qualitative and quantitative data analysis techniques. Chronbach's alpha test was conducted for different variables to assess the reliability of the instrument. SPSS was used to produce preliminary frequency tables, graphs and other descriptive statistics. Correlation analyses were also conducted to describe the relationships between variables. From the analysis results, the study has found that the company should revise the transportation management activity and challenges, customer service management activity and challenges, inventory management activity and challenges, supply management activity and challenges, demand management activity and challenges identified in all the above major activities in petroleum supply chain management. Finally the study has recommended the company to work on minimizing transportation cost, to improve the distribution network, to develop a tool to control the stock level of stations, increase the number of trucks available, revise the safety requirement and discuss with the government to boost the supply of petroleum products to reduce product shortage challenge by the company.

Key Words; Supply Chain management, Customer Service, Petroleum Distribution

Chapter One

1. Introduction

This chapter starts through providing general background information on the supply chain management and their challenges in petroleum supply. Secondly, it goes through discussing the statement of the problem along with brief description of the research gap and the basic research questions of the study. Additionally: objectives of the study, the scope of the research work, limitation of the study and significance of the study are also form a part of this chapter.

The oil and gas industry is involved in a global supply chain that includes domestic and international transportation, ordering and inventory visibility and control, materials handling, import/export facilitation and information technology. In a supply-chain, a company is linked to its upstream suppliers and downstream distributors as materials, information, and capital flow through the supply chain

In Ethiopia the Petroleum industry has no upstream section rather it is said to be downstream because the resource crude oil is not found in Ethiopia till now. Hence, the supply chain starts from importation of petroleum products from abroad by the Government. Therefore, the purpose of this paper is to identify the challenges of supply chain management in the petroleum supplier company the case of Total Ethiopia S.Co that creates disturbance in delivering products to the stations and customer sites on time to ensure continues selling operation and to help customers sites from being out of stock which leads them to incurring of huge costs due to shortage of petroleum products like machine idle time, labor hours and project period postponement.

1.1. Background of the Study.

Supply Chain

According to Chopra and Meindl, (2001) supply chain consists of all stages involved, directly or indirectly, in fulfilling a customer request. A supply chain includes the manufacturers, suppliers, transporters, warehouses, retailers, and customers.

In a supply-chain, an organization will link to its suppliers upstream and to its distributors downstream in order to serve its customers. Usually, materials, information, capital, labour, technology, financial assets and other resources flow through the supply-chain.

Since the goal of the firm is to maximize profits, the firm must maximize benefits and minimize costs along the supply chain. The firm must weigh the benefits versus the costs of each decision it makes along its supply chain. (Christopher, 1997).

Supply Chain Management

According to the Global Supply Chain Forum, Supply Chain Management (SCM) is the integration of key business processes from end user through original suppliers that provide products, services, and information that adds value for customer and other stakeholders (Chan and Qi, 2003). SCM is a proactive relationship between a buyer and supplier and the integration is across the whole of the Supply Chain. Most SCM related challenges stem from either uncertainties or an inability to coordinate several activities and partners Turban *et al.* (2004). The motive behind the formation of supply chain management is to increase channel competitive advantage (Bowersox and Closs 1996). (Porter, 1980) defines two basic competitive advantages: cost leadership and differentiation. Improving a firm's competitiveness and profitability through supply chain management can be accomplished by enhancing overall customer satisfaction (Giunipero and Brand, 1996).

Supply chain management has become an important means for sustaining competitive advantage for all successful industries and businesses (Magretta, 1998). The objective of every supply chain is to maximize the overall value generated. The value a supply chain generates to

an organization is the difference between what the final product is worth to the customer and the effort the supply chain expends in filling the customer's request. For most commercial supply chains, value will be strongly correlated with supply chain profitability, the difference between the revenue generated from the customer and the overall cost across the supply chain (Chopra and Meindl, 2003).

Liberalized Markets, globalization and global supply chains have to be regarded as business opportunities of economic development for each supply chain actor, but at the same time, they introduce a number of challenges that affect the Capability of the Supply chain. SCM in the oil marketing companies contains various challenges that are not present in most other companies. These supply chain challenges has a major influence on the supply chain management activity of petroleum marketing and distribution in the country and also it has an effect on the company.

Supply Chain Management of Petroleum Marketing in Total Ethiopia S.Co

Petroleum products are used across the entire economy in every country and are used widely as a major source of energy in the world. The same international trend is true in Ethiopia as well. Currently, Regular gasoline, Gasoil (diesel), Kerosene, Heavy fuel oil (HFO), Light fuel oil (LFO) and JTA-1 are imported by Ethiopian Petroleum Supplies Enterprise (EPSE). The Heavy fuel oil (HFO) and Light Fuel Oil (LFO) is imported for industrial use like sugar factories, brewery factories, textile factories, etc and JTA-1 for aviation purpose. Gasoil and gasoline are used in the transportation, construction, industries, power generation, agriculture, house hold cooking and lighting in rural areas. (Tegegn Mekuria, 2015).

In the years before 2001, only four companies SHELL, MOBIL, TOTAL and Agip controlled marketing and distribution of Fuel 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 currently Ethiopia has 13 companies working in Petroleum marketing industry including OIL LIBYA, TOTAL, NOC, KOBIL, YBP, TAF, DALOL, NILE, WAS, GOMEJU,

OLWAY, GENET and YESHI which has both local and foreign ownership. (Tegegn Mekuria, 2015).

Ethiopia Oil Market is tightly controlled. The Ethiopian Petroleum Supply Enterprise (EPSE) is a government monopoly whose function is to purchase from international suppliers (Sudan, Saudi Arabia and Kuwait) and sell to the above mentioned thirteen domestic distributors that then supply fuel to the local market. The EPSE purchases Petroleum products from Kuwait, Saudi Arabia and Sudan and transported via vessels and deliver it to Djibouti port and Khartoum Port where the government of Ethiopian depot is located. And companies will buy from EPSE at Djibouti and Sudan from the depot and distribute the products by their own means of transport (using transporters) to the stations and customer sites available in the country. (World Bank Report, 2015).

1.2. Statement of the Problem

The supply chain of the petroleum industry is extremely complex compared to other industries. It is divided into two different 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. It includes the exploration, forecasting, production, and logistics management of delivering the crude oil from remotely located oil wells to refineries. (Barua, 2010)

The downstream supply chain starts at the refinery, where the crude oil is manufactured into the consumable products that are the specialty of refineries. It involves the process of forecasting, production and the logistics management of delivering the petroleum products like Gasoline, Gasoil, Kerosene, Jet A1, LFO and HFO to customers around the globe. Therefore, there exists a variety of challenges in both the upstream and downstream supply chain operations. (Barua, 2010)

In supply chain management unwise decision, lack of skilled man power and poor supply chain coordination and planning increase expenses and affect profitability of the company. In Total Ethiopia S.Co failure to deliver products on time before stations or sites being out of stock

and careless transportation of products lead buyers/customers to dissatisfaction. Most of these problems occur due to the challenges that exist in the supply chain management activity of the company. According to the audit report of Total Ethiopia S.Co for the year 2015, the main problem of the company that decreases profitability, product sales and market share is that the challenges that exist in the supply chain to deliver products to the stations and customer sites on time like transportation problem, supply delay, customer service problem, demand related problem, inventory management problem and distribution problem.

Modern supply chains are very complex, with many parallel physical and information flows occurring in order to ensure that products are delivered in the right quantities, to the right place in a cost-effective manner. It has also been suggested that the drive towards more efficient supply chains during recent years has resulted in the supply chains becoming more vulnerable to disruption and prone to challenges. (Fahad, 2013)

The significance of the oil industry's impact on the global economy is obvious. Oil supply chain management has to solve a lot of challenges caused by the nature of the supply chain in the oil industry such as complexity, inflexible characteristics, long lead time, and limited transportation forms at the different stages in the supply chain, limited primary distribution capacity and unforeseen events like political or economic changes. (Fahad, 2013)

Therefore, the main purpose of this research is to assess those mentioned above supply chain challenges that affect the company in order to satisfy customer orders and propose a solution to the challenges in the supply chain management of petroleum marketing at Total Ethiopia S.Co.

1.3. Basic Research Questions

The study tries to answer the following basic research questions.

- What are the major challenges that affect the supply chain management of petroleum marketing in Total Ethiopia S.Co?
- What are the causes that create supply delay in the supply chain to deliver products to the stations and/or customer sites?

1.4. Objective of the Study

1.4.1. General Objective

The general objective of this study is to assess the supply chain management challenges of Total Ethiopia S.C.

1.4.2. Specific Objectives

The study is guided by the following objectives:

- ✓ To identify the challenges facing supply chain management in petroleum marketing activity in Total Ethiopia S.Co.
- ✓ To identify the causes that creates supply delay in the supply chain of Total Ethiopia S.Co.

1.5. Scope of the Study

This study is delimited only in Total Ethiopia S.Co and assesses the supply chain management challenges and problems. Area of the study is Total Ethiopia S.Co transport and supply Department and sub units, marketing department sections customer service sections those who are involved in selling and distribution of company products specially petroleum product, Akaki depot, Dukem Depot and Bole international Airport. This study only assesses the supply chain management challenges and related problems faced in the company not other area in the company.

1.6. Limitation of the Study

The limitations of the study were the use of subjective data and lack of published/organized resources in the company. In addition non-cooperativeness of the respondent to fill the questionnaire will be some of the limitations to be faced while doing this research.

1.7. Significance of the Study

Since the study was not done before that reviews the challenges of supply chain management in Total Ethiopia S.Co. And Supply chain management today is the back bone of many companies in any operation for delivering products to customers. Therefore, Total Ethiopia S.Co will be benefited from the study to overcome the supply chain management challenges in petroleum marketing.

This study can also serve as reference for further studies that will be conducted in the Oil Industry of Ethiopia with particular emphasis on challenges of supply chain management of Total Ethiopia S.Co. For policy makers, this study is expected to give a clue in order to improve the supply chain management activity of the country and Total Ethiopia S.Co also.

1.8. Organization of the Paper

The study consists of five chapters. The first chapter deals with the problem, its nature and level. Objective and importance of the study were briefly discussed in this chapter. The review of related literature is discussed in the second chapter. This chapter presents the conceptual frame works or a brief review of recent related studies that serve as a basis and proof to support the basic questions of the study. Chapter three address research methods which explain the design, sample procedure, instrument and data analysis techniques that will be used to achieve the purpose of the study. Chapter four focuses on the presentations, analysis, and interpretation of the data. Finally, the fifth chapter deals with summary, findings/conclusions and recommendations of the results obtained.

Chapter Two

2. Related Literature Review

This chapter presents the recently emerged knowledge products through extensive review of relevant literatures from different sources. It is composed of four main parts, the theoretical review which discusses the research issue from the existing theories point of view, empirical review which looks the research issue in relation to other empirical studies previously undertaken in the area, the conceptual framework which describes the different variables assessed in this study and the literature gaps identified.

2.1. Theoretical Review

The boom in global demand of oil along with the ease of international trade and the inflexibility involved in the petroleum industry's supply chain has made its management more complex and more challenging (Coia, 1999; Morton, 2003). Despite the importance of supply chain management and its growing complexity, the petroleum industry is still in the development stage of efficiently managing their supply chains. However, even with the inflexibility and complexity involved in the industry's supply chain, there is a lot of room for improvement and cost reduction (Barua, 2010).

Inflexibility in the supply chain is the constraint involved along the chain, such as long lead-times, manufacturing capacity, and limited means of transportation, that are hard to change. Commodities such as oil, gas, and petrochemicals require specific modes of transportation such as pipelines, vessels or tankers, and railroads. These commodities are produced in specific and limited regions of the world, yet they are demanded all over the globe since they represent an essential source of energy and raw material for a large number of other industries. Several weeks lead-time from the shipping point to the final customers' location is very common in this type of industry (Barua, 2010).

According to Christopher (2007), Supply chain link in the oil industry would follow the following process; Exploration → Production → Refining → Marketing → Consumer. The links represent the major supply chain links in the oil and gas industry. Further, the links represent the

interface between companies and materials that flow through the supply-chain. Within each stage, there are many operations like exploration, production, refining and marketing operations. Refining is a complex operation and its output is the input to marketing. Marketing includes the retail sale of gasoline, engine oil and other refined products. Each stage of the link can be a separate company or a unit of an integrated firm.

Companies therefore have recognized that improved supply chain efficiencies represent a huge area for cost savings, specifically in the logistics area; they are estimated to be an average between 10 and 20 percent of revenues (Hamilton, 2003). Also, companies believe that the supply chain in which they participate as customers and suppliers is what creates competition rather than individual companies (Whitfield, *et al. 2004*).

Despite the importance of the petroleum industry in our daily life and the operational challenges it involves, unfortunately the topic has received very little attention in operations and supply chain management literature. The objective of this paper, therefore, is to shed some light on challenges and opportunities in the petroleum industry's supply chain management.

2.1.1. Definition of Supply Chain

Supply chain has various definitions and some of them have mentioned below that help the study related to get full picture on the issue to be addressed;

A supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer request. The supply chain includes not only the manufacturer and suppliers, but also transporters, warehouses, retailers, and even customers themselves. Within each organization, such as a manufacturer, the supply chain includes all functions involved in receiving and filling a customer request. These functions include, but are not limited to, new product development, marketing, operations, distribution, finance, and customer service (Chopra & Mendil, 2007).

A supply chain is a network of facilities and distribution options that performs the procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers (Ganeshan *et. al*, 1995).

Supply chain is a set of firms that pass materials forward. Normally, several independent firms are involved in manufacturing a product and placing it in the hands of the end user in a supply chain like raw material and component producers, product assemblers, wholesalers, retailer merchants and transportation companies are all members of a supply chain (La Londe and Masters, 1994).

By the same token, Lambert, Stock, and Ellram define a supply chain as the alignment of firms that brings products or services to market.

Given the above definitions, for the purpose of this paper, a supply chain is defined as a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer.

2.1.2. Supply Chain Management

The term "supply chain management" arose in the late 1980s and came into widespread use in the 1990s. Prior to that time, businesses used terms such as "logistics" and "operations management" instead.

Definition of Supply Chain Management

Supply chain management has also defined from different perspectives from each sector or industry. Some of the definitions are shown as below.

According to the Council of Supply Chain Management Professionals (CSCMP), 2010 Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies (Wisner Tan Leong, 2012).

According to the handbook of logistics management published by UNICEF, Supply chain management includes the logistics activities plus the coordination and collaboration of staff, levels, and functions (Wisner Tan Leong, 2012).

Supply Chain Management is the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long term performance of the individual companies and the supply chain as a whole (Mentzer *et al*, 2001).

In general, Supply chain management is the coordination of production, inventory, location, and transportation among the participants in a supply chain to achieve the best mix of responsiveness and efficiency for the market being served.

Consistent across the above definitions of supply chain management is that the idea of coordinating or integrating a number of goods and services related activities among supply chain participants to improve operating efficiencies, quality and customer service among the collaborating organizations. Thus, for supply chain management to be successful, firms must work together by sharing information on things like demand forecasts, production plans, capacity changes, new marketing strategies, new product and service developments, new technologies employed, purchasing plans, delivery dates and anything else impacting the firm's purchasing, production and distribution plans (Wisner Tan Leong, 2012).

2.1.3. Supply Chain Management in the Petroleum Industry

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 production/acquisition of crude oil and getting it to the refinery. The refining process is where the crude from various production sites comes together and from where the refined products diverge on their way to the end consumer. The

upstream process includes the exploration, forecasting, production, and logistics management of delivering crude oil from remotely located oil wells to refineries (Raed Hssain *et al*, *2014*)

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 or petroleum products to customers around the globe. It focused on moving the refined products from the refineries to terminals and on to the wholesalers or retail outlets such as gas stations. Thus, challenges and opportunities exist now in both the upstream and downstream supply chains (Raed Hssain *et al*, *2014*)

And hence, Petroleum downstream is defined as the activities which take place between the purchase of crude oil and the use of the oil products by the end consumer. This covers transporting the crude oil, performing supply and trading activities, refining the crude oil, and distributing and marketing the refined products output (Fidel Santos Manzano, 2005).

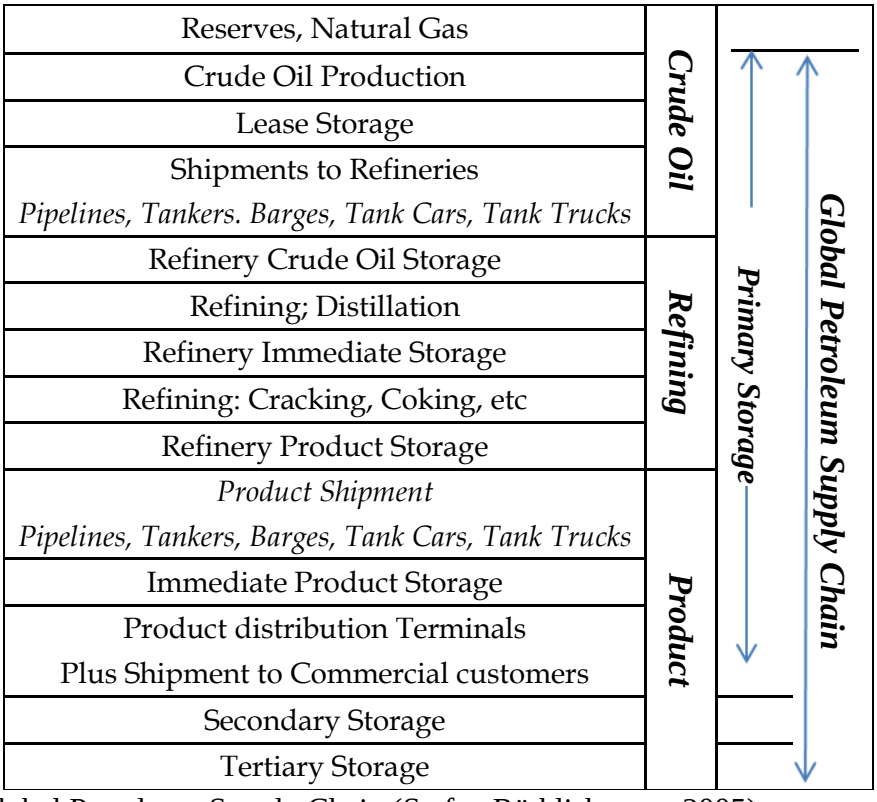

Figure 2.1. Global Petroleum Supply Chain (Stefan Röthlisberger, 2005)

Stages in the Global Petroleum Supply Chain

According to Stefan Röthlisberger, 2005 the stages in the petroleum supply chain are as follows;

The stages are summarized as follows by defining each stage in the petroleum supply chain. Exploration stage refers to seismic, geophysical and geological operations. Production stage in petroleum supply chain refers to drilling, reservoir, production and facilities engineering. Refining stage refers to a complex operation and its output is the input to marketing. Marketing stage refers to the retail sales of gasoline; engine oil and other refined products (Stefan Röthlisberger, 2005)

Petroleum Products

The main products obtained from the activities of a refinery are: liquefied petroleum gases, naphtha, gasoline, kerosene, diesel, fuel oil, lubricant oils, asphalt, and petroleum coke. Most of these products are used in every day applications (transportation, heating, etc). Moreover, petroleum products are also used in the petrochemical industry for the manufacturing of rubber, nylon, plastics and other kinds of derivatives (Favennec, 2001; Gary, 2001). On the other hand, refiners also take into account the seasonality of consumption, usually producing more gasoline (*Fidel Santos Manzano, 2005*).

The below figure show the list petroleum products and their use.

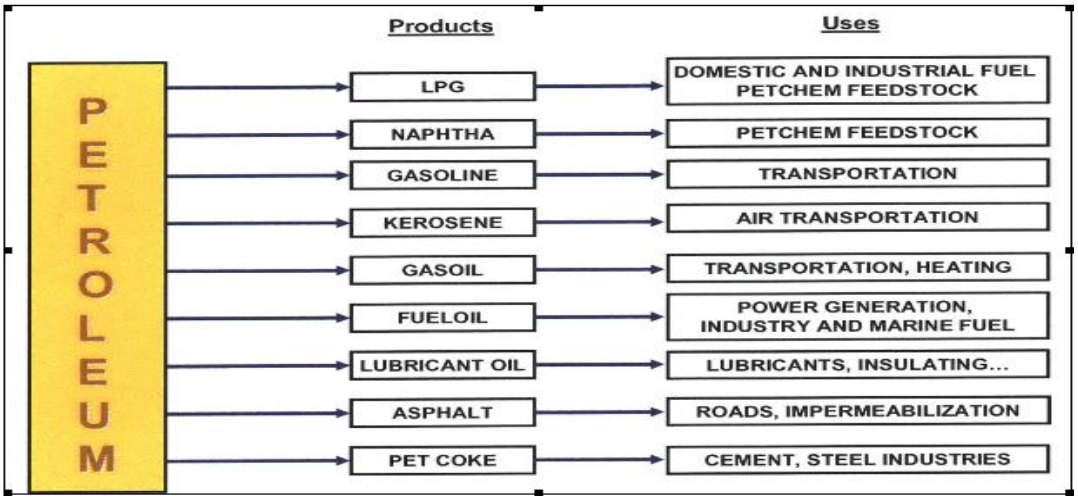

Figure 2.2. Petroleum Products and their application. (Fidel Santos Manzano, 2005).

Unique Features of Petroleum Industry Supply chain

Some of the unique features of petroleum industry supply chain are limited source of raw material suppliers which is dominated by cartels, highly unstable and fluctuating raw material prices, the production flow is reversed because from single raw materials many outputs will be produced, high transportation cost, very complex and lengthy supply chains, highly inflexible in terms of volumes transported and product variation and finally difficult to integrate suppliers, customers and distribution (Hugos, 2003).

2.1.4. Participants in the Supply Chain

In its simplest form, a supply chain is composed of a company and the suppliers and customers of that company. This is the basic group of participants that creates a simple supply chain. Extended supply chains contain three additional types of participants. First there is the supplier's supplier or the ultimate supplier at the beginning of an extended supply chain. Then there is the customer's customer or ultimate customer at the end of an extended supply chain. Finally there is a whole category of companies who are service providers to other companies in the supply chain. These are companies who supply services in logistics, finance, marketing, and information technology (Hugos, 2003).

In any given supply chain there is some combination of companies who perform different functions. There are companies that are producers, distributors or wholesalers, retailers, and companies or individuals who are the customers, the final consumers of a product. Supporting these companies there will be other companies that are service providers that provide a range of needed services (Hugos, 2003).

2.1.4.1. Producer/ Importer

Producers or manufacturers are organizations that make a product. Producers of raw materials are organizations that mine for minerals, drill for oil and gas, and cut timber. Producers of finished goods use the raw materials and subassemblies made by other producers to create their products (Hugos, 2003).

Here in the case of Ethiopia, since its establishment of the company there was no any petroleum product produced in the country and hence products were supplied by the government body Ethiopia Petroleum Supply Enterprise (EPSE) through buying from Abroad like Kuwait, Sudan, Saudi Arabia, etc. therefore, the producer in this study is EPSE who buy Petroleum products and supply it to all petroleum marketing companies in Ethiopia. And Total Ethiopia S.Co is one of among the buyers.

2.1.4.2. Distributors/ Wholesalers

Distributors are companies that take inventory in bulk from producers and deliver a bundle of related product lines to customers. They typically sell to other businesses and they sell products in larger quantities than an individual consumer would usually buy. Distributors buffer the producers from fluctuations in product demand by stocking inventory and doing much of the sales work to find and service customers. For the customer, distributors fulfill the "Time and Place" function they deliver products when and where the customer wants them. (Hugos, 2003).

A distributor is typically an organization that takes ownership of significant inventories of products that they buy from producers and sell to retailers. A distributor can also be an organization that only brokers a product between the producer and the customer and never takes ownership of the product (Hugos, 2003). In this case the distributor is Total Ethiopia S. Co who buys petroleum products from government (EPSE) and sold it to the retailers so called dealers/ station owners.

2.1.4.3. Retailers/ Dealers or Station Owners

Retailers stock inventory and sell in smaller quantities to the general public (Hugos, 2003). Here in this study the dealers or station owners are said to be the retailers in the case of petroleum distribution throughout the country. Hence Total Ethiopia S.Co has more than 130 stations throughout the country who sell products to individual users.

2.1.4.4. Customers

Customers or consumers are any organization that purchases and uses a product from retailers/ dealers or stations. A customer may be the final end user of a product who buys the product in order to consume it (Hugos, 2003). In this study consumers are all cars owners and different projects who require petroleum products for daily consumption for factories and machineries.

2.1.4.5. Service Providers

These are organizations that provide services to producers, distributors, retailers, and customers. Service providers have developed special expertise and skills that focus on a particular activity needed by a supply chain (Hugos, 2003).

Some of the service providers here in the case of petroleum marketing who works with Total Ethiopia S. Co are Transporters (those who supply trucks for transportation service), Banks (those who make loans), market research and advertising, engineering services, and legal service providers.

Because of this, they are able to perform these services more effectively and at a better price than producers, distributors, retailers, or consumers could do on their own. All these service providers are integrated to a greater or lesser degree into the ongoing operations of the producers, distributors, retailers, and consumers in the supply chain (Hugos, 2003).

Therefore, most supply chains are composed of repeating sets of participants that fall into one or more of these categories. Over time the needs of the supply chain as a whole remain fairly stable (Dawei Lu, 2011).

2.1.5. Supply Chain of Petroleum Industry in Ethiopia and Total Ethiopia S.Co

Ethiopian Petroleum Industry Supply Chain:

It is known that the goal of any supply chain management is to provide maximum customer service and satisfaction at the lowest cost possible. In Ethiopia the supply chain of coordination activities range from selecting and procuring quality fuel from supply source to product distribution at retail outlets. It is advisable to examine the fuel supply chain of the country because of a number of reasons. Fuels that are produced by the refineries and imported to the country at port usually comply with legislation (Tegegn, 2015).

The key and distinguished activities in the downstream petroleum sector supply chain of Ethiopia can be classified to importation (Sourcing), Storage (Inventory), Transportation, Distribution and Marketing. Thus, this paper tries to show the challenges in the petroleum supply chain in the case of Total Ethiopia S.Co (Tegegn, 2015).

Importation & Storage:

All imports of products are made via Djibouti and Sudanese port by Ethiopian Petroleum Supplies Enterprise. Ethiopian Petroleum Supplies Enterprise (EPSE) is a government body and has the authority and responsibility of supply management of petroleum or fuel products; procure based on the standard and quality set by Ethiopian Standard Agency (ESA), control quality and temporarily store at depot in Djibouti, Sudan and National Petroleum Reserve Depots Administration (NPRDA). Fuel is imported into Ethiopia for general use and all issues in relation to quantity and quality and price are dealt by EPSE. After the fuel is procured by EPSE, then it will be sold to Oil companies and the oil companies subsequently sold to consumer and to public via the network of branded fuel stations (Tegegn, 2015).

Table 2.1.

Ethiopia Petroleum Supply Enterprise
Petroleum Product Sales
From 2003 - 2013 (1995 to 2005 EC)

	Petroleum Products Qty in M Tons							
Year	***MGR***	***Gasoil***	***Jet A1***	***KERO***	***LFO***	***HFO***	***Total in M. Tons***	***Daily Import***
2003	132,014	681,110	78,216	183,610	45,896	89,222	1,210,068	3,315
2004	141,608	701,237	87,697	208,994	45,014	90,497	1,275,047	3,493
2005	139,611	745,669	113,896	212,550	46,499	108,055	1,366,280	3,743
2006	147,514	851,381	145,775	229,898	42,318	119,623	1,536,509	4,210
2007	146,614	927,753	176,778	242,847	45,600	117,615	1,657,207	4,540
2008	143,025	1,107,193	218,850	265,664	45,861	130,066	1,910,659	5,235
2009	149,967	1,199,673	214,004	272,304	37,510	117,029	1,990,487	5,453
2010	162,070	1,250,641	248,386	257,022	10,544	106,910	2,035,573	5,577
2011	151,634	1,154,560	320,443	239,032	34,823	96,320	1,996,812	5,471
2012	154,286	1,231,815	319,870	237,399	37,126	110,740	2,091,236	5,729
2013	169,059	1,351,280	352,967	232,942	40,548	143,319	2,290,115	6,274

Source: Extracted by the Author from unpublished Source 2017

Supply Chain of Total Ethiopia S.Co in Petroleum Distribution.

Total here in Ethiopia has counted 67 years of age in distribution and selling petroleum products since 1950. Total Ethiopia S. Co is the second largest oil distribution company in Ethiopia Next to National Oil Company of Ethiopia (NOC) in terms of market share. The supply chain of Petroleum Sector in Ethiopia is the same for all oil companies because the source of petroleum is the government of Ethiopia who import from Abroad and the sale to oil companies available in the country. Therefore, Total Ethiopia Supply chain is composed of Purchasing from EPSE – Transportation – Storage – Distribution – Marketing – Customers.

In the Supply Chain of Total Ethiopia S. Co there are different parties involved like Sellers (EPSE), Transporters and drivers, Dealers or Station Owners. Each of those parties in the chain has various interests that should be fulfilled. Thus the supply chain of Total Ethiopia S.Co should try to fulfill their needs in order to keep their profit and to satisfy the requirements of the dealers in order to maximize the profit and to sell more products to the country as a whole.

2.1.6. Supply Chain Management Activities

Successful supply chain management requires a change from managing individual functions to integrating activities into key supply chain processes. The key supply chain processes identified by members of the Global Supply Chain Forum are customer service, inventory management, demand management, supply management, distribution management and transportation management. For the purpose of this study the above mentioned supply chain management activities are considered and discussion of each activities related to supply chain of petroleum marketing will be made as below.

A description of each of the above six supply chain management processes are as follows;

1. **Customer Service Management Activity**

   Customer service management is the firm's face to the customer. Customer service provides the customer with real-time information on promised shipping dates and product availability through interfaces with the firm's functions such as supply and logistics. The customer service process may also include assisting the customer with product applications (Douglas M, Lambret, *1997).*

   Customer relationship management provides the structure for how the relationships with customers will be developed and maintained. Management identifies key customers and customer groups to be targeted as part of the firm's business mission. The goal is to segment customers based on their value over time and increase customer loyalty by providing customized products and services. Customer teams work with key customers, improve processes and eliminate demand variability and non-value-added activities (Douglas M, Lambret, *1997).*

2. **Inventory Management Activity**

   Inventory management policy affects how efficiently a firm deploys its assets in producing goods and services. Developing effective inventory control systems to reduce waste and stock outs in manufacturing or service organizations is a complex problem.

The right amount of inventory supports manufacturing, logistics and other functions, but inventory is a sign of poor inventory management that creates unnecessary waste of scarce resources. In addition, excessive inventory adversely affects financial performance. The need for better inventory management systems continues to challenge operations managers (Wisner Tan Leong, *2012).*

3. **Demand Management Activity**

Customer demand is by far the largest source of variability and it stems from irregular order patterns. Given this variability in customer ordering, demand management is a key to effective Supply Chain Management.

Demand management is the supply chain management process that balances the customers' requirements with the capabilities of the supply chain. With the right process in place, management can match supply with demand proactively and execute the plan with minimal disruptions. The process is not limited to forecasting. It includes synchronizing supply and demand, increasing flexibility, and reducing variability. A good demand management system uses point-of-sale and "key" customer data to reduce uncertainty and provide efficient flows throughout the supply chain. Marketing requirements and production plans should be coordinated on an enterprise-wide basis. Thus, multiple sourcing and routing options are considered at the time of order receipt which allows market requirements and production plans to be coordinated on an organization-wide basis. In advanced applications customer demand and production rates are synchronized to manage inventories globally (Douglas M, Lambret, *1997).*

Order fulfillment is a key process in managing the supply chain. It is customers' orders that put the supply chain in motion, and filling them efficiently and effectively is the first step in providing customer service. However, the order fulfillment process involves designing a network and a process that permits a firm to meet customer requests while minimizing the total delivered cost. The objective is to develop a seamless process from the supplier to the organization and then on to its various customers segments (Douglas M, Lambret, *1997).*

4. **Supply Management Activity.**

Effective supply management has resulted generally in smaller supply bases and the development of more long-term supplier relationships to achieve the competitive benefits. Purchasing and the strategic concepts of supply management are one of the foundations of supply chain management, since incoming material quality, delivery timing and purchase price are impacted by the buyer–supplier relationship and the capabilities of suppliers (Wisner Tan Leong, 2012).

5. Distribution Management Activity

This part of the petroleum supply chain comprises the transport of finished fuels from the door of the refinery to consumers/stations and the sale of the products either in bulk or in small quantities in gas stations.

The distribution of finished products is made by pipeline, tanker, truck, rail. The quantities transported are smaller (typically 10 to 50,000 tons) than in the case of crude oil and therefore the economies of scale are less important than in the case of bigger crude oil tankers. Sales may target the direct delivery to big consumers (e.g., heating oil, heavy oil for power plants) or the retail selling through a network of service stations (*Fidel Santos, 2005*).

In the Case of the network of service stations, fuel retailing is a well differentiated part of the business where marketing strategies are critical. Fuel retailing is similar in some aspects to the consumer product goods industry. Therefore, this part of the business presents different challenges in supply chain than the refining or upstream activities, less focused on final consumer needs (*Fidel Santos, 2005*).

Customer Segments and Sales Channels in Petroleum Marketing

The petroleum downstream industry serves basically two types of customers:

i) **Wholesale customers** composed by petrochemical facilities, power plants, big fuel consumers (airlines, shipping companies) and other industrial customers.

ii) **Retail customers** who use the fuels essentially for transportation and domestic heating. In the case of fuel retailing, the main channel is the network of service stations (*Fidel Santos, 2005*).

Gas stations are can be categorized as branded or non-branded, depending on whether the gas station is using the brand image of one of the major integrated oil companies or not (*Fidel Santos, 2005*).

According to Onyango et al. (2009), branded gas stations can be classified in four categories depending on the different combinations of the ownership of the physical assets and the management of the actual operations: CoCo - Company Owned Company Operated. These are the gas stations where the oil company owns the assets and controls the operations through its own employees. CoDo – Company Owned Dealer Operated. In this case, the oil company is the owner of the gas station assets, but the operations are delegated to another entity through some kind of contract. DoDo - Dealer Owned Dealer Operated. Here the oil company may just decide to offer the brand and operate the gas stations through franchises. DoCo - Dealer Owner Company Operated. The owner may ask an oil company to run the operations of its assets.

6. Transportation Management Activity

Transportation costs are a significant portion of total logistics and supply chain costs for many organizations. To help reduce these costs while optimizing service levels, transportation management system applications allow firms to find carriers, select the best mix of transportation services and pricing to determine the best use of truck trailers or tankers, better manage transportation contracts, rank transportation options, clear customs, track fuel usage and product movements, and track carrier performance. Additionally, regulatory bodies, shippers and customers want to know the locations of goods in transit; thus, real-time information about a shipment's location while it is being transported to a final destination is required. Consequently, information may need to be provided by the manufacturer, third party logistics service providers, agents, freight forwarders and others as products move through global supply chains. Technologies employed to provide this visibility include barcode scanners, Radio Frequency Identification Data tags, the Internet and Global Positioning Systems devices *(Wisner, 2012)*.

2.1.7. Challenges of Supply Chain Management

This section of the literature will discuss the general challenges that exist in the supply chain management of petroleum marketing. The oil business and its supply chain as a whole faces a series of challenges. The quality issues are becoming especially constraining as the new fuels specifications demand more complex processing and expensive investment in new equipment at the refining point. These investments do not always provide an attractive return but are in many cases required to keep the refinery operating (*Fidel Santos, 2005*)

One of the most common challenges in Supply Chain Management is the so-called bullwhip effect. Even small fluctuations in demand or inventory levels of the final company in the chain are propagated and enlarged throughout the chain. Because each company in the chain has incomplete information about the needs of others, it has to respond with a disproportional increase in inventory levels and consequently an even larger fluctuation in its demand relative to others down the chain (Forrester, 1961).

The maximum efficiency of each chain does not, however, necessarily lead to global optimization (Gunasekaran *et al.*, 2004). In addition, human factors should also be taken into consideration: decision-makers at various points along the SC do not usually make perfect decisions due to the lack of information or their personal hindrances, and their decisions are also influenced by employee reward systems (McGuffog and Wadsley, 1999).

As compliance mandates, suppliers and information flows multiply, supply chains are becoming more complex, costly and vulnerable. And executives are finding it increasingly difficult to respond to these challenges, especially with conventional supply chain management strategies and designs (Joel Jeffreys Barua, 2010).

The logistics network in the petroleum industry is highly inflexible, which arises from the production capabilities of crude oil suppliers, long transportation lead times, and the limitations of modes of transportation. Every point in the SC network, therefore, represents a major challenge (Jenkins and Wright, 1998).

The long distance between supply chain partners and slow modes of transportation induce not only high transportation costs and in-transit inventory, but also high inventory carrying costs in terms of safety stocks at the final customer location. The great distances between supply chain partners present a high variability of transportation times that can hurt suppliers in terms of service levels and final customers in terms of safety stock costs. Moreover, the transportation process is carried out either by ships, trucks, pipelines, or railroads. In many instances, a shipment has to exploit multiple transportation modes before reaching the final customer's location. Such constraints on transportation modes in this type of industry induce long lead times from the shipping point to the final customers' location compared to other industries. Hence, considering the amount of inflexibility involved, meeting the broadening prospect of oil demand and its derivates while maintaining high service-levels and efficiency is a major challenge in the petroleum industry (Joel Jeffreys Barua, 2010).

Due to the globalization of the petroleum industry supply chain, sophisticated information technology is essential for smooth information flow considering the complexity of the logistics network in such an industry. Companies' relationships in supply chain networks are directly related to the effective use of information technology (Guimaraes, Cook and Natarajan, 2002).

Another challenge in the petroleum industry supply chain is the attitude and anxiety regarding collaboration and information sharing between supply chain partners in the oil marketing companies. While collaboration and information sharing represent a crucial factor for supply chain efficiency, companies in the petroleum industry are sometimes cautious when it comes to sharing their demand/costs information (Al-Kharraz, 2004). This type of parsimony regarding collaboration and sharing demand/costs information can waste opportunities for costs saving (Joel Jeffreys Barua, 2010).

Sophisticated information technology is also essential for petroleum marketing companies due to security needs and detecting theft by drivers. Petroleum companies ship a great deal of hazardous products, and supply chain partners (suppliers and customers) must be aware of the locations of each shipment at any point in time (Morton, 2003).

More efficient and cost effective supply chain management practices in the petroleum industry represent important factors for maintaining continuous supplies of crude oil, the reduction of lead times, and lowering of production and distribution costs. Due to the inflexibility involved in the petroleum industry's supply chain network, cost containment, visibility, globalization, Risk, information technology logistics, knowledge management and greening the supply chains are some of the challenges facing the SCM in the oil marketing companies as advanced by other researchers. Integrated process management, Information systems and information sharing, organizational restructuring, and cultural reorientation are equally important (Joel Jeffreys Barua, 2010).

Until now, the oil industry has continued to face growing challenges, from stricter government regulation, political risks, competition, emergent new comers, environmental uncertainties and political hostilities, which has affected growth and output. Due to the scramble for resources, many oil companies have been driven to explore and produce in some of the most hostile and harsh environments, which in turn tend to be extremely costly. Also, there have been concerns in the industry about the growing scarcity of natural resources, which underlies fears of not being able to meet production levels and goals. However, in reality, the resources are not the cause of supply restrictions with vast potential still available due to continuous discoveries of oil reservoirs around the world. The main challenge facing the oil industry is not the availability of oil resources, but putting these reserves into production and delivering the final products to consumers at the minimum cost possible. Thus, a solid supply chain management program will enhance this goal (Bahaidar Fahad F.A, 2013).

Despite the great challenges in the oil marketing companies supply chain management, best practices for improvements, management of challenges and cost savings do exist along the supply chain. One major area for improvement and cost savings lies in the supply chain management functions like supply, transportation, demand management, distribution, inventory control and customer service.

2.2. Empirical Review of Literature

This section reviews literature from studies carried out related to logistics and supply chain management of petroleum marketing in Ethiopia and other countries context that support the study.

In 2010, Joel Jeffreys Barua in his challenges facing supply chain management in the oil marketing companies in Kenya, founds that the challenges facing oil marketing companies in Kenya are long lead times, lack of continuous supply of petroleum products and high distribution cost of petroleum products.

In 2013, Ebsittu in the study of the logistics management practice of Total Ethiopia S.Co founds that the transportation management, inventory planning, supply management, long import process, warehouse design and customer service satisfaction level needs some improvement from the previous practice in order to reduce the total logistics costs of the company.

In 2013, Bahaidar Fahad F.A in the study of factors affecting supply chain management by oil companies in Kenya founds that the oil marketing companies consider constrained infrastructure to be an important factor in ensuring an efficient and effective supply chain management system. The factors affecting oil marketing companies supply chain are storage facilities, transport infrastructure, efficiency of supply chain management system and long term relationship with other suppliers.

2.3. Conceptual Framework of the Study

The chart below shows the relationship of variables challenges of supply chain managements are dependent variable and the benefits of overcoming the challenges of supply chain management as the independent variables.

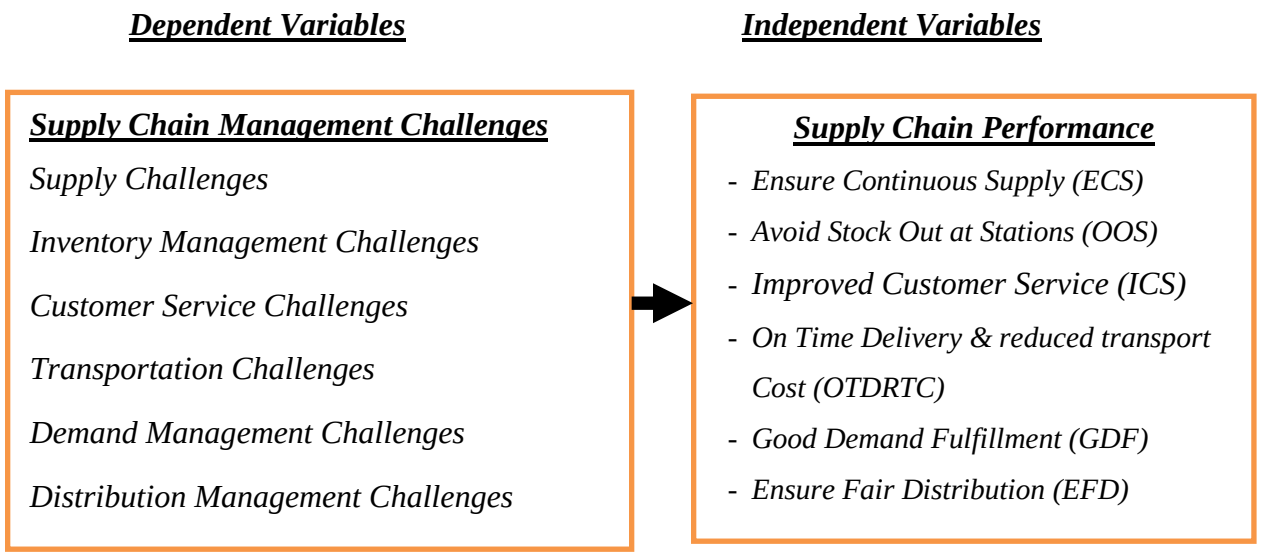

Figure 2.3. Conceptual Framework adapted from Taylor (2005) and modified by the researcher.

2.4. Identified Literature Gaps

There are no studies conducted on the challenges of supply chain management in petroleum supplier the case of Ethiopia as a whole or Total Ethiopia S.Co. Rather the local studies were conducted on the logistics management practices of Total Ethiopia S.Co was done by Ebsittu (2013) and her focus was on the practices of logistics management in the company like transportation management, inventory management, distribution management, customer service management. Tringo Gisilla (2013) conducted a study on Supply Chain Management challenges and prospects in Ethiopia Leather Industry. She noted that in leather industry supply chain most firm in Ethiopia fail to implement supply chain management and the challenges faced will be solved through benchmarking SCM practices, searching other potential market from neighboring countries to import hides and skins and work jointly with stakeholders.

However the above studies did not concentrate on the challenges of supply chain management of petroleum marketing in Total Ethiopia S.Co. It is for this research gap that the study wishes to investigate the challenges of Supply Chain Management of petroleum supplier Company.

Chapter Three

3. Methodology of the Research

In this chapter, the researcher described different methods and approaches explained by different authors. After giving a theoretical demonstration of each part of the methodology, the researcher explained why and how used these approaches to conduct the research.

3.1. Description of the Study Area

This study is focused on Total Ethiopia S. Co and tries to assess the supply chain management challenges of petroleum distribution. As per the company organizational structure collected from the human resource unit there are 168 permanent employees in Ethiopia. The main reason to study the challenges of supply chain management in Total Ethiopia S. Co is that the company is multinational company operating all over the world and pioneer company in Ethiopia since 1950.

The other reason of this study on supply chain management challenges of petroleum marketing in the company is that it is center of all the operations depend on the supply chain management of petroleum distribution and the major activities of the company is focusing on buying petroleum, transportation and distribution of petroleum products throughout the country stations and industrial and different project as per their requirement and consumption.

3.2. Research design

Descriptive survey method were used describe the challenges of supply chain management of petroleum supplier of Total Ethiopia S.Co. The approach was more structured and controlled. According to Emory (1995), a survey is feasible when the population is small and variable and hence the researcher was able to cover all the elements of the population.

For this study interviews and questionnaires were used to gather data. The researcher made use of pre-tested questionnaire during the survey. The questioning consisted of both open and closed ended questions. To ensure the reliability with in the process the questionnaire was designed based on the theory and Chronbach's Alpha reliability measurement scales were used.

A pilot test of 10 questionnaires were distributed to test the reliability of the items on the questionnaire and to make the necessary corrections. Accordingly the questionnaire was pre tested using Chronbach's Alpha reliability measurement scale and the overall result was between 0.66 and 0.99 which shows that the instrument was highly reliable. Chronbach's Alpha vales were satisfactory with alpha values between 0.66 and 0.99. (Nunnally and Brenstein, 1994). It also shows that values more than 0.6 indicates a satisfactory internal consistence of the measurement items.

3.3. Population of the Study

The target population of the study in this research was employees of the Transport and supply department, sections and sub units, marketing department sections those involved in distribution and selling of petroleum products of the company and customer service officers since they are involved in the supply chain activities. As the study covers all the employees in the stated department transport and supply in which census is used as sampling method and purposive sampling will be used to conduct the study.

Specifically, the dispatchers and its coordinators, territory managers, customer service officers, station owners, customer site managers, transport & supply managers, oil tanker drivers and fleet managers, finance managers and the general managers are the main subjects of the study. The transport & supply, territory managers and area manager work forces are mainly targeted in this study to evaluate the supply chain challenges of the company. According to the organizational structure of February 2017, the total number of employees at Total Ethiopia S.Co and the total size of the population is 168 employees.

3.4. Sampling Design and Procedure

Sample size for the supply chain management work force is easy to take which assumes all of the Dispatcher, Coordinator, Managers and Assistant managers who work in any of logistics functions. This is because of the Total Ethiopia S. Co employees of transport and supply department are 40 (Forty) in number and census study was used as population size.

The sample population was selected by using purposive sampling technique. All of the transport and supply management work forces are selected via using purposive sampling technique based on their relevance for the study. The transport and supply department work forces are purposely considered in this study because they are the key stakeholders who are mainly involved in the supply chain management activities of the firm. These populations were also targeted since they have possessed the required knowledge, specialization and various experiences on the supply chain management activities pertinent to this research study. Furthermore, the small size of the total number of the supply chain management work force allows the researcher to consider all of them. Similarly, employees who are not directly involved in the supply chain management activity will not be considered in the target population.

3.5. Sources of Data

The study used both primary and secondary sources of data to undertake the investigation. This will be used to make the study reliable and to increase its generalizability.

The primary sources of data were collected from the target population/respondents through structured questionnaire and structured interviews.

Secondary data were obtained from various sources like the Total Ethiopia S.Co supply chain performance report and literatures which are related to supply chain management challenges like inventory management challenge, supply challenge, transportation challenges and customer service challenges, distribution management challenge, demand management challenges and any other related issues. The source may include research and reports, published books, journal articles, newspapers and internet sources.

3.6. Data Collection Methods and Techniques

The main data collection instruments of this study were structured interview paired with structured questionnaire.

Self-administered questionnaire and structured interviews were used as data collection tools to gathered data from primary sources. Questionnaire is selected since it is time saving and easy instrument to collect data from many respondents. Interview is more important to get detail information about a certain phenomenon. Therefore, questionnaires were used to collect data from the supply chain management work force whereas interview was made with the different supply chain process managers in order to get detail information about the issue.

Secondary data were collected from researches, reports, published books, journal articles and internet sources. Review of literatures was conducted to provide cognitive information to the readers which help to see the problem from the existing knowledge point of view. Journal articles are necessary to see how the previous researchers threat similar problems and what gaps are there.

The questionnaire developed by the researcher to test the variables was tested with comparative and non-comparative scaling techniques. Hence, Likert scales and rank order scaling questions are mainly planned to deploy for the measurement of variables. Likert scales were used to obtain non comparative information. Thus, the respondents were required to indicate their degree of agreement or disagreement with each series of statements about specific attributes (Malhorta, 2004). The study tries to identify the challenges of supply chain management in petroleum supply at Total Ethiopia S. Co by using Likert scale questions by asking the respondents to express the challenges based on their experience and belief in 5 scale points as strongly agree, agree, neutral, disagree and strongly disagree. Rank order scaling is used to obtain comparative information. In rank order scaling respondents are presented with several items simultaneously and asked to rank them according to some criteria. Additionally the study was employed both open ended and close ended questions.

3.7. Data Analysis and Interpretation

The study employed both qualitative and quantitative data analysis techniques so as to draw reliable conclusion from the data. The former is used to describe qualitative data whereas the latter is used to make statistical analysis. The qualitative data analysis helps to identify and better understand the main challenges of supply chain management of Total Ethiopia S.Co and to give suggestion regarding the measures that would be taken to improve the current challenges of

supply chain management activity in the company. The quantitative data was checked for completeness then the data entry was began with writing on data entry format (including coding and data edit checks). Then, the data were exported into Statistical Package for the Social Sciences (SPSS) for analysis. SPSS was used to produce preliminary frequency tables and tabulations that help to select statistical methods to do further analysis of the data as per the objectives of the study. Correlation analyses were used to explain the challenges of supply chain management.

In addition the responses obtained from the respondents from interview was used to substantiate the analysis following each table. Depending on the results of the analysis, interpretations and necessary discussions were done to clarify the issue. Finally the major findings of the study was reported and recommendations are put.

3.8. Ethical Considerations

Informing Consent: The researcher used to apply oral and informed consent to solicit the willingness of the individual to participate in this research. The participants was given information on the purpose of the study, the time it takes, the procedures to be followed, and benefits before starting the research. It is only after getting an informed consent that the participants will be required to move to the next steps. The potential participant was informed that he/she can refuse to answer any question and that he/she can quit the interview at any point. If the participant has any questions, the researcher was requested to respond adequately.

Confidentiality: The researcher assured information that participants provides during the study were kept confidential. The raw data set and recorded interviews shall not be used for any other purpose than the intended purposes.

Chapter Four

4. RESULTS, DISCUSSION AND INTERPRETATION

This chapter holds with in itself the presentation and analysis of data gathered from the field to describe clearly, consistent pattern in the data as the result may be studied and interpreted in a concise and meaningful way. Findings from analysis of the study are presented in this chapter.

The researcher targeted on the supply chain management challenges of Total Ethiopia S.Co. The transport and logistics department, marketing unit and customer service units was the main source of data. Accordingly, the questionnaire was administered to 40 staffs and all were returned on time. Beside 5 (Five) interviews were conducted with top level managers to strength the result. In addition to this document analysis were made to support the data obtained through questionnaire and interview.

The findings of the study were presented to answer the leading research questions. The results are categorized according to various supply chain management challenges and issues dealt with in this study. Data collected through questionnaire were organized in tabular form and analyzed using percentage and mean scores.

The issues under supply chain management challenges are firstly, transportation management activity and its challenges, secondly, the customer service management activity and challenges, thirdly, inventory management activity and challenges, fourthly, the supply management activity and its challenges and fifthly, the distribution management activity and challenges and finally, the demand management activity and its challenges in the supply chain management of petroleum distribution at Total Ethiopia S.Co.

4.1. Socio Demographic Characteristics of Respondents

Table 4.1, Socio Demographic Characteristics of Respondents

Sex of Respondents		
	Frequ.	Percent
Male	20	50
Female	20	50
Age of Respondents		
19-25	2	5
26-30	7	17.5
31-35	16	40
36-40	13	32.5
41-45	2	5
Specialization of Respondents		
Marketing Management	23	57.5
Computer Science	5	12.5
Mechanical Engineering	9	22.5
Accounting	1	2.5
BIS	1	2.5
Purchasing & Supplies Mgt	1	2.5
Qualification of Respondents		
BSc/BA	39	97.5
MSc/MA	1	2.5

Source; Questionnaire, 2017.

As shown in the table above the gender of the respondents is having equal share from both male (50%) and female (50%). And about the age of respondents ninety percent of the respondents are between the age group of 26-40 years. And the specialization of the respondents is 57.5% from Marketing, 22.5% from Engineering who are working in the position of sales, the remaining are from computer science, accounting, business information system and purchasing. Most of the respondents have got a Bachelor of Arts degree qualification and it shows the company has educated man power. The use of modern transportation system in supply chain management of petroleum distribution and to provide good customer service it requires educated man power who are aware of the changes in the environment. Therefore, the workforce at Total Ethiopia S.Co has composed of skilled man power and easily prone to the changes in the supply chain to satisfy customer requests on time.

4.1. Transportation Management Activity (TM)

Table 4.2, Transportation Management Activity (TM)

Q. 1	The current transportation system provides efficiency in supply chain management activity of the company.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	3	7.5	2.75	0.98
2	Disagree	16	40		
3	Neither	9	22.5		
4	Agree	12	30		
5	Strongly Agree	0	0		
	Total	**40**	**100**		
Q. 2	The transportation system of the company ensures timely delivery of products to satisfy customer request on time.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	4	10	2.88	0.18
2	Disagree	15	37.5		
3	Neither	6	15		
4	Agree	12	30		
5	Strongly Agree	3	7.5		
	Total	**40**	**100**		
Q. 3	Transportation of fuel through transporters help the company reduces the cost of supply chain management to the company.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	3	7.5	3.25	0.93
2	Disagree	2	5		
3	Neither	15	37.5		
4	Agree	18	45		
5	Strongly Agree	2	5		
	Total	**40**	**100**		

Source, *Questionnaire, May 2017*

… Continued

Q. 4	The transportation of fuel with safety requirement satisfies the customer request on time.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	6	15	2.98	0.38
2	Disagree	13	32.5		
3	Neither	4	10		
4	Agree	10	25		
5	Strongly Agree	7	17.5		
	Total	**40**	**100**		
Q. 5	The use of information technology to follow trucks location and status support the supply chain management of the company to deliver products as planned.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	0	0	3.68	0.18
2	Disagree	9	22.5		
3	Neither	6	15		
4	Agree	14	35		
5	Strongly Agree	11	27.5		
	Total	**40**	**100**		

Source, *Questionnaire, May 2017*

On item 1 of transportation management activity, respondents were asked to express their level of agreement on the current transportation system efficiency in supply chain management activity of the company. And hence 16 (40%) of the respondents disagree on the item, 3 (7.5%) of the respondents disagree on the item, 9 (22.5%) of the respondents are neither agreed nor disagreed on the item and only 12 (30%) of the respondents agree on the item. It shows that 47.5% of the respondents disagree on item 1 and it shows that the current transportation management system of the company lacks efficiency which also hinders the supply chain management in reducing transportation cost.

On item 2, respondents were asked about the transportation system like timely delivery of products to satisfy customer request on time or not. Thus, 15 (37.5%) of the respondents disagree on the on time delivery of transport system, 4 (10%) of the respondents strongly disagree, 6 (15%) of the respondents neither agree nor disagree, 12 (30%) of the respondents agree and 3

(7.5%) of the respondents strongly agree on the item. It shows that 19 (47.5%) of the respondents disagree on the transport system to ensure on time delivery of products.

On item 3, most respondents 18 (45%) agree on the item that the use of transporters to move petroleum products help the company to reduce the supply chain management cost. And 2 (5%) of the respondents strongly agree, 15 (37.5%) of the respondents fall on neither agreed or disagreed on the item, 2 (5%) of the respondents disagree and 3 (7.5%) of the respondents strongly disagree on the item.

On item 4, respondents were asked on the transportation of fuel with safety requirement satisfies the customer request on time or not. Most of the respondents 13 (32.5%) of the respondents disagree on the item and 7 (15%) of the respondents strongly disagree on the item. And 4 (10%) fall on neither agree nor disagree on the item, 10 (25%) agree on the item and 7 (17.5%) strongly agree on the item.

Finally item 5, respondents were asked about the use of information technology to follow trucks location and status support the supply chain management of the company to deliver products as planned or not. Majority of the respondents 14 (35%) of the respondents agree, 11 (27.5%) of the respondents strongly agree, 6 (15%) of the respondents fall neither agree nor disagree on the item and 9 (22.5%) of the respondents disagree on the item.

Generally, the average mean and standard deviation of the total item represents 3.19 and 0.42 respectively, this shows most of the respondents shows their disagreement on the factors raised on the transportation management activity of the company.

4.2. Customer Service Management Activity (CSM)

Table 4.3, Customer Service Management activity.

Q. 1	There is well developed tool to check customer satisfaction in the supply chain activities of the company.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	9	22.5	2.5	0.17
2	Disagree	15	37.5		
3	Neither	3	7.5		
4	Agree	13	32.5		
5	Strongly Agree	0	0		
	Total	**40**	**100**		
Q. 2	Customer service policy of the company results in high sales of petroleum products to the company.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	0	0	3.08	0.14
2	Disagree	6	15		
3	Neither	7	17.5		
4	Agree	21	52.5		
5	Strongly Agree	6	15		
	Total	**40**	**100**		
Q. 3	The response time to receive an order is short.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	6	15	2.85	0.35
2	Disagree	15	37.5		
3	Neither	4	10		
4	Agree	9	22.5		
5	Strongly Agree	6	15		
	Total	**40**	**100**		
Q. 4	There are a number of different petroleum products offered for a customer to satisfy their requirements.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	3	7.5	3.08	0.09
2	Disagree	10	25		
3	Neither	11	27.5		
4	Agree	13	32.5		
5	Strongly Agree	3	7.5		
	Total	**40**	**100**		

Source, Questionnaire, May 2017

In the first item, respondents were asked about whether there is a well-developed tool to check customer satisfaction in the supply chain activities of the company or not. Most of the

respondents 15 (37.5%) were disagreed, 9 (22%) of the respondents strongly disagree, 3 (7.5%) of the respondents neither agree nor disagree and 13 (32%) of the respondents agree.

In the second item, respondents were asked about the customer service policy of the company in resulting high sales of petroleum products or not. Most of the respondents 21 (52.5%) agree on the item, 6 (15%) of the respondents strongly agree, 6 (15%) of the respondents disagree and 7 (17.5%) of the respondents fall on neither agree or disagree.

In the third item, respondents were asked about the response time to receive an order is short or not. 15 (37.5%) of respondents disagree, 6 (15%) of respondents strongly disagree, 4(10%) of the respondents fall on neither agree nor disagree, 9 (22.5%) of the respondents agree and 6 (15%) of the respondents strongly agree on the item.

Finally item 4, respondents were asked about the number of products offered by the company for sale to satisfy customer request. Thus, 3 (7.5%) of the respondents strongly disagree, 10 (25%) of the respondents disagree, 11 (27.5%) of the respondents neither agreed nor disagree, 13 (32.5%) of the respondents agree and 3 (7.5%) of the respondents strongly agree on the item.

Generally, the average mean and standard deviation of the respondents were 2.88 and 0.19 respectively; this shows most of the respondent’s shows disagreement on the customer service management activity. Thus, the non-existence of developed tool to check customers satisfaction in the supply chain activity of the company is one of the challenges in the supply chain management activity of the company and the response time to deliver order is long as per the respondents response and it shows that the challenge that exists in the supply chain will hinder fast or shorter delivery time.

4.3. Inventory Management Activity (IM)

Table 4.4, Inventory Management activity.

Q. 1	The quantity ordered by stations and customer sites for petroleum product is based on real demand analysis and sales forecast.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	1	2.5	3.70	0.90
2	Disagree	24	60		
3	Neither	3	7.5		
4	Agree	6	15		
5	Strongly Agree	6	15		
	Total	**40**	**100**		
Q. 2	The stock of the stations or customer sites is followed regularly by the sales team to avoid being stock out.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	3	7.5	3.40	0.19
2	Disagree	18	45		
3	Neither	5	12.5		
4	Agree	8	20		
5	Strongly Agree	6	15		
	Total	**40**	**100**		
Q. 3	There is storage space limitation in the stations or customer sites to manage the inventory.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	0	0	3.18	0.10
2	Disagree	10	25		
3	Neither	8	20		
4	Agree	15	37.5		
5	Strongly Agree	7	17.5		
	Total	**40**	**100**		
Q. 4	There is a developed tool to control the stock of all stations and customer sites in the company.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	6	15	2.90	0.22
2	Disagree	16	40		
3	Neither	8	20		
4	Agree	9	22.5		
5	Strongly Agree	1	2.5		
	Total	**40**	**100**		

Source, Questionnaire, May 2017

On item 1, the respondents were asked about whether the quantity ordered by stations and customer sites is based on real demand analysis and sales forecast or not. 24 (60%) of the respondents disagree, 6(15%) of the respondents strongly agree, 3 (7.5%) of the respondents fall on neither agree nor disagree, 6 (15%) of the respondents agree and 1 (2.5%) of the respondents strongly disagree.

On item 2, respondents were asked about whether the stock of the stations or customer sites is followed regularly by sales team to avoid being stock out or not. Majority of the respondents 18 (45%) of the respondents disagree on the item, 3 (7.5%) of the respondents strongly disagree, 5 (12.5%) of the respondents neither agree nor disagree, 8 (20%) of the respondents agree on the item and 6 (15%) of the respondents strongly agree on the item.

On item 3, respondents were asked about whether there is storage space limitation in the stations or customer sites to manage their inventory which affects the supply chain to avoid truck stranding for long period to unload because of storage space. Most of the respondent 15 (37.5%) agree, 7 (17.5%) of the respondents, 10 (25%) of the respondents disagree on the item and 8 (20%) of the respondents neither agree nor disagree on the item. Thus it shows storage space limitation is one of the challenges in the supply chain of inventory management.

Finally on item 4, respondents were asked about whether there is a developed tool to control the stock of the stations or not. Most of the respondents 16 (40%) disagree, 6 (15%) of the respondents strongly disagree, 8 (20%) of the respondents fall on neither agree nor disagree, 9 (22.5%) of the respondents agree on the item and 1 (2.5%) of the respondents strongly agree on the item.

Generally, the average mean and standard deviation of the respondents of the total item in inventory management activity represents 3.30 and 0.35 respectively, thus it shows that most of the respondents agree on the existence of those challenges in the supply chain management activity of the company like space limitation, poor stock control at stations, lack of forecast or real demand analysis to order product for delivery and lack of developed tool to control stations or customer sites stock to reduce being zero stock before the next delivery of petroleum product.

4.4. Supply Management (SM)

Table 4.5, Supply Management activity.

Q. 1	The supply management system designed in the company target to minimize the supply chain costs of petroleum marketing.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	4	10	3.45	0.13
2	Disagree	25	62.5		
3	Neither	3	7.5		
4	Agree	5	12.5		
5	Strongly Agree	3	7.5		
	Total	**40**	**100**		
Q. 2	The organization approach to supplier has an impact on the transport and supply department success.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	3	7.5	3.50	0.17
2	Disagree	7	17.5		
3	Neither	3	7.5		
4	Agree	21	52.5		
5	Strongly Agree	6	15		
	Total	**40**	**100**		
Q. 3	The petroleum product supply has faced shortage of products for different periods from the government side (EPSE).				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	0	0	4.23	0.69
2	Disagree	0	0		
3	Neither	6	15		
4	Agree	19	47.5		
5	Strongly Agree	15	37.5		
	Total	**40**	**100**		
Q. 4	The supply of petroleum product by EPSE is affected by bad weather condition and lack of storage capacity.				
S. No	Extent of Agreement	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	0	0	3.85	0.85
2	Disagree	6	15		
3	Neither	0	0		
4	Agree	28	70		
5	Strongly Agree	6	15		
	Total	**40**	**100**		

Source, Questionnaire, May 2017

On the first item, respondents were asked whether the supply management system designed target to minimize the supply chain cost of petroleum marketing or not. Most of the respondents 25 (62.5%) disagree on the item, 4 (10%) of the respondents strongly disagree on the item, 3 (7.5%) of the respondents neither agree nor disagree on the item, 5 (12.5%) of the respondents agree on the item and 3 (7.5%) of the respondents strongly disagree on the item.

On the second item, respondents were asked to express their level of agreement on the organizations approach to supplier has an impact on the transport and supply department success or not. Most of the respondents 21 (52.5%) agree on the item and 6 (15%) of the respondents strongly agree on the item and a total of 27 (67.5%) of the respondents agree on the item that the current poor approach to supplier of petroleum product has an impact on the transport and supply department of the company and it is one of the challenge in the supply chain of petroleum marketing. And 3 (7.5%) of the respondents strongly disagree, 7 (17.5%) of the respondents disagree and 3 (7.5%) of the respondents fall on neither agree nor disagree on the item.

On the third item, respondents were asked about the petroleum product supply has faced shortage of product for various periods by the government or not. Most of the respondents 19 (47.5%) agree, 15 (37.5%) of the respondents strongly agree and 6 (15%) of the respondents fall on neither agree nor disagree on the item.

Finally on item 4, respondents were asked about the supply of product is affected by bad weather condition and lack of storage capacity at unloading point or depot or not. Majority of the respondents 28 (70%) agree, 6 (15 %) of the respondents strongly agree and 6 (15%) of the respondents disagree on the item.

Generally, the average mean and standard deviation of the total items in supply management activity represents 3.76 and 0.46 respectively, this shows that majority of the respondents agreement on the challenges of supply management activity because the major challenges in the supply chain management is due to product shortage at the depot/ Djibouti for loading, bad weather condition which creates delay in vessels, the company approach to supplier is also a challenge and the design of the supply chain management system.

4.5. Distribution Management Activity (DM)

Table 4.6; Distribution Management activity.

Q. 1	The distribution of petroleum products is dependent on the availability of trucks.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	3	7.5	2.83	0.59
2	Disagree	17	42.5		
3	Neither	6	15		
4	Agree	14	35		
5	Strongly Agree	0	0		
	Total	**40**	**100**		
Q. 2	The distribution system of petroleum product in the company is fair to ensure product availability at all stations/customer sites.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	3	7.5	2.90	0.21
2	Disagree	19	47.5		
3	Neither	0	0		
4	Agree	15	37.5		
5	Strongly Agree	3	7.5		
	Total	**40**	**100**		
Q. 3	The petroleum distribution system is flexible enough to alter delivery schedules depending on customer demand.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	3	7.5	3.18	0.15
2	Disagree	18	45		
3	Neither	5	12.5		
4	Agree	11	27.5		
5	Strongly Agree	3	7.5		
	Total	**40**	**100**		
Q. 4	The distribution network of the company helps to ensure fair distribution of products to the stations or customer sites.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	5	12.5	2.98	0.80
2	Disagree	13	32.5		
3	Neither	10	25		
4	Agree	12	30		
5	Strongly Agree	0	0		
	Total	**40**	**100**		

Source; Questionnaire, May 2017

On item 1, the respondents were asked about the distribution of petroleum product is dependent on the availability of truck or not. Most of the respondents 17 (42.5%) disagree on the item, 3 (7.5%) strongly disagree on the item, 6 (15%) of the respondents neither agree nor disagree on the item and 14 (35%) of the respondents agree on the item.

On item 2, respondents were asked to express their level of agreement on the distribution system of petroleum product is fair to ensure product availability or not. Most of the respondents 19 (47.5%) disagree on the item, 3 (7.5%) of the respondents strongly disagree, 15 (37.5%) agree on the item and 3 (7.5%) strongly agree on the item.

On item 3, respondents were asked about the petroleum distribution system is flexible enough to alter delivery schedules depending on customer demand or not. Most of the respondents 18 (45%) disagree on the item, 3 (7.5%) of the respondents strongly disagree, 5 (12.5%) of the respondents neither agree nor disagree, 11 (27.5%) of the respondents agree and 3 (7.5 %) of the respondents strongly agree on the item.

Finally on item4, respondents were asked whether the distribution network helps to ensure fair distribution of products to the stations or customer sites or not. Majority of the respondents 13 (32.5%) disagree and 5 (12.5%) of the respondents strongly disagree, 10 (25%) of the respondents neither agree nor disagree and 12 (30%) of the respondents agree on the item.

Generally, the average mean and standard deviation of the total item of the respondents in the distribution management challenges of the supply chain represents 2.97 and 0.44 respectively, this shows that the distribution management system of the company is affected by the availability of trucks and it is not fair which considers all stations or customer sites or locations, the distribution system is not flexible enough as per the demand of customers.

4.6. Demand Management Activity (DDM)

Table 4.7, Demand Management activity.

Q. 1	The supply chain management activity of the company is fulfilling the customers demand accurately.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	3	7.5	2.75	0.13
2	Disagree	19	47.5		
3	Neither	6	15		
4	Agree	9	22.5		
5	Strongly Agree	3	7.5		
	Total	**40**	**100**		
Q. 2	The demand and request of customers' orders are filled on time and up on their request and expectation.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	6	15	2.40	0.08
2	Disagree	21	52.5		
3	Neither	7	17.5		
4	Agree	3	7.5		
5	Strongly Agree	3	7.5		
	Total	**40**	**100**		
Q. 3	The stock replenishment system of the company is good to the stations compared to their orders.				
S. No	**Extent of Agreement**	**Frequency**	**Percent**	**Mean**	**S.D**
1	Strongly Disagree	3	7.5	2.78	0.97
2	Disagree	15	37.5		
3	Neither	10	25		
4	Agree	6	15		
5	Strongly Agree	6	15		
	Total	**40**	**100**		

Source, Questionnaire, May 2017

On item 1, respondents were asked about whether the supply chain management activity is fulfilling the customers demand accurately or not. Most respondents 19 (47.5%) disagree on the item, 3 (7.5%) of the respondents strongly disagree on the item, 6 (15%) of the respondents

neither agree nor disagree on the item, 9 (22.5%) of the respondents agree on the item and 3 (7.5%) of the respondents strongly agree on the item.

On item 2, respondents were asked to express their level of agreement on the demand of customers request are fulfilled on time or not. Majority of the respondents 21 (52.5%) disagree on the item, 6 (15%) of the respondents strongly disagree on the item, 7 (17.5%) of the respondents neither agree nor disagree on the item, 3 (7.5%) of the respondents agree and strongly agree on the item each.

Finally on item 3, respondent were asked whether the stock replenishment system of the company is good to stations compared to their orders or not. Majority of the respondents 15 (37.5%) disagree on the item, 3 (7.5%) of the respondents strongly disagree, 10 (25%) of the respondents neither agree nor disagree on the item, 6 (15%) of the respondents agree and strongly agree on the item each.

Generally, the average mean and standard deviation of the total item in the demand management in the supply chain represents 2.64 and 0.39 respectively, it shows that the majority of respondents show their disagreement on the demand management and the challenges identified in the demand management is no stock replenishment system, orders are not fulfilled on time and the supply chain management is not fulfilling customers demand accurately as per their request.

In the analysis above the mean and standard deviation is used to measure each questionnaire items are in the acceptable range or not. Thus the acceptable range for the mean is 1.5 – 4 and for standard deviation is 0.25 – 2.

A spear's man correlation coefficient is named after Charles Spearman is a non-parametric measure of statistical correspondence between variables (David, 2003).

Table 4.8; Correlations between Variables (Spearman's Correlation)

Correlations

Correlation Coefficient *Sig (2 tailed)* N	*RTC*	*ICS*	*OTD*	*ECS*	*GDF*	*EFD*
TM	*1.000* *.* *40*	*.494*** *.001* *40*	*.357** *.024* *40*	*.399** *.011* *40*	*.555*** *.000* *40*	*.594*** *.000* *40*
CSM	*.494*** *.001* *40*	*1.000* *.* *40*	*.539*** *.000* *40*	*.381** *.015* *40*	*.448*** *.004* *40*	*.527*** *.000* *40*
IM	*.357** *.024* *40*	*.539*** *.000* *40*	*1.000* *.* *40*	*.456** *.003* *40*	*.510*** *.001* *40*	*.541*** *.000* *40*
SM	*.399** *40*	*.381** *.001* *40*	*.456** *.024* *40*	*1.000* *.* *40*	*.344* *.000* *40*	*.611*** *.000* *40*
DM	*.555*** *.000* *40*	*.448*** *.004* *40*	*.510*** *.001* *40*	*.344* *.000* *40*	*1.000* *.* *40*	*.567*** *.000* *40*
DDM	*.594*** *.000* *40*	*.527*** *.000* *40*	*.541*** *.000* *40*	*.611*** *.000* *40*	*.567*** *.000* *40*	*1.000* *.* *40*

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

Based on the spearman's correlation coefficient the transportation management and improved customer service has positive relationship with r = 0.494** and P < 0.05.

There was a significant relationship between transportation management and on time delivery with r = 0.357 and P < 0.05. The degree of linear relationship between transportation management and ensures continuous supply indicates a positive correlation with r = 0.399 and P < 0.05.

The distribution management is positively correlated with the reduce transport cost with r = 0.555 and P < 0.05.

The demand management is significantly related with the reduce transport cost with r = 0.594 and P < 0.05.

The inventory management is significantly related with the improved customer service with r = 0.539 and P < 0.05.

Supply management challenge is significantly related with improved customer service with r = 0.381 and P < 0.05.

Distribution management activity was also significantly related with supply chain management challenge which is improved customer service with r = 0.448 and P < 0.05.

Demand management was significantly related with improved customer service with r = 0.527 and P < 0.05.

There was significant relationship with customer service management challenge and ensure continuous supply with r = 0.381 and P < 0.05.

There was a positive relationship between inventory management challenge and ensure continuous supply with r = 0.456 and P < 0.05.

There was a significant relationship between distribution management and on time delivery with r = 0.510 and P < 0.05.

There was a significant relationship between distribution management and ensure continuous supply with r = 0.344 and P < 0.05.

The distribution management significantly related with good demand fulfillment with r = 0.611 and P < 0.05.

The supply management has also significantly related with good demand fulfillment with r = 0.541 and P < 0.05.

Generally, all the supply chain management variables have a positive relationship with significance important of less than 0.05 degree of error. Therefore, the researcher argues that all the stated variables have appositive relationship among them with a positive coefficient and significant importance. Therefore, the impact of one of the challenges of supply chain management variables has s significant impact on the supply chain management activity of total Ethiopia S.Co.

Chapter Five

5. Findings, Conclusions and Recommendations

The final chapter highlights the summary of findings, conclusions drawn and recommendations have been provided as per the findings of the study to identify the challenges of supply chain management and improve the supply chain efficiency at Total Ethiopia S.Co.

The major purpose of the study is to identify the major challenges in the supply chain management of petroleum marketing at Total Ethiopia S.Co in the areas of transportation, customer service, supply management, inventory management, distribution, and demand management challenges.

In order to achieve the objective of the study case study method was employed and 40 employees of the company were under the study. The questionnaires were tested and the Chronbach's Alpha values were satisfactory for the reliability then questionnaires were distributed.

5.1. Summary of Major Findings.

5.1.1. Transportation Management

In this analysis more than 65% of the respondent shows their disagreement on the current transportation system efficiency and on time delivery in the supply chain activity of the company. The challenges observed are the transportation management system lacks efficiency, it does not ensure on time delivery of products to customers, using third party transporters will lead to high supply chain costs, and the safety requirement creates delay in delivery and the bad road condition, congestion, flood, bridge broken on the road network available become the other challenges that hinders the supply chain management activity of the company. Therefore, the study indicates that the transportation management challenge will create delay and customers to be dissatisfied.

5.1.2. Customer Service Management

In customer service management of the supply chain management activity there is no developed tool to check their satisfaction level in the supply chain activity it is one of the challenge in the supply chain management. The customer service policy of the company also one of the challenges in the supply chain management of petroleum marketing because it cannot minimizes the lost sales that come from the dissatisfaction of customers in the supply chain activity due to the challenges exist in the supply chain. The other challenges identified in the customer service management activity are that response time to receive an order delivery is long because of the long chain and the challenge in the supply chain.

5.1.3. Inventory Management

In inventory management challenge of supply chain management activity shows that most respondents disagree on the ordering activity of products which is not made based on real demand forecast. And hence the challenges identified in the inventory management activity are poor stock control method and storage space limitations will hinder the supply chain management activity not to become efficient in order to achieve the company objective.

5.1.4. Supply Management

In the supply management activity the challenges identified which is summarized from the majority of respondents response is that there is product shortage from the source of supply which is the Ethiopia Petroleum Supply Enterprise, delay of vessels at port is observed, lack of storage capacity at the port to unload products from the vessel is another challenge and the company approach to the supplying organization will also a challenge in the supply chain management activity of the company

5.1.5. Distribution Management

In the distribution management activity on the supply chain the challenges identified are there is shortage of truck tankers to ensure equal distribution of product at al locations thus which affects the distribution system not to be fair, and the majority of the respondents agree that the distribution system lack flexibility of fulfilling customer demand when required and there is vast distribution network to serve by the company which is the main challenge in the supply chain management.

5.1.6. Demand Management

In the demand management activity of the supply chain the challenges identified are there is mismatch in the supply and demand which is to be filled by the supply chain activity which is too difficult and poor stock replenishment system to recover the stock at the stations or customer sites.

5.2. Conclusions

The result of this study clearly show that the major challenges identified in the supply chain management of petroleum marketing of the company are discussed as follows;

- The transportation management activity of the company has suffered from a lot of challenges like lack of efficiency in the system, it does not ensure on time delivery of products to customers, using third party transporters will lead to high supply chain costs, and the safety requirement creates delay in delivery and the bad road condition, congestion, flood, bridge broken on the road network available become the other challenges that hinders the supply chain management activity of the company.
- The customer service management activity of the company has challenges identified that response time to receive an order delivery is long because of the long chain and the challenge in the supply chain.
- The inventory management challenge of supply chain management activity is poor stock control method and storage space limitations will hinder the supply chain management activity not to become efficient in order to achieve the company objective.
- The supply management activity the challenges identified are product shortage from the source of supply which is the Ethiopia Petroleum Supply Enterprise, delay of vessels at port is observed, lack of storage capacity at the port to unload products from the vessel is another challenge and the company approach to the supplying organization will also a challenge in the supply chain management activity of the company
- The distribution management activity on the supply chain the challenges identified are there is shortage of truck tankers to ensure equal distribution of product at al locations thus which affects the distribution system not to be fair, and the majority of the respondents agree that the distribution system lack flexibility of fulfilling customer demand when required and there is vast distribution network to serve by the company which is the main challenge in the supply chain management.
- The demand management activity of the supply chain the challenges identified are there is mismatch in the supply and demand which is to be filled by the supply chain activity which is too difficult and poor stock replenishment system to recover the stock at the stations or customer sites.

5.3. Recommendations

As indicated in the conclusion part of this study, the major challenges in the supply chain management activity of the company were identified. Thus the company should take corrective actions to reduce those challenges related to supply chain management activity on transportation management, customer service management, inventory management, supply management, distribution management and demand management. As the company major activity is focused on distribution of petroleum products to their customers, so due attention must be given for those stated areas to be profitable and competitive in today's dynamic business environment.

Generally, the study recommends the following for Total Ethiopia S.Co.

1. The company should work on transportation management to minimize costs incurred related to supply chain management which has a negative impact on the supply chain management and should strive and train workers to reduce the challenges.
2. The company should improve the distribution network and its system to reduce the effect of the supply chain challenge on the late and unsafe delivery of products to ensure on time delivery for customers and to reduce their dissatisfaction level.
3. The company should come up with a standard tool to control the stock level of the stations and customer sites with hampers the supply chain by creating delay on the trucks for unlading products on time.
4. The company should have come up with a best solution for increasing the number of trucks for distribution of products by discussing with the transporters or using own means of transportation rather than using the transporter.
5. The company should revise the safety requirement for the trucks who are working to deliver products from place to place in order to increase their turnover and improve the supply chain efficiency.
6. The company should discuss with the supplier and government to increase the supply of products by importing independently and or increasing the share among the companies in the industry or keeping enough storage space to keep a lot of inventories to avoid product shortage challenges.

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Appendix I: Research Questionnaire

ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Questionnaire to be filled by employees of Total Ethiopia S. Co who participate in the supply chain of Petroleum Marketing.

Dear Respondent,

The main purpose of this questionnaire is to collect necessary data for the study on the challenges of supply chain management in petroleum distribution in Total Ethiopia S. Co. This questionnaire has been designed to seek information for purely academic purposes and hence would not affect any one in any case. The information collected through the questionnaire is kept confidential and only used for academic purposes and thereby, to come up with some workable solutions to overcome the challenges of supply chain management in petroleum marketing in the company. To this end, the outcome of this study will highly depend up on your response. Therefore, you are requested to fill the questionnaire as per the instruction, carefully and responsibly.

Therefore, I kindly request you to give your genuine, frank and timely response for all questions in the questionnaire in accordance with the instruction given for each part.

General Directions

1. You are not required to write your name.
2. Respond to all close-ended question items by putting “X” in the boxes.

Thank you in advance for your cooperation.

Section 1. *Personal Data*

For this section, I kindly request you to indicate your response by putting a (√) mark in the corresponding boxes or in writing on the lines that follow the items.

1. Sex: Male ☐ Female ☐
2. Age Group :

   19-25☐ 26 – 30 ☐ 31-35 ☐

   36-40☐ 41-45 ☐ above 45 ☐

3. In which department you are working currently?

   Transport & Logistics ☐ Marketing ☐ Customer Service ☐

   Transporter ☐ Depot ☐ Finance ☐

   Other ☐, Specify_____
4. What is your current position in the company? _____
5. What is your field of study /Specialization? _____
6. Please indicate your highest level of qualification.

   Level IV ☐ BSC/BA ☐ MSC/MA ☐

   PHD ☐ others, namely: _____
7. Your work experience in years including your experience in other company.

   Less than 1 year ☐ 1-5 Years ☐

   6-10 years ☐ Greater than 10 years ☐

Section. 2. Rating Scale Questions

1. Indicate your level of agreement on **transportation management activity** of your company using the following rating scales. (1. Strongly Disagree, 2. Disagree, 3. Neither, 4. Agree and 5. Strongly Agree).

No	Variables	1	2	3	4	5
1	The current transportation system provides efficiency in supply chain management activity of the company.					
2	The transportation system of the company ensures timely delivery of products to satisfy customer request on time.					
3	Transportation of fuel through transporters help the company reduces the cost of supply chain management to the company.					
4	The transportation of fuel with safety requirement satisfies the customer request on time.					
5	The use of information technology to follow trucks location and status support the supply chain management of the company to deliver products as planned.					

2. Indicate your level of agreement on **customer service management** activity in your company using the following rating scales. (1. Strongly Disagree, 2. Disagree, 3. Neither, 4. Agree and 5. Strongly Agree).

No	Variables	1	2	3	4	5
1	There is well developed tool to check customer satisfaction in the supply chain activities of the company.					
2	Customer service policy of the company results in high sales of petroleum products to the company.					
3	The response time to receive an order is short.					
4	There are a number of different petroleum products offered for a customer to satisfy their requirements.					

3. Indicate your level of agreement on **inventory management** of stations along the supply chain of your company using the following rating scales. (1. Strongly Disagree, 2. Disagree, 3. Neither, 4. Agree and 5. Strongly Agree).

No	Variables	1	2	3	4	5
1	The quantity ordered by stations and customer sites for petroleum product is based on real demand analysis and sales forecast.					
2	The stock of the stations or customer sites is followed regularly by the sales team to avoid being stock out.					
3	There is storage space limitation in the stations or customer sites to manage the inventory.					
4	There is a developed tool to control the stock of all stations and					

	customer sites in the company.					

4. Indicate your level of agreement on **supply management activity** in your company using the following rating scales. (1.Strongly Disagree, 2.Disagree, 3.Neither, 4.Agree and 5. Strongly Agree).

No	Variables	1	2	3	4	5
1	The supply management system designed in the company target to minimize the supply chain costs of petroleum marketing.					
2	The organization approach to supplier has an impact on the transport and supply department success.					
3	The petroleum product supply has faced shortage of products for different periods from the government side (EPSE).					
4	The supply of petroleum product by EPSE is affected by bad weather condition and lack of storage capacity.					

5. Indicate the level of your agreement on **distribution management activity** in your company using the following rating scales. (1.Strongly Disagree, 2.Disagree, 3.Neither, 4.Agree and 5.Strongly Agree).

No	Variables	1	2	3	4	5
1	The distribution of petroleum products is dependent on availability of trucks.					
2	The distribution system of petroleum product in the company is fair to ensure product availability at all stations/customer sites.					
3	The petroleum distribution system is flexible enough to alter delivery schedules depending on customer demand.					
4	The distribution network of the company helps to ensure fair distribution of products to the stations or customer sites.					

6. Indicate your level of agreement on **demand management activity** of your company using the following rating scales. (1.Strongly Disagree, 2.Disagree, 3.Neither, 4.Agree and 5.Strongly Agree).

No	Variables	1	2	3	4	5
1	The supply chain management activity of the company is fulfilling the customers demand accurately.					
2	The demand and request of customers' orders are filled on time and up on their request and expectation.					
3	The stock replenishment system of the company is good to the stations compared to their orders.					

Section 3. Interview Questions.

1. What can you say about the supply chain activities of your company?

   _____

2. Is your company customer service policy result in customer satisfaction/ if so how do you check this level of satisfaction?

   _____

3. What challenges does the company experience in managing the supply chain with regard to the following areas:
   Transportation

   _____

   Suppliers /Source of Supply/

   _____

   Customers

   _____

   Inventory Management

   _____

   Distribution Method

   _____

   Demand Management

   _____

   Other (Please specify if any);

   _____

4. How do you describe the challenge of geographical location of stations and/or customer sites to the supply chain management of petroleum marketing in the company?

   _____

   _____

5. Do you think that the challenges of supply chain management activity of the company are avoidable?

   _____

   If yes, please suggest the possible solutions to the challenges you listed above?