Supply Chain Management Practices in the Petroleum Industry of Zimbabwe.

A thesis submitted in fulfilment of the requirements for the degree of Doctor of Business Administration (DBA).

By

Happyson Bimha

Graduate School of Business and Leadership

University of Kwazulu Natal

South Africa

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DECLARATION

I declare that the thesis "Supply Chain Management in the Petroleum Industry of Zimbabwe" is my own work and all sources I have used or quoted have been indicated and acknowledged by means of complete references. The work is being submitted to the Graduate School of Business and Leadership University of Kwazulu Natal in respect of the Doctor of Business Administration programme. This work has not been submitted previously in its entirety or in part for any degree or examination in order to obtain an academic qualification at any institute or university.

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Signature **Date**

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Errors and omissions in this document are my personal responsibility and have got nothing to do with any of the people and organisations mentioned in the document.

ABSTRACT

Supply chain management is one of the contemporary management philosophies recommended to companies that seek to improve competitiveness. Supply chain management focuses on cost efficiency, customer satisfaction and systems thinking. This study analyses supply chain management practices in the Zimbabwe petroleum industry. Supply chain management is a nascent concept in Zimbabwe. Zimbabwean petroleum companies are uncompetitive because they have not embraced the supply chain management philosophy or the philosophy is not properly implemented among other reasons. The study analyses the Zimbabwe petroleum industry players based on how they manage supply chain managent activities such as procurement, inventory, logistics, information technology and customer service. It also analyses the industry's environment, supply chain strategies, industry structure and challenges. The study uses the robust convergent parallel mixed methods research design to simultaneously and independently collect data aimed to achieve a wider and detailed indepth understanding of factors leading to the Zimbabwe petroleum industry's uncompetitiveness. In-depth interviews were hel with six executives from Ministry of Energy and Power Development, Zimbabwe Energy Regulatory Authority and National Oil Iinfrastructure Company of Zimbabwe. Quantitative data was collected through objective questionnaires from fifty seven managers with supply chain management responsibilities in petroleum companies. A regression analysis on supply chain performance establishes that developing effective supply chain management strategies and staff motivation, training and development are the two determinants of supply chain management performance.The results further reveal existence of supply chain management challenges owing to an unfavourable business environment, lack of clear supply chain strategy, lack of foreign currency, weak industry structure, high cost of product, the country's poor policy framework, and lack of communication and cooperation among supply chain members. The study recommends that authorities craft and market a supply chain strategy that takes advantage of the country's potential to become a regional hub for fuel distribution to countries like Botswana, Zambia and DRC. Government must fix environmental factors that keep investors at bay and threaten de-industrialisation. Industry captains must de-bottle their planning processes; encourage teamwork and strategic alliances among supply chain members. However, the small sample size, data based on one petroleum company and its distributorship and difficulty in generalising results of the study, are some of the study's limitations.

KEY WORDS

Competitiveness, Customer satisfaction, Supply chain collaboration, Supply chain integration, Supply Chain Management, Zimbabwe petroleum industry.

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ACRONYMS

B2B	Business to Business
B2C	Business to Customer
B-BBEE	Broad Based Black Economic Empowerment
BOT	Build Operate and Transfer
BOOT	Build, Own, Operate and Transfer
BP	British Petroleum
BPR	Business Process Reengineering
CEO	Chief Executive Officer
CLDO	Leased Operations of Non-petroleum Dealer or Operator
COCO	Company Owned Company Operated
CODO	Company Owned Dealer Operated
CPI	Consumer Price Index
CPMZ	Compendia Do.Pipeline Mozambique-Zimbabwe
CRM	Customer Relationship Management
CSFs	Critical Success Factors
CSCMP	Council of Supply Chain Management Professionals
CSPro	Census and Survey Processing System
DOCO	Dealer Owned Company Operated
DODO	Dealer Owned Dealer Operated
DRC	Democratic Republic of Congo

Supply Chain Management Practices

DRP	Distribution Requirements Planning
DSI	Demand and Supply Integration
ECTS	Electronic Cargo Tracking System
EMA	Environmental Management Authority
EOQ	Economic Order Quantity
FDI	Foreign Direct Investment
FOB	Free On Board
FTL	Full Truck Load
FSCMS	Fuel Supply Chain Management System
FSCOM	Fuel Supply Chain Operations Model
GST	General Systems Theory
Ibid-	The same author
ICT	Information and Communication Technology
IDP	Industrial Development Policy
IoTs	Internet of Things
IP	Illuminating Paraffin
IPG	Independent Petroleum Group
ISO	International Standards Organisation
JIT	Just in Time
KIPEDA	Kenya Independent Petroleum Dealers Association
KMS	Knowledge Management Systems
KPIs	Key Performance Indicators
LLLDCs	Land Locked Less Developed Countries

Supply Chain Management Practices

LTLs	Less than Truck Loads
LSPs	Logistics Service Providers
MMRD	Mixed Methods Research Design
MoEPD	Ministry of Energy and Power Development
MNCs	Multi National Corporations
MRC	Medical Research Council
MRP	Materials Resource Planning
NERSA	National Energy Regulatory Authority of South Africa
NOCZIM	National Oil Company of Zimbabwe
NOIC	National Oil Infrastructure Company
NPC	National Procurement Committee
NUST	National University of Science and Technology
3PLs	Third Party Logistics Service Providers
OECD	Organisation of Economic Cooperation and Development
OMCs	Oil Marketing Companies
OPC	Office of the President and Cabinet
PEST	Political, Economic, Social and Technological Factors
PMS	Performance Measurement System
PPM	Process Performance Measurement
PPPs	Public, Private Partnerships
PSVCM	Petroleum Supply Value Chain Model
PZL	Petro Zim Private Limited
RATPLAN	The Service Station Rationalisation Plan

Supply Chain Management Practices

SADC	Southern African Development Community
SAPIA	South Africa Petroleum Industry Association
SCA	Supply Chain Agility
SCC	Supply Chain Collaboration
SCD	Supply Chain Drivers
SCI	Supply Chain Integration
SCM	Supply Chain Management
SCMPM	Supply Chain Management Performance Measurement
SCOR	Supply Chain Operations Reference model
SHEQ	Safety, Health, Environment and Quality
Sis	Statutory Instruments
SMEs	Small to Medium Enterprises
SPSS	Statistical Package for the Social Sciences
SRM	Supplier Relationship Management
SWOT	Strengths, Weaknesses, Opportunities and Threats
TOC	Theory of Constraints
TQM	Total Quality Management
UKZN	University of Kwa Zulu Natal
USAID	United States Agency for International Development
USD	United States Dollars
VMI	Vendor Managed Inventory
ZERA	Zimbabwe Energy Regulatory Authority
ZIMRA	Zimbabwe Revenue Authority

Supply Chain Management Practices

ZINARA Zimbabwe National Roads Authority

ZOPCO Zimbabwe Oil Procurement Consortium

Supply Chain Management Practices in the Petroleum Industry of Zimbabwe.

CHAPTER ONE: INTRODUCTION

1.1 Introduction

This study was about the supply chain management philosophy, a management philosophy which is aimed to integrating all linkages in the supply chain into a seamless unit (Badenhorst-Weiss, Biljon & Ambe, 2017). Companies are implementing new innovative management philosophies including supply chain management to enhance their competitiveness (Azfar, Khan & Gabriel, 2014). In fact, 80% of operating expenses in most companies were spent on the supply chain management system (Saad, Udin & Hausan, 2014). Research has shown that supply chain management focuses on how to improve efficiency and eliminate redundancy along a company's value chain in order to improve product availability to the customer (Ogunlela & Lekhanya, 2016). Therefore, the Zimbabwean economy requires a flawless fuel supply system so that, fuel, which is a strategic commodity in ensuring the efficient functioning of all economic activities from domestic to industrial operations, is made available to customers all the time. The petroleum industry in Zimbabwe has been the country's Achilles heel since the attainment of independence in 1980. The country experienced different fuel supply challenges which the Government tried to address using different strategies but failed to bring the sanity that is required to stabilise the petroleum industry.

The peak of the fuel industry's supply chain challenges was witnessed in 2008/2009 financial year when motorists waited in endless queues for several hours for fuel that never came. In 2010 the National Oil Company of Zimbabwe (NOCZIM) was closed because it was ineffective and inefficient in executing its role as the sole fuel procurer for the country. NOCZIM was immediately replaced with the current national fuel distribution system which authorities claim is a liberalised system which gives petroleum companies freedom to import their own fuel for resale and to operate at different levels of the supply chain. However, the new system has its own problems because it has failed to deliver fuel to the satisfaction of consumers. The effects of uncompetitiveness of the petroleum industry's supply chain are felt immediately because fuel is an input cost for companies involved in both manufacturing and service companies particularly those in transportation business. Thus, any slightest fuel price increase will filter through all components of the Consumer Price Index (CPI) basket while

the effects of fuel shortages and unavailability will be immediately felt across all sectors of the economy.

From a practical point of view, sustainable supply chain management is the strategic, transparent, and integrated achievement of an organisation's social, environmental and economic goals in the systematic coordination of key inter-organisational business processes for improving long term economic performance of the individual company and its supply chains (Carter & Rogers, 2008). Therefore, the goal of supply chain management is to remove inefficiencies, excess costs and excess inventories from the supply chain that extends from customers back to suppliers (Bala, 2014). Up to 90% of a company's costs are attributable to supply chain activities, hence the need for managers to pay more attention to supply chain management (Fawcett & Waller, 2013).

The philosophy of supply chain management is that the overall performance of supply chains is increased when the performance of all the organisations associated with the process is optimized in relation to the performance of the individual organisations through effective coordination. The objective of coordination and good organisation is to enable customers to obtain high quality products, reliable service and lowest costs (Soheila, Alizera & Alizera, 2015). Earlier research confirmed that in modern day business, individual enterprises no longer compete with themselves, but rather as a series of chains (Lambert, 2008). Thus, the researcher undertook the study in an endeavour to contribute towards finding solutions to the uncompetitiveness of the Zimbabwe petroleum industry, albeit from a supply chain management viewpoint. Competitiveness in this context relates to how effectively a petroleum company meets the needs and wants of customers relative to other companies that offer similar goods and services. Competitiveness is the effectiveness with which firms meet customer needs relative to competitors who offer similar products and services (Stevenson, 2012). Mwaura, et al. (2015) suggest that, the core focus of the competitiveness of a firm is price and cost developments of production factors that can potentially affect economic growth, market shares and other performances of companies in targeted sectors. It signifies a firm's ability to compete and be more successful than others. Competitiveness can be identified with a firm's economic performance whose indicators include market share, sales growth and profitability (ibid). Some of the necessary requirements for success in the fuel distribution business are consistently reliable sources of products that charge fair prices,

supply products of the right specifications, and make product and service deliveries on time (Beare, 2004).

A landlocked country like Zimbabwe, which has no known fuel deposits and is a net importer of fuel, requires effective supply chain management (SCM) strategies at national, industry and company levels. Businesses with inefficient and ineffective fuel supply chain management in highly competitive markets have low relative market shares and high operational costs and these attributes make them uncompetitive. The Chief Executive of Caterpillar construction materials manufacturing company remarked that the competitor who is better at managing the supply chain is probably going to be the most successful competitor over time - it's a condition of success (Habib, 2011). Top performers have a clear supply chain strategy aligned with overall business objectives and customers' requirements (Varma, Wadhwa & Deshmuk, 2008). Thus, supply chain management enables companies to create links with suppliers, customers and other supply chain members all the time, creating better opportunities for success for the focal company. Companies therefore need to take supply chain management seriously and they should never consider it as an optional strategy for growth and survival.

The study sought to identify supply chain management practices which made the Zimbabwean petroleum industry uncompetitive. Based on the fact that there were no known studies that have tried to address supply chain management in the Zimbambwe's petroleum industry, the study was also aimed at making supply chain management philosophy a relevant tool in improving competitiveness of petroleum companies, and bridging knowledge gaps in supply chain management. Enhancing petroleum industry, stakeholders' supply chain management knowledge could create prospects for the transformation of Zimbabwean petroleum industry's uncompetitive status quo. Coyle, et al. (2013) submits that, supply chain is depicted as being boundary spanning. That is to say, it encompasses a group of interrelated firms which are focused on delivering the best price or value products and services to the ultimate customer at the end of the supply chain. Therefore, a supply chain should manage four important flows, namely; products/materials, information, financials and demand while responding to policy and customer satisfaction (Coyle, 2013). These are international supply chain performance benchmarks hence they are applicable to companies operating in the petroleum industry of Zimbabwe too. The current study focuses on transportation fuels, mogas (petrol) and gasoil (diesel) only because they are the most demanded petroleum

products in Zimbabwe. In the study associative organisations are organisations that work to support a collective of firms in a given industry. Their role is to provide specific services and resources that individual firms often find too costly to achieve alone (Gereff & Fernandez-Starke, 2011). Associative organisations help firms to lower costs and improve competitiveness by establishing common standards and quality controls among other issues. Therefore, whenever the term associative organisations is used in the study, it will be referring to the trio of Ministry of Energy and Power Development (MoEPD), Zimbabwe Energy Regulatory Authority (ZERA) and National Oil Infrastructure Company (NOIC).

1.2 Rationale of the study

The study was concerned with developing deeper insights into supply chain management processes and techniques and enhancing managers' understanding of supply chain management, and how it interfaces with the company's overall strategy. Frederico and De-Souza (2017) notes how the importance of the correlation between supply chain practices and competitiveness can help managers overcome the management of complexity created in the network of companies. Therefore, the study of supply chain management practices can improve the understanding of how all the processes are integrated in a way that could provide products, services and information that add value to the customers (Frederico & De-Souza, 2017). Thus, generating new knowledge about how the petroleum industry's supply chain management practices can complement efforts made by other stakeholders in addressing the petroleum industry's supply chain management challenges is important.

Despite efforts by the Government of Zimbabwe, problems affecting the economic performance of the petroleum industry still prevail. The study looks at how SCM activities of the petroleum industry are organised and seeks to provide strategies which are essential to assist petroleum companies to find viable solutions to the industry's challenges, particularly uncompetitiveness. The ability to develop and implement viable SCM strategies is crucial to turning around company performance. Research shows that a lot of supply chain studies have focused on manufacturing, ignoring process industry supply chain, particularly in the petroleum industry, which has unique characteristics such as effective standardisation, high risk owing to product inflammability and ease of contamination, bulk shipments, long supply chain and prices that keep fluctuating in the international market (Varma, et al., 2008). The

lack of known studies that have been carried out about supply chain management issues in the petroleum industry motivated the desire to get more information and understanding about the Zimbabwean petroleum industry's supply chain management activities.

Spurred by a supply chain management drive, Oil Marketing Companies (OMCs) are expected to fully utilise their capacities and enhance their competitiveness. Companies that establish the required supply chain capabilities to deal with the business complexity at hand have proven to be more successful than their competitors because effective supply chain strategies influence the way an organisation works with its supply chain partners, including suppliers, distributors, and even its customers' customers (Pienaar & Vogt, 2014). The researcher anticipated that, the findings from the study could be used to inform supply chain management decisions and influence competitiveness among companies in the petroleum industry in Zimbabwe giving them a competitive edge over their counterparts who have not implemented supply chain management.

Recommendations from the study could provide independent consulting practitioners and teachers of management with more information and knowledge to strengthen their theoretical and practical understanding of petroleum industry operations. Zimbabwe currently faces unprecedented fuel supply challenges that the government has battled since 1982 the major ones being cost and restricted distribution. Recommendations from the study can enhance policy makers' understanding of the petroleum industry and its operations leading to effective policies that spur petroleum industry's contribution to the economic growth and stability. Economic and industrial recovery anticipated in Zimbabwe requires a flawless supply of fuel at competitive prices, industry supportive policies, and associative organisations with a better understanding of industry operations (Ministry of Energy and Power Development, 2012).

Consumers of petroleum products have not enjoyed the commodities and related supply services since 1982 when fuel shortages hit the market. Fuel shortage results in fuel price increases which affect individual motorists, transportation companies and other industrial and domestic users. During fuel shortages, prices of all basic commodities and bus fares increase substantially. Customs duties for transportation fuel are currently pegged at USD 0.44 per litre of diesel and USD 0.56 per litre of unleaded or leaded petrol (Zimbabwe Revenue Authority [ZIMRA], 2016). These and other charges lead to higher pump prices compared to fuel prices charged in the SADC region (see Table 1.1). Thus, the fuel situation in Zimbabwe

is delicate and creates the need to develop strategies to ensure an uninterrupted supply of affordable high quality petroleum products. The country's strategic reserve fuel was less than three months cover and this situation was exacerbated by lack of buffer stocks at individual oil companies owing to the shrinkage of funding and lack of storage facilities (NOCZIM, 2010). This necessitates the need to find alternative and stronger supply chain strategies for the industry.

1.3 The problem of the study

Competitiveness has eluded companies operating in the petroleum industry of Zimbabwe over time because the industry's supply chain does not operate as a system and there were no value chain benefits for operators. The fact that the industry's supply chain does not operate as a system can be explained by poor relationships between the petroleum companies and suppliers, associative organisations, logistics service providers and customers. There was no cooperation, coordination and integration of activities between members of the petroleum industry's supply chain.

Unscrupulous petroleum sellers tinker around with product quality and they sometimes illegally mixed diesel with paraffin and they over blended their petrol to gain volume (Gumbo, 2017). Since customs duty for petrol and diesel were high, customers paid exorbitant prices for adulterated poor quality products. Lack of investment in the petroleum industry led to slow growth and a restricted distribution network (NOCZIM, 2010). Service stations were concentrated in urban centers and far apart in remote areas (Regulatory Agency of Zambia, 2012). Further to that, there is instability which is driven by: regulatory uncertainty, government controls on fuel prices, restricted movement of fuel tankers and shortage of foreign currency. All these led to an unfavourable business environment which chased away investors and made planning difficult for industry players. In addition to this, lack of infrastructure such as storage, loading and distribution facilities created a dilemma for all petroleum industry's supply chain members. Additionally, there has been no study about the local petroleum industry's chain issues, particularly, supply chain management practices and the industry's uncompetitiveness. This limited the availability of knowledge and information and further perpetuated the petroleum industry's supply chain challenges. Urgent action involving all key supply chain stakeholders was required to turn around the situation

because the challenges did not affect the petroleum industry alone. The problems cut across all sectors of the economy which relied on petroleum products as their inputs. Failure to address the supply chain problems now and as a team could lead to a total collapse of the transportation business and ripple effects such as arbitrage pricing, corruption, smuggling of product and the fuel black market have the potential of shutting down the economy.

The continued lack of solutions to the problem of uncompetitiveness hampers the government and business community's industrialisation programmes because the success of industrialisation programmes depends on reliable availability of transportation fuel (Ministry of Industry and Commerce, 2012). Failure to attract adequate investment to support the industrialisation programme meant that potential investment funds could be redirected to other countries with competitive petroleum supply chains (Ibid). Thus, solving the fuel industry's supply chain challenges will not only improve existing supply chain knowledge in general but it will generate new information and new knowledge about the Zimbabwe petroleum industry supply chain in particular. Supply chain management experts have declared that, in the course of time, the most considerate benefits to businesses with advanced supply chain management capabilities were radically improved customer responsiveness, developed customer service and satisfaction, increased flexibility for changing market conditions, improved customer retention and more efficient marketing (Habib, 2011).

The following factors highlight typical challenges faced by Zimbabwean petroleum companies and other stakeholders. Cumulatively, they all merge into the above industry problems.

- Prices of fuel were uncompetitive compared to regional prices yet the cost of fuel impacted directly on other services and the competitiveness of enterprises (ZERA, 2012). The following table of regional pump prices of diesel fuel between 2010 and 2015 shows that, Zimbabwe's fuel prices were relatively higher compared to other SADC countries.

Table 1: Pump prices of gasoline fuel in the SADC 2010, 2012, 2014 and 2015.

COUNTRY	2010 (USD) Price per litre	2012 (USD) Price per litre	2014 (USD) Price per litre	2015 (USD) Price per litre
Zimbabwe	1.29	1.52	1.56	1.40
Swaziland	1.07	1.30	1.14	--
South Africa	1.19	1.38	1.19	0.97
Namibia	1.06	1.24	1.08	1.12
Lesotho	0.97	1.24	1.03	---
Mozambique	1.11	1.58	1.55	.73

Source: (Germany Agency for International Cooperation, 2015).

- Environmental uncertainty which made it difficult for investors to plan for the future with confidence led to modest investments into the petroleum industry as evidenced by the existence of only 23 petroleum companies currently licensed to do business in Zimbabwe (ZERA, 2017). Notwithstanding the government's acknowledgment of the fact that availability of sufficient, reliable and least cost energy services was important and that, continual shortage perpetuated economic underdevelopment, the petroleum industry continued to experience supply challenges owing to poor quality and inadequate supplies (Ministry of Energy and Power Development, 2012).
- Fewer investors were attracted to the petroleum industry because of poor support from Government and associative organisations. Gereffi and Fernandez-Starke (2011) note that while entrepreneurs play a critical role in identifying opportunities and accepting the risks involved in trying to seize such opportunities, the government and public institutions must help in building and supporting a country's entrepreneurial base. In that regard public institutions can participate through offering entrepreneurial training, connecting petroleum companies to global investors and ensuring there was good national infrastructure and business environment.
- Government controls constrained fuel market forces from taking place and this squeezed petroleum companies' profit margins to the bone, hence cost management and innovation are important to stay competitive (Arvis, Marteau & Raballand, 2010). A country's business environment will largely be determine by the prices of imported products; the

more favourable the conditions, the lower the prices and, the harsher the conditions the higher the prices (Borenstein & Bushnell, 2005).

- Whilst the Zimbabwean petroleum industry was uncompetitive because it faced glitches like lack of growth and investment among petroleum companies, limited product distribution, lack of facilities and customers who were not happy, empirical evidence abound that, implementing the supply chain management philosophy had helped companies in other economies to create benefits such as growth, cost efficiencies, and competitiveness (Fawcett, Magnan & McCarter, 2008; Lambert, 2008; Naslund & Williamson, 2010; Jonsson, Rudberg & Holmberg, 2013; Adoga & Valverde, 2014).
- Despite all the above efforts, there was a dearth of empirical research concerning the Zimbabwean petroleum industry's supply chain management initiatives, practices, challenges and industry and firm competitiveness. Therefore, it is important to investigate the implementation of the supply chain management philosophy in the petroleum industry of Zimbabwe and to identify the impact this has had on corporate competitiveness. The researcher was therefore motivated to make a contribution in this area.

1.4 Aim and objectives of the study

The main aim of the study was to analyse factors that lead to uncompetitiveness of the Zimbabwean petroleum industry from a supply chain management perspective. The intention was to determine how the supply chain management philosophy was being implemented in the Zimbabwean petroleum industry, identifying any relationships that existed between supply chain management and corporate competitiveness, and how the supply chain management philosophy impacted petroleum enterprises' operations.

Specific objectives were set to achieve the study aim. Therefore, specific objectives of the study were to:

1. Determine the Zimbabwe petroleum industry' business environment, supply chain management strategies and the industry's structure.
2. Assess the attitudes of supply chain managers in Zimbabwean petroleum industry towards adopting and implementing the supply chain management philosophy in the petroleum industry of Zimbabwe.

3. Identify critical success factors required for implementing supply chain management in the Zimbabwean petroleum industry.
4. Identify the Zimbabwe petroleum industry's supply chain collaboration drivers.
5. Evaluate supply chain management performance measurement attributes relevant to the Zimbabwean petroleum industry's supply chain and how they affect operations of petroleum companies.
6. Identify the Zimbabwe petroleum industry's supply chain management challenges and benefits and suggest ways to improve competitiveness in the Zimbabwe petroleum industry.

The main questions emerging from the above were:

1. What are the Zimbabwe petroleum industry's business environmental conditions?

1. What are the Zimbabwe petroleum industry's supply chain management strategies?
2. How does the Zimbabwean petroleum industry structure affect petroleum companies' operations?
3. What are the Zimbabwean petroleum industry's supply chain managers' attitudes towards adopting and implementing the supply chain management philosophy?
4. What critical success factors would be required to implement supply chain management in the Zimbabwean petroleum industry?
5. How would the petroleum industry's critical success factors affect operations of petroleum companies?
6. What are the collaboration drivers in a petroleum industry's supply chain environment?
7. What are the Zimbabwe petroleum industry's supply chain management challenges and benefits?
8. What recommendations can be made to improve the Zimbabwe petroleum industry's competitiveness?

1.5 Significance of the study

Overall, discovering and understanding more insights and more information about the views and perceptions held by supply chain professionals about the Zimbabwean petroleum industry could assist the different petroleum industry stakeholders to resolve the industry's uncompetitiveness. However, the sectors mentioned below could derive more benefits from the study than other stakeholders.

- For petroleum companies in the retail sector an effective supply chain management strategy entails partnering with suppliers and logistics service providers. This has the potential to reduce costs along the supply chain and improving profitability for the petroleum companies. The supply chain management philosophy emphasizes the removal of all non-value adding activities from operations and ensuring the end user is satisfied by the product or service delivered (Stevenson, 2012);
- For fuel importers, improved and integrated supply chain networks could facilitate the establishment of long term and viable supply relationships with global suppliers enabling them to import fuel at competitive prices. When fuel prices go down importers can increase the size of their orders and benefit from economies of scale and quantity discounts (Coyle et al., 2017). Low cost benefits could be passed on to local players and ultimately all users tend to benefit because fuel becomes easily accessible at affordable prices. As a result, the general standard of life of communities will improve. In addition to that, the resultant profits made by petroleum companies can be invested in fuel distribution facilities such as construction of more service stations, acquisition of fuel tankers and storage facilities, thereby, reducing distances travelled by motorists to refuel their vehicles;
- Uninterrupted, stable, fuel supply could give confidence to investors who will then develop an interest to inject capital into the fuel industry. New investments further stabilise fuel supply and they can give confidence to players from other industries whose operations rely on fuel availability. The country's industrialisation process benefits when companies embark on new investment projects requiring guaranteed continuous fuel supply with minimum disruptions, thereby creating the much-needed employment (Ministry of Industry and Commerce, 2012);

- The Government could benefit from effective supply chain management because it is one of the channel members which own strategic fuel distribution infrastructure, regulated the fuel industry and generated revenue through pipeline charges and licencing fees. From the resultant revenue and competitive fuel import prices the Government would be able to buy more fuel and build enough stocks for the country's strategic reserves which it needed for emergencies (NOCZIM, 2010). The average time to deliver an order from Beira to Harare by pipeline was six to seven days. When the country has adequate strategic fuel reserves, the principle of litre in-litre out could be applied when importing fuel. This drastically reduced the waiting time to receive orders from the Beira Port. The litre in litre-in litre out principle meant that, when a petroleum company's fuel order had been injected into the pipeline at Beira port the petroleum company was allocated same product and volume from reserve stocks held at Feruka in Mutare or Msasa in Harare;
- From a regulatory point of view, it was much easier for the Government to regulate a stable industry than one that was akin to continuous and unending supply problems (Zimbabwe Energy Regulatory Authority [ZERA], 2012). The supply chain management philosophy promotes effective communication and sharing of information, hence planning for the industry could be less costly when accurate information about the industry was readily available (Scott, Lundgren & Thompson, 2011). Without accurate information planning was driven by guesswork leading to frequent reviews of policies and pricing which actually lead to uncertainty. Furthermore, there would be less need to regulate a market whose operations were stable. Potential savings could be made as a result of few inspections and other administrative costs. Savings made could be channelled towards industrialisation programmes.

1.6 Contribution of the study

The systems and value chain theories discussed in the literature review in Chapter Three explained how the supply chain management philosophy ought to be implemented in practice. The two emphasized the need for greater cooperation, collaboration and teamwork among all members of the supply chain (Sheel, 2016). It is hoped that explanations given about the systems theory and the value chain analysis would provide insights and knowledge to the reader and practicing managers on how the two management theories can guide them on how best to implement a supply chain management philosophy in the company. The

researcher viewed understanding of the systems theory and value chain provisions as a good starting point for both readers and practitioners who needed to understand supply chain management activities of the petroleum industry of Zimbabwe.

The researcher also required a better understanding of the industry's supply chain issues including supply chain management activities, attitudes of staff towards supply chain management and challenges faced in implementing supply chain management in the petroleum industry. National issues uncovered required policy intervention.The study must therefore guide policy makers on which policies they need to adopt, change and scrap to assist industry players to become more competitive.

New knowledge and information emerging from the study could assist the researcher to make sound recommendations on how best supply chain management issues could be managed to achieve corporate competitiveness. Thus, considering a supply chain management process that is rooted in other contemporary management theories such as the systems theory and value chain analysis provided more insights into strengthening supply chain management as an emerging management philosophy. The identification of the petroleum industry's supply chain management challenges in tandem with the attitudes of managers in charge of the petroleum industry's activities would help the researcher to extract accurate information that could be relevant in finding more realistic and more practical solutions to the problems faced by Zimbabwean petroleum companies. Adopting researcher suggested improvements could create an opportunity for turning round the industry and making it more competitive.

Studying real industry practices exposed the researcher to real reasons why certain things do not happen as expected and why some things that were not expected do happen. Armed with that kind of information, the researcher, practitioners and other scholars could look for realistic supply chain strategy options and interventions for the industry's supply chain problems. It is hoped that the study would provide an overview of fuel supply chain management strategies that have worked or have not worked for the petroleum companies in Zimbabwe, reasons why the strategies failed to spur the companies into success and to suggest alternatives for strengthening the companies' competitiveness. The study explored the extent to which SCM strategies could be used to improve competitiveness in the petroleum industry, an opportunity that rarely prevailed with no formal studies about the supply chain management phenomenon in particular and the petroleum industry in general.

As an avenue for advancing knowledge, the study could open up gaps for further study with the view to have a fuller understanding of the petroleum supply chain challenges and how they could be minimised and how theories related to supply chain management could be adapted to solve real life industry problems. Effective decision making is a product of availability of quality information (Cooper & Schindler, 2010). Quality information must be accurate, relevant, adequate, accessible, of the right quantity, and available on time (Zikmund & Babin, 2010). Research was one of the key tools that could provide most of these qualities and it was hoped that, the current study would provide quality information that practitioners, policy makers and other users could depend on in developing effective supply chain management strategies for their organisations.

1.7 Thesis Structure

The study was organized as follows:

Chapter One explains the rationale of the study, the problem statement, aims and objectives of the study and the study's potential benefits to different industry stakeholders;

Chapter Two provides the Zimbabwe petroleum industry's background and narrates bibliographical history of the petroleum industry and gives a summary of events that took place in the recent past, the industry's structure, general business environment, and a brief on petroleum products. All this leads to the current scenario where the industry is considred to be uncompetitive;

Chapter Three reviews the literature used in the study. First to be discussed are the systems theory and the value chain analysis, which the researcher perceives to be the bedrock of the supply chain management philosophy. Second, the supply chain management concept is reviewed focusing five elements of supply chain management of procurement management, inventory management, information communication technology management, and customer service will be reviewed focusing global supply chain management best practices. Finally, the chapter reviews supply chain management imperatives focusing on attitudes of managers towards implementing supply chain management, supply chain management drivers, supply

chain management critical success factors, supply chain management challenges and benefits and supply chain management performance measurement;

Chapter Four discussed research methodology starting with research philosophies and research approaches. The Chapter proceeds to explain the mixed methods research design which was used in the study. The chapter explains benefits and advantages of the mixed methods strategy and how the design was used to address both positivist and phenomenological elements that characterise mixed methods research. The chapter also discusses qualitative and quantitative research methods which were merged into the mixed methods design for the study;

Chapter Five presents study findings from both the quantitative research which used the survey questionnaire and secured 57 responses from supply chain managers working for petroleum companies and the qualitative research which used the qualitative in-depth interviews with six managers from the associative organisations;

Chapter Six discusses findings from the study. Both qualitative and quantitative findings converge in this chapter. Although quantitative and qualitative data were collected separately the mixed methods design requires all data to be merged into a single comprehensive discussion reflecting any similarities and contradictions in the two data sets;

Finally, Chapter seven presents the study's conclusions and recommendations, confirming the extent to which the research managed to achieve the study objectives.

1.8 Chapter summary

Having highlighted the need for adopting the supply chain management philosophy to address the petroleum industry's uncompetitiveness, the chapter stressed the need to have a flawless supply of fuel at competitive prices, supportive policies and regulations to minimize the petroleum industry's problems. Thus, the chapter defined the petroleum industry's problem as uncompetitiveness which was driven by ineffective supply chain management practices. Therefore, the aim of the study was to analyse factors that contribute to the uncompetitiveness of the Zimbabwean petroleum industry's supply chain and to advocate the

use of the supply chain management philosophy as a tool for solving the problem. The identified research objectives and research questions would be incorporated in the data collection instruments to formulate an effective and informative inquiry which can lead to the discovery and understanding of more insights and information about the Zimbabwean petroleum industry's supply chain challenges. That information and knowledge could be used as the springboard for tackling the problem of uncompetitiveness of the petroleum industry and in finding lasting solutions for the problem.

It was further highlighted in this chapter that petroleum importers, companies operating service stations, the government and customers could derive different benefits from the study. To the best of the researcher's knowledge, to date, there is no published study which analysed supply chain management practices among Zimbabwean petroleum companies.The study was based on a quantitative evaluation through scoring company supply chain managers' attitudes about supply chain management performance (quantitative research) and interviewing and recording expert evaluations (qualitative research) as explained in Chapter Four. The next chapter gives and analyses the background of the Zimbabwean Petroleum Industry focusing on its business environment, strategy and industry structure.

CHAPTER TWO: BACKGROUND-ZIMBABWEAN PETROLEUM INDUSTRY OPERATIONS

2.1 Introduction

This chapter gives a summary background of the Zimbabwe petroleum industry which is the subject of this study. The focus of the industry background description is on the general business environment, the overall strategy of bringing fuel into the country, and the structure of the industry and the required support services that drive the industry's supply chain management processes.

2.2 The business environment

The macro environment consists of all the factors outside the business which have a positive or negative influence on the growth and continued existence of the business. The external environmental factors can encourage or hinder the achievement of business objectives (Nieuwenhuizen, 2013). Positive environmental factors create opportunities for the business while negative environmental factors threaten the viability of business. Factors that are often used to evaluate the business environment are political factors, economic factors, social factors, technological factors and environmental factors (Shermehorn & Bachrach, 2015).

2.2.1 Political factors affecting the petroleum industry in Zimbabwe

Doing business in the Zimbabwean petroleum industry is controlled through Acts of parliament and Statutory Instruments (SIs). The main ones are the National Energy Policy, 2012 and the Indigenisation and Economic Empowerment (General) Regulations, 2010. According to the Ministry of Energy and Power Development (2012) the objectives of the National Energy policy were to:

- Accelerate economic development;
- Facilitate rural development;

- Promote small-medium scale enterprises;
- Ensure environmentally friendly energy development and efficient utilization of energy resources.

To achieve the above objective the Government created the Energy Regulatory Authority Act, (2010) which consummated the Zimbabwe Energy Regulatory Authority (ZERA) whose functions include, but are not limited to:

- Regulating the procurement, production, transportation, transmission, distribution, importation and exportation of energy derived from any energy source;
- Ensuring licensing and regulatory functions in respect of the energy industry;
- Ensuring that prices charged by licensees are fair to consumers in the light of the need for prices to allow licensees to finance their activities and obtain reasonable earnings.

Owing to the country's economic difficulties, the Government has been hiking duties for fuel imports and introducing other measures to enable it to meet its petroleum industry obligations. Some of the measures include the compulsory use of the pipeline although the strategy denies the country an opportunity to develop multimodal network. Multimodal networks would promote investments in rail, road and pipeline infrastructure projects for the country (Devillers, Nieman, & Nieaman, 2015). Things have gone bad to the extent that Government announced that it can no longer be expected to undertake any major investment beyond the maintenance of infrastructure it has already developed, directing petroleum companies to coordinate their efforts to deal with infrastructure challenges (Ministry of Energy and Power Development, 2012).

The Ministry of Youth Development, Indigenisation and Empowerment (2010) stated that the Indigenisation and Economic Empowerment (General) Regulations,2010 was avehicle for transferring at least fifty one per centum or controlling interest in any business to indigenous Zimbabweans. However, owing to the unfavourableness of this policy among investors there has been modest investment in the country and the petroleum industry was not spared.

2.2.2 Economic factors affecting the petroleum industry in Zimbabwe

Funding for capital investment and the availability of foreign currency to pay for imports have been thorny issues for the petroleum industry. In an effort to resolve order financing and fuel procurement Government disbanded Zimbabwe Oil Procurement Consortium (ZOPCO) in 1982 when service stations ran dry because ZOPCO was unable to effectively coordinate the procurement of fuel (NOCZIM, 2010). ZOPCO was replaced by the National Oil Company of Zimbabwe (NOCZIM) in 1983. NOCZIM was a sole procurer/importer of fuel for the nation until 2003 when Government deregulated the industry. Deregulation simultaneously allowed petroleum companies to import own products and NOCZIM to participate in fuel distribution and the industry's downstream activities, but losing its sole procurer status. In 2003 petroleum companies agreed to organise into a petroleum procurement body, the National Procurement Committee (NPC). NOCZIM chaired the committee and provided secretarial services to the NPC. Both multi nationals and indigenous petroleum companies were represented in the NPC but membership was not compulsory.

The purpose of NPC was to promote and facilitate an effective and efficient fuel procurement system for the benefit of the entire supply chain (all the customers, oil companies, fuel suppliers and Government). When NOCZIM was closed in 2010 the NPC naturally disappeared. NOCZIM (2010), indicates that, NPC made the following achievements:

- Continuous flow of fuel without any stock outs;
- Price stability;
- Knowledge and information sharing;
- Quality products;
- Negotiated fuel facilities for the industry;
- Shared facilities across the country;
- Consignment stock arrangements.

NPC's main challenges were:

- Because NPC was not covered by any legal instrument some companies disregarded NPC resolutions and negotiated separate fuel deals behind the NPC. This exposed NOCZIM and therefore relations in NPC were not good;
- Under capacity utilization of both national and company assets;

- Accumulation of interface which reached 8 million litres in 2010;
- Lack of funding for dead stock and buffer stock;
- Leakages that saw companies smuggling product and bringing into the country cheap and poor quality products.

2.2.3 Social factors affecting the petroleum industry in Zimbabwe

Economic deindustrialisation means less industrial activities which often lead to lowered demand for fuel. When there is less economic activity in the country fewer individuals will afford to own personal vehicles but the Zimbabwean case was different owing to the Government's policy of allowing the importation of cheap reconditioned vehicles. The policy enabled almost every household to own at least one vehicle (Ministry of Industry and Commerce, 2012). However, cost competitiveness, and accessibility challenges still remain unresolved owing to import costs and poor service station networks outside the urban areas. Therefore, vehicles are underutilised and motorists have to travel longer distances to refuel their cars with the most expensive fuel in the region (Germany Agency for International Cooperation, 2015).

2.2.4 Technological factors affecting the petroleum industry in Zimbabwe

Lack of investment in new technology and facilities affected the petroleum distribution efficiency. The accumulation of eight million litres of interface is one of the signs of inefficiency and also lack of innovation because no uses have been found for this core mingled product. Trucks used for inland distribution were old, no longer efficient and prone to road accidents. After a number of fatal incidents the Environmental Management Authority (EMA) banned the movement of fuel between 6.00 PM and 6.00 AM (NOCZIM, 2010). There was little integration between petroleum companies and suppliers in the upstream of the supply chain with customers in the downstream of the supply chain.

2.2.5 Environmental factors affecting the petroleum industry in Zimbabwe

Zimbabwe is a landlocked country which does not have direct access to the sea. Zimbabwe is a landlocked country that does not have its own fuel deposists, hence it is heavily dependent

on energy imports, in particular petroleum products and electricity (ZERA, 2012). The International Bank for Reconstruction and Development is tasked with improving competitiveness of firms by engaging in initiatives such as bringing down the costs of moving goods and services through analysing the operational framework of what causes the structure and supply chain costs and other initiatives. In a study commissioned by the bank, Arvis, Marteau & Raballand, (2010) identified the following disadvantages of being a landlocked less developed country (LLLDC).

- Exporters and importers in landlocked developing countries face high logistics costs, which are detrimental to their competitiveness;
- High logistics costs depend on low logistics reliability and predictability;
- Low logistics reliability and predictability stem mostly from rent seeking governance issues. These get worse in low volume trading environments such as in Zimbabwe and this increases uncertainty along the supply chain;
- Transit costs, transit delays, unpredictability (non-standardised customs formalities and duties), and lower security and integrity;
- Corruption in the form of facilitation payments paid at scheduled and unscheduled roadblocks was another common problem in LLLDCs. In the absence of facilitation payment, there is greater potential for further delays. Because these payments have nothing to do with compliance with regulations it is a strong incentive for truck drivers to violate regulations such as overloading and this has significant consequences for road conditions (Arvis, Marteu & Raballand, 2010);
- Poor transportation infrastructure has potential to increase trucking operating costs and ultimately makes full cost recovery difficult to achieve and this has implications for business growth. Teravininthon and Raballand (2008) observe that this forces companies to buy second hand vehicles; typically, the second hand trucks at the end of their initial 250,000 to 300,000 kilometres and use them for 3 to 6 years more. At this advanced age the cost of maintaining the vehicles will be high and such costs will be factored into the pricing structure.

In a related study, Groenewald (2013) contends that, challenges of Land Locked Less Developed Countries (LLLDCs) include, red tape in the process of clearing goods through customs. The process is lengthy and tedious, and this is made even more difficult by different regulatory frameworks in different African countries. The only hope left for the continent is

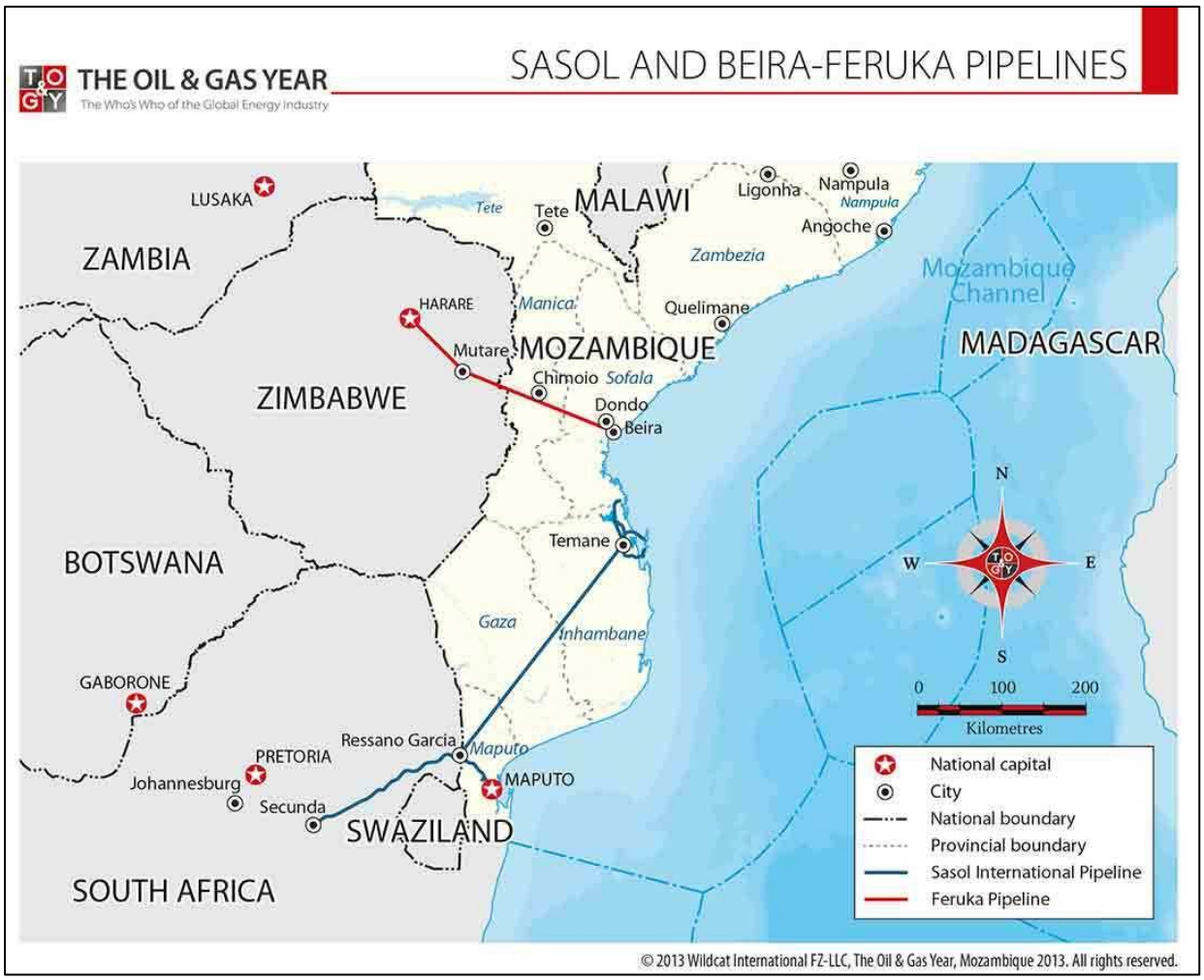
the implementation of the long awaited Intra-African free trade area, which is expected to bring relief for Africa. Some of the changes to be brought about by the intra- African free trade area by 2017 were: improvement of cross-border trade by simplifying the border procedures, limiting the number of agents at the border, improving the professionalism of officials, removing non-tariff barriers to trade such as rules of origin and import and export licensing, and reforming immigration regulations (Groenewald, 2013).

The above costs, peculiar to landlocked countries such as Zimbabwe, increase supply chain management costs, which are detrimental to individual petroleum companies' competitiveness in the market. Lack of direct sea access presents growing challenges to global integration and growth prospects of many landlocked less developed countries (LLLDCs) thwarting growth opportunities for companies operating in these environments (Teravaninthom & Raballand, 2008).

There is uncertainty surrounding Zimbabwe's reliance on the Beira port for its fuel supplies. Beira was a shallow port with a limited capacity to accommodate bulky ship carriers and this affected cost competitiveness (ZERA, 2012). As of now the Zimbabwean fuel importers have limited options but may consider the deeper port at Matola for the future. Still on the environmental front pressure was mounting from the international environmentalism movement for companies to minimize polluting the environment through use of modern technology and clean fuels.

The following map shows the location of Zimbabwe in respect of its proximity to the Indian Ocean. Zimbabwe's nearest port is the Beira port in Mozambique. Zimbabwe currently gets more that 90% of its fuel requirements through pipeline (ZERA, 2012). The Beira to Feruka pipeline is 408 kilometers long, the Zimbabwean Government owns 21 kilometers of this length from the Mozambique border to Feruka and CPMZ owns 387 kilometers from the border to Beira port and the Feruka to Msasa pipeline is 285 kilometers long (NOCZIM, 2010). The other port is at Matola in Maputo but at the moment fuel from Matola can only be transported by rail via Beitbridge.

Figure 2: Zimbabwe to Beira Pipeline Map



Source: Wildcat International FZ-LLC (2013).

2.3 The Zimbabwean petroleum industry's supply chain strategy

Understanding industry and companies' environmental conditions paves way for a clearer understanding of the industry and supply chain management practices (Achua & Lussier, 2013). This facilitates the development of appropriate supply chain strategies to generate competitiveness for the Zimbabwean petroleum companies.

The overall industry strategy was to create competitiveness. Competitiveness determines the ability of a country or an industry or a company to, proportionally generate more wealth than its competitors are in the market, creating an environment, which favours sustained value

creation (Shurchuluu, 2002). Companies that desire to grow and become successful are therefore expected to be competitive. To acquire competitiveness firms require functional public and private institutions, a well-developed infrastructure and a stable macro environment (Collins & Troilo, 2015).

In the study, competitiveness is determined by elements such as company sales performance and number of service stations relative to its nearest competitors. Achieving company competitiveness is obtained through optimal use of company assets and resources and effective management of these processes; providing quality products and services, responsiveness and customisation of products and services (Fawcett & Waller, 2013). Fuel service stations' competitiveness depends on both lower prices and meeting customer requirements, which are both critical elements in a supply chain management oriented organisation. Companies that practice supply chain management are therefore expected to be more competitive than their counterparts who have not adopted the supply chain management philosophy or those who adopted it, but are struggling to implement it effectively (Stevenson, 2012).

To achieve competitiveness the industry endeavours to ensure existence of an effective petroleum products pricing structure that is fair. Free on Board (FOB) Beira Port prices are influenced by international market rates, which are generally dependent on supply and demand factors. Fuel imported into Zimbabwe is mainly sourced from Western Europe, Middle East and Asian companies who deliver the fuel parcels at Beira port in Mozambique (NOCZIM, 2010; ZERA, 2012). Fuel from Beira is usually expensive between October and January because of supply constraints driven by increased demand in Europe during that region's winter season (NOCZIM, 2010). During the same period, it will be summer in Mozambique and docking and loading can be delayed by bad weather, which is characteristic of the port environment in Mozambique in the summer.

Based on Table 2.1 which is a dummy industry cost structure generated from prices which are quoted in Table 1.1, the ideal fuel pump price is supposed to be USD1.22 per litre of diesel and USD1.39 per litre of petrol. This means that there is a price variance in excess of 7 cents per litre of diesel on prices charged in table 1.1 which shows SADC region fuel prices from 2010 to 2014 in Chapter 1 (USD1.29) and the question is where is it channelled? Another issue would be that petroleum companies with an above average performance can beat the

national average FOB prices of USD0.75 for diesel enabling them to make more money in terms of their mark-up. However, one wonders why these companies were not performing and growing. The third issue is about the prices that were charged by companies with importer, wholesale and retail licenses. If the companies in this category sold products at retail prices why are there constricted growth and limited distribution of service stations in the industry? These and other challenges have caused teething problems for the petroleum industry and it is hoped that new knowledge and information to be generated from the study will assist industry captains and stakeholders to address the petroleum industry's challenges.

Table 2.1: Diesel and petrol price build up template.

Item	**Description**	**Diesel/Litre USD**	**Petrol/Litre USD**
1	FOB Beira	0.75	0.74
2	Beira-Feruka transport	0.037	0.037
3	Feruka –Msasa transport	0.020	0.020
4	Duty/NOIC storage &handling charge	0.25	0.35
5	Carbon tax	0.01	0.028
6	Debt redemption/Finance charges	0.01	0.047
7	Strategic reserve fees/ Insurance	0.017	0.028
8	Road levies & transport to service stations	0.010	0.024
9	Administration fees	0.012	0.012
10	Wholesale mark-up	0.091	0.091
11	**Wholesale Price**	**1.21**	**1.38**
12	Retail mark-up	0.0104	0.0104
	Retail/Pump Price	**1.22**	**1.39**

Source: NOCZIM (2010).

Fuel import and distribution strategy for the Zimbabwe petroleum industry is heavily influenced by the country's land locked status already discussed. The other issue is that Zimbabwe has no known fuel deposits and no refinery facilities and operations in existence (Ministry of Energy and Power Development, 2012). Thus, the idea of tapping into the upstream supply chain activities which would result in the country extracting its own fuel from the ground will not be a reality, at least for the foreseeable future. The only remaining option is to craft strategies to deal with the prevailing situation which requires the country to

effectively import all its fuel requirements for all commercial and industrial uses. In tandem with the product pricing issues, the supply chain management strategy discussed must also address distribution aspects of the products. To facilitate the distribution strategy the Government has made a lot of investment into the pipeline which transports fuel from Beira to Harare and fuel storage facilities in Harare, Feruka and Beit-Bridge.

The fuel distribution strategy shows that, there were some supply chain logistical complexity emanating from a cocktail of challenges affecting petroleum companies as a group and some affecting individual players. The presence of only 23 registered petroleum companies in a market that used to have more than fifty companies raised eyebrows. In any market supply chain complexity can be aggravated by conflicting governance policies, non-synchronous decisions and incomplete information systems (Sheel, 2016). The Zimbabwean market's fuel distribution network was characterised by the uncooperativeness of petroleum companies. There was no forum where petroleum industry players could discuss issues that affected their business like they used to do during the ZOPCO and the NPC eras. Because of this weakness some of the following problems have affected petroleum industry's competitiveness in one way or the other.

- Imported petroleum products destined for Zimbabwe could come by road or rail from South Africa and Mozambique or by pipeline from Beira in Mozambique. The country experienced challenges in maintaining a multi-modal transportation system because petroleum companies favoured road transportation to the pipeline. This left the Government overburdened by debt repayments until it (the Government) in 2010 gave a directive that all fuel imports should come through the Beira port and shipped by pipeline to Feruka and Harare (NOCZIM, 2010). Apart from the proposal that the pipeline was the cheapest mode of transporting fuel (Wiid, 2013), the Government's directive was meant to ensure that the Beira to Harare pipeline was not underutilized and using a single channel makes monitoring of fuel imports into the country easier. Other advantages of the pipeline highlighted by Pienaar (2010) are that, the pipeline is a non-containerized bulk mode of transport, there is no need for packaging and retaining of empty containers, only the commodity itself moves, there are no empty containers and it is easy to load and offload, pipelines consume the least energy per unit of commodity moved, the pipeline is able to move voluminous batches of fluids uninterruptedly in a continuous stream over long distances at low unit cost, the pipeline is the fastest mode of transport for carrying

petroleum products and it does not contaminate the environment and accidents are very rare and automating the fuel pumping process brings about additional security and safeguards.

- To encourage fuel importers to use the pipeline, additional punitive charges were levied to companies that tried to bring fuel into the country by road and rail. For example, over and above the normal duty of US 44 cents per litre of diesel an importer who brings product by road pays an additional 4 cents making his products more expensive than those using the pipeline. The Government wanted to collect as much as possible from fuel imports to service its take or pay operations agreement which had a monthly instalment of USD2.2 million to Compedia Do Pipeline Mozambique (CPMZ). Zimbabwe uses CPMZ's Feruka to Beira pipeline at a fixed cost of USD2.2 million per month although the country's actual throughput is much lower. Government is therefore under pressure to pump more volumes so that it raises money for the monthly rentals.
- One of the requirements for using the pipeline is that the pipeline must be full of dead stock which is non-tradable and buffer stock to enable the release of orders once a petroleum company handed over its parcel to NOIC at Beira. This is a litre in -litre out concept that enables petroleum companies to get immediate releases of orders inland at Feruka or Msasa after handing over their parcels to NOIC in Beira. This has the effect of reducing lead time by up to seven days (NOCZIM, 2010). The 435 kilometre pipeline from Beira to Feruka is owned by Compendia Do Pipeline Mozambique (CPMZ) and requires 15,400,000 litres of dead stock while the pipeline from Feruka to Msasa is owned by Petrozim Private Limited (PZL) and requires 11,100,000 liters of dead stock (NOCZIM, 2010). The pipeline from Beira to Harare therefore carries a combined volume of 26.5 million untradeable products (dead stock). All the dead stock is funded by the Government of Zimbabwe which also pays USd2.2 million to CPMZ every month for the exclusive use of the Beira to Feruka pipeline under a take or pay agreement. The agreement between CPMZ and the Zimbabwe Government the said amount was payable to CPMZ whether the pipeline was utilized or not (NOCZIM, 2010).
- According to Ng'ang'a, (2017), in Kenya where pipelines are the main mode of transporting fuel products the petroleum companies invested into dead stock. In South Africa and Kenya, Transnet and Kenya Pipeline Company allocated dead stock and interface to petroleum companies based on their market shares. Interface is untradeable fuel which is a result of co-mingling of different products during the pumping process. In

Zimbabwe interface is the responsibility of Government and it stood at 8,000,000 litres at the end of 2010 (NOCZIM, 2010).

- Port logistics require an importing country to have storage facilities at the port to take care of its imports before any injections into the pipeline because relying solely on private facilities can be both expensive and inconveniencing. Because of that, the Government of Zimbabwe owns 40% shareholding in Inpetro, a joint venture company in Mozambique with warehousing facilities at Beira port. Petromoc of Mozambique owns 20% and the balance of 40% belongs to Independent Petroleum Group (IPG) of Kuwait. Other companies with storage facilities at Beira are Petromoc (24,400 m^3), Petro-Beira (77,000 m^3), BP (51,490 m^3) and Total Oil (28, 000 m^3). If there is no ullage at Inpetro Zimbabwe makes use of private facilities and pays commercial rates for the services (NOCZIM, 2010).

Table 2.2: Share of storage facility at In-petro in Cubic Meters (m^3)

Shareholder	Gas oil	Mogas	Jet A1	Total
IPG	27,375.25	20,513.30	10,377.72	58,266.27
NOIC	11,708.00	8,781.00	4,647.00	25,136.00
PETROMOC	4,672,00	3,504.00	1,854.00	10,030.00
TOTAL	43,755.25	32,798.30	16,878.72	93,432.27

Source: NOCZIM (2010).

The above table shows that the Zimbabwean Government shares storage capacity worth 93,432.27 cm^3 with Independent Petroleum Group (IPG) of Kuwait and Petromoc of Mozambique. Using this space minimizes the use of privately owned facilities which would attract commercial rates for Zimbabwe bound fuel imports.

- The government is expected to keep national strategic fuel reserves because absence or inadequate national strategic stocks pose a risk to the security of fuel supply. As a result, all petroleum companies contribute USD 0.07 for every litre of fuel imported and this goes towards the accumulation of strategic reserve stocks (NOCZIM, 2010). Additionally, the government has invested in inland fuel storage and depot facilities. Msasa fuel depot in Harare provides a hub for road distribution network for all petroleum

companies in Mashonaland, Midlands, Masvingo, and part of Matabeleland. Petroleum products distributed to all provinces except Manicaland are collected from Msasa, fuel distributed in Manicaland is collected from Feruka depot, and fuel for some parts of Masvingo South and Matabeleland South comes from Beit-Bridge depot. The Beit-Bridge depot is underutilized because of its unfavourable proximity to the pipeline and because of the location's high temperatures, which are not conducive for the storage of mogas. The capacities of the individual fuel depots owned by the Government of Zimbabwe are shown in table 2.3 below.

Table 2.3: Zimbabwe National Fuel Depot Capacities

Depot	Diesel (m^3)	Petrol (m^3)	Jet (m^3)	IP (m^3)	TOTAL (m^3)
Feruka	58,300	41,100	15,100	4,300	118,800
Msasa	25,800	12,600	10,600	4,900	53,900
Mabvuku	210,000	80,000	70,000	-	360,000
Beit-Bridge	3,560	980	-	323	4,863
TOTAL (m^3)	297,660	134,680	95,700	9,523	537,563

Source: NOCZIM (2010).

2.4 The Zimbabwean petroleum industry structure

The Ministry of Energy and Power Development oversees the activities of the petroleum industry and represents government interests. The Ministry created statutory bodies and companies to facilitate the implementation of its energy policies including National Oil Infrastructure Company (NOIC), Zimbabwe Energy Regulatory Authority (ZERA) and Petrotrade (a private petroleum company).

National Oil Infrastructure Company (NOIC) is 100% owned by the Government of Zimbabwe. NOIC manages national assets and infrastructure used for fuel transportation mainly the pipeline from Beira to Harare and fuel storage and loading gandries at Feruka in Mutare and Msasa and Mabvuku in Harare. NOIC provides international logistics support

and in country warehousing because it also handles fuel being shipped to other countries like Botswana, Zambia and Democratic Republic of Congo (DRC). In the petroleum industry's supply chain NOIC plays a critical role because it provides logistics services to all the players. NOIC services include pipeline transport, fuel storage and quality tests before products are injected into the pipeline in Beira and when products are being offloaded into tanks at Msasa and reloaded into fuel tankers and rail wagons for local distribution. For the purposes of transparency and fairness NOIC is not allowed to trade in petroleum products. Therefore, NOIC's only source of income are the pipeline and storage fees it charges the petroleum companies which use the national fuel facilities.

Customs duties for all the petroleum products that are transported through the pipeline will only be paid when the importers draw stocks from NOIC warehouses. Therefore, NOIC works hand in hand with the Zimbabwe Revenue Authority (ZIMRA) in ensuring that requisite customs duties are paid before the release of any fuel under its custody. NOIC and ZIMRA have a bonded warehouse agreement which allows imported fuel to be kept in bond in NOIC storage facilities whereby duty becomes due and payable when petroleum companies withdraw stocks for distribution to their customers and service stations (NOCZIM, 2010).

The Zimbabwe Energy Regulatory Authority (ZERA) is the petroleum industry's regulator. Petroleum companies need to be registered and licensed in order to do business in the petroleum industry in Zimbabwe. Registration fees and conditions are stringent to the extent that they discourage new entrants. For example, to register as a fuel importer one has to pay USD 23,200 per calendar year from January to December (ZERA, 2015). At the time the study was carried out only 23 companies shown in table 2.4 below were properly registered and licensed. The Zimbabwean situation is similar to the Zambian situation where there are no incentives for investing in the rural areas, hence the proliferation of service stations in urban centres tends to affect margins for the petroleum marketing companies as volumes traded are shared by a growing number of outlets (Energy Regulatory Agent, 2010).This also restricted fuel distribution to outlying rural communities forcing motorists from these communities to drive long distances to refuel their vehicles.

Table 2.4: Licenced Petroleum Companies as at January 2017

1.	High Performance Energy	2.	Expo Energy
3.	Total Zimbabwe	4.	Ayton Investments
5.	Petrotrade	6.	Strauss Zimbabwe
7.	Zuva Petroleum	8.	Maps Petroleum
9.	Extreme Oils	10.	Trek Petroleum
11.	ZX Fuels	12.	RAM Petroleum
13.	Sakunda Petroleum	14.	Redan Petroleum
15.	Southern Diesel	16.	Afrifor
17.	Mount Men Petroleum	18.	Petromoc Exor
19.	Mura Energy	20.	Storm Energy
21.	Shipyard Freight	22.	Engen Petroleum
23.	Glow Petroleum		

Source: Zimbabwe Energy Regulatory Authority [ZERA] (2017).

NOIC shares the provision of logistics services with other logistics services providers (LSPs). In the petroleum industry logistics service providers (LSPs) are third party companies, which provide services to petroleum companies. SOCOTEC an inventory management agency provides stock management services for petroleum companies in liaison with NOIC and ZIMRA. For example, if Trafigura imports 200 million litres of diesel into bond at Msasa it will engage SOCOTEC to do stock takes, stock checks and stock dispensing on its behalf.

The Zimbabwe Revenue Authority (ZIMRA) collects duty and other taxes on behalf of government. ZIMRA prefers to deal with registered clearing agents; hence, petroleum companies are forced to engage the services of independent clearing agents to clear their parcels with ZIMRA.

The Ministry of Transport and Communications collects carbon tax and tollgate fees through the Zimbabwe National Road Authority (ZINARA). At the time the study was carried out a fuel tanker was paying USD10 to pass through a tollgate (ZINARA, 2014). Thus, from Msasa depot in Harare to Bulawayo the second largest town in Zimbabwe one passes through 5 toll

gates, hence a total of USD100 is needed for a to and from trip per tanker. There are different commercial transporters who provide fuel tankers to move fuel from NOIC storage facilities to different centres as directed by the petroleum companies. Although some petroleum companies have their own distribution fleet they usually complement their capacity using outsourced transportation services.

Environmental Management Authority (EMA), which controls environmental management issues across all industries, collects the following taxes from petroleum companie: depot fees per annum (USD 490), truck fee per annum (USD 651), service station fees per annum(USD 84). Trucks bringing fuel by road are charged an additional USD 84 per truck per entry. This is a separate charge from the 4 cents per litre surcharge for imports coming by road. EMA also prohibits inland transportation of fuel between 6.00 P.M. to 6.00 A.M. (Environmental Management Authority [EMA], 2011).

The Ministry of Industry and Commerce, which issues import permits charges $65 per permit. The department of Trade Measures in the Ministry of Industry and Commerce is also responsible for sizing nozzles at the dispensing pumps and charges USD60 per nozzle (NOCZIM, 2010). Ministry of Health and Local authorities jointly oversee compliance with health and safety regulations and the charges for their services vary from one local authority to the other and they impose heavy penalties for any violation. Some of the fees collected by local authorities include vehicle registration fees (USD500 per year, depot licence (USD 2,400 per year, service station licence fees (USD 2,400 per year, shop licence fees (USD 530) and nozzle fees (USD100) per nozzle (NOCZIM, 2010). Petroleum companies also require third parties for the maintenance and servicing of equipment used in fuel distribution, especially for calibrating and recalibrating tanks and dispensers.

Since the Government has invested heavily in supply chain's upstream activities like the pipeline and storage facilities, it was anticipated that petroleum companies would invest in the petroleum industry's downstream activities such as fuel distribution facilities like service stations and fuel distribution fleet, and ensuring consistent availability of quality products at affordable prices. However, lack of investment in the petroleum industry's downstream over the years contributed to the industry's uncompetitiveness problem but reasons for same were not known or undocumented. The researcher perceives this to be a typical supply chain management problem which the study set to investigate.

Petrotrade private limited is a private company 100% owned by the Government of Zimbabwe. It is mandated to act and behave like any other petroleum company. Petrotrade does not get any preferential treatment in any way in the fuel distribution equation (NOCZIM, 2010). Technically, the Government expects Petrotrade to be an industry stabilizer offering competitive services, prices and terms to its customers. However, the company does not get any government subventions therefore Petrotrade faces the industry problems faced by all the other private petroleum companies. However, Petrotrade could not raise investment money from the market without clearance from the Government.

Due to uncompetitiveness of the Zimbabwe petroleum industry which was largely as a result of poor supply chain strategies and other administrative issues, some international petroleum companies that used to propel the Zimbabwean petroleum industry have left the country. For example, British Petroleum (BP) and Caltex/Chevron sold their assets, leaving the industry to be dominated by new and local suppliers who seem to be struggling to survive because of the industry's supply chain bottlenecks.

Zimbabwean petroleum companies, mostly get their stock from international suppliers via the Beira Port. Some of the international suppliers like Trafigura, Independent Petroelum Group (IPG) and Puma have established offices in Zimbabwe and sell petroleum products on vendor managed inventory (VMI) basis. VMI is another form of retailer supplier collaboration where suppliers provide automatic replenishment of stocks at the retailing or distribution facilities (Sohel et al., 2016). In the Zimbabwean set up suppliers keep fuel stocks at NOIC depots in Harare and Mutare and immediately release stock as soon as the petroleum company that the international suppliers has prior arrangements with has paid. Sometimes they also sell to their partners on agreed terms.Therefore, instead of ordering fuel and paying for it in advance petroleum companies could place orders just in time (JIT), avoiding inventory holding costs and long lead times.However, most indigenous petroleum companies did not have strategic alliances with international suppliers hence they relied on cash transactions or sourcing from local wholesalers (Ministry of Energy and Power Development, 2012).

2.5 Organisation and dealership arrangements of fuel service stations

Most of the supply chain challenges investigated through this study affected the petroleum supply chain's downstream activities which affected the customers. It was therefore found necessary to offer a more detailed explanation of how the petroleum industry's retail operations are organised. According to Ng'an'ga (2017) gas stations can be classified into five categories depending on the different combinations of the ownership of physical assets and management of the actual operations as follows:

- Company owned, company operated (COCO) outlets;
- Company owned, dealer operated (CODO) outlets;
- The dealer owned company operated (DOCO) outlets;
- Dealer owned dealer operated (DODO) outlets;
- The company leased operations of a non- petroleum dealer or operator (CLDO).

1. At a COCO dealership arrangement the petroleum company owns the service stations and its own employees manage the operations. The petroleum company is responsible for the trading stock, marketing, and logistics services for all its service stations. This model requires the petroleum company to have enough capital to construct distribution outlets in strategic points in the market. The General Manager of Total Swaziland, Anthony (2015) said, very few oil companies use the COCO mode because it is an expensive model of marketing petroleum products though some petroleum companies use the model for staff training and development purposes
2. In CODO, dealership arrangement the petroleum company owns fuel distribution infrastructure (service stations) but those outlets are leased to third parties (dealers). In a franchise arrangement, the dealer will get trading stock from the petroleum company and will trade on terms prescribed by the franchisor. Thus, the dealer pays the agreed commission to the petroleum company. When the petroleum company leases assets to independent dealers, the latter operates independent of the petroleum company. The dealer procures product from sources of her own choice and pays rentals to the petroleum company.
3. In DOCO dealership arrangements a dealer owns fuel distribution assets and outsources her service stations to a petroleum company for a rental fee. In this case, the dealer is not

directly involved in trading activities except the collection of rent for use of her assets by a petroleum company.

4. Under the DODO dealership, arrangement a dealer owns and operates her own fuel distribution outlets. The dealer relies on a particular petroleum company for supplies. The only contractual obligations pertaining to this arrangement are meeting terms of payments agreed between the dealer and its chosen supplier of the product. The dealer, therefore, has the freedom to select fuel suppliers that meet her supply conditions.
5. Finally, with the CLDO dealership arrangement a petroleum company leases fuel distribution assets of independent individuals or companies that are not involved in the petroleum business. This is common when heavy users of fuel set up own facilities with the option of trading or not trading and later on decide to lease such facilities to a petroleum company. For example, a mining company, which is a heavy user of diesel, can own fuel-dispensing facilities, which are later rented to independent operators who run and operate such facilities on a commercial basis.

2.6 The supply chain challenges of the Zimbabwean petroleum industry

The fuel price build up formula in Table 2.1 does not capture all the taxes and tariffs under the industry structure discussion where so many organisations have to charge something for their services, municipalities' fees and rates, import permit fees, customs clearance fees, maintenance costs and others. This implies that petroleum companies may be struggling to recover costs under the current regulatory regime based on the fact that, Government sets a price ceiling for petroleum products although the price template did not capture all the taxes collected along the supply chain (NOCZIM, 2010). The administration fees of one and half cents that appears in the price template may not be enough to cushion petroleum companies against all the supply chain costs.

The low volume of petroleum products that come through the pipeline and small size of individual parcels which are a result of under capitalisation lead to many interruptions and depressed industry activities that result in more incidences of product adulteration and the accumulation of interface at the main depots in Msasa and Feruka (NOIC, 2013). It seems there was no clear strategy in sight to deal with interface that continued to accumulate.

The skewed industry structure created problems for small players and restricted local participation in the petroleum industry. A big company like Total can operate as an importer, wholesaler and retailer with no restrictions and this created monopolistic tendencies and cartels, sometimes it motivated the big companies to collude and muscle the young players out of business (Groenewald, 2013). There was lack of clear demarcations between importers, wholesalers, and retailers which resulted in financial leakages along the supply chain. Some importers directly deliver to service stations and charge retail prices, a practice that enables them to offer huge price discounts rendering the retailers who get their product through the normal wholesaler- retailer channels (the right distribution channels) uncompetitive (NOCZIM, 2010). The adulterated products and over blended products are sold at giveaway prices. This frustrates efforts by genuine traders who cannot compete at all the three levels.

Illegal and unethical practices such as product smuggling and tax evasion enable the smugglers to offload products on the market at below costs that are determined through the price build up template. As a result, customers only buy fuel from the genuine retail outlets when the cheap smuggled stocks are finished. Some operators also have backyard service stations which are not licenced and do not pay any fees and rates to local authorities. Even if they bring their products through normal channels, such companies can afford to undercut the normal market price without foregoing any margins. They can afford to do that because they do not pay licence fees and other taxes (Arvis, Martean & Raballand, 2010).

2.7 National policy and planning

The Ministry of Energy and Power Development [MoEPD], (2012) acknowledges that the cost of fuel impacts directly on the services and the competitiveness of enterprises and emphasise that in light of such an acknowledgement, Government policies must be seen to be supportive of the fuel industry players as a matter of priority. However, contrary to the portrayal by the MoEPD that the fuel industry is critical, the Industrial Development Policy (IDP) for the period 2012 to 2016 did not consider the petroleum industry to be a national priority when it comes to allocation of resources particularly foreign currency. Instead, the latter's top priority areas for industrialisation were Agriculture, Mining, Manufacturing, and Tourism in that perking order (Ministry of Industry and Commerce, 2012).

2.8 Ease of doing business in Zimbabwe

According to the Ease of Doing Business Report, Zimbabwe was number 157 out of 183 countries and the country is affected by its Indigenisation and Economic Empowerment Act which prescribes a maximum of 49% shareholding for foreign investment (World Bank, 2011). Zimbabwe's Millennium Development Goals Status Report (2012) confirmed the negative impact of unattractive investment conditions. The report observed that, the continual shortage of sufficient, reliable, and least cost energy services continued to prolong underdevelopment in the country. In the same vein, Groenewald (2013) argues that foreign direct investment (FDI) inflows are driven by new markets and cost effective operations characterised by a market orientation and the emergence of private companies, entrepreneurship, and foreign investment, which contribute to economic development of developing countries. Anything to the contrary leads to de-industrialisation and companies in the petroleum industry hardly attract any foreign investors unless the companies are seen to be competitive. Mark Stevens of Fortress Income Fund, a member of the Sunday Times' top 100 companies observed that, during tough economic times, having support from the Government was critical for business to survive (Tsamela, 2016). Based on this observation, the challenge to the Zimbabwe petroleum industry was the presence of many Government departments with different interests in the operations of petroleum companies.

An analysis study of the oil and gas sector by Beare (2004) revealed that Africa is beset with non-transparent market rules and poor governance, which have put upward pressure on the transaction costs, deterring many investors. In that study the following critical factors for successful sectorial development were identified; a strong science and technology base, a growing company base, a skilled workforce, sustainable premises and infrastructure, business support services and large companies in related industries, entrepreneurial culture, ability to attract key staff, availability of funding, effective networks and supportive policy environment. It was hoped that the current study would reveal the extent to which the Zimbabwe petroleum industry has responded to the critical factors mentioned above and other related issues.

2.9 Petroleum products and their uses

According to Chima (2007), the following list presents different petroleum products found in the market:

- Liquefied petroleum gas (LPG) – used mainly as domestic and industrial energy source;
- Petro hem feedstock;
- Naphtha – Petro hem feedstock;
- Gasoline – transportation fuel commonly referred to as Petrol;
- Kerosene – air transportation fuel, in Zimbabwe also called Jet A1;
- Gasoil – transportation and heating fuel also known as Diesel;
- Lubricating oil – lubricants are mainly used in industry for insulation purposes;
- Asphalt – used in road construction for impermeabilization.

The study focused on road transportation fuels only, diesel and petrol, which are both imported into the country. Commoditization of petroleum products makes customer service and prices the most critical competitive factors because all the other features such as quality, transportation costs, and duties are identical. Therefore, the need to consider value added services for differentiating companies from each other and increasing company competitiveness was also critical. These value added services tend to be elements of supply chain and include support and maintenance, finance, logistics, closeness to customers, customer service and information technology capabilities. When these are not managed well the company struggles to compete successfully in the market (Abbasi & Nilsson, 2012).

2.10 Research in petroleum industry's supply chain

A review of 70 Doctoral dissertations in the area of supply chain and supply chain management in NORDIC countries revealed that more dissertations are based on articles and most of them on manufacturing companies (Zachariasen & Arlbjorn, 2008). According to Varma, et al., (2008), the petroleum industry has its own distinguishing supply chain characteristics, which justify the need for some research studies that are petroleum supply chain specific, and such studies are not many now. The several petroleum supply chain characteristics identified by Varma, et al. (2008) to justify a separate treatment of its supply chain are explained below, and the same factors tend to make any petroleum industry

uncompetitive. The petroleum industry operations have got some unique characteristics that separates the industry from other industry sectors and therefore sometimes requires research that has specific focus on petroleum industry operations. Some unique petroleum industry characteristics are explained below.

a) **Process industry**

Petroleum is a result of the process industry which is very different from discretely manufactured items like television sets or automobiles. The majority of research carried out in the area of supply chain management focus on manufacturing industry and not the process industry.

b) **Inflammability**

Petroleum products are highly inflammable and so the risk in handling the product is much higher than in case of other products.

c) **Contamination**

Petroleum products can be contaminated easily, e.g. by mixing petrol with diesel. This is especially true for a country like India where subsidies provided by government on petroleum products like kerosene encourage mixing of petrol or diesel with kerosene by dealers (Varma et al., 2008). The National Oil Company of Zimbabwe (NOCZIM) had 8 million litres of fuel which was a result of mixing at different stages of transportation and they call the bad fuel interface (NOCZIM, 2010). The problem of interface is exacerbated by the fact that no packaging is required for petroleum products and product handling is basically at two ends, the loading point and the receiving end. Interface reduces the volume of tradable fuel and therefore impacts product availability and profitability. Interface also accumulates when the pipeline accepts too small parcels of different products. To minimise interface risk NOIC will not accept orders less than 2 million litres for pipeline injection.

d) **Bulk volumes**

Petroleum products are produced and moved in bulk leading to high inventory carrying costs. There is no volume flexibility either in terms of production or distribution. Thus, petroleum companies that do not have capital to import large parcels will have to spread their orders or else they buy from larger petroleum companies and forfeit some profit margins.

e) High transportation costs

Transportation costs represent a much higher fraction of total costs than in the case of other products made by the discrete manufacturing given risks such as inflammability which attracts higher insurance premiums.

f) Long supply chain

Much of the crude required by the petroleum industry in India is outsourced. Transportation of crude by ship is very time-consuming, which means that the supply chain is very long starting from the sourcing of crude to delivery of the finished product to the customer (Varma et al., 2008). The Zimbabwean situation is similar given the number of parties in the supply chain although the supply chain costs in Zimbabwe are concentrated on the demand (distribution side) because there are no upstream supply activities related to refinery.

2.11 Chapter summary

The chapter highlighted that the petroleum industry of Zimbabwe is uncompetitive owing to unfavourable business environment that delivers products at very high costs, a poor industry supply chain strategy that dwells a lot on Government to provide key services, an inappropriate structure which does not create a level playing field for all players. The business environment was seen to be not friendly with standards and regulations that were violated yet the culprits are rarely apprehended and brought to book. At the end of the day genuine industry players suffer because of unethical and illegal practices perpetrated by unscrupulous and fly by night companies. These conditions were exercabated by the unfavourable geographical location of the Beira port which makes the port unreliable because it cannot deliver product consistently through out the year. The petroleum industry's supply chain strategy does not give clear policy guidance, responsibilities and accountabilities to supply chain members.This weakens decision making processes, kills investment confidence and breeds uncooperativeness among the supply chain members. This limits the volumes of fuel imports and leaves the national assets such as the pipeline and storage facilities underutilised. In terms of the industry structure the key observation is that there are no limits for registered companies who can operate at any level of the supply chain. This causes both legislative and administrative challenges for industry, especially the fact that the system restricts entry and operations of local and small companies. As a result associative

organisations, Government of Zimbabwe, Zimbabwe Energy Regulatory Authority, National Oil Infrastructure Company and petroleum companies have poor working relationships creating an industry that is faced with perpetual supply chain problems. The chapter highlighted that the study was carried out at a time when there were only 23 registered and licensed petroleum companies in Zimbabwe, a sign of poor investment drive and a sign that there is no easy entry into the Zimabwe petroleum industry. Based on the given petroleum industry's brief, it can be noted that the industry's supply chain is complex and uncompetitive. The next chapter reviews the literature which was used in the study.

CHAPTER THREE: LITERATURE REVIEW

3.1 Introduction

The chapter focuses on four key issues; the theoretical framework, the conceptual framework, supply chain management imperatives and empirical evidence. New theory always emerges and develops from earlier theories and it is critical that new management practices are rooted in rock solid, tried and tested contemporary management philosophies. Supply chain management is perceived as a systems and value chain based management philosophy (Loedolff, 2014). The general systems theory which was discovered by Ludwig von Bertalanffy (1968) and the value chain analysis discovered by Michael Porter (1980) provided the theoretical framework informing the study. The systems theory and value chain analysis were never cited together in articles which were reviewed for the study. "The fact that two or more theories that relate to supply chain management have not been cited together before suggests the existence of underdeveloped research areas. The process of identifying or constructing gaps to generate research questions from existing literature is called gapping or spotting (Alvesson & Sandberg, 2011).

The conceptual framework of the study is a review of the supply chain management philosophy. Under this review focus will be on procurement, inventory control, transport and distribution, information and communications technology, and customer service. In addition, total quality management (TQM), leadership and organisational learning will also be discussed. Supply chain management imperatives will be reviewed next, covering attitudes of managers towards implementing supply chain management, supply chain drivers, supply chain management's critical success factors, measurement of supply chain management performance and challenges, and benefits of the supply chain management philosophy. The review of recent studies was based on peer reviewed journal articles, latest supply chain management books and higher degree dissertations. While elaborating on the importance of supply chain management, Jim Owens (the CEO of Caterpillar Construction Equipment Manufacturers) alluded to the fact that, the competitor that is best at managing the supply chain is probably going to be the most successful competitor over time; he viewed supply chain management as a condition of success (Owens, 2010, Habib, 2011).

3.2 Theoretical framework

The study uses systems theory and value chain analysis as its theoretical lenses in order to develop a hypothesis for identifying any relationships between implementing supply chain management philosophy and company competitiveness. The arguments of the study are based on two famous management theories, Ludwig von Bertalanffy's General Systems Theory and Michael, E. Porter's Value Chain Analysis and Competitive Advantage. The study hypothesizes that, an effective supply chain management system can spur competitiveness among petroleum companies. The systems theory and the value chain analysis theories therefore, form the bed-rock of the supply chain management philosophy and they are worth reviewing in a study of this kind.

3.2.1 The General Systems Theory

The researcher's idea of an effective fuel supply chain is rooted in the systems approach to management. According to Shukla et al. (2011) as survival of firms relies on integration, understanding of the systems theory is a key aspect in supply chain management. In the General Systems Theory (GST) Ludwig von Bertalanffy explained that all efforts were based on systems or wholes or organisations which were concerned with the totality of organisations and it also emphasised interaction, cooperation and collaboration between system components (von Bertalanffy 1969, Mammy, Helou & Caddy, 2006).

Therefore, the general systems theory focuses attention on the whole as well as the complex interrelationships among its constituent parts; hence the approach is all-embracing and comprehensive (Shukla et al. 2011). Leenders et al. (2002) argue that, supply chain management is a systems approach to managing the entire flow of information, materials and services, from raw materials suppliers through factories and warehouses to the end customer. Mammy, Helou and Caddy (2006) state that, supply chain management would extend an organisation's emphasis beyond its own performance to a more holistic inter organizational focus. Therefore, effective management of a company's supply chain does not solely rely on company systems alone; it also involves external supply chain members and third parties. Studying a petroleum industry's supply chain based on the systems approach is therefore pinned on the fact that, individual businesses no longer compete as autonomous entities but

rather as supply chains. In such a set up, the ultimate success of a single business will depend on management's ability to integrate the company's intricate networks of business relationships (Brevis & Vrba, 2014).

A system is defined by Narayanan and Nath, (1993) as, "a complex of components (elements) directly or indirectly related in a causal network, such that each component is related to at least some others in a more or less stable way within any period of time". Research has shown that, in a system set up, the performance of a firm depends not only on how efficiently it cooperates with its direct partners, but also on how well these partners cooperate with their own business partners (Hugo & Badenhorst-Weiss, 2011). Therefore, the firm's continuous interaction with other players becomes an important factor in the development of competitiveness (Gichuru, Iravo & Iravo, 2015). This entails that a company's supply chain practices can be impacted by both its internal and external operations. Therefore, a supply chain oriented company depends on actions and the cooperation of other companies for its success. Badenhorst-Weiss, Van Biljon and Ambe (2017) observe that, integration is at the core of supply chain management and the main issues that management should address in an effort to integrate the supply chain are:

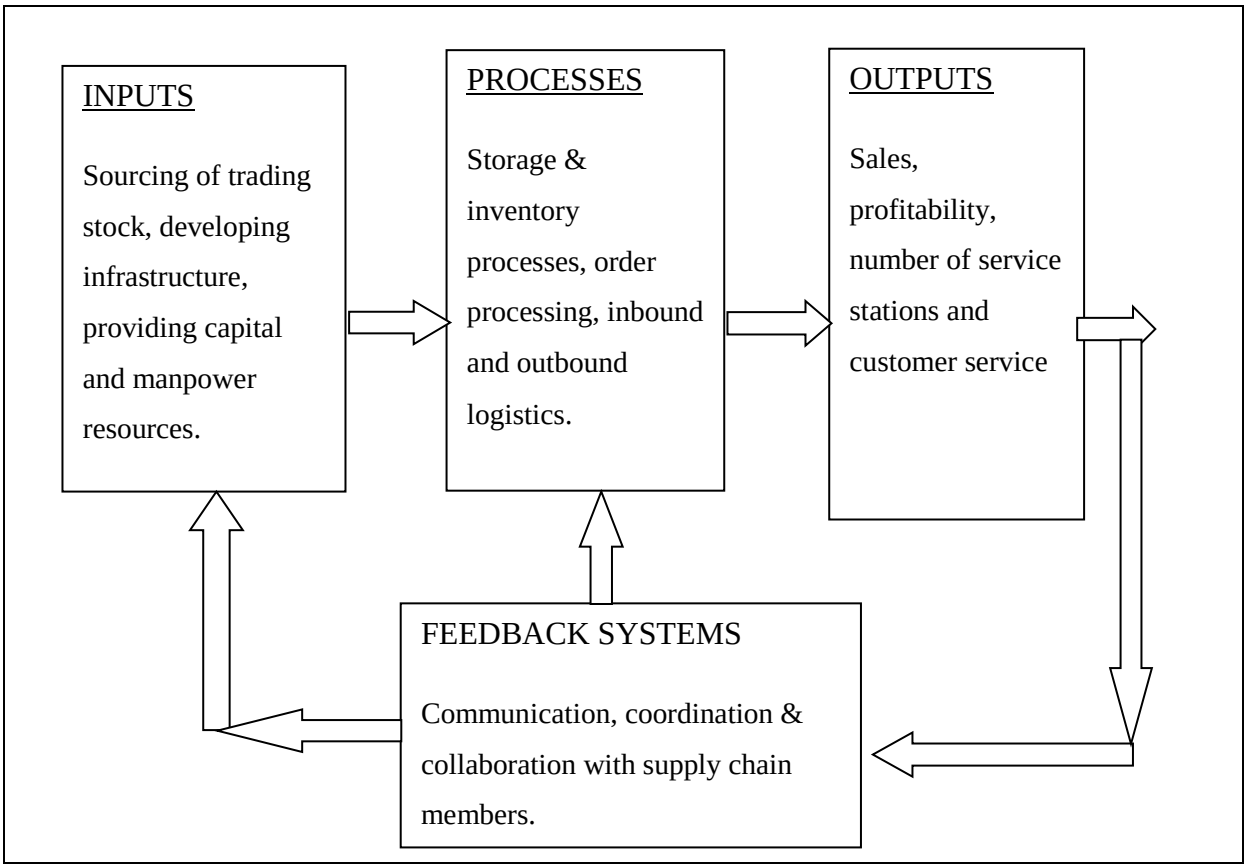
- Having flexible organisations that can adapt quickly to markets and other changes;
- Organizational relationships where information sharing, joint problem solving and trust are key success factors;
- Coordination in the supply chain at functional level internally and externally with suppliers, customers and other role players to ensure smooth flow of materials, products and information;
- The outsourcing of non-core components which allows outsourced services to be provided by specialists and the company time to concentrate on its core business;
- Effective cost control through cost transparency across all organisations in the supply chain;
- Reducing cycle time through elimination of unnecessary activities.

The output of an effective system is based on the principle that all the elements of a system strive to achieve a common outcome and in supply chain management, the effectiveness of the whole supply chain is more important than the effectiveness of individual departments (Bala, 2014). Therefore, the systems approach can provide a sound conceptual framework for analysing and creating a better understanding of the petroleum industry's supply chain

especially the petroleum companies' relationships with suppliers, customers and other supply chain members.

The following systems framework, a simplified fuel supply chain operations model (FSCOM), is proposed to guide the identification of petroleum companies' supply chain activities. These activities will guide companies in implementing the supply chain management philosophy. Therefore, the analysis of problems faced in the petroleum industry's supply chain can generate knowledge and help researchers and practitioners to come up with appropriate solutions to deal with the Zimbabwe petroleum industry's supply chain management problems.Figure 3.1 below is a modified version of the basic operations systems proposed by Brown, Bessant &Lamming, 2013).

Figure 3.1: The Fuel Supply Chain Operations Model (FSCOM)



Source: Brown, Bessant and Lemming (2013:5)

Applying the above model, a petroleum company would source its inputs such as trading stock from the external environment, processes such products through logistics activities (warehousing, transportation and distribution, inventory management and information processing) and the company's performance will be assessed based on outputs such as market

share, number of distribution outlets and customer satisfaction. In the proposed model the feedback loop represents the need for a petroleum company to constantly coordinate its internal and external stakeholders to ensure the smooth flow of fuel, funds and information. The company's performance will not solely be a product of its internal management systems alone but a product of cooperation, coordination and collaboration with other supply chain members who are not necessarily part of the company's structures. This entails that an industry's supply chain is a complex organisation sub-system and its success depends on the behavior of supply chain members and effective management of the supply chain processes (Badenhorst-Weiss, Biljon & Ambe, 2017). Thus, studying the petroleum industry supply chain as a system requires the collection of data from the petroleum companies and other petroleum industry supply chain members who have roles to play in the fuel distribution network.

The systems approach can provide a sound conceptual framework for analyzing petroleum companies' supply chains and analysing their relationships with other supply chain members especially customers and suppliers. The systems theory also suggests that concentrating on one part of the system, for example, focusing on financial controls alone gives an inadequate picture of the whole (Mammy, Helou & Caddy,2006). Under the systems concept, a system such as a company's supply chain is a whole that cannot be taken apart without the loss of its essential characteristics (Fawcett, Magnan & MacCarter, 2008). In that case, implementing the systems theory requires a multidisciplinary approach that looks at the different disciplines and functions that are part of the supply chain (Abbas & Nilsson, 2012). The supply chain must be looked at as a whole unit and its management has to be treated likewise. According to Narayanan and Nath (1993), the essentials of modern systems theory include open systems, static versus dynamic equilibrium, interdependence, feedback, stability and change and systems thinking.

- **Open systems**

Fawcett, Wallter and Bowersox (2011) note that, firms are open systems that participate in larger systems known as supply chains and that enduring success comes only when the supply chain members work together to perform their roles and maintain relationships

regardless of environmental and technological turbulence. A company interacts with two broad subsystems, internal and external subsystems.

The internal sub-systems include, a company's functional subsystems such as finance management systems, supply chain management systems, operations management systems, human resource management systems and marketing information systems to name a few (Stevenson, 2012). Management must be in firm control of all the internal subsystems if the supply chain is to operate effectively. The overall aim of having an effective supply chain system is to achieve the overall goals of the company. It therefore means that a supply chain management oriented company must have strategic supply chain goals that the functional or internal subsystems will aim to achieve (Badenhorst-Weiss, Biljon & Ambe, 2017). Functional subsystems are directed by the corporate objectives of the company.

The external subsystems are made up of political sub-systems, economic sub- systems, socio-cultural subsystems, and technological subsystems, and external supply chain members such as suppliers and third party service providers (Nieman & Bennett, 2014). The way the company interacts with all these subsystems will influence its supply chain strategy and eventually company competitiveness (Coyle et.al, 2017). It is therefore paramount that an investigation of an industry or a company's supply chain practices be done within the context of its environments because supply chains must strive to match developments driven by the company's environment (Nieman & Bennett, 2014). Organisational effectiveness is increasingly becoming a function of a firm's network of upstream and downstream partners rather than the strategies followed only by the focal firm alone (Hugo & Badenhorst-Weiss, 2014). Cooperative behavior which is a result of supply chain partners' trust creates credibility and reputation for the supply chain partners (Arora, Arora & Sivakumar, 2016). In light of the fact that network organisations are important in supply chain management, Gonzalez and Souza, (2010) argue that, the health of the overall system is contingent upon the subsystems functioning properly. This accounts for external supply chain members such as suppliers, customers and 3rd party service providers. Therefore, open systems import and export material from and to the environment, resulting in some form of synergy. This means that, the whole is greater that sum of parts, implying that management must not prioritise individual supply chain members' activities ahead of the objectives of the entire system (Basu & Wright, 2010).

- **Static versus dynamic equilibrium**

The fact that external environmental factors that cause changes in the business environment are no longer stable but ever changing requires management to frequently review and adjust their business strategies in line with the dynamic environments they now operate.The said reviews are usually driven by factors such as competition, costs and changes in customer tastes and demand (Benton, 2013; De Villiers, Nieman & Niemann, 2015). This entails that, the systems approach acknowledges multiple and overlapping purposes between the system, its parts and the supra-system (the system of which it is a part) (Laszlo & Krippner, 1998). The trio of the system, the parts and the supra-system are all dynamic and change over time allowing the system to adjust and change. Therefore, analyzing supply chain management practices of the petroleum industry should take into account the dynamic nature of these practices and the need to do the analysis on a continual basis.Analysing the supply chain competitiveness cannever be a one off event.

- **Systems Interdependence**

Supply chain management imitates a systems approach which requires a holistic approach to managing the entire flow of information, materials and services, from raw materials suppliers through factories and warehouses to the end customer (Leenders et al., 2002). Therefore, to be effective, the petroleum industry supply chain study shall look at activities along the industry's entire supply chain based on the fact that, these supply chain components live and operate in an open system. In an open system, each company depends on others. The scenario therefore requires management who have the ability to integrate the company's networks of business relationships (Hibib, 2011). Systems interpendence requires supply chain members that work together as a team through cooperation, collaboration and integration (Coyle et.al, 2017).

- **Systems Feedback**

The systems viewpoint of management represents an approach to solving problems by diagnosing them within a framework of inputs, transformation (process), outputs and feedback. Kruger, Ramphal & Maritz, (2013) notes that the main purpose of a system is to generate profit and to achieve organisational goals of the main system and that a system can be divided into subsystems such as operations, finance and marketing. Thus, systems theory promises to offer a powerful conceptual approach for understanding the interrelations of human beings, and the associated cognitive structures and processes specific to them, in both society and nature (Bolumole, Frankel & Naslund, 2007). Effective feedback can ensure sustainability of relationships between supply chain members and effective communication among different supply chain members acts as a feedback system that can create room for further interaction and cooperation between members of the supply chain (Lee, 2004).

- **Stability and change**

Stability within a system can be brought about through open and effective communication, interaction and feedback among stakeholders (Oakland, 2014). When everyone in the organisation considers how their action will affect other parts or functions of the organisation the whole system reduces boundaries both within the organisation and with other companies, which allows for collaboration and continuous learning (Achua & Lussier, 2013). In a systems environment companies share information and exchange ideas and they are able to change and adjust strategies because the evolving business environment requires management to continuously re-strategise in order to remain relevant and competitive. A recent study of major marketers of petroleum products concluded that stability enabled companies to develop firm and long term strategies while change required more frequent strategy reviews in response to dynamic conditions of the market place (Babatunde, Gbadeyan & Bamiduro, 2016).

- **Systems Thinking**

Gonzalez & Souza, (2010) argue that the "systems thinking" paradigm considers keeping the whole system in mind in order to be critical and to avoid undue focus on effects or symptoms. Systems' thinking focuses on tackling the real problems of a system. Management ought to recognize that systems' thinking involves seeing how everything affects everything else and that in a system environment piece meal solutions never work (Mammy, Helon & Caddy, 2006). The anticipated benefits of systems thinking include: lower costs, increased sales and introduction of new competencies (Belyaeva et al., 2016). Business organisations, petroleum companies included, are therefore expected to forge partnerships and strategic alliances with suppliers, third party logistics service providers (3PLs), and customers to bring more benefits to the petroleum industry supply chain (Balfaqih, Nopia & Saibani, 2016).

To achieve this, management requires both, analytical and creative thinking styles and they need to work together in finding solutions to complex problems and systems (Groenewald, 2013). The key premise of supply chain management is that, the achievements of the supply chain that works as a system can surpass achievements made by individual companies operating with no common purpose (Jonsson, Rudberg & Holmberg, 2013). In a system, companies tend to realize better results if they collaborate with other supply chain members. Therefore, the fundamental rationale behind supply chain managment systems is that a single company cannot successfully compete by itself (Mehrjerdi, 2009; Braziotis et al., 2013). The cooperation among key industry players such as the associative organizations, customers and suppliers can facilitate motivation, and consequently industry competitiveness (Karagiannopoulos, Georgopoulos & Nikolopoulos, 2005). Supply chain management issues require team effort not only from company management but also from external stakeholders such as business advisers and consultancy agents which are engaged by supply chain members to provide business advice (Chopra & Meindl,2013; Kuiken, 2014) including regulatory protection from Government (Chunda, 2007;Tanco,Furburg & Escuder, 2015).

3.2.2 Porter's Value Chain Analysis and Competitive Advantage

Like the systems theory, Michael Porter's value chain analysis stresses the need to look at a company as a whole. Value chain relates to interconnectedness of internal functions and

activities of the company with the activities of external supply chain members (Nieman & Bennett, 2014). This portrays the value chain as interconnected activities through which a firm delivers products or services and the value chain is made up of primary and secondary value activities (Brevis & Virba, 2014). A value chain identifies the full range of activities that companies undertake to bring a product or a service from its conception to its end use by final consumers. Value is added at each step of the chain in one form or another (Gereffi & Fernadez-Starke, 2011). In that same line of thinking, value chain therefore encourages innovation among suppliers, which is the implementation of a new or significantly improved product (good or service) or process. For example, the value chain can entail a new marketing method or a new organisational method in business practices, workplace organisations or external relations (Ibid).

De-Villiers, Nieman and Niemann (2015) contend that there are five primary and four secondary value chain activities performed by a firm which seek to maximize value while minimizing costs.

- Primary value chain activities include: inbound logistics, operations (production), outbound logistics, marketing and sales and services (maintenance);
- Secondary value chain or support service activities include: procurement, human resources management, technological development and company infrastructure management.

When an organisation is managed on value chain basis cost advantages and successful differentiation are found in the chain of activities that a company performs and these are meant to deliver value to anorganisation’s customers (De-Villiers, Nieman & Niemann, 2015). Similarly, the essence of supply chains therefore, is a set of primarily collaborative activities and relationships that link companies in the value-creation process to provide the final customer with the appropriate value mix of products and services (Braziotis et al., 2013). While researching on the impact of supply chain capabilities on business performance (Tracey, Lim and Vonderembe, 2005) discovered that that enterprises managed as value chains were more capable of lowering costs, increasing efficiency and customer service.

An organisation can identify where to achieve cost or gain differentiation advantage on its products by reviewing the effectiveness of its value chain activities (Brevis & Virba, 2014).

Commenting on building customer satisfaction, value and retention, Kotler and Keller (2012) emphasise that the marketing department can be effective only in companies whose departments and employees have designed and implemented a competitively superior customer value-delivery system. This system of creating superior customer value entails creating a competitive advantage or the ability to provide greater value than competitors and in a way its competitors should not easily be able to duplicate its processes (Nieman & Bennett, 2015). In a value chain driven environment the company aims to deliver customer satisfaction, subject to delivery of acceptable levels of satisfaction to other stakeholders within the constraints of its total resources (Varma, Wadhwa & Deshmuk, 2008; Kotler & Keller, 2012).

The value chain concept contends that, instead of focusing on customer satisfaction alone, a value chain driven company is required to work with other stakeholders such as suppliers, franchisees, employees, distributors and others (Coyle et.al, 2017). A value chain driven organisation can effectively manage its business processes and resources when it is well organised (Lambert, 2008). However, the dynamic nature of the supply chain environment makes it more complex than ordinary business environments. This justifies the need to invest in research that aims to understand how the complex supply chain environments should operate and be managed in order to get the greatest benefit from them.

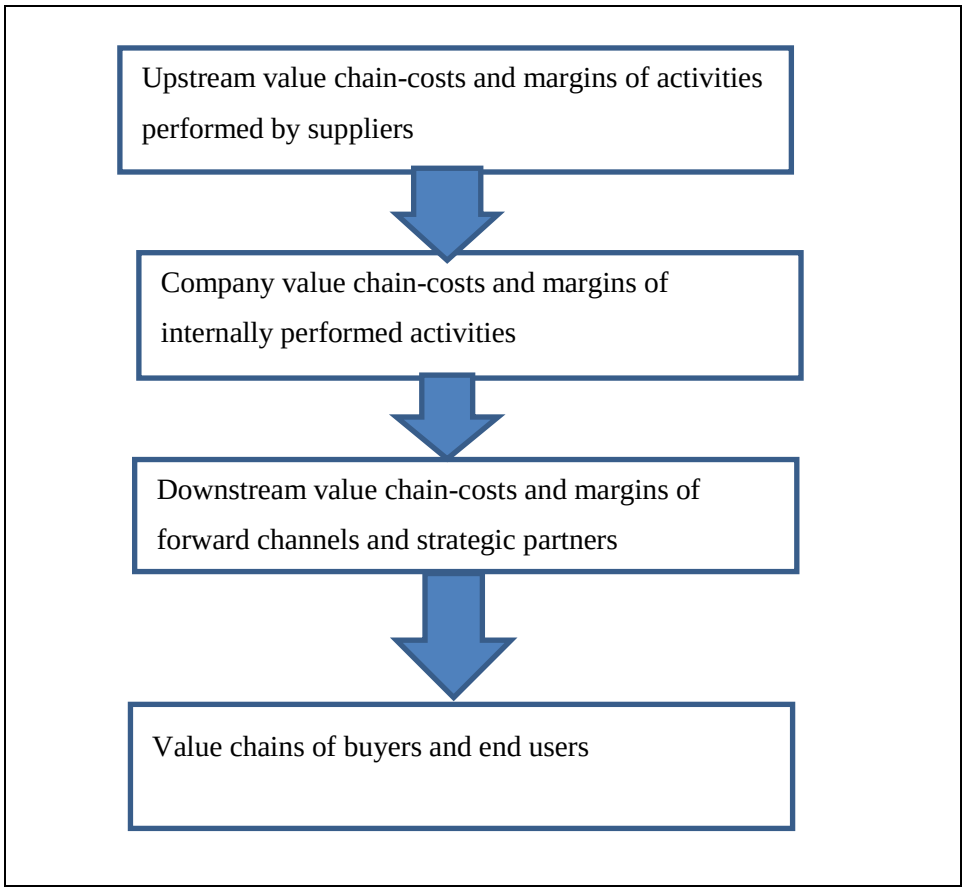
Thus, companies that participate in a value chain must acquire new capabilities that enable them to upgrade and capture a higher share of the market. For example, when a company is participating in a value chain it can benefit from skills and technology spillover through interaction with global suppliers because delivering value to customers requires the company to look for competitive advantages even beyond its own operations into the value chains of suppliers upstream and its customers downstream (Evans & Lindsey, 2017). In an information technology enabled environment a company can do this by linking its suppliers and customers to its company data base such that information sharing is possible and faster (Yunus & Tadisina, 2016).

While companies share common supply chain elements the extent to which each supply chain element impacts the company's ability to attain its objectives varies a lot from one company to the other (Ettlie, 2014). For example, in the case of the Zimbabwe petroleum industry a petroleum company that imports its entire product may require stronger procurement,

distribution, and collaboration with suppliers than a petroleum company that has its own refinery and operates up to wholesale level alone.

The proposed petroleum supply value chain model in Figure 3.2 below shows the elements of a value chain and how they are interrelated. First, the upstream value chains are dominated by external supply chain members such as suppliers at the upstream. Second, the company's value chains cover internal company systems and sub-systems such as the company's procurement and logistics systems. Third, the downstream value chains include the company's forward channels and strategic partners such as 3PLs and customers. Last, buyers and customers' value chain are included and in this case customers are all end users of the company's products and services. These days more successful companies are eager even to understand their suppliers' suppliers' and their customers' customers's supply chain situations, extending further the traditional supply chain boundaries (Leyh & Thomschke, 2015).

Figure 3.2: The Petroleum Supply Value Chain Model (PSVCM)



Source: De-Villiers, Nieman and Niemann (2015:11).

Studying industry supply chains requires one to look beyond company boundaries because both, internal and external interactions among stakeholders affect the supply chain. Brevis and Vrba (2014) call this value system and it includes the value chains of the supplier, the focal company, the distribution channel and buyer. Thus, corporate success requires more effort in coordinating the inter-organisational activities and the different value chains. In a value chain system competitive advantage will be a function of how an organisation manages the entire system and strength of the relationships between the focal company and its supply chain members.

Customer relationship management (CRM), information systems and thinking outside the box are three concepts that make the value chain analysis more effective (Kotler & Keller, 2012). This is in tandem with Lambert (2006) who argues that, in order to be effective supply chain management requires well managed processes like customer relationship management (CRM), customer service management, order fulfillment, manufacturing flow management, supplier relationship management (SRM), product development and commercialization and returns management.

Kotler and Keller (2012) further argue that CRM and SRM emphasize that when a company forges good relationships with its customers and suppliers it can be easy for it to collect and process information about its customers, inputs and raw materials quality (Arora & Sivakumar, 2016). Customer Relations Management, information systems and thinking outside the box need to be managed effectively if the benefits of value chain analysis and the systems approach are to be realized (Niemann & Bennett, 2014). Thinking outside the box encourages decision makers to think beyond the obvious considering the fact that the markets change all the time (Ettlie, 2014). This renders a fixed way of thinking and solving business problems irrelevant and moribund (Atkinson, 2014). From a business strategy perspective all the activities of value chain analysis should result in companies forging strategic alliances or cooperative relationships that can involve the sharing of common goals, joint research, sharing technology, shared manufacturing and joint marketing and distribution arrangement (Grant, 2005; Kruger, Rampha & Maritz, 2013).

Fawcett and Waller (2013) indicate that companies that do not build outstanding value-creation capabilities always struggle to meet customer needs and stay in business. Thus, the systems theory and value chain analysis strongly converge on encouraging teamwork and adopting holistic approaches and working with both internal and external stakeholders to

manage their supply chains. This study is set to analyse factors that affect the implementation of supply chain management in petroleum companies in Zimbabwe. To this end, the study analysed the petroleum industry's supply chain activities to have a better understanding of how supply chain activities were managed and identify how and what improvements could be needed. The study can also establish the extent to which Fuel Supply Chain Management Systems (FSCMSs) can be integrated to achieve competitiveness of petroleum companies. This is why it is necessary to identify and understand characteristics and strengths of the value chain activities of the petroleum companies. The treatment of supply chains as systems and value adding systems can help management to identify where they can achieve cost and differentiation advantages on their products (Stevenson, 2012; Brevis & Virba, 2014).

3.3 The Supply Chain Management Conceptual Framework

This section focuses on supply chain management. It starts with the definition of supply chain management, gives a brief history of supply chain management and supply chain management principles. The discussion then progresses to supply chain fundamentals, supply chain strategy, supply chain activities and related activities such as procurement, inventory, logistics, ICT, customer service, leadership, learning organisation, TQM and ethics. The conceptual framework discusses supply chain imperatives such as managers' attitudes towards supply chain management, supply chain management drivers, critical success factors and supply chain management performance measurement.

3.3.1 Supply chain management definition

Debates and arguments about the correct definition of supply chain management are ongoing among academics because there has been no agreement on a universal definition of supply chain management as a management concept. Thus, the definition of supply chain management adapted for this study is the one proposed by the Council of Supply Chain Management Professionals (CSCMP) which states that;

"Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, 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 the essence

supply chain management integrates supply and demand management within and across companies" (Council of Supply Chain Management Professionals [CSCMP], 2015:3).

Based on the above definition, the key tasks of people charged with supply chain management responsibilities of an organisation include: focusing all supply chain members' efforts towards customer satisfaction, observing that a supply chain is a process environment with inputs, processes and outputs (Trkman, Budler & Gronzik, 2015). Implementing supply chain management requires effective communication based on principles of coordination, collaboration and integration and the acknowledgement of supply chain management's complex nature given that it is both intra-organisational and inter-organisational (Butner, 2010; Braziotis et.al, 2013). Therefore, effective implementation of supply chain management requires commitment and understanding of a range of business operations both in the focal company and in supply chain member organizations (Badenhorst-Weiss, Biljon & Ambe, 2017).

3.3.2 A brief history of supply chain management

Supply chain management is a recent management philosophy which is still evolving. Supply chain management philosophy evolved because of the existing desire to strengthen relationships between supply chain members to enhance value delivered to customers (Kruger& Ramphal, 2009). The supply chain management philosophy essentially evolved because of the desire of business to create a structure that would enable it to establish synergy between supplier organisations and their customers in specific market segments and to balance value delivered to customers (Badenhorst-Weiss, Biljob & Ambe, 2017). The same authors argue that, under the supply chain management philosophy, for the eventual product or service to be commercially advantageous to the organisations involved in its creation and provision, value must be added to a process faster than cost ($Value = performance / cost. Performance = quality + speed + flexibility$) [ibid].

The aim of supply chain management is to reduce costs particularly in purchasing prices, inventory holding costs, transportation and distribution costs and to keep performance high. In the same vein, Badenhorst-Weiss, Biljon and Amber (2017) advance the argument that, supply chain management, when well executed, will efficiently integrate suppliers, manufacturers, warehouses, and other intermediate value adding partners so that production

and distribution is synchronised with customer demand. Additionally, this can lead to a reduction in overall system or pipeline costs without compromising service level requirements (Wisner et al., 2012). This implies that supply chain managers must not restrict themselves to focusing on cost reduction activities and short term benefits alone. They must also consider how best they could generate additional customer value along the entire chain (Wu et al., 2016). In a study about supply chain management theory, practice and future challenges, supply chain management was suggested as a replacement of 'operations management' which the authors perceived as a limited concept (Storey & Emberson, 2006, Bowersox, Closs & Cooper, 2007)). Supply chain management embraces logistics, operations management, purchasing and supply management, industrial relationship marketing and customer service management (Storey & Emberson, 2006). The underpinning idea is to exploit relational strategies in a holistic way and not just an aggregation of these topics.

Supply chain management occupies a strategic position in the field of management from both an academic and practical view point (Coyle et.al, 2017). Its importance has grown so fast and is the reason why every company that strives for success wishes to be associated with supply chain management in one way or the other (Horn et.al, 2014). However, the evolvement of supply chain management has been labeled as a 'conceptual slack' Halldorsson, Hsuan & Kotzab (2015), based on controversies surrounding its fluid relationships with related disciplines and professions such as logistics, operations management, purchasing and quality management. According to Wisner, Leong and Tan (2012) events leading to the founding of supply chain management, based on American industrial developments started with a focus on the traditional mass production in the 1950s, inventory management in the 1970s, JIT, TQM and others in the 1980s and supply chain management was founded in the 1990s (See table 3.1).

Table 3.1: Events that characterize the evolution of supply chain management

Periods	Events
• 1950s to 1970s	• Traditional mass manufacturing
• 1970s to 1980s	• Inventory management, MRP, MRP11 and cost containment
• 1980s to 1990s	• JIT, TQM, BPR, supplier and customer alliances
• 1990s to 2000s	• Supply chain relationship formation, sustainability, social responsibility
• 2000s and beyond	• Increased supply chain capability

Source: Wisner, Leong and Tan (2012:12).

Note:$MRP = material\ requirements\ planning, JIT = just - in - time, TQM = total\ quality\ management, BPR = business\ process\ reengineering.$

Supply chain management research and studies are ongoing and the current study hopes to make a mark in these developments.

3.3.3 Supply chain management principles

Like in any other profession the activities of supply chain management practitioners are guided by a set of principles. This section reviews some of the principles that guide supply chain management operations. Wiid (2013) argues that, for an organisation to achieve excellence in supply chain management, it needs to follow key principles, which are knowing the customer, adopting lean philosophies, creating an information infrastructure, and integrating business processes and decision support systems.

- Knowing the customer-supply chain oriented organisations must be driven by the need to satisfy customers. Therefore, the efforts of the company and its supply chain stakeholders are all focused on delivering optimum value to the customer and this is best done when the needs and wants of the customer are well understood (Kruger, Ramphal & Maritz, 2013);
- Adopting lean philosophies- Supply chain management is associated with cost reductions achieved through lean operations. Lean companies are organisations that view the

spending of resources for anything other than the improvement of customer value as wasteful (Wiid, 2013). Lean supply chains seek to remove all waste from the supply chain which in turn aim to maintain acceptable customer service while using fewer resources. These resources are mainly: people, facilities, time, stock, equipment, and so on (Jacobs & Chase, 2014);

- Creating an information infrastructure- In order to achieve the cost benefits associated with supply chain management, information infrastructure will facilitate the sharing and processing of information among supply chain members (Butner, 2010). Trust levels between supply chain members, including suppliers and customers, tend to increase among business partners when information is shared with limited restrictions (Cao et.al, 2010);
- Integrating business processes and decision support systems- this entails physical connection of business technology and application systems. This can improve customer relationship management processes, customer service and customer orders processing (Katunzi, 2011).
- Decision support systems-based on computer programmes, supply chain members are in a position to analyse information, generate business reports, and communicate easily with other supply chain members.

In a related proposition, Badenhorst-Weiss, Van-Biljon and Ambe (2017:12) propose that in order to be able to create real customer value a supply chain should possess the following characteristics:

- SCM is a philosophy in which supply chain members conduct business based on principles of sharing risks, benefits and rewards, long term cooperation between partners and joint planning and mutual exchange of information across the supply chain;
- SCM implies optimized performance from all supply chain members;
- SCM is the integration of multiple layers or tiers of companies striving as a team to optimize the shared supply chain processes;
- SCM is the management of a network of organisations to ensure focus remains on the delivery of customer value;
- SCM is the management of all links and interfaces in the supply chain;
- SCM is made possible by information sharing throughout the whole chain;

- SCM is based on a shared vision of what customer value is. Therefore, corporate philosophies that are compatible with these characteristics are essential in achieving the necessary levels of planning and coordination required for effective supply chain management.

These supply chain principles and characteristics must remain consistently guided by the company's supply chain vision and strategy. However, principles and characteristics evolve in tandem with developments in a particular profession.

3.3.4 Supply chain management fundamentals

The already reviewed systems theory and value chain analysis are the springboard to successful supply chain management. They demonstrate how broad and complex situations integrating various activities within a company ought to be managed. The operations of the petroleum industry are perceived to be equally complex and cutting across many organisations such that a systematic way to manage the complex set up for efficiency and effectiveness is required. Supply chain management is perceived as a reliable alternative to manage complex situations provided its basic fundamentals and principles are understood and followed.

In a study which analysed research conducted for assessing the state of supply chain management practices followed by Indian organisations and to identify areas that needed to be addressed to increase productivity Sahay, Gupta and Mohan, (2006) concluded that fundamentals of a supply chain system included supply chain objectives, supply chain processes and management's focus on supply chain activities. Writing on designing and managing the supply chain fundamentals Simchi-Levi et al. (2009) identified four fundamentals of supply chain management, namely; supply chain objectives, the supply chain philosophy, managing the flow, and relationships (Leyh & Thomschke, 2015).

3.3.5 Supply chain vision and objectives

The basic objectives of supply chain are to optimize performance of the chain, add as much value as possible for the least cost possible and link the supply chain agents to jointly cooperate with the firm to maximize productivity in the supply chain and deliver the most benefits to all related parties (Sahay et al. 2006). Successful implementation of a supply chain system will require a strong vision that informs the supply chain objectives and strategies. It has been observed Badenhorst-Weiss, Van Biljon and Ambe (2017) that the complexity of the management of supply chains is characterized by complex functions, activities, processes, suppliers and information flows. Based on supply chain complexities Fawcett et al. (2015) developed a goal or vision to address the complexities of supply chain management. That vision identified important things that supply chain needed to address, such as: relationship alignment, information sharing, performance measurement and people empowerment (Fawcett, Magnan & McCarter, 2008). Further research concluded that, a strong supply chain vision can be built on the principles of quality leadership, customer focused, driven by demand, collaborative partnerships, design for supply chain, integrated information systems and strategic partnerships and trust (Merhrjerdi, 2009).

3.3.6 Supply chain philosophy

Storey and Emberson (2006) suggest that the real focus of supply chain was on basically all activities cutting across virtually all key functions in the company. This reiterates the point that, supply chain as a management philosophy has roots in the systems perspectives that focus on integrating operations of all the functions within an organisation and in other companies. It is not easy for managers who are responsible for supply chain management in the organisation to have a narrow focus on a particular function or a particular level because supply chain management tends to be all inclusive and for it to succeed it has to deal with the whole system (Stevenson, 2012).

Just like in an ordinary chain, the supply chain management philosophy contends that, the ultimate performance of a supply chain will be determined by the weakest link in the chain. It is therefore imperative for management to make efforts to align these supply chain activities with the company's vision and corporate strategy (Coyle et.al, 2017). To do this effectively, management must clearly define the role of supply chain and its objectives in the company

and understand the company's context. This can be achieved through carrying an industry analysis, as well as strengths, weaknesses, opportunities and threats (SWOT) analysis (Nieman & Bennett, 2014).

Overall, supply chain philosophy considers the fact that competition is no longer between two or more competing companies but it is between supply chains (Handfield et al. 2011). In such a competitive game the weakest point in a chain will determine the strength of its supply chain.

Managing the flow

Managing the flow relates to tracking and controlling the movement of money, materials and information within a supply chain (Stevenson, 2012; Sweeney, Grant & Magnan, 2015). Supply chain managers will be concerned with processes that track movement and control of material, money, men, and information within and across the supply chain in order to maximize customer satisfaction and to get an edge over competitors (Kumar, Singh & Shanker, 2015). As already highlighted under the discussion on systems theory, a supply chain is considered to be a system made up of inputs, transformation processes, and outputs. This system must deal with the acquisition and consumption of finances, materials, equipment, buildings, factories, labour, administration and management. The manner in which these activities are managed will have an impact on cost and the profit that an organisation makes (Wiid, 2013). In line with the value chain concept, as a product goes through each of these steps it must become more useful. Based on the lean management view activities that do not add value must be eliminated because they are a waste (Sohel et.al, 2016). In order to be successful the flow in an organisation has to be consistent and uninterrupted. This can only prevail if the supply chain of the focal company and other supply chain members has strong relationships (Kumar, Datta & Mahapatra, 2014).

Managing Relationships

Nowadays as economic globalization develops, customers' demands are diversifying, information technology changes at a terrific pace and competition among firms is becoming fiercer (Sheel, 2016). In supply chain management environment relationships that are

important are those between the company and its suppliers on the upstream and its customers on the downstream (Varma, Wadhwa & Deshmuk, 2008). In such a market firms tend to cooperate with major suppliers and key customers in order to survive and expand (Yu, Xiong & Cao, 2015). In the current study focus is on collaborative relationships and integrative relationships between petroleum companies and other petroleum industry supply chain members. "Collaboration is when two or more supply chain members are working together to create a competitive advantage through sharing information, making joint decisions and sharing benefits which result in greater profitability of satisfying end customer needs than acting alone" (Mathuramaytha, 2011).

Collaborative relationships emphasise the adopting of closer relationships with key suppliers and it can lead to a high degree of interdependence along the supply chain (Barve, 2011). The need to integrate management of international fuel suppliers, Beira Port Authority operations, Beira to Harare pipeline and storage facilities, customers dotted throughout Zimbabwe and several third party logistics service providers (3PLs) were considered in a bid to make the petroleum industry and petroleum companies competitive. Management attention is also given to supply chain activities across and within organisations for providing customer value and establishing effective and feasible relationships both inside and outside the organisation (Habib, 2011).

3.3.7 Supply chain management strategy

The above discussions on supply chain management imply that supply chain managers have strategic, tactical, and operational responsibilities. Sound supply chain strategies are therefore required at strategic, tactical, and operational levels (Fawcett, Walter & Bowersox, 2011). First, strategic responsibilities focus on supply chain issues at corporate level.This entails having policy statements about procurement, inventory management and logistics, ICT and customer service at corporate level (Stevenson, 2012). Second, tactical or functional responsibilities relate to medium term supply chain strategies including, forecasting, sourcing, operations planning, order scheduling, logistics and transportation scheduling and collaborating with network partners (Kruger & Ramphal, 2009). Technically, supply chain strategies draw from the overall corporate strategy and inform the operational strategy (Coyle et.al, 2017). Third and last, operational responsibilities relate to operational tasks such as

receiving inventory, production scheduling, order fulfilling, shipments in and out of company and information sharing (Jacobs & Chase, 2013). Operational strategies are the responsibility of lower level managers or junior managers. Therefore implementing the supply chain strategy takes place at different levels along the entire supply chain (DeVilliers, Nieman & Niemann, 2015).

A strong supply chain strategy must be arrived at following the due process of developing business strategies. Strategy development process involves the analysis of the business's external political, economic, socio-cultural, technological and environmental factors (Nieuwenhizen, 2013). These are the factors that generate opportunities and threats that the company has to be aware of and they usually affect the entire industry (Loedolff, 2016). The firm's market factors also need to be considered because they directly influence company performance. These include, competition, suppliers, customers, supply chain members and specialist interest groups (Paradkar, 2011; Nieman & Bennett, 2014). Lastly, strategy takes into account micro-environmental factors or the internal factors. The company's vision, objectives, strategies and the management of internal operations such as: planning, organising, leading and controlling constitute the internal environment (Lazenby, 2014; Schermerhorn & Bachrach, 2015). This will also take into account the company's resources, capabilities, and its core competencies (Sweeney, Grant & Mangan, 2015). Therefore, a clear understanding of strategy issues can help a company to develop more realistic supply chain strategies. However, the success of the strategy largely depends on how it will be implemented, hence the company will require a supply chain implementation strategy (Nag, Han & Yao, 2014).

3.4 Strategic supply chain management activities

Supply chain optimization in companies can be achieved when there is reduced uncertainty in the supply chain with regards to suppliers, processes and customers, internal collaboration between the company's different functions (Trkman, Budler & Groznik, 2015). Additionally, critical success factors to implement supply chain management must be identified and you also need good leadership to drive the supply chain strategy (Lysons & Farrington, 2012; Coyle et.al, 2017). These are the critical practices thought to be relevant for achieving supply chain optimization and company competitiveness. This section focuses on five key elements

of supply chain management, namely procurement management, inventory management, logistics management which focus on transportation and distribution, information and communications technology (ICT), and customer service management. The management of storage facilities which is central to the petroleum industry's activities is not discussed here because it was centrally managed by the National Oil Infrastructure Company (NOIC) and was covered under industry structure discussion in Chapter 2.

3.4.1 Procurement and supply chain management

Research shows that procurement costs account for 50 to 60% of the total cost of goods sold in a manufacturing company and the percentages could be higher for service organisations (Coyle, Bard & Langley, 2009). All petroleum companies in Zimbabwe are either importers, or wholesalers or retailers meaning their main business is procurement and distribution of petroleum products (Ministry of Energy and Power Development, 2012). They are all not engaged in any refinery or manufacturing processes. As such, they all need sound procurement strategies.

Procurement management is defined as, the part of supply chain management that plans, implements, and controls the efficient, effective acquisition of all raw materials, semi-finished goods, finished goods, services and information in order to support the core operations and ancillary activities of the organisation (Pienaar & Vogt, 2016). In a supply chain, procurement links, integrates, and mobilises co-operation among a company's internal and external stakeholders (Stevenson, 2012). Its efforts insure collaborative relationships with suppliers which can lead to reduced delivery lead times, improved quality of products and customer satisfaction.

Procurement incorporates activities such as choice of suppliers and managing relationships with suppliers but it rarely attends to the wider vision of the supply chain management concept which emphasizes end to end pipeline management with seamless and efficient flow of information, materials and products through the whole chain (Storey & Emberson, 2006). Therefore, procurement is a sub field of supply chain management and because of its narrower scope than supply chain management, the goals of procurement must be derived from supply chain management goals (Coyle et al., 2013). According to Hugo and Badenhorst-Weiss (2016) procurement policy guidelines and supply strategies should, of

course, be in line with those of the enterprise and the supply chain as a whole. Some of the benefits of sound procurement include: improved quality, improved service to end customer, cost reduction, cost improvement, cash flow improvement and development of process technology (Flynn & Fearon, 2010; Benton, 2013). Below are examples of procurement objectives identified by Hugo and Badenhorst-Weiss (2016):

- To supply the organisation with a flow of materials and services that meet its current and expected future needs;
- To manage the supply base so that adequate suppliers are available for the current and future requirements of the enterprise;
- To foster inter-functional relationships by, for example, contributing multifunctional teams and by providing outstanding customer service to the internal customers of the supply function;
- To maintain an optimum balance of inventory that would ensure the desired level of of customer service while minimizing costs associated with the service level;
- To maintain and develop the quality of purchased products and services as well as internal service delivery by implementing quality assurance programmes within the organisation and with external suppliers;
- To contribute to the development of overall business strategies by strategic supply inputs;
- To ensure that a timely, cost-effective and comprehensive information system is in place to support information systems of the supply chains in which the organisation may be involved.

Barve (2011) argues that in order to cope with market instability, companies must look beyond cost advantages and embrace other strategies such as speed, quality, and flexibility as means of responding to unique needs of customers and markets. He further contends that, a supply chain procurement plays a central role of integrating and mobilising support from organisational stakeholders. This involves making procurement outsourcing decisions where they are beneficial to the company, creating collaborative relationships with suppliers, and reducing delivery lead times of quality products that will offer satisfaction to the customer (Ibid). Brown et al. (2005) argue that, supply is not carried out in a chain, supply is carried out in a network or in a mess, and therefore supplier relationship management is not straightforward as a chain. Brown et.al (2005) also note that, in order for the supply chain to be effective the company requires a procurement strategy that supports the company's supply

chain objectives. Therefore, an organisation requires a procurement management strategy in order to operate within the supply chain and for it to operate competitively (Brown et al., 2005).

The procurement strategy is performed and implemented at different levels of the company. The three levels of the procurement strategy are strategic procurement management, tactical procurement management, and operational procurement management (Scott, Lundgren & Thompson, 2011). Participation and involvement of different stakeholders in implementing procurement strategies of a company is important. This requires procurement practitioners to create time to interface with appropriate levels of external supply chain members in order to maximize the benefits from procurement. Table 3.2 below shows procurement activities handled at the three procurement strategy levels.

Table 3.2: Procurement strategy levels and activities

Strategic Procurement Management	Tactical Procurement Management	Operational Procurement Management
• Ensure the efficient and effective sourcing of inputs needed to conduct business • Formulates long term goals and objectives of the company's procurement • Strategic procurement planning take place at company's strategic management level • It addresses issues to do with prices, purchase sizes, location issues and transportation and also deals with outsourcing	• Ensures effective implementation of the company's overall procurement strategy • Mid-term procurement goals are set in the tactical procurement strategy • Within centralised procurement system procurement planning is the functional manager's responsibility. In process oriented systems procurement becomes a shared responsibility among managers that are responsible for different processes. • Developing current and new suppliers and profiling them.	• Ensures short term planning and implementation of procurement schedules • Monitoring and controlling of daily procurement operations • Investigating, explaining and correcting deviations and refer serious constraints issues to senior management • To conduct tactical activities such as inventory analysis and stock-taking, order scheduling, provide administrative and technical support to suppliers, payment of suppliers' invoices and monitor and control incoming orders to avoid overstocking or stock outs.

Source: Scott, Lundgren & Thompson (2011).

Table 3.2 shows that strategic procurement goals feed into corporate goals and decisions at this level take into account impact on other supply chain members. Tactical procurement focuses on implementing strategy, making sure the relevant processes are put in place. Operational procurement is concerned with the day to day activities of procurement staff.

Information from operations to tactical and strategic levels is used to develop future supply chain strategies.

In the case of the Zimbabwe petroleum industry the products are all imported. However, some international suppliers have opened offices in Zimbabwe to facilitate strategic alliances like vendor managed inventory (VMI) arrangements with some of their customers (ZERA, 2012). Suppliers with VMI arrangements can create strong supply relationships with customers and this results in increased delivery speed, reliability of supply, lower inventories handling cost, lower administrative costs, higher profitability and improved customer service (Stevenson, 2012).

Apart from the benefits of business alliances with suppliers and customers Tadisna (2016) proposes that working with competition is also possible especially where competition is not product, quality and price based and he suggested the use of cooperative or consortium purchasing. This strategy enables organisations to share purchasing costs and to benefit from volume discounts from suppliers (Adoga & Valverde, 2014). In the fuel industry importers of fuel already share the same pipeline and storage facilities thereby making this option realistic.

Procurement and outsourcing

Outsourcing is the process of moving aspects of your own company to another supplier or third party logistics (3PL) provider (Shi et al., 2016). Outsourcing has become a critical factor to consider in procurement and logistics processes because of its potential to reduce costs and improve efficiency and effectiveness (Lysons & Farrington, 2012). When a company engages third parties with specialist skills and capacity advantages it does not only get outsourced services at cheaper prices but this also creates an opportunity for the company to focus its energy on its core business (Stevenson, 2012). Therefore, outsourcing has the potential to drive costs down. It is a good strategy when your company does not have capacity to perform the specific task or when it believes that another organisation can perform the task better (Scott, Lundgren & Thompson, 2011; Atkinson, 2014). Procurement outsourcing is recommended where it offers potential for great savings in procurement costs. For example, because procurement is labour intensive imminent direct labour cost savings can be realized when procurement is outsourced (Coyle et.al, 2017). Experts always have better leverage due to quantity ordering, they get preferential pricing that a company cannot

realize itself and this has potential to reduce costs (ibid). Outsourcing can also remove fixed costs such as warehousing and transportation costs allowing the company to focus on its core competences (Bowman, 2008). However, implementing outsourcing requires confidence and trust in the third parties contracted to provide the outsourced activities of the business (Varma,Wadhwa & Desmuk, 2006). When the procuring entity does not have trust it will spend more resources in follow ups and controlling the activities of the service provider and this becomes another waste. Benefits of outsourcing include: better customer satisfaction, increased control of inventory, reduced costs, higher profitability, enhancement of corporate image, and sustainability (Pienaar & Vogt, 2014). Additionally, in an investigation of supply chain management issues in the oil and gas industry in South Africa Chima, (2007) noted the following outsourcing advantages:

1. Outsourcing provides a company the form and opportunity to focus on what it knows best-its core competencies;
2. It allows the firm to add capacity without added overhead and fixed costs; additional assets and equipment are owned by service providers;
3. It fosters market agility and corporate growth; it allows a firm to grow without undertaking large capital investments;
4. It provides more flexibility during periods of economic downturn; the company leases out facilities and recalls leased facilities as and when need arises;
5. Outsourcing provides better quality and supply chain performance; work is done by specialists leaving companies to concentrate or focus on core business.

In the fuel industry it is common practice to see petroleum companies contracting transport companies to move fuel containers from one point to the other (Scott, Lundgren & Thompson, 2011). The study is yet to uncover the extent to which the practice of outsourcing is used, the benefits it brings to petroleum companies and which areas of the petroleum industry activities are outsourced.

Lean management is another modern management concept closely related to outsourcing and it is normally directly managed under the procurement function. Stevenson (2012) points out that lean practices focus on eliminating non-value added processes, and improving product flow along the supply chain. Disintermediation (the removal of middlemen) is a common strategy to remove non-value added process in procurement which can be achieved through

the use of fewer suppliers, supplier certification programmes and encouraging continuous improvement of systems (Kruger, Ramphal & Maritz, 2013). When a company uses fewer suppliers, in the long run it is expected to establish strong relationships with the few suppliers resulting in more and closer consultations on product specifications, availability and competitive prices. For example, if a supplier distributes International Standards Organisation (ISO) certified products, this is full proof that the supplier has quality programmes that meet international standards (Oakland, 2014). There will be less inspection costs when a company orders from ISO certified suppliers and buying ISO certified products can drastically reduce the supplier's marketing budget and the customer's procurement costs (Hugo & Badenhorst-Weiss, 2016).

Outsourcing to keep operational costs low and manageable is one of the objectives of a company's supply chain management system (Chopra & Meindl, 2013). Depending on how a company manages its other costs, low procurement costs will allow the company to charge competitive prices. Therefore, to achieve this objective management attention to procurement issues is critical but the procurement function alone cannot achieve the required performance effectiveness hence the need to ensure effective control of other supply chain elements, especially inventory management (Emmet & Granville, 2007).

3.4.2 Inventory management in supply chain management

In a recent study about drivers of retail supply chain efficiency it was noted that inventory management practitioners face two competing tasks, which are maintaining effectiveness and efficiency (Adoga & Valverde, 2014). In inventory management, effectiveness means the ability to not miss a single order because of stock outages and efficiency means incurring minimum ordering costs, inventory carrying costs and shortage costs (Horn et.al., 2014). Having adequate inventory on one hand, but not getting caught with obsolete or out-of-season items involves skillfully balancing a number of competing requirements and staying alert to changing external factors (Rana et.al., 2016). Both efficiency and effectiveness goals must be met for the company to steer clear of problems. Rana et al. (2016) also note that, the embarrassment of apologizing to customers for stock outs leads to loss of sales while the embarrassment of apologizing to company owners for stock that the company purchased and is moving slowly leads to increased cost of holding inventory. Therefore, meeting both

inventory management efficiency and effectiveness goals is a challenge to inventory managers (Render, Stair & Hanna, 2012). The challenge requires management to improve on stock management, demand management (forecasting), cost of inventory and inventory control (Kruger & Ramphal, 2009).

Stock management

Scientific methods of managing fuel inventory at national, industry and company levels are a critical component of the petroleum industry's supply chain and they need to be managed well (Babatunde, Gbadeyan & Bamiduro, 2016). Good inventory control can reduce the need for safety stock, lead time, supplier uncertainty, forecast error and increase service level (Scott, Ludgren & Thompson, 2011). Stabilising deliveries means that when the supply and demand situations of particular commodities can be reliably determined companies can make inventory decisions that help in minimizing inventory holding costs while maintaining reasonable margins (Tay et.al., 2015).

The concept of stabilizing deliveries is linked to balancing supply and demand, ensuring stable product availability and protection against quality defects (Tadisina, 2016). If suppliers are pressured to supply outside their usual production schedules shortcuts are likely to happen and in the process product and service quality will be compromised (Stevenson, 2012). In the fuel industry, especially at retail level when companies are under pressure, they are tempted to take shortcuts such as mixing diesel with paraffin and over blending petrol with ethanol (Gumbo, 2017). In Zimbabwe paraffin was being imported duty free till December 2016 and regulations demands the blending of petrol with ethanol up to 15%. These regulatory requirements motivated operators to tinker around with products thereby compromising quality (Gumbo, 2017).

Reasons for holding inventory include: balancing supply and demand, safety stock, stabilizing manufacturing, protecting against quality defects, cost reduction and to protect the company against uncertainty (Scott, Ludgren & Thompson, 2011) and continuity in production and marketing, cost savings and hedging against price uncertainties, protection against supply uncertainties and purchasing costs (Hugo & Badenhorst-Weiss, 2016). Therefore, keeping inventory has advantages and disadvantages. Kruger, Ramphal and Maritz (2013) suggest that holding inventory has the following advantages and disadvantages.

Table 3.3: Advantages and disadvantages of holding inventory

Advantages of carrying inventory	Disadvantages of carrying inventory
• The organisation can take advantage of discounts from suppliers on quantities purchased • Disruptions can be minimised in operations • Unexpected demand can be met • Some inventory forms an integral part of the organisation such that without that inventory the organisation will not function • In manufacturing entities reduction of set up times can be achieved with sufficient inventory holding • Inventory can be used to hedge against inflation	• There is inherent, risk that inventory can be damaged and the larger the inventory kept the greater this risk is • Obsolescence and depreciation cause losses to the organisation • Inventory hides process problems • There are many types of costs that are associated with keeping inventory • Too much inventory hides quality problems • Flexibility is jeopardised in the sense that adopting new technology can be put on hold till old stocks have been used

Source. Kruger, Ramphal and Maritz (2013:166).

Any saving accruing from the advantages of holding inventory are expected to be passed down to customers in the form of competitive prices and more efforts will be directed to manage the disadvantages and keep operational costs low.

Forecasting/Demand management

The objective of any inventory management system is to accurately forecast demand ensuring a balance between supply and demand (Scott, Ludgren & Thompson, 2011). In manufacturing industries, the levels of inventories are reviewed up to the stage when inventory is dispatched to customers. Inventory levels therefore represent the firm's

competitive positioning, strategies, internal processes and relationships with suppliers and downstream customers (Nakano, 2009; Nag, Han & Yao, 2014). Thus, excessive inventory carrying costs are signs of inefficiency while losses resulting from stock outs are signs of ineffectiveness. These are linked to lack of planning and coordination in product movement (Bala, 2014).

Failing to keep a balance between supply and demand is a sign of poor forecasting that can result in poor customer service (Stevenson, 2012). In supply chain management you are constantly managing the level of inventory against the risk of being out of stock and the challenge is to balance the level of inventory while maintaining a high service level (Scott, Lundgren & Thompson, 2011). This becomes a problem if management is not in full control of their internal systems and uncertainty from external factors. External factors cause uncertainty if a country's economic fundamentals are not stable. In Africa, this is reflected by: unstable prices, rising interest rates, shortage of foreign currency and so on (Naude, 2013; Osoro, 2015). The uncertainty makes it difficult for companies to make decisions regarding how much stock to order and how much to keep in stock and this increases the risk of product shortages. To balance supply and demand requires that the most ideal stock level is maintained all the time, yet it is difficult to accurately determine stock level in an unstable environment (Osoro, 2015).

A balanced supply and demand is one that avoids accumulation of inventory that attracts inventory holding costs when uptake is slow and disappointment to customers when they are asked to wait for back orders due to non-availability of stock at the time they place orders (Kruger & Ramphal, 2009; Render, Stair & Hanna, 2012). Therefore, achieving a balance of supply and demand requires good forecasting strategies which are also aided by the business environment. Maintaining a balance between supply and demand is not an easy task in an environment with market uncertainties, environmental changes and fluctuating customer demand associated with land locked less developed countries (LLLDCs), Zimbabwe included.

Pienaar and Vogt, (2014) observed that, products that arrive at the customer too early necessitate additional storage and handling activities, while late delivery can disrupt the customer's operations and consequently damage the supplier's reputation. Lee, (2004) adds that, many suppliers are small and medium-sized companies that must borrow money to

finance their inventories at higher interest rates than larger wholesalers and manufacturers pay. Therefore, companies cannot afford to borrow money to finance stock they cannot sell on time and that which gets delivered when customers have already cancelled their orders.

Forecasting theory is closely related to the theory of constraints (TOC). Proponents of the Theory of Constraints (TOC) such as, Balfaqih, Nopiah and Saiban (2016), argue that, implementing TOC forces an organisation to focus management attention on increasing throughput while at the same time reducing inventory and operating expenses thereby getting closer to the organisation's ultimate goal of making money.

The theory of constraints is a management philosophy that states that organisations or systems have constraints. Otherwise the system will generate infinite amounts of end products (Stevenson 2012, Pienaar & Vogt, 2014). A constraint can be defined as anything, an activity or resource that restricts a system, organisation or process from achieving its best possible performance in its entirety (Piennar & Vogt, 2016). It is therefore important to note that the overall capacity that a supplier has is based on their constrained capacity. Since constraints can prevent companies from achieving their best possible performance it is important that in the case of managing supply chains, managers must identify all system constraints and direct more effort towards managing these constraints (Muthu, 2010). To do that, Pienaar and Vogt (2016) recommend that the process of identifying and evaluating constraints capacity within a system should include the following steps:

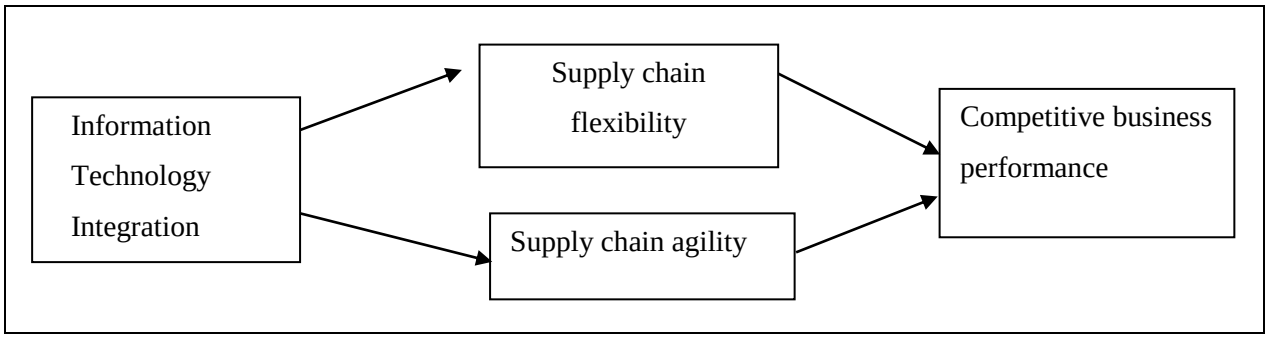
1. Identifying system constraint's capacity. This entails performing some root cause analysis to determine the exact points that prevent the system to function as originally designed. Such constraints could be at any of the company's supply chains and require cooperation and collaboration from the other party to be effectively dealt with;
2. Deciding how to exploit the system's constraints. Team work and cooperation allows all stakeholders to be involved in finding solutions to the identified constraints. Empowering staff that are directly involved in processes those constraints the system is encouraged but when the constraints are externally driven the involvement of the C.E.O. or even external consultants will not be a bad idea;
3. Subordinating everything else to the above decision. The strength of a system is determined by its weakest link. That being the case, directing and spending more

management efforts in managing the identified bottle necks in the supply chain will be a worthwhile investment (Tanco, Furbrg & Escuder, 2015);

4. Elevating the system constraint's capacity. One of the rational ways to increase a system's capacity is by elevating the capacity at the bottleneck because production at the bottleneck determines a company's production capacity (Stevenson, 2012);
5. If constraint has been broken-return to step 1 and do not allow inertia to cause a system constraint. This is in line with the objectives of learning organisations and total quality management which advocate continuously striving to improve current performance and never being comfortable with the status-quo.

Effective demand management also plays a critical role in achieving supply chain agility (SCA). Agility entails quick response to sudden changes in supply and demand, smooth and efficient handling of disruptions, and survival of unprecedented threats of the business environment and flexibility entails integration within and across functions or processes, speed and customer empowerment (Lee, 2004). Agility has been considered one of the fundamental characteristics needed for a supply chain to survive in an environment of turbulent and volatile markets as it is essential for firms' endurance and competitiveness (Gloria & Talavera, 2015). The concept of agility has been identified as one of the most important issues of contemporary supply chain management and has been credited with helping firms respond in a timely and effective manner to market volatility and other uncertainties, thereby allowing firms to establish a competitive position (Gligor, 2014). Gligor (2014) added that, procurement flexibility and distribution logistics flexibility are key antecedents of a firm's supply chain agility. The firm also requires flexibility in managing demand because demand and supply integration (DSI) inside a firm is critical to achieving supply chain agility. The following supply chain agility (SCA) conceptual framework demonstrates the significance of agility in a supply chain management oriented company.

Figure 3.3: The supply chain agility model



Source: Gligor (2014:583).

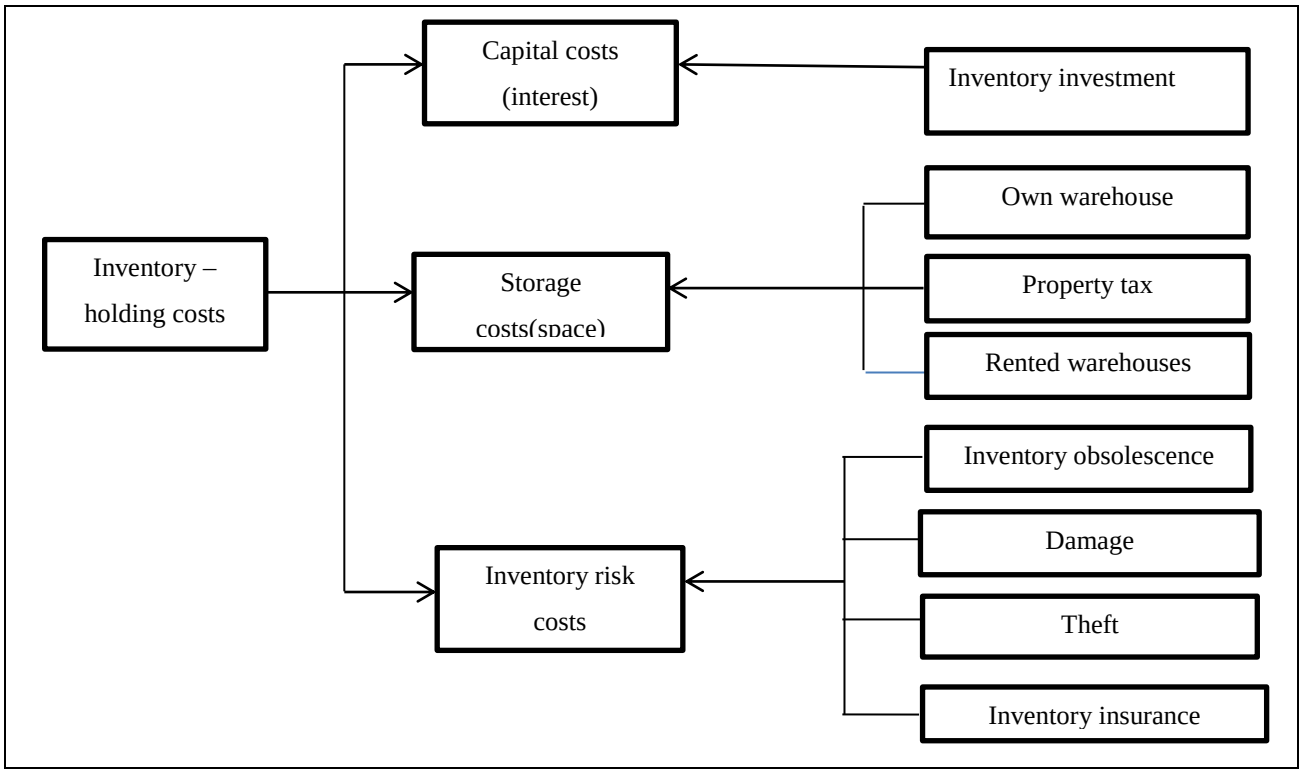
Based on the supply chain agility model, information technology combined with supply chain flexibility and supply chain agility can improve business competitiveness.

Inventory costs

Costs associated with keeping inventory include carrying costs, ordering costs and shortage costs and these costs must be managed. Carrying costs increase with the amount of inventory held and the time inventory is kept in stock, hence companies are discouraged to hold a lot of inventory (Jacobs & Chase, 2013). Ordering costs depend on how many orders or how often orders are placed over a period of time. Shortages costs are costs associated with loss of business as a result of customers that turn away from a supplier who talks about back orders and experiences stock outages (Render, Stair & Hanna, 2012). The issue of ordering costs is heavily linked to the company's procurement processes already discussed.

Therefore, inventory management's biggest challenge is the cost of holding inventory. Cost of holding inventory is important because inventory carrying costs have a bearing on the selling price of the company's products (Collins & Troilo, 2015). For example, a petroleum company's pump prices can be influenced by the cost of money used to procure stock, warehouse charges, and importation logistics costs. When inventory costs are many and unavoidable such costs will unfortunately be passed on to customers in the form of high prices. Sometimes high inventory costs will force companies to squeeze their margins to the bone leaving them with no capital to grow or expand their businesses. A summary of inventory holding costs suggested by Hugo and Badenhorst-Weiss (2016) is shown in Figure 3.4 below.

Figure 3.4: Components of Inventory holding costs



Source: Hugo and Badenhorst-Weiss (2016:156)

Most businesses, particularly small to medium entreprises (SMEs), borrow money to finance their operations. If one borrows to procure trading stock all the costs must be recovered from product sales. The company also has to invest in storage and risk management. All this has potential to increase inventory holding expenses which have a bearing on the company's bottom line. Therefore, inventory requires to be closely controlled.

Inventory control

Companies use different techniques to control their inventory and the techniques used depend on factors such as the nature of industry, the size of company operations, available technology and capacity and capability that the company has (Krugar & Ramphal, 2009). Inventory techniques such as Just-In-Time (JIT), Materials Requirements Planning (MRP) and Distribution Requirements Planning (DRP) do not yield the required effectiveness in petroleum distribution. The technique called vendor managed inventory is therefore widely used in process operations such as petroleum retailing (De-Villiers, Nieman & Niemann, 2015). In conjunction with elements of economic order quality (EOQ), vendor managed inventory VMI) manages inventories outside an organisation's logistics network. VMI is used

by an organisation to manage its inventories held in its customer's distribution centers (Coyle et al. 2017). The suppliers spearhead the stock replenishment process and they have knowledge of product demand and push product to the customers' location.

In the fuel retailing business, the concept of vendor managed inventory (VMI) (Stevenson, 2012) or consignment stock (Kruger & Ramphal, 2009) is an alternative inventory management strategy preferred by supply chain oriented organisations. VMI allows inventory to be managed by the vendor instead of the customer. The vendor monitors product stocks and replenishes inventory when supplies are low. In this instance the vendor decides when and how much stock should be stocked. VMI advantages include that the arrangement reduces transactions in the entire supply chain since the consuming party is not concerned about materials management, and the VMI takes collaboration among suppliers and buyers to a new level where an outside party still owns inventory in the enterprise (Loedolff, 2014).

Kumar, Datta and Mahapatra (2011) view VMI as an information sharing strategy and contends that, information sharing practices give suppliers access to more accurate demand information which improves demand visibility and could improve inventory control efficiency. Successful organisations have market responsive supply chains which are characterized by a responsiveness oriented strategy that focuses on speed, flexibility, and order accuracy through build to order, mass customization, and strategically positioned inventory buffers (Nag,Han & Yao, 2014). Companies can achieve this if they dynamically adjust their network, take a global view of demand, work the supply network, boost asset productivity, expand their visibility, know what happens when it happens, design to deliver, and track performance for continuous improvement (Gloria & Talavera, 2015). The same authors concluded that, the disciplined strategic approach to understanding the internal and external customer dimensions of the business puts a company in a better position to outperform competitors whose decisions are based on less complete and less insightful information.

Managers in charge of inventory control must be aware of possible deviations from approved company inventory control procedures so that they can take corrective action on time. They need to spot some verifiable indicators and symptoms of any deviations. Hugo and Badenhorst-Weiss (2016) identified the following symptoms of poor inventory management.

Table 3.4: Symptoms of poor inventory management

• An increase in the number of outstanding orders, which may be an indication that timing for inventory replenishment is poor	• An increase in the monetary investment in inventory without a definite reason
• Considerable differences in inventory turnover rates or times at different plants or at different comparable depots	• An increase in the number of out-of-stock occurrences during a fixed time period, indicating a drop in the level of control by inventory management
• No storage space from time to time, indicating too much inventory	• Excessive increases in inventory – holding costs, compared with previous or budgeted figures
• Increases in obsolete inventory, for example as a percentage of total inventory, and the extent of inventory not moving or inventory that has to be written off	

Source: Hugo and Badenhorst-Weiss (2016:157).

Supply chain management driven companies must have strategies to minimize the impact of poor inventory control behaviors. Effective control systems require companies to adopt and implement some best practices such as quality control, risk management and compliance. These can be in-house based or outsourced depending on induvial companies' circumstances.

3.4.3 Logistics in supply chain management

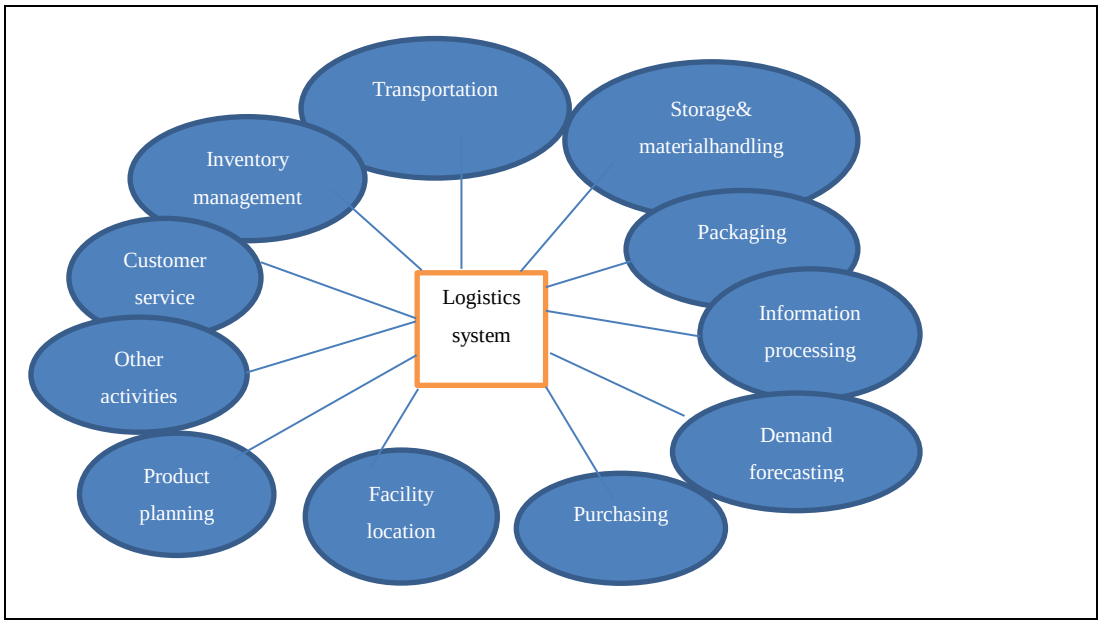
The definition of logistics adopted from the Council of Supply Chain Management Professionals is:

> *"Logistics management is the part of Supply Chain Management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customer requirements"*. (Council of Supply Chain Management Professionals [CSCMP], 2015:3).

The logistics system model in Figure 3.5 below shows that logistics activities cut across the entire supply chain from inbound logistics, storage, information management and outbound

logistics. This alone confirms the complexity of supply chain management and affirms the need for total cooperation, collaboration and integration among members of the supply chain.

Figure 3.5: Components of a logistics system



Source: Dorn, C. Inwent (2014).

The above model shows that, logistics activities cut across the entire supply chain from sourcing to customer satisfaction. Therefore, the key objective of any logistics operation is to ensure that the logistics strategy delivers maximum cost benefits and is in line with the corporate strategy (Loedolff, 2014). A logistics operation represents the integrated management of all activities required to move products through the supply chain (Dey, LaGuardia & Srinivasan, 2011). The same authors posit that, logistics activities focus on transport, distribution, warehousing activities and emphasize the need to balance costs and service aspects of business (Ibid). Bowersox, Closs and Cooper (2007) add that, a logistical competency of a firm can be measured by its flexibility or how well it is able to adapt to unpredictable situations.

Studies on logistics challenges for landlocked less developing countries (LLLDCs) reveal that lack of direct sea access presents growing challenges to the global integration and growth prospects of companies in LLLDCs because crossing a border entails very high transaction costs due to customs and handling charges (Jean-Francois,A., Jean-Francois, M. & Gael, 2010). In the case of Zimbabwean petroleum companies' logistics costs associated with being landlocked include water shipment charges, Beira port storage charges, pre-shipment

inspection fees, and pipeline fees (NOCZIM, 2010). All these have potential to affect petroleum companies' competitiveness and the study hopes to generate information about how these costs impact the petroleum industry's supply chain.

Pienaar and Vogt (2016) assert that smart businesses realize that world class logistics and supply chain strategy play an important role in improving shareholder value. Apart from having a clearly documented supply chain strategy such organisations are characterized by, a clear business strategy supported by supply chain strategies and operations, strategies executed well through complementary operations, an operating model and strategy aimed at achieving a balanced set of objectives and following a limited number of tailored supply chain practices. Therefore, the logistics channel stack is closely linked to procurement and it is responsible for coordinating the origin or the sources of supply with the physical flow of products, information, processes, roles and responsibilities with the destinations or the customers. These activities strengthen the supply chain. They are important because supply chains are about satisfying customers by delivering to their expectations at a price they are willing to pay in such a way that the members of the supply chain will enjoy sustainable competitive advantage (Bowman, 2008). In this whole network the logistics service providers (LSPs) coordinate and link all the supply chain members and the timing of shipments. The logistics function needs to play a prominent role to implement a sustainability strategy in supply chain operations to manage costs involved and creating opportunities to eliminate inefficiencies that prevail in logistics processes (Dey, La-Guardia & Srinivasan, 2011).

Distribution or transportation management is central to the petroleum industry supply chain logistics. In a study on critical tasks for implementing Porter's generic strategies, under the cost leadership strategy, it emerged that the tactic that proved to be the most critical to cost leadership strategy is minimization of distribution costs (Loedolff, 2014). Inbound logistical arrangements are needed to land fuel in the country at competitive prices and outbound logistics arrangements are needed to distribute product to customers and the various service stations in a cost effective manner. Bolumole et al. (2007) notes that, when logistics is not given the critical success factor status in the decision calculus, the firm's in-house operational performance of logistics services will be low and the choice to fully outsource the function to a capable third party becomes logical. The majority of oil companies outsource the logistics services, hence impacts of outsourcing logistics both for the individual oil companies and for

the entire supply chain need to be examined (Chima, 2010). The examination is necessary given that logistics outsourcing has a bearing on the fuel pricing model.

Tactical logistics, arrangements and organisation need to ensure that the desired product and information are made available to the customer at the designated place and time, in a required condition and quantity, at an acceptable place, in order to ensure perfect customer service (Pienaar & Vogt, 2014). Tactical logistics activities that are not effectively managed have potential to cause an increase in the product distribution costs. Planning and corporate strategies must therefore take into account existence of extended supply chains and the potential they have in influencing logistics costs (Horn et.al., 2014). Establishing partnerships and collaborative relationships can result in a reduction of logistics costs and improved customer service if properly managed (Kohli & Jensen, 2010).

The role of transport management is to make sure that products made in one part of the world arrive in full and on time in another part of the world, without sacrificing quality or exaggerating costs (Scott, Lundgren & Thompson, 2011). Key variables in transport management are speed, reliability, security, quality, environment and cost (Wiid, 2013). Speed guarantees timely delivery averting the need for companies to keep a lot of safety stock as companies order to stock and just in time implying reliable supplies and high service levels. Security of product means that all safety precautions are taken to protect everyone along the supply chain (Wiid, 2013). At source suppliers are expected to load and dispatch the right product quality and quantity into the right transport at the right time and to the right destination. In transit products must be protected against accidents, theft and other transit risks and at the destination the customers must receive the right quality, quantity and product at the correct time (Pienaar 2010, Pienaar & Vogt, 2014).

Reliability of supply means that when customers place orders they expect deliveries in full, on time and satisfying product specifications (Horn et.al., 2014). This has potential to generate reordering and long lasting relationships between supplier and its customers. Cost of ensuring delivery of the right product can be quite high if the transportation costs are not properly managed (Wiid, 2013). Thus, the environment under which products are transported must be compatible with type of product being moved ensuring issues of quality and on time delivery are not compromised in any way because this has the impact of pushing the cost of products upwards (Borenstein & Bushnell, 2005). Therefore, the petroleum distribution

business in Zimbabwe should be driven by companies' ability to effectively manage their distribution costs. The petroleum companies' ability to keep transportation and distribution cost low is likely to improve competitiveness. However, according to Chima (2010) inflammability and lack of packaging of petroleum products create more risk for petroleum companies who have to incur more insurance costs to protect themselves against risk.

The main modes of transport in the petroleum industry are rail, road, and pipeline. Rail is good for high density products such as diesel and for long distances, non-time sensitive deliveries (Pienaar & Vogt, 2016). To use rail therefore requires distributors who have invested heavily in storage facilities and high inventory levels. These tend to be out of reach in Zimbabwe because of the low level of investment in storage facilities and shortage of capital to import the required stocks (NOCZIM, 2010). Road transport allows for door to door delivery, full truck loads (FTLs) and less than truck loads (LTLs) but is associated with limited carrying capacity, high number of accidents and lack of speed (Prasad & Tata, 2010). In Zimbabwe, punitive import tariffs levied on organisations that attempt to import petroleum product by road and rail make the two options less lucrative (NOCZIM, 2010). The pipeline carries products like oil, gas, and powder-products which are pushed under pressure in large volumes (Pienaar, 2010). Pipelines are considered the safest, fastest and cost effective mode of transporting petroleum products over long distances but they require large capital outlay (Shurchuluu, 2002). Large capital investments required to operate a fuel pipeline requires a market that is large enough and economically active enough to keep the pipeline busy (Pienaar, 2010). Overall, the Zimbabwean economy has not been doing well since 2000 when the agriculture and mining industries crumbled after the government decided to implement a land redistribution policy and restructured the mining industry (Ministry of Industry and Commerce, 2012). These two triggered a deindustrialization process which wiped out demand for many products and the trend is felt to date. As a result, the pipeline from Beira to Harare is underutilized and Government debts related to it continue to accumulate (NOCZIM, 2010). A duty surcharge of US 4 cents per litre for all road and rail fuel imports was government strategy to increase pipeline utilisation by importers of petroleum products because fuel that comes through the pipeline is exempt from the US four cents surcharge (ZERA, 2012).

3.4.4 Information and communications technology in supply chain management

Designing successful systems has always been the goal of most organisations. However, factors such as Government policies, taxation policies, foreign investments and foreign exchange policies, political climate, culture and industrial relations and infrastructure will determine the extent to which companies integrate their supply chains to make them competitive (Braziotis et.al, 2013; Ettlie, 2014). As a result, creating, accessing, processing and using information has always been the goal of information and communications systems (Kumar, Datta & Mahapatra, 2014). Use of advanced technology ensures availability of adequate, current and accurate information allowing companies to make effective decisions and craft winning strategies which allow companies flexibility and the ability to quickly take advantage of new technology which they need and to quickly take defensive positions when the new technology is a threat to their business (Laing, You & Lin, 2010). Information and communication technology plays a significant role at all stages of the supply chain. It allows companies to gather, capture and analyse information to solve company problems (Mehrjerdi, 2009; Render, Rajaguru & Matanda, 2013). The advent of e-Commerce, e-Procurement, and overnight third party logistics companies (3 PLs) and other developments have forced organisations to have a closer look at computerizing their supply chain management systems as a survival strategy (Weingarten, 2013). The petroleum industry is affected by all these developments in different ways which the current study hopes to identify and suggest ways of maximizing benefits from these developments.

Researchers in information management challenges have observed that although more information is available, proportionally less is being effectively captured, managed, analysed, and made available to people who need it. They also noted that, affected executives cite organisation silos, lack of reward for information, inefficient tools and information not being viewed as important as being significant cultural barriers to achieving high levels of interaction and visibility that is needed (Prajogo & Sohal, 2013, Paradkar, 2011, Butner, 2010).

Laing, You & Yin (2010) advanced an argument that companies were not necessarily using more technology; they were using technology more effectively and efficiently. On the contrary Dey, La-Guardia and Srivasan (2011) argue that, the development of technologies such as the internet means every business is constantly monitored 24 hours a day.

Consequently, questionable practices along the supply chain have the potential to spread very fast with the effect of damaging a company's image and ultimately reducing its profitability. Therefore, when management adopt communication, manufacturing process and information technology they must understand both the benefits and disadvantages of such technology and put in place control systems to maximize benefits from any new technologies (Ettlie, 2014; Zhang, Van-Donk & Vander Vaart, 2016).

A study on micro-enterprise supply chain management in different developing countries found that just as information systems are important for shop floor control, the type of information available and its degree of complexity within an operation can affect the management of the enterprise and eventually, its profitability (Prasad & Tata, 2010). If the effectiveness of organisations' supply chains is directly related to the quality of information it is prudent for management to invest in information and technology development (Zhang, Van-Donk & Vander Vaart, 2016). E-Commerce, e-Procurement, e-Marketing, integration with third party logistics (3PLs) and other developments have forced organisations to review the use of technology in their supply chain systems as a survival strategy (Richey, Adams & Delela, 2012). The use of E-Business enables companies to improve competitiveness and quality of service allowing access to their services at many places at any time. E-Business makes it easy for suppliers to monitor customers' choices and requests electronically facilitating disintermediation (Stevenson, 2012). This drastically reduces costs of intermediation.

While a broad range of technologies is considered essential, its use remains somewhat low (Prajogo & Sohal, 2013). Simchi-Levi et al. (2003) advanced an argument that advanced technology and information processing technology can be used to blur the traditional boundaries in the supply chain between suppliers, manufacturers and users in a new set up where suppliers and service providers are treated as if they were inside the company. This involved, sharing design data bases, methodologies, increasing speed and reducing time to market products and services (Pienaar & Vogt, 2016). In a similar vein, the supply chains of organisations change over time. With the current state of information technology, supply chains are operated differently to the way they were operated some time ago and the nature of the relationships among organisations with the supply chain would also be expected to develop and change over time (Laing, Yu & Chin, 2010). Therefore, the challenge to managers with supply chain management responsibility is to constantly and consistently

upgrade their information and technology systems in an endeavor to maintain a long lasting relationship with supply chain members (Ettlie, 2014).

Critical management decisions are made along the supply chain. When information is readily available decisions must be made after considering several decision alternatives based on information from the organisation's information system. This therefore means that the quality of decisions made is a function of the quality of information used to arrive at a decision option (Prasad & Tata, 2010). The quality of data used in making company decisions depends on the accuracy with which data are gathered, coded, processed, stored, presented and projected while quality of information depend on accuracy, relevance, sufficiency, and timeliness (Brevis & Vrba, 2014). All these are ingredients for a company's stronger competitive advantage and are directly linked to ingredients required to develop lasting supply chain relationships among supply chain members (Laudon & Laudon, 2012). Extensive developments and innovations in areas such as information and communication technology (ICT) have driven demand for supply chain management because of the dynamism and variety they brought in the market (Leyh & Thomschke, 2015).

At Mitsubishi Electric Company in Japan, every scrap of information gleaned from visits to libraries, customers, trade shows, conferences, committee meetings, and so forth, is required to be written up and inserted in common files, fully cross- referenced (Schonberger & Knod, 1994). This is done because effective decisions and strategies require accurate, timely, adequate and credible information, especially in the fast moving consumer goods markets like the petroleum products. One of the four ingredients of successful supply chain management is technology that can assist with automating processes; thereby diminishing busy work. The other three are having the ability to measure supply chain partners' performance, shared knowledge, and relationships (Minnick, 2014)**.** In an effort to encourage more investment in technology, Lee (2004) argued that, although building effective supply chains requires more technology and investment most firms have infrastructure in place to create supply chains that are agile, adaptable and aligned to risks of their businesses. The author further argues that what was needed was fresh attitudes and a new culture to make the supply chain perform better (ibid).

In another dimension, Zhang, Van Donk and VanderVaart (2016) assert that when discussing effectiveness of supply chains two issues that cannot be spared are the roles played by inter-

organisational and intra-organisational information and communication technology (ICT) in improving supply chain performance. Inter-organisational ICT refers to technology based infrastructure that acts as a conduit for facilitating transactions, sharing information with trading partners, coordinating activities and establishing governance structures between firms (Ibid). Intra-organisation ICT refers to information technology and/or practices used to share information within a firm including the data bases and applications which facilitate integrating financial, accounting and supply chain operations with the particular focus on logistics systems (Katunzi, 2011; Zhang, Van- Donk and Vander-Vaart, 2016).

According to Laing, You and Lin (2010), on one hand, intra-organisation ICT helps firms to enhance internal control capabilities, strengthen performance and cooperation between the departments, and improve capacity of the system and development. It supports the computerization of the operational process. Weingarten (2013) adds that, the said electronic linkages can help a company share data, information and business applications with its trading partners, they provide the capabilities of electronic transactions including buying and selling goods and services, and facilitate communication and decision making for the purpose of increasing efficiency, effectiveness, competitiveness and profitability for participating organisations. On the other hand, intra-organisation ICT facilitates the ability to work with external partners for cooperation and information sharing electronically linking different organisations in a supply chain beyond traditional enterprise boundaries forming network based systems (Rajaguru & Matanda, 2013). Based on the above two arguments, a supply chain oriented organisation needs to invest in both intra-organisational and inter-organisational ICTs starting with intra-organisational ICT which becomes the bed-rock of a strong inter-organisational ICT.

Some researchers have argued that better results can be achieved if organisations convert their supply chains into smarter supply chains (Butner, 2010, Wu et al., 2016). Butner (2010) contends that a smarter business environment is instrumented, interconnected and intelligent. The author defines the smarter supply chain as the ‘new interconnected business system which extends from isolated, local and single-company applications to supply chain wide systematic smart implementations’(Butner, 2010). In addition, the smarter supply chain would possess features and technologies such as Internet of Things (IoT), smart machines and intelligent infrastructure and capabilities such as interconnectivity, fully enabling data collection and real time communication across all supply chain stages, intelligent decision

making, and efficient and responsive processes to better serve customers (Wu et al., 2016). The IoT is a network of hardware, software, devices, databases, objects, sensors, and systems, all working at the service of humanity. IoT allows digital and physical entities to be linked to enable a whole new class of applications and services ultimately resulting in more reliability and productivity (Wang, Tai & Grover, 2013). Smart supply chains should possess appropriate instruments, interconnectedness among supply chain members, automated and integrated processes (Wu, 2016). Getting the supply chain logistics right and use of advanced technology can increase a company's ability to offer quality customer service.

Overall, the benefits of the proposed smart supply chain include;

- Companies' ability of to collect large amounts of information and use same to make better business decisions;
- Companies can design better business processes capable of supporting higher efficiency and business responsiveness;
- Dynamism and complexity of the smart chains has potential to overcome human intervention problems and therefore be able to deal with more supply chain and systems issues faster and with better efficiency.

The current study is set to identify modern technologies used, not used, and underutilized in the petroleum supply chain with the view to note and record contributions that ICT make to the petroleum industry supply chain.

3.4.5 Customer service in supply chain management

Customer service is driven by the theory of market orientation which states that, the prime focus of the organisation providing a service should be the needs of the customer- the members that form part of the supply chain (Loedolff, 2016). Providing effective customer service in a supply chain environment has the potential to strengthen relationships. Evans and Lindsay (2017) note that, an organisation fosters satisfaction and engagement by developing trust, communicating with customers, and effectively managing the interactions and relationships with customers through its processes and its people. Some of the customer focused processes are sincere commitments to customers, quality customer contact, selecting and developing customer contact employees, and managing complaints and service recovery.

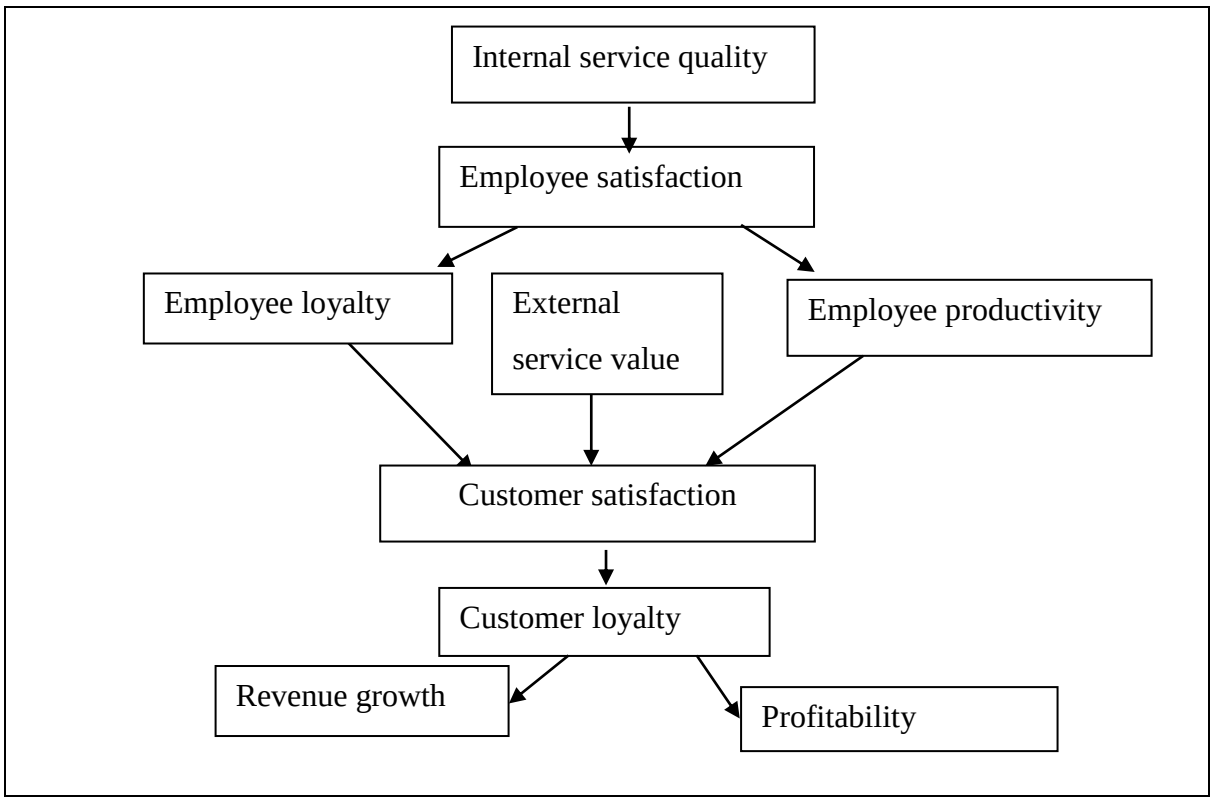
An organisation provides quality service to its customers when customers' expectations are either met or exceeded (Havenga & De Bod, 2016). Ascertaining if customers' expectations have been met can be based on service quality dimensions such as reliability, assurance, tangibles, empathy and responsiveness (Ibid). Customers want more quality, design, innovation, choice, convenience and service and they want to spend less money, efforts, time and risk (Bala, 2014). Customer service is therefore important for improving business performance. According to Pienaar & Vogt (2014), when rendered effectively customer service is the overriding logistics supply chain function that can create and retain customer loyalty. Customer service includes a wide variety of activities like after sales service, repairs and maintenance, replacement services, extended warranties, regular mailing information and free call telephone services for inquiries and complaints.

Horn et al. (2015) note that customers do not tolerate inferior products or services, they do not want to wait unnecessarily for orders, and they hate out-of-stock situations and they will always seek something extra from their suppliers that will enable them to perform their job better when serving their own customers.

Customer service is the ability of an organisation to constantly and consistently exceed the customer's needs and satisfaction (Emmet, 2007; Scott, Lundgren & Thompson, 2011). Simchi-Levi, Kaminsky, and Simchi-Levi (2009) propose that sharing information and assisting suppliers to improve quality, reduce cost, deliver on time; deliver correct quantities and service performance are necessary for world class performance because customers tend to stick with a supplier whom they are happy with for longer periods of time. Technology tends to be easy to copy therefore availability of technology makes quality easy to copy and this increases competition and commoditization of products. Competition pushes costs down and results in efficient and effective transportation networks which reduce lead times, while trading in commodities makes it difficult for companies to differentiate on the basis of technology, product attributes and price which can be easily copied by competitors. This leaves customer service as one of the few alternative sources of competitive advantage (Kotler & Keller, 2012). This alone makes it difficult for companies to make profit if they offer poor customer service because in a highly competitive environment only the efficient and the effective survive (Leenders et.al, 2002). Responding to the unique needs of customers and achieve good customer service requires companies to emphasise speed, quality and flexibility in order to create responsiveness (Barve, 2010).

While customer service is required for improving business performance, it is important to recognize the categorization of customers into internal customers and external customers and to ensure both categories are satisfied. Internal service quality is treating internal customers, usually your employees; with a high level of service because staff stay longer in a company they are satisfied with (Scott, Lundgren & Thompson, 2011). The same author argues that, as employees begin to provide greater level of external service value, they derive a high level of external customer satisfaction which in turn builds customer loyalty. With a loyal customer base, companies can achieve greater revenue growth and profitability. The following model illustrates relationships among internal customers, external customers and the need for the company to grow and make profit.

Figure 3.6: The service profit chain model



Source: Scott, Lundgren and Thompson (2011:156)

The service profit chain model suggests that charity begins at home. It demonstrates the need for companies to give the appropriate treatment to staff who in turn become satisfied, more productive and loyal to the company. As a result of the positive treatment from the company employees extend the good treatment to customers in the form of courteous treatment, availing information and after sales service among other customer services. The latter will

continue to patronize the company and its products/services thereby contributing to profitability and revenue growth. It is therefore managerial prudence to ensure that employees themselves are well looked after for them to become more productive and more loyal so they can treat the company's customer well. When employees are ill-treated the ill treatment is likely to filter through to the company's customers and eventually the company's ability to make money (Kotler & Keller, 2012).

According to Scott, Lundgren and Thompson (2011), companies can build customer service ambassadors by recruiting new people with the required skills, redeploying people from one role to another, removing people who are unable to display the required skills and training and coaching people to improve their skills. To meet or exceed customers' expectations companies must evolve with customers otherwise they risk being left behind and they seriously need to know and follow company procedures, know company products and services, give correct information to customers, emphasise the benefits of company products and services, communicate effectively and execute opportunities effectively (Scott, Lundgren & Thompson, 2011; Katunzi, 2011).

Survey research results about customer complaints concluded that, 68% of consumers say they are willing to pay up to 20% more to stay with an organisation that offers exceptional service, 60% of customers are willing to complain about products, 46% are prepared to make a complaint about services, 89% of customers are more likely to tell others about bad service experiences, and only 60% are likely to talk about good experience (Scott, Lundgren & Thompson, 2011). The message that spreads fastest (89%) is about bad experiences, hence companies must avoid exposing their customers to poor products and shoddy services because customer service is a way of protecting the company's image.

Another important thing about customer service is that it must create customer value. Customer value is about the way the customer perceives the entire company's offerings. From a supply chain management view point the idea of sharing information and assisting suppliers to improve quality, reduce cost, deliver on time, deliver correct quantities and service performance are no longer seen as novel, but more a necessity for world class performance (Leenders et al., 2002). Customer perceptions can be broken down into: conformance to requirements; product selection; price and brand; value added services; and relationships and experiences (Simchi-Levi, Kaminsky, & Simchi-Levi, 2003). This entails

building strong relationships and integrating with the most important supply chain members and in the case of petroleum industry good relationships with the supply base are critical as it is these suppliers that have access to information which is not available to the petroleum companies. Integration with customers assists petroleum companies with information on market trends especially customers' attitudes towards products, prices and distribution (Beare, 2004). Effective product availability, effective after sales and back up service, follow ups (customer satisfaction surveys), competent technical sales representatives, acceptable lead times and reliability and consistency are some of the customer service characteristics recommended for adoption by companies (Horn et al., 2015).

3.4.6 Other supply chain management imperatives

In addition to the foregoing discussions on procurement, inventory control, logistics, ICT and customer service, supply chain management oriented companies have other supply chain management imperatives that need to be managed well. When organisations decide to adopt the supply chain management philosophy they must also effectively manage the following supply chain imperatives because they impact supply chain performance outcomes. These imperatives include staff attitudes towards implementing supply chain management, supply chain management drivers, supply chain management critical success factors, measurements challenges, and benefits. In the study, these imperatives were part of the study's objectives. These imperative are reviewed in this section based on evidence from recent research studies about supply chain management in different countries and in different industries.

3.4.6.1 Staff attitudes towards implementing supply chain management

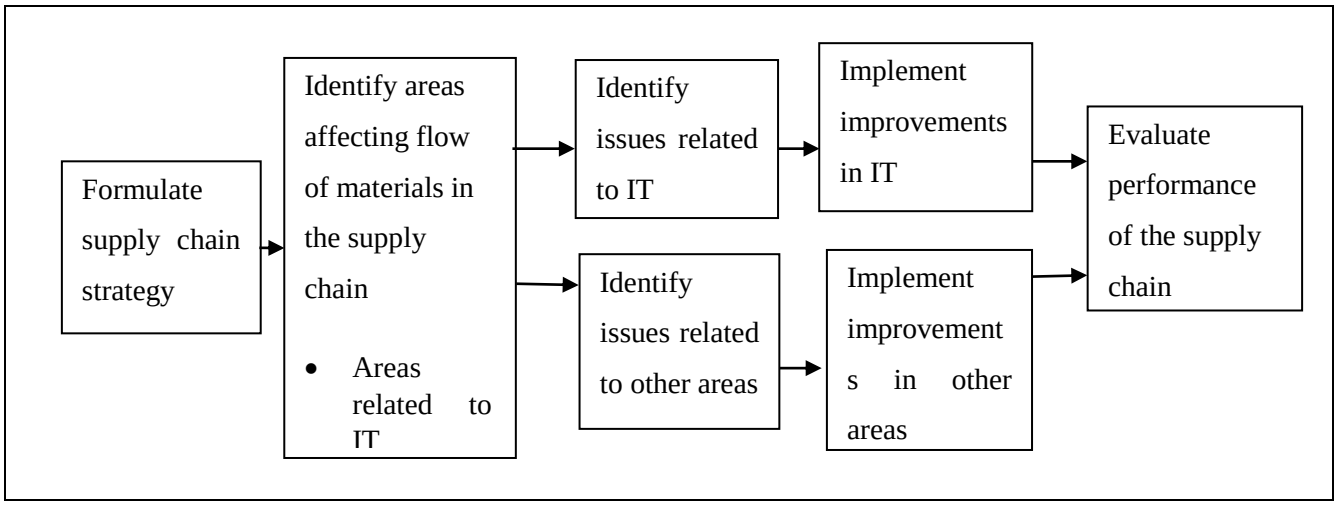
At the centre of implementing a supply chain management programme is staff from both the focal company and other supply chain members. They need to have the right attitudes to create a cooperative environment needed for sharing information and resources and collaborating efforts to achieve goals of the entire supply chain. Strategies used to analyse staff attitudes include staff attitudes surveys and developing supply chain strategy implementation framework. Staff attitudes surveys must be carried out on a continual basis to identify both positive and negative feedback from staff about their feelings towards implementing supply chain management in the organisation. The resultant feedback need to

be acted upon to provide timely interventions to issues that hamper supply chain management implementation. The surveys are necessary to ensure staff attitudes are always under check and they become the source of staff training and development.

The involvement of many stakeholders in supply chain activities requires effective communication and trustworthiness among supply chain members, interorganisational staff relations included. Unethical behavior in the supply chain includes bribing government and company officials to secure permits or favourable status, ignoring health and safety and environmental standards and violating basic rights of workers (Stevenson, 2012). Therefore, Stevenson (2012) also suggests the development of ethical supply chain codes to guide behavior among customers, suppliers, contract negotiators and those responsible for recruitment and environmental issues. This observation is an issue that companies must seriously consider given the ready availability of investigative journalism. For example, any negative publicity in the press has potential to damage the image of the company permanently, including those of its supply chain members. A firm that fails to enforce ethical behavior in any of its supply chain members can also be affected by negative publicity which can damage its reputation.

Implementation of any business programme or strategy is crucial for the attainment of the overall company strategy. The following supply chain implementation framework which emphasises the need for a clear supply chain strategy, information technology issues and performance evaluation was suggested by Jacob and Chase (2013) in an effort to guide corporations on maximising the benefits of adopting the supply chain strategy.

Figure 3.7: A framework for implementing supply chain management



Source: Jacob and Chase (2013: 226).

Effective implementation of supply chain management requires the company to have a clear supply chain strategy, especially at corporate level. In that strategy key success areas such as Information technology/Information systems (IT/IS), and the traceability of orders in the system need to be clear (Jacob & Chase, 2013). Finally, improvements should be implemented in all the areas not in information technology and communications alone (Evans & Lindsay, 2017). All these activities have a bearing on staff attitudes.

3.4.6.2 Supply chain drivers (SCDs)

In a study on drivers of retail supply chain efficiency researchers concluded that inventory management, use of IT, transportation management and coordination are the most determinants of retail supply chain efficiency (Mehrjerdi, 2009; Paradkar, 2011; Pienaa & Vogt,2014; Rana et al., 2016). Horn et al. (2015) argue that implementing the supply chain vision and its subsequent goals and strategies compels management to identify supply chain drivers which combine and interact to form the pillars and operating tools for implementing supply chain strategies and allowing supply chain partners to carry out their operations successfully. In that regard, processes that drive supply chain efficiencies and effectiveness include customer relationship management, customer service management, demand management, order fulfilment, manufacturing flow management, supplier relationship management, product development and commercialization and returns management (Mehrjerdi, 2009). Thus, if management can identify their supply chain drivers and fundamentals they can improve the quality of their services and company competitiveness (Jacobs & Chase, 2013).

Chopra & Meindl (2013) posits that a company's supply chain connects suppliers, producers, and final customers in a network that is essential to the creation of goods and services. The sequence begins with basic suppliers of raw materials and extends all the way to the final customer (Jacobs & Chase, 2013). Thus, the main supply chain drivers have been identified as reducing the cost of carrying excessive inventory, reducing the cost of goods sold to customers, increasing transaction processing speed by exchanging data in real time, increasing sales by implementing customer requirements more efficiently and reducing delivery lead times (Paradkar, 2011). Pienaar and Vogt (2014) suggest that imperatives for business competitiveness must be translated into supply chain drivers which are flexibility,

responsiveness, reliability, availability, and lowest delivery cost and asset optimization. Tay et al. (2015) observe that sustainable supply chain management can be driven from within or from outside. The same authors identified the following internal drivers and external drivers of supply chain management.

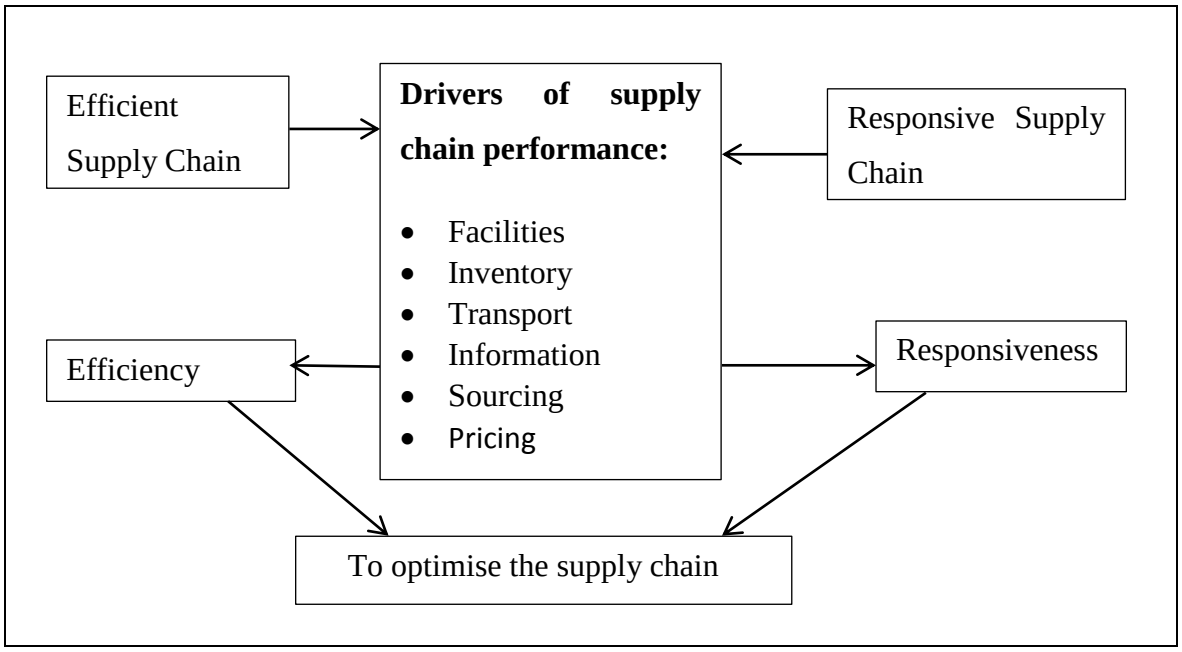
Table 3.5: A comparison of Internal and External supply chain drivers

Internal supply chain drivers(enablers)	External supply chain drivers
• People issues (top management, commitment, employee involvement & culture) • Strategic issues (strategic fit between corporate and supply chain strategies, company's supply chain strategy, company competitiveness, and company size) • Functional issues (purchasing and supply function, capabilities within purchasing and supply functions and how other corporate social responsibility practices influence supply chain management)	• Government (government policy, regulations) • Competitors-competition becoming fiercer • Customers-shift in demand • Collaboration with suppliers • Pressures from investors • Influence of NGOs

Source: Tay, Rahman, Aziz and Sidek (2015:893-894)

Based on the table above, supply chain managers require conceptual skills to help them anticipate and respond to opportunities and threats posed by the identified supply chain drivers. A clear understanding of these drivers is critical because they become components of supply chain management performance measurement. The adoption of the supply chain management is anticipated to bring about competitiveness in companies provided appropriate supply chain drivers are properly managed. The effects of these supply chain drivers are shown in Figure 3.8 below.

Figure 3.8: Effect of supply chain drivers on performance



Source: Chopra & Meindl (2013: 56)

Figure 3.8 indicates that supply chain efficiency and responsiveness are prerequisites for optimising supply chain performance. However, efficiency and responsiveness have to be driven by how the company's facilities, inventory and logistics, IT and sourcing are managed.

3.4.6.3 Supply chain management critical success factors

The critical success factors (CSFs) are all the tasks that when accomplished desirably assure a manager, an organisation, a supply chain of success. CSFs therefore represent that category of supply chain management that call for special and continuous attention to improve company performance (Soheila, Alireza & Alireza, 2015). Any industry or business requires the presence of a set of success factors all the time. These success factors require continuous management for an organisation to be successful. Identification of critical success factors leads to the identification of specific financial and non-financial attributes later used to assess supply chain management performance (Kumar, Singh & Shankar, 2015). Thus, identifying critical success factors for the petroleum industry in Zimbabwe and assessing supply chain management performance based on them are some of the study's objectives.

A group of researchers advised a Nigerian oil company that required to achieve maximum profit, robust sales revenue and increased market share to concentrate on supply chain success factors which they identified as vendor managed inventory (VMI), suppliers'

collaboration, customer relationship management, and information sharing (Babatunde,Gbadeyan & Bamiduro, 2016). VMI is a form of retailer collaboration whereby suppliers provide automatic stock replenishment at retailing and distributing facilities (Stevenson, 2012). The concept becomes effective when there is trust and when communication is effective to deal with the risk associated with sharing sensitive company information across companies (Rana et.al, 2016).

Based on a study of German enterprises Leyh and Thomschke (2015) identified the following set of critical success factors for implementing supply chain management systems and suggested that such factors must correlate with the performance of the company. They identified the following generic critical success factors.

- Top management support and involvement;
- Compatibility of supply chain management systems with other information systems and IT infrastructure;
- Cooperation with supply chain partners;
- Effective communication;
- Involvement of end users and stakeholders;
- Skills, knowledge and expertise;
- Supplier and customer relationships support.

In a related development it was proposed that companies must identify factors affecting supply chain management first before they can move on to narrow the list of factors to a list of critical factors. A company must have three to five critical success factors (Quesada, Gazo & Saunchez, 2012).The trio's research findings from the US pallet industry environmental certainty, information technology, supply chain relationships, value added processes, supply chain performance, business management and customer satisfaction were identified as the US pallet industry's critical success factors (Quesada, Gazo & Saunchez, 2012). Every company will have different critical success factors depending on its structure, strategy, industry position, geographical location, environmental factors and time factors (Arora & Sivakumar, 2016).

3.4.6.4 Supply chain management performance measurement (SCPM)

This section first addresses the reasons for analyzing and measuring supply chain performance and then proceeds to review some of the performance matrices recommended by different authors. Performance measurement is the procedure of quantifying the efficiency and effectiveness of an activity, while a performance indicator is a measure played to quantify the efficiency and effectiveness of an action (Bafaqih, Nopiah, & Saibani, 2016). The study uses issues discussed under critical success factors for implementing a supply chain management philosophy as part of the measurement attributes of supply chain performance in the petroleum industry of Zimbabwe. According to Bala (2014) supply chain management represents the way to customer retention and growth, competitive advantage and profitability. Therefoe, analysing supply chain performance leads to the identification of problems and opportunities associated with all the discussed supply chain management attributes particularly the critical success factors.

- **Reasons for measuring supply chain management performance**

Stressing the importance of supply chain performance measurement Wisner, Tan and Leong (2012) note that, performance measurement must be utilised along supply chains. This can help firms keep track of their supply chain management efforts. Firms are expected to work together to develop long term supply chain management strategies and then device short-term tactics to implement these strategies. Performance measurement help firms decide the value of these tactics and should be developed to highlight performance within the areas of purchasing, operations, logistics and integration (Wisner, Leong & Tan, 2012).

In a study about evaluating petroleum supply chain performance (Varma, Wadhwa & Deshmuck, 2008) listed the following reasons for supply chain performance measurement:

1. Identifying successes;
2. Identifying whether companies are meeting customer requirements;
3. Helping companies understand their processes;
4. Identifying where bottlenecks, problems and waste existed;
5. Identifying areas where improvements were necessary;

6. Ensuring decisions are based on facts not suppositions, emotions or intuition;
7. Showing if improvement planned actually happened.

The company needs to have performance measurement to be able to evaluate the efficiency of the supply chain because you cannot manage if you cannot measure (Taylor, 2014; Osoro, 2015). Feedback on what has already been done is required, especially if it can be obtained from the final consumer. However, the complex structure of the supply chain that cuts across internal operations and externally across companies and the dynamic nature of that supply chain exacerbate the supply chain performance measurement task (Lee, 2004). The real issue is that, if you are looking at a complex phenomenon such as supply chain management and the dynamic nature of its characteristics you need to identify what must be measured and how.

Research in supply chain management shows that supply chain performance measurement is based on different measurement models. The study examines three supply chain management measurement models: Performance Measurement Systems (Osoro, 2015), the Triple-A Supply Chain (Lee, 2004) and Supply Chain Operations Reference (SCOR) model proposed by the Council for Supply Chain Management Professionals [CSCMP], 2010). When implementing supply chain management performance measurement the idea is to identify and assess measurement elements of supply chain management attributes raised in these measurement models.

- **The performance measurement system (PMS)**

The performance measurement system (PMS) is organised around five distinct but linked perspectives of performance: stakeholder satisfaction, strategies, processes, capabilities (people issues, practices and technology) and stakeholder contributions (Osoro, 2015). Despite the fact that different supply chains are managed differently, any efforts to evaluate performance must include and assess the said five perspectives among other issues. It is further argued that, apart from the five performance measures supply chain practitioners must observe and watch performance of the following factors which Osoro, (2015) calls supply chain drivers. These relate to effectiveness of facilities, inventory, transportation, information, delivery, pricing, quality and service.

- **The triple-A supply chain measurement model**

The triple-A supply chain measurement model was authored by Lee (2004) who spent over 15 years researching on companies' supply chain dilemmas. He studied 60 companies in America and concluded that, top performing supply chains possess three very different qualities. First, great supply chains are agile. They react speedily to sudden changes in demand and supply. Second, they adapt over time as market structures and strategies evolve. Third, they align the interests of all the firms in the supply chain networks so that companies optimise the supply chain's performance when they maximise their interests. All three components are essential; without any one of them; supply chains break down (Lee, 2004). Because agility assesses the company's response to external disruptions its evaluation ought to include things like, a company's communication processes, information management, customer relationship management and supplier relationships management, dependability of its logistics and effectiveness of its contingency and crisis management plans, so as to respond both quickly and cost effectively (Lee, 2004).

Adaptability on the other hand addresses issues to do with the company's ability to adapt to changes. For example, changing product designs to meet changing customer tastes which may require changing one's strategy of adjusting the product. Thus, understanding customer needs and expectations and being able to adjust within short lead times will be some of the measurement criteria. Lee (2004) highlights that, although companies found it tough to continuously change and improve their operations they really did not have any choice.

Free flow of information along the supply chain is necessary to incentivise supply chain members to improve their performance. According to Lee (2004) this is achieved through free exchange of knowledge and information with vendors and customers, clearly laying out the roles and responsibilities of all parties and the sharing of risks, costs, and gains of improvement. Alignment is more about collaborative and integrative relationships with other supply chain members. Inability to align strategies with business partners limits a company's opportunities for growth. Therefore, customer satisfaction becomes part of the attributes of measuring alignment.

- **The supply chain operations reference (SCOR) model**

The view of the (Council for Supply Chain Management Professionals [CSCMP], 2010) is that, through the use of the supply chain operations reference (SCOR) model companies should have a wider view on their total supply chain. The SCOR model helps companies to understand the flow of raw materials, funds, information, sub-assembly products and finished products between various players in the supply chain (Pienaar & Vogt, 2016). Therefore, the SCOR model identifies each of the companies in the supply chain by means of these five core management processes: planning, sourcing, making, delivery and returns (Schaltegger & Burriff, 2014). Evaluating how these key management processes perform has become an important part of measuring the entire supply chain's performance (Trkman, Budler & Groznik, 2015). Planning entails balancing supply and demand with the overall supply chain strategy. Sourcing is part of logistics mainly focusing on ordering and receiving goods. Transportation and distribution, third party service providers and facilities are assessed under logistics (Coyle et.al, 2017). Making refers to production and/or operations, delivery entails outbound logistics (transport and distribution) and returns are about reverse logistics or managing goods returned to suppliers and goods returned by customers. The integration of these five processes constitutes key components of supply chain management. However, the SCOR model is further linked to other quality improvement models such as Business Process Reengineering (BPR), Benchmarking, and Process Performance Measurement (PPM) hence a thorough performance evaluation is supposed to be done based on the five management processes and looking at the upstream supply chain (suppliers), the focal company itself and the downstream supply chain (customers) (Trkman, Budler & Groznik, 2015).

In a study about supply chain performance in the desalination industry, Balfaqih, Nopia and Saibani (2016) discovered a process measurement system that focus on five key processes:

- Supplying;
- Inbound logistics;
- Core manufacturing;
- Out bound logistics;
- Marketing and sales.

Supply chain management performance matrices must be developed based on the above five processes.A qualitative study on supply chain constraints in the South Africa's coal mining industry was carried out using unstructured face to face interviews and it involved 13 executives and professionals from the Coal Mining Industry. The study found out that communication barriers between industry role players in the public and private institutions affected companies' performance (Muthu, 2010). There was weak coordination between the business communities involved in coal mining and the Government which regulated the industry operations (Muthu, 2010). To attest the importance of supply chain performance measurement, the study recommended a model for planning, sourcing, procurement, manufacturing and logistics to improve industry performance.

Cuthbertson and Piotrowicz (2011) highlight that it is important to carry out supply chain performance measurement using all the measurement models briefly discussed above and others which are not part of this study because there is always an overlap between a company's internal processes and its external processes, especially those of suppliers and customers. All the supply chain performance measurement attributes must be measured and fixed at the same time because supply chain problems cannot be fixed by focusing internally and ignoring the external processes or vice versa. The complex nature of supply chain performance measurement compounds the issue of supply chain management and this therefore can be dealt with by having a strong, capable and committed leadership in the driving seat (Zairi, 2013).

Research carried out with Britain's Jaguar Spare parts supply chain which is outsourced to Unipart, to determine the possibility of developing a common framework for the empirical analysis of supply chain performance measurement systems found out that supply chain performance measurement is a context- dependent process tailored to specific supply chain requirements. Therefore, different organisations need different supply chain designs, strategies and relevant performance measures (Cuthbertson & Piotrowicz, 2011).

In a descriptive survey of downstream supply chain performance measurement by the oil marketing companies in Kenya, Livohi (2012), collected data using a semi-structured questionnaire based on Council of Supply Chain Operations Reference (SCOR) model. The study collected data from a population of 53 oil companies (census). Data was analysed both qualitatively and quantitatively. The study found that oil companies used industry key performance indicators such as storage costs, cost of transportation, quality of service and

customer service to measure supply chain performance. Industry challenges found included infrastructural limitations, high demurrage costs, government controls and high operational costs (Livohi, 2012).

In evaluating petroleum supply chain performance in India, using the balanced scorecard and the analytical hierarchy, findings by (Varma et al., 2008) show that the importance of the four balanced scorecard perspectives with respect to petroleum supply chain performance in descending order of importance are customer, financial, internal business processes and innovation and learning. Within these perspectives the following factors were found to be the most important respectively: purity of product, market share, steady supply, and use of information technology.

The current study considered extent to which some of the above elements are used in the Zimbabwean petroleum industry as a way of improving petroleum companies' competitiveness and achieving the companies' supply chain management goals. Interviewing the petroleum industry stakeholders can shed more light on how the Zimbabwean situation is managed and how it is influenced by environmental factors.

3.4.6.5 Supply chain management challenges

The complex nature of the supply chain management philosophy presents a number of challenges to supply chain managers. Researchers have identified the following to be key barriers to successful development and implementation of supply chain management strategy: lack of top management commitment, incompatible corporate cultures, regulatory and political considerations, reluctance to share or use relevant data and incompatible information systems (Kimani, 2013; Bala, 2014; Gloria & Talavera, 2015).

Recent supply chain studies revealed that sharing information, coordination of physical goods flow, supply chain integration (SCI), increasing complexity in business processes and the need for new methodologies to handle complexity and supply chain collaboration (SCC) were the major challenges of implementing the supply chain management strategy (Trkman, Budler & Groznik, 2015). In a study on factors affecting performance of supply chain

systems in an oil company stricter government controls, political risk, competition, emergent new comers and political hostilities were other challenges (Osoro, 2015).

Given the multidisciplinary nature of supply chain activities already discussed and the general uncertainty of the business environment, especially in the underdeveloped economies of the southern region of Africa, it is necessary to explain how supply chain management challenges faced by companies can be managed. The following section reviews literature on supply chain management implementation challenges which include supply chain collaboration (SCC), supply chain integration (SCI), customer relationship management (CRM) and supplier relationship management (SRM). It is hoped that the brief discussions on these four issues can help in explaining the complex nature of the supply chain management problems faced by practitioners.

- **Supply chain collaboration (SCC)**

Fawcett et al. (2015) define supply chain collaboration as the ability to work across organizational boundaries to build and manage unique value-added processes which is a form of differential firm performance.

According to Richey et al. (2012) supply chain collaboration is a mutually shared process where two or more firms display mutual understanding and a shared vision. The firms in question must voluntarily agree to integrate human, financial, or technical resources to achieve their collective goals.

Therefore, collaboration is a key driving force behind competitive supply chain management because it entails pooling of risks, sharing resources to achieve cost reduction and operational flexibility (Mathuramaytha, 2011). Collaboration has the potential to offer competitive advantages through sharing information, making joint decisions and sharing benefits which result from greater profitability of satisfying end customer needs than acting alone (Soosay & Hyland, 2015). The following components of collaboration were found to be critical in creating mutually beneficial relationships between companies: information sharing, goal congruence, decision synchronization, incentive alignment, resource sharing, collaborative communication and joint knowledge creation.

In latest developments about supply chain collaboration, the United Kingdom government has developed collaborative business relationships (BS11, 000) standards which provide a strategic framework to establish and improve collaborative relationships in organisations of all sizes. These latest standards were developed to ensure that organisations' supply chain management are effective and optimized utilization of resources and delivered enhanced benefits to stakeholders (Oakland, 2014). The anticipated benefits of using BS11, 000 include collaborating successfully with chosen partners, creating a neutral platform for mutual benefit with business partners, defining roles and responsibilities to improve decision making processes, sharing cost, risks, resources and responsibilities, providing staff with wider training opportunities and building better relationships that lead to quicker results (Ibid). The development of agreed upon methods for sharing gains and losses is essential to the success of the supply chain collaboration (Coyle et al., 2017).

In line with the key strategy of forging supply chain collaboration and partnerships among supply chain members Oakland (2014) recommended that, when establishing collaborative partnerships attention should be given to:

- Maximizing the understanding of what is to be delivered by the partnership;
- Understanding what represents value for money-getting the commercial relationship right;
- Understanding the respective roles and ensuring an appropriate allocation of responsibilities-to the party best able to manage them;
- Working in a supportive, constructive and team-based relationship;
- Enabling the incorporation of knowledge transfer and making sure this adds value;
- Developing a stronger relationship and stronger working relationship geared to delivering better and better products or services to the end-customer-based on continuous improvement principles.

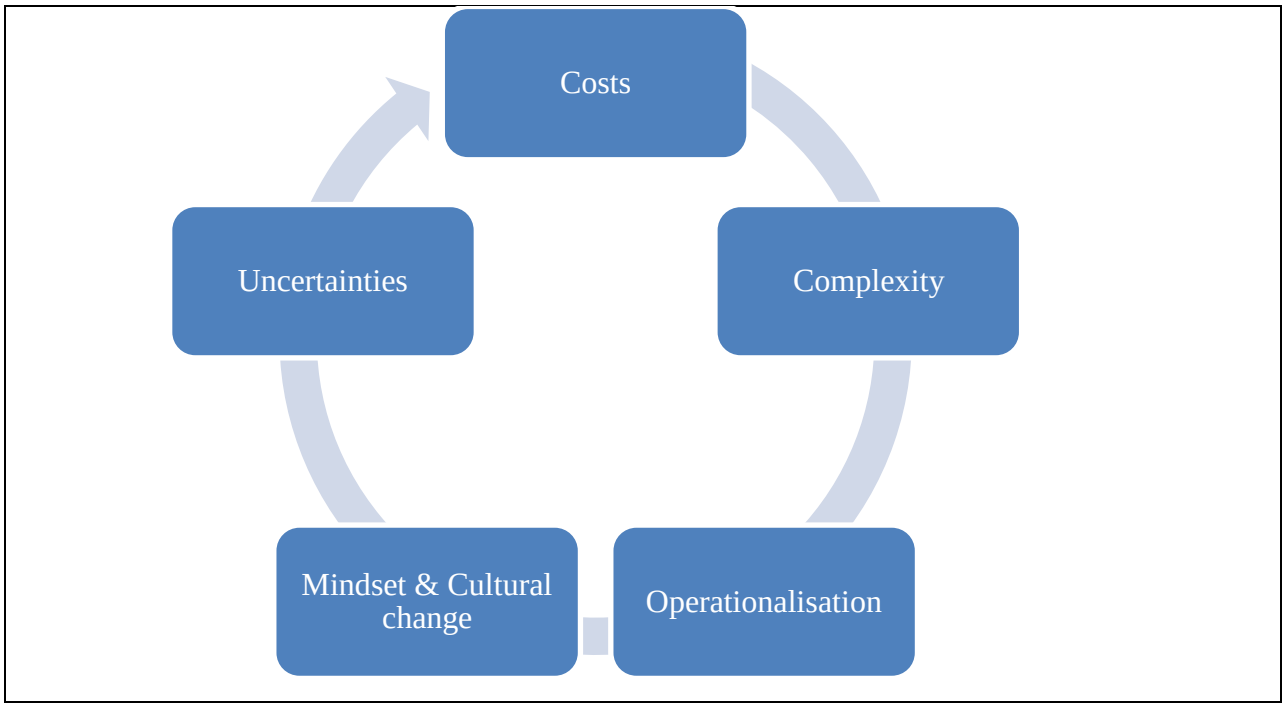
In a study about implementing supply chain management theory in practice it was discovered that supply chain managers still appear to suffer from an underlying frustration or perception of being largely ignored. Supply chain practitioners feel they have a great deal of value to

add, but the organisation is not concerned with them. Therefore, lack of recognition is one of the challenges the supply chain management profession faces (Butner, 2010).

In a qualitative research methodology study that aimed to reduce business risk through sustainable supply chain, Butner (2010) carried out in-depth interviews with 400 chief supply chain officers from 25 different countries and found conventional supply chain strategies to be out dated to make supply chain less risky because of shifts in costs and other operational fundamentals. To address the challenge of old and traditional strategies of managing supply chains, the study recommended identifying and eradicating supply chain bottlenecks such as quality problems, cost constraints, poor collaboration and networking (Butner 2010).

In Kenya, a study by Kimani (2013) looked at supply chain management challenges in Kenya's petroleum industry, focusing on the National oil Corporation of Kenya's operations. Major findings of the study showed that lack of strategic stocks, relatively high petroleum prices compared to other East African countries, frequent fuel shortages, substandard products and diversion of products destined for exports back into the country were the main challenges. The study of factors affecting effective supply chain management in the Kenyan petroleum sector also identified: lack of developed information technology, poor supply chain design which is heavily influenced by government, people issues such as culture and behavior and poor partnerships or collaboration among supply chain members as main challenges (Livohi, 2012; Osoro, 2015). A related study that focused on themes and challenges in making supply chain environmentally sustainable concluded that five major areas of challenges for SCM are derived from costs, complexity, operationalisation, mindset and cultural challenges and uncertainties (Abbasi & Nilson, 2012). Abbasi and Nilson (2012) proposed the following model to represent challenges towards sustainable supply chains.

Figure 3.9: Challenges towards sustainable supply chains



Source: Abbasi and Nilsson (2012).

The model states that management are faced with a dilemma between managing supply chain costs and increasing financial costs because they both have implications in meeting customer expectations. Supply chain complexity is enshrined in a dynamic and ever changing environment that requires speed and flexibility in the supply chain processes (Sohel et.al, 2016). Supply chain managers also face operationalisation difficulties because it requires coordination, integration and collaboration of supply chain members who possess conflicting interests (Arora & Sivakumar, 2016). To effectively deal with change and operational dynamics people involved in supply chains decision making processes must have the right attitudes and culture (Abbasi & Nilsson, 2012). Management must be geared to survive within situations that are characterized by uncertainties driven by external environmental factors. For example, the extent to which petroleum company operations are influenced by the political climate and government regulations, economic situations, socio-cultural developments, technological changes and pressure to protect the environment can influence their supply chain performance need to be understood and constantly monitored.

An exploratory survey on main difficulties hindering supply chain performance in Uruguayan small to medium enterprises (SMEs) searched different databases and discovered 18 difficulties which hinder supply chain performance workforce. However, product availability

and government policies were the main hindrances in the Uruguayan case (Tanco, Furburg & Escuder, 2015). Some of the difficulties are similar to those highlighted by Abbasi & Nilson (2012), Kimani (2013). The difficulties include information technologies, commitment of top management, distribution side problems, macroeconomic and market instability, political environment, local warehouse infrastructure, ground transportation and telecommunications (Tanco, Furburg & Escuder, 2015).

In a related study, Fawcett et al. (2008) looked at benefits, barriers and bridges to effective SCM and the results show that all managers recognize technology, information and measurement systems as major barriers to successful supply chain collaboration and that, people are the key bridge to successful collaboration. Therefore, to implement SCM, companies must invest in supply chain enablers such as technology, information and measurement systems and human capital (Barve, 2011). According to Trkman, Budler and Groznik (2015) challenges such as information sharing, complexity in business processes and coordination of physical goods flow companies need new methodologies to handle the supply chain challenges that require them to effectively adapt and respond to changes in demand and other market uncertainties.

- **Supply chain integration (SCI)**

Supply chain integration is the degree of collaboration between manufacturers and their supply chain partners as well as their intra and inter-organisational processes to achieve an effective flow of products, services, information, capital and decision making in the supply chain (Flynn, 2010). Thus, supply chain integration has been identified as one of the most effective supply chain practices in solving the problems arising from business uncertainty (Kim & Chai, 2016). The same authors suggest that, to effectively implement supply chain integration (SCI) it is advisable to divide it into three components: internal integration, supplier integration and customer integration. Internal integration focuses on breaking down a company's functional barriers between finance, marketing, operations and other departments (Ibid). Supplier integration focuses on strengthening relationships with the upstream supply chain members, mostly suppliers, while customer integration aims to have a better understanding of market expectations among downstream supply chain members (Ibid). Therefore, to address uncertainty problems in supply chain management it is recommended to

individually deal with four identified uncertainty characteristics of dynamism, hostility, munificence and heterogeneity (Belyaeva et.al, 2016).

First, dynamism represents the degree of change in product design, technology and customer preferences. Dynamism is a situation which requires more frequent planning reviews for companies to remain relevant and competitive (Laing, You & Lin, 2010). Second, hostility is the level of competition and government controls. The level of hostility has potential to unite companies in a supply chain so that they work as teams to deal with the common problems. Under hostility there is potential for sharing and exchanging information (Katunzi, 2011). Third, munificence is the extent to which the external environment creates business opportunities for companies. Munificence will encourage internal cooperation among company departments and collaboration with external supply chain members (Frederico & Trindale de Souza (2017). This allows businesses to take advantage of emerging business opportunities. Lastly, heterogeneity is the degree of dissimilarity between organisations. A heterogeneous environment creates more competition because of different product varieties (Belyaeva, 2016). In a heterogeneous environment doing business becomes expensive for all the companies. This compels companies to team up with supply chain members, upstream and downstream, to reduce operational costs and to solve business problems jointly (Kim & Chai, 2016). A clear understanding of these four attributes of uncertainty and how they impact company operations reduces uncertainty and brings stability which makes planning easier.

In a related study, Kim & Chai (2014) note that supply chain integration is one of the key success factors because integration provides business with flexibility. Flexibility is the ability to react and adapt to changes in the market due to an increase or decrease of customers' requirements, accelerating or decelerating manufacturing process when it is requested (Bowersox, Closs & Cooper, 2007). Still on supply chain integration, Soosay & Hyland (2015) advocate that, now that supply chains are operating in more dynamic environments more integrative efforts are needed. This involves collaboration among multiple firms that engage in relationships that aim to share improved outcomes and benefits. Businesses pursuing the supply chain management philosophy need to establish appropriate levels of trust, share critical information, make joint decisions, and when necessary integrate their supply chain processes (Ibid).

Despite the observed benefits of supply chain integration and collaboration research has shown that problems still exist because of low levels of trust among companies and this prevents companies from sharing proprietary information or idiosyncratic resources (Fawcett et al., 2012). The situation where some companies prefer to operate as stand alones create dysfunctional silos which impede the formation of productive relationships and value creation activities (Richey, Adams & Delela, 2012). In a study of competitiveness among Russian oil companies Belyaeva (2013) confirmed the popularity of collaboration and integration. The researcher concluded that, traditional approaches to ensuring competitiveness through the development of competitive strategies of stand-alone companies were gradually giving way to approaches that focused on enhancing the competitiveness of production complexes that can operate globally, reaching beyond individual countries or regions (Belyaeva, 2013).

Soosay & Hyland (2015) posit that to achieve performance improvements the business entities need to establish appropriate levels of trust, share critical information, make joint decisions and when necessary, integrate supply chain processes. In that same vein, the authors proposed that, supply chain integration components include, information sharing, goal congruence, decision synchronisation, incentive alignment, resource sharing, collaborative communication and joint knowledge creation (Soosay & Hyland, 2015). Research has shown that there is a positive relationship between SCI and firm performance. Integration among supply chain members is driven by global competition, continuing unpredictable environment (demand uncertainty, supply uncertainty and technological uncertainty) and opportunity for new markets. Therefore, competition encourages companies to establish cooperative relationships with their partners to obtain competitive advantages (Zhao et.al, 2013; Yu, Xiong & Cao, 2015, Yunus & Tadisina, 2016).

- **Customer relationship management (CRM)**

The special relationships that companies create with their clients or customers are known as customer relationship management (CRM). The term CRM also refers to activities that occur to develop a relationship between the supplier and some key customers in the supply chain (Loedolff, 2016). According to Evans and Lindsay (2017) CRM helps firms gain and maintain competitive advantages by:

- Segmenting markets based on demographic, and behavioural characteristics;
- Tracking sales trends and advertising effectiveness by customer and market segment;
- Identifying which customers should be the focus of targeted marketing initiatives with predictable high customer response rate;
- Forecasting customer retention (and defection) rates and providing feedback as to why customers leave a company;
- Studying which goods and services are purchased together, leading to good ways to bundle them;
- Studying and predicting which Web characteristics are most attractive to customers and how the website might be improved.

In CRM the supplier is involved in demand management, creating value, information flow, capacity management and cash flow management to meet customer expectations (Koetler & Keller, 2012). Best considerations must be given to product availability, avoiding stock outs, lead-time performance-no service failure and order fill rate which represents number of units delivered against number of units ordered (Loedolff, 2016). Management are however encouraged to investigate reasons why customer satisfaction efforts sometimes fail. Some causes of customer satisfaction failure are poor measurement schemes, failure to identify appropriate quality dimensions, failure to weight dimensions appropriately, lack of comparison with leading competitors, failure to measure potential and former customers and confusing loyalty with satisfaction (Evants & Lindsay, 2017).

- **Supplier relationship management (SRM)**

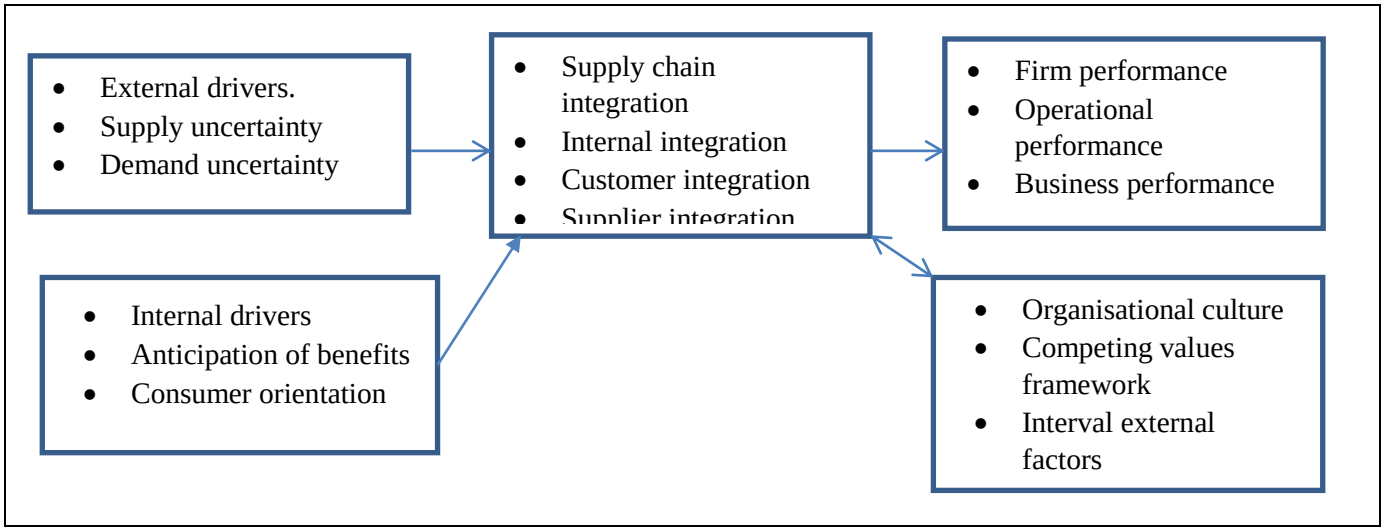
Supplier relationship management (SRM) is about building better relationships with selected strategic suppliers that will benefit all the members of the supply chain (Jacobs & Chase, 2014). Additionally, supplier relationship management (SRM) is about proactively managing the link between buyer and supplier and it has to be beneficial to both supplier and buyer and the ultimate user of products and services bought (Scott, Lundgren & Thompson, 2011). Supplier relationship management benefits identified by Scott, Lundgren and Thompson (2011) include:

- breaking down functional barriers and functional mindsets;
- promoting innovation and joint thinking for doing things better;

- improving supply chain visibility for buyer and seller;
- sharing assets across supply chain;
- removing duplications;
- enhancing forward looking visibility and giving reliability to all parties andstrategic purchasing where two or more companies combine orders so that each can benefit from volume discounts.

Issues addressed in SRM include the type of product and service involved, quality and quantity of products, capacity to manufacture, social responsibility of suppliers, suppliers' relationships with competitors, financial stability of suppliers, global presence, SCI, cost management, compatibility and strategic alliances and environmental issues (Loedolff, 2016).

Figure 3.10: Relationships required for achieving supply chain management effectiveness.



Source: Yunus and Tadisina (2016:93).

The above model confirms that an effective supply chain system is one which achieves both operational and business performance. An effective supply chain is viewed as an integrated system. In an integrated supply chain system inter-departmental interaction, interaction with customers and interaction with suppliers is expected to be strong and also takes into consideration external and internal drivers and organisational culture. Implementing supply chain management is intended to generate higher performance of a company's operations in general, and it specifically aims to increase sustainable performance for the entire supply chain (Jansen, Johnson & Schaltegger, 2015).

In a study on relationships among supply chain strategies, organisational performance, and technological and market turbulences Arora, Arora and Sivakumar (2016) noted that collaboration, integration and transformation were some of the supply chain factors which have positive influence on an organisation's competitiveness. Benton (2013) emphasized cooperative relationship as one of the key success factors in implementing supply chain management and he defined cooperative relationship as the extent to which the buyer perceives the relationship to be cooperative. This implies a partnership relationship based on joint problem solving capability and flexibility in arrangements. Studying critical success factors for implementation of supply chain management in Indian small and medium enterprises and their impact on performance Kumar, Singh and Shankar, (2015) raised the issue of information sharing as being critical, adding that, willingness to make strategic and tactical data available to other members of the supply chain relates to sharing information on issues like inventory levels, forecasts and future plan.

- **Lack of leadership in supply chain management**

Markets abound with challenges being driven by complex supply chains, uncertainty, new technology, changing consumption trends and globalization just to mention but a few thorny issues. In order to survive in business environments faced with such dynamic challenges companies require strong and capable leadership (Schermerhorn & Bachrach, 2015). Successful implementation of supply chain initiatives always requires good leadership. Leadership is the ability to positively influence people and systems under one's authority so as to have meaningful impact and achieve important results (Evans & Lindsay, 2017). The same authors observed that when employees are treated without respect at work, they may respond with low performance, poor customer service, absenteeism, and even antisocial behaviour which are all against the supply chain management philosophy (Ibid). Supply chain oriented managers must therefore effectively utilise powers such as legitimate power, expert power, information power, referent power, reward power and even coercive power to drive their companies to competitiveness (Achua & Lussier, 2013).

Studies on leadership concluded that desirable characteristics of effective leaders include ability to motivate others, intelligence, integrity, self-confidence, knowledge and the drive or willingness to work (Nieman & Bennett, 2014). Allen and Schwartz (2011) propose that in order to lead in the above circumstances you need leaders who can assess what is good, quickly grasp the essence of situations, create contexts for learning, communicate effectively,

and exercise political power to bring people together and encourage development of practical wisdom in others through apprenticeship and mentoring. Additionally, Oakland (2014:41) notes that there are five requirements for effective leadership which are:

1. Developing and publishing clear documented corporate beliefs and purpose a corporate vision;
2. Developing clear and effective strategies and supporting plans for achieving the vision;
3. Identifying the critical success factors and critical processes;
4. Reviewing the management structure;
5. Empowerment-encouraging effective employee participation.

All these efforts are linked to developing a robust supply chain management strategy which focuses on the focal company and its supply chain partners especially customers and suppliers. Therefore, both personal and group leadership skills are required to ensure that a company succeeds in its competitiveness endeavours (Pienaar & Vogt, 2016).

- **A learning organisation and knowledge management**

In the spirit of generating new information and new knowledge organisations are expected to learn. A learning organisation is a place where people continually expand their capacity to create the results they truly desire. This can happen when new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together (Senge 1990, cited in Atkinson, 2014). Organisational learning involves external and internal sources. Externally, the organisation can learn from customers, suppliers, competitors, industry and academic publishers, business partners and consultants and internally the company can learn from the employees (Dey, La Guardia & Srinivasan, 2011). Achua and Lussier (2013) propose that there is need for effective communication, coordination and collaboration if the learning process has to bring about more knowledge about a company's products, services, systems and processes. It is important that, learning outcomes benefit both, the learning organisation and its stakeholders to motivate them to invest more energy looking for new information and knowledge to streghten their organizations (Quesada, Gazo & Sanchez, 2012).

The process of managing organizational learning is called knowledge management. Lavassani, Movehedi and Kumar (2011) define knowledge management as the deliberate and systematic coordination of an organisation's people, technology, practices and organisation structure in order to add value through reuse and innovation. According to the knowledge

based view (KBV), the exchange of knowledge facilitates the integration and performance of supply chains and enhances collaboration among inter organizational supply chains. The resultant knowledge can be a source of competitive advantage when it is shared, understood, and combined (Achua & Lussier, 2013).

Studies in knowledge management revealed that knowledge adds value through its contribution to products, processes, and people hence knowledge management was considered as a major enabler of supply chain management (Samuel et al., 2011). Results of an empirical study showed that knowledge management processes have a significant impact on supply chain performance and the knowledge management processes that can enhance an organisation's supply chain performance were knowledge creation, knowledge capturing, knowledge organisation, knowledge storage, knowledge dissemination and knowledge application (Sangari, Hosnavi & Zahedi, 2015). Therefore, supply chain oriented organisations are expected to move from traditional ways of learning and adopt the learning organisation's concepts which are capable of delivering more customer satisfaction. Table 3.5 below compares traditional and learning organisations.

Table 3.6: Key differences between the traditional and the learning organisation

Traditional (efficiency driven)	Learning (learning driven)
• Stable environment • Vertical structure • Strategy is formulated from the top and passed down • Centralised decision making • Rigidly defined and specialised tasks • Rigid culture that is not responsive to change • Formal systems of communication tied to the vertical hierarchy with lots of filters	• Changing environment • Flat horizontal structure • Strategy is collaborative effort within the organisation and with other companies • Decentralised decision making • Loose, flexible, and adaptive roles • Adaptive culture that encourages continuous improvement and change • Personal and group networks of free, open exchanges with no filters

Source: Achua and Lussier (2013:425).

Traditional organizations were characterized by stable environments, rigidly defined specialised tasks, a vertical structure and formal systems of communication with lots of filters where the pace of change was slow (Lazenby, 2016). However, increased product availability, developments in communications and transportation technology, improved speed of product and service delivery, reduced cycle time and the need to hold inventory make stable environments scarce to find these days (Achua & Lussier, 2013). Therefore, knowledge management systems (KMS) enable organisations to better manage processes for capturing and applying knowledge and expertise. Such systems collect all relevant knowledge and experience in the firm, and make it available whenever and wherever it is needed to improve business processes and management decisions (Laudon & Laudon, 2012).

In an effort to encourage businesses to contend with accelerated change in highly competitive environments and multi-channel markets Senge (2006) suggested that companies can avoid complacency and risk losing out to competitors if they can adopt five disciplines which include: personal mastery, mental models, shared vision, team learning and systems thinking.

Personal mastery requires people to use their personal interest and curiosity to improve their capabilities. For example, individual employees should not wait for those responsible for training to identify suitable training and development programs for them. They need to be innovative and make effort to upgrade their skills. According to Kumar, Singh and Shankar (2011) work related experience, expertise, knowhow and best practices among employees could be shared for the benefit of the organisation because employees use knowledge to become more effective and productive in their work.

The Mental models is a concept which requires people to challenge their own ways of thinking so that they become aware of why they think in the manner they think. This may assist them to change their behavior in preparation for the future. This suggests the need for flexibility and thinking outside the box in order to effectively deal with dynamics of businesses today where change is the norm rather than the exception (Senge, 2006).

Shared vision is about communication that results in common understanding and eventually common support of the company values and objectives (Oakland, 2014). Effective communication of company goals and effective coordination of the supply chain must result

in a better understanding of company objectives, processes and priorities and if everyone cooperates then achieving company goals is made easy and customer satisfaction will prevail.

Team learning is a result of employees working together through discussion and dialogue. In such a way they become more effective as a team than they would be individually. A lesson from a study conducted in Australia about supply chain management practices is that information visibility throughout the supply chain will not bring significant impact if companies do not have capabilities to utilise the information in an effective way (Lazarevic, Sohal, & Baihaque, 2007). The same researchers recommended effective training and knowledge based leaning as essential components of developing and maintaining newly gained supply chain management skills.

Achua and Lussier (2013) recommend the following knowledge management principles for fostering a learning culture among employees: encourage creative thinking, create a climate in which experimentation is encouraged, provide incentives for learning and innovation, build confidence in followers' capacity to learn and adapt, encourage systems thinking, create a culture conducive to individual and team learning, institute mechanisms for channeling and nurturing creative ideas for innovation, create a shared vision for learning, broaden employees' frame of reference and create an environment in which people can learn from their mistakes.

- **Total Quality Management (TQM)**

Total Quality Management is a set of systematic activities carried out by the entire organisation to effectively and efficiently achieve the organisation's objectives so as to provide products and services with a level of quality that satisfies customers at the appropriate time and place (Oakland, 2014). Achieving competitiveness is therefore linked to implementing TQM principles in conuction with supply chain management. The basic elements of TQM include, top management's commitment, coordination, human resource management, supplier management, quality information and performance evaluation (Hugo & Badenhorrst-Weiss, 2016). Thus, the impact of Total Quality Management on supply chain includes customer focus, structured relationships, performance measurement, employee involvement and teamwork (Ibid).

Like the general systems theory, the TQM is a holistic approach to long term success that views continuous improvement in all aspects of the company as a process and not as a short term goal-leading to changes in attitudes, practices, structures and systems (Stevenson, 2012).

Three main cornerstones of total quality management, which have already been highlighted as important components of supply chain management are, continuous improvement, involvement and customer satisfaction (Zairi, 2013). Total Quality Management is a management philosophy that is driven by the need to continually improve quality of products and processes to achieve customer satisfaction and eventually company profitability.

According to Zairi (2013) TQM is a holistic approach to long-term success that views continuous improvement in all aspects of an organisation as a process and not as a short term goal, and it leads to changes in attitudes, practices, structures and systems. Total Quality Management must therefore involve the entire organisation and all members of the supply chain (Oakland, 2014). Quality is not a bonus because it is always expected hence customer satisfaction must not be achieved by default. The planning and organizing of the supply chain has to be driven by the need to satisfy the customer (Evans & Lindsay, 2017). The total quality management philosophy that has become the bedrock of successful companies today emphasises that companies must continually interrogate their processes with the view to continuously improve (Oakland, 2014). This can only happen when individual employees adopt the culture of challenging their thinking especially for the purposes of cost cutting, turnaround time reduction and quality improvement. The relevance of Total Quality Management (TQM) in implementing supply chain management is highlighted by the European quality award model which outlines the attributes considered by the body when it gives companies awards for quality performance (Assen, Vandenberg & Pietersma, 2009).

The model ranks customer satisfaction at 20% ahead of other performance attributes such as business results [15%], processes [14%], leadership [10%], people management, resource management and people satisfaction each at [9%], policy and strategy [8%] and finally impact on society [6%] (Assen, Vandenberg & Pietersma, 2009). Assessing efficiency and effectiveness of the strategic and operational management of Makana Municipality in Grahamston, South Africa, using a TQM and Business Excellence approach, it was concluded that, TQM not only leads to increased productivity, higher standards, improved systems and procedures, improved motivation and customer satisfaction, but it also helps the organisation to cover costs and improve its bottom line (Naidoo, 2007). However, for this to happen there was need for a successful integration process which requires management to focus on integrating the business interests with those of customers and suppliers ahead of internal dynamics between the internal functions of the company (Oakland, 2014). All these attributes have been highlighted as important ingredients for effectively managing a company’s supply chain.

3.4.6.6 Supply chain management benefits

From a benefit view point, adopting a supply chain philosophy can result in supply chain members collaborating in different aspects of their businesses. Research has shown that collaboration is a pillar of successful implementation of supply chain management systems yet collaboration fails many times (Katunzi, 2011; Osoro, 2015; Babatunde, Gbadeyan & Bamiduro, 2016).

A study of supply chain management practices among petroleum products marketers in Nigeria revealed that, successful collaboration involves willingness to innovate and change, understanding others' business, common goals and objectives, appropriate measures and incentives and information sharing (Babatunde, Gbadeyan & Mamiduro, 2016). This can result in collaboration benefits which can lead firms to combine their complementary capabilities for the purpose of increasing value they cannot achieve individually.

Despite all the supply chain challenges already mentioned, companies do not give up because they also tend to yield some positives from the struggle for supply chain effectiveness. Fawcett, Magnan and McCarter (2008) identified the following supply chain benefits, unique products and services, superior quality, cost competitiveness, better asset management, increased cash to cash velocity and superior channel relationships. The range of benefits that can accrue to companies that are able to effectively manage and work in their supply chains include: increased market share and sales growth, reduced supply chain costs, increased assets and capital utilisation, improved delivery performance, flexibility and responsiveness to customer requirements (Katunzi, 2011).

In a study on supply chain challenges in the South African automotive industry Naude (2013) commends the adoption of the supply chain management philosophy because of its impact on a company's bottom line. Some of the positive supply chain management impacts are listed in table 3.8 below.

Table 3.8: Impacts of supply chain management

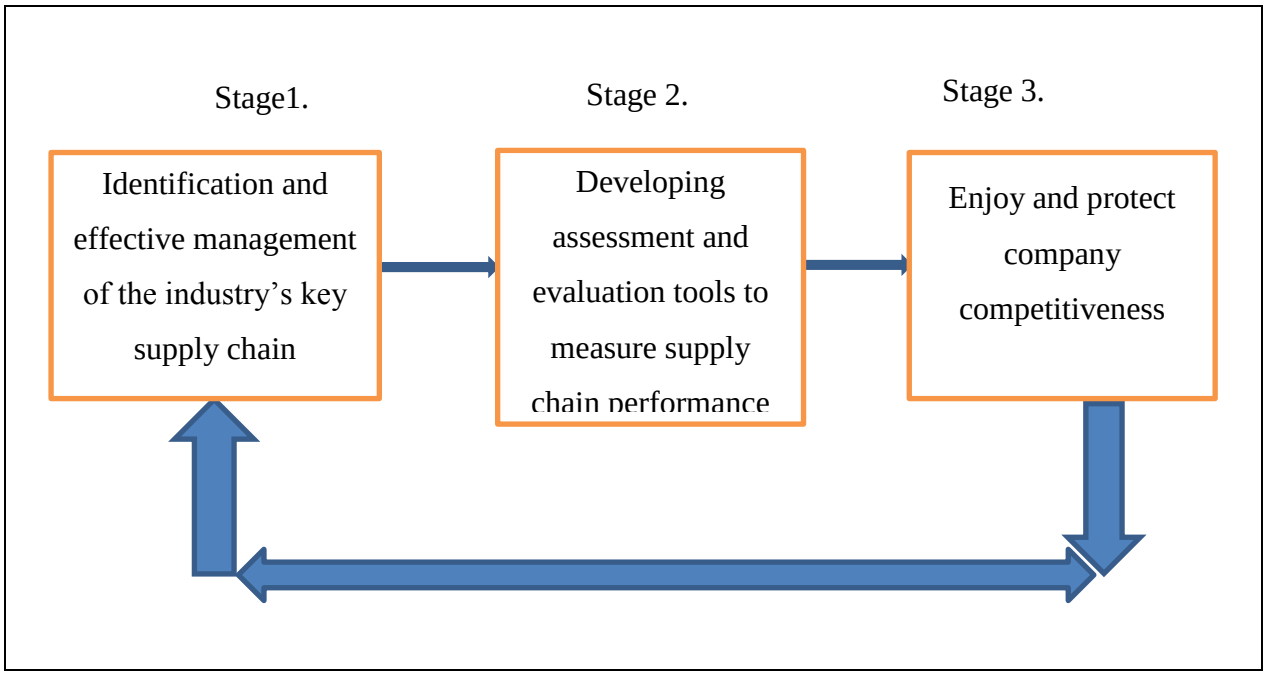
Impact on sales	Impact on costs
• Faster to market • Improved quality • Price flexibility • Innovation • Enhanced customer service • Satisfaction • Customer fulfilment and flexibility • Shorter cycle and lead time	• Better product design • Reduced acquisition cost • Reduced processing cost • Better asset utilisation • Reduced downtime cost • Lower risk and risk cost • Lower non-value added cost • Lower supply chain costs • Lower post ordering costs

Source: Naude (2013:71)

3.5 The study's conceptual framework model

In view of all issues discussed in Chapter 3, the following framework is proposed to represent the most important issues that require close management attention in order to bring about change and improvement in petroleum companies' supply chain. Effective implementation of these issues can drive petroleum companies towards competitiveness.

Figure 3.11: The petroleum industry's supply chain conceptual framework



Source: Researcher Composed

In the above model, having identified the petroleum industry's key supply chain activities at stage 1, which is management of procurement, inventory, logistics, information and communications technology and customer service, management must develop and implement appropriate strategies for each of the activities. The focal point of stage 2 is to ensure that all the supply chain strategies agreed upon by management have the potential to be assessed and evaluated during and after implementation to strengthen the companies' planning and control processes. Planning, assessment and evaluation processes must be iterative and carried out on a regular basis. Stage 3 in the model hypothesizes that stages 1 and 2 can lead to company competitiveness. The focus of competitiveness of a firm is price, cost and development of operations factors that can potentially affect economic growth, market shares and other performances of companies in the targeted sector and this enables the organisation to create, strengthen and sustain competitive advantage (Mwaura et al., 2016).

3.6 Chapter summary

The chapter reviewed literature at three distinctive levels; the theoretical framework, conceptual framework and supply chain management imperatives focusing on empirical

evidence. Under the theoretical framework two management theories, the systems theory and the value chain analysis are considered to be the springboard of the supply chain management philosophy were reviewed. The central themes of these two being that, to produce good performance results an organization must always be managed as a whole system made up of interdependent subsystems and that performance of the entire chain is based on the performance of its weakest link (Porter, 1980; Nieman & Bennett, 2014). In this system, also known as the value chain, management need to treat internal company issues in the same way they treat the external organisational factors (Tadisina, 2016). Movement along the value chain is expected to create more value for the customer and for other supply chain members.

Under the conceptual framework the origin and fundamentals of supply chain management and its key elements were reviewed. The review showed that supply chain management relies on interorganisational and intraorganisational collaborative relationships (Zhang et.al, 2016). Therefore, supply chain management is an all-encompassing management philosophy. It has the potential to make companies competitive (Varma, Wadhwa & Deshmuk, 2008). Under strategic supply chain activities focus was on management of procurement, inventory, logistics, information technology and customer service in a supply chain environment.

Supply chain imperatives were reviewed last. Focus was on managers' attitudes towards supply chain management, supply chain management drivers, critical success factors, challenges, benefits and measurement of supply chain performance. The review of the imperatives was tied to a review of recent research studies carried out in different countries and in different industries on supply chain related topics. Focus in this section was to document common research methodologies used to investigate supply chain research questions, identifying relevant supply chain problem areas researched, findings from the different studies and conclusions made. The review of recent studies showed that researching supply chain management topics tends to be complex because supply chain management issues are dynamic and cut across many functions of the organisation (Soosay & Hyland, 2015). The next chapter discusses the research methodology used in planning the process of collecting and analyzing data for the study. The mixed methods approach was selected as the research methodology suitable for investigating and analysing complex business issues.

CHAPTER FOUR: RESEARCH METHODOLOGY

4.1 Introduction

Chapter two gave a summary of the Zimbabwean petroleum industry's operations which indicated lack of coordination, cooperation, collaboration and integration among the multiple supply chain partners of the petroleum industry. In chapter three a review of literature on the systems theory, value chain analyses and supply chain management showed that it requires effort for one to understand and appreciate the contribution of the supply chain management to company competitiveness and the development of managerial excellence both in public and private business organisations. The complexity associated with the country's petroleum supply chain can contribute to the problem of uncompetitiveness of the Zimbabwe petroleum industry. The research methodology chapter therefore discusses the research propositions or strategies for achieving the objectives adopted for the study and the research methodology. When the researcher seeks to emphasise both quantitative and qualitative data bases a convergent mixed methods approach is recommended (Creswell, 2014).

Owing to the petroleum industry supply chain terrain's complexities the mixed methods methodology was used because it is the only methodology that can provide different perspectives in analysing and interpreting the research results (Maree, 2016). Multi-methods can adequately address the complexity in supply chain management issues because it provides different kinds of information about the topic under investigation and its use can provide more confidence in the study findings (Ngulube & Ngulube, 2015; Maree, 2016). This is so because issues will be addressed in greater detail. In addition to the above, understanding a complex and dynamic phenomenon such as supply chain management requires a comprehensive investigation and analysis of same. This comprehensiveness cannot be achieved using quantitative research or qualitative research alone and it can address a wide range of issues and provides the researcher with a broader picture of supply chain management practices in the Zimbabwean petroleum industry. For example, responses to supply chain management questions require hands on operational information which can be

collected from the petroleum companies using the survey design. However, practical solutions to some of the supply chain management problems, such as taxation and foreign currency shortage, require policy related solutions. Information to deal with the latter can only come from senior executives in associative organisations and these executives cannot offer detailed descriptions of the situation on the ground through filling in questionnaires, hence the use of in-depth interviews.

Related studies indicate that managing supply chain is highly complex especially when the companies involved are operating in uncertain and dynamic operating environments where one needs to manage business relations between many firms, many business processes and their interactions (Sheel, 2016). The Zimbabwean petroleum industry is characterised by dynamic complexity which lead to complex decision making which in turn requires a more robust research design to conduct an investigation in such a complex environment.

4.2 Strategies for achieving the objectives adopted for the study

Table 4.1: Study objectives and the respective questions for the objectives

Study objectives were to:	Qualitative research questions for Associative organisations executives	Quantitative research questions for supply chain managers of petroleum companies
1. Determine the Zimbabwe petroleum industry's business environment, supply chain management strategies and the industry structure	Question1.What are the petroleum industry's supply chain strategies, structure and business environment like and are they supportive of SCM activities? Question 2 "---What kind of support are you offering to petroleum companies ----- do you think petroleum companies are happy with the level of support you give them? Question 3. Petroleum companies have complained about market uncertainty, poor quality and	Section A. Demographic data Question 9. Measures growth based on employees employed between 2013 and 2016 Questions 10 to 14 ask about distribution strategies used by the focal company. These strategies and the number of service stations owned can be used as a measure of the company's market share. Question 15 In which department do you work?

	stringent regulations among other things. They allege that they do not get enough support from Government and associative organisations. How do you respond to the allegations? Question 7. How does your organisation support the identified critical success factors?	Questions 16 to 18 ask about the outsourcing of supply chain activities of the company and how outsourcing arrangements are managed. Outsourcing is in line with recommended strategies for effective implementation of SCM programmes
2. Assess the attitudes of supply chain managers in the Zimbabwean petroleum industry towards adopting and implementing the supply chain management philosophy in the petroleum industry of Zimbabwe	Question 4. What are the attitudes of petroleum industry executives towards implementing SCM in their companies? Question 5. What are the executives' knowledge levels and commitment to SCM initiatives? Question 6.Why has SCM not helped development of the Zimbabwean petroleum industry?	Section B. The management of supply chain activities. Questions 19 to 29 are attitudinal questions asking respondents to indicate levels of satisfaction with the way different supply chain activities are managed at the petroleum company-each of the activities is rated from very satisfied to very unsatisfied.
3. Identify critical success factors required for implementing supply chain management in the Zimbabwean petroleum industry	Question 7. What are the petroleum industry's critical success factors? Question 8. Do you think petroleum companies are meeting customers' expectations?	Section C. Supply chain management Critical success factors. Questions 30 to 39 requires managers to identify and rate the importance of what they feel are the company's critical factors required to implement the SCM philosophy - the ratings range between not important and extremely important.
4. Identify the Zimbabwe petroleum industry's supply chain collaboration drivers	Question 9.Is there any form of collaboration among petroleum companies and other supply chain members and what could be driving such collaboration? Question 10. Can you explain the relationship that exists between supply chain management and	Section D. Supply chain collaboration drivers Questions 40 to 49 ask respondents to indicate their level of agreement with the choice of that factors identified in

	company competitiveness?	questions 40 to 49 being the factors driving supply chain collaboration
5. Evaluate supply chain performance and measurement attributes relevant to the Zimbabwe petroleum industry's supply chain and how they affect operations of petroleum companies	Question 10. Is there any relationship between SCM and company competitiveness and what changes were realised after implementing the SCM philosophy? Question 14. What supply chain lessons can the Zimbabwean petroleum industry learn from their regional and international counterparts	Section E. Supply chain performance measurement. Questions 50 to 62 SCM performance measurement questions. Respondents are asked to evaluate impact of SCM by highlighting changes experienced after adopting the SCM philosophy
6. Identify the Zimbabwe petroleum industry's supply chain management challenges and benefits and suggest ways to improve competitiveness in the Zimbabwean petroleum industry.	Question 11. "---pick the most important and critical supply chain problems and benefits affecting the petroleum industry in Zimbabwe--" Question 12. What are the reasons for the challenges and benefits given in question 11? Question 13, 14 & 15. Asked about lessons learnt from others, and recommendations on what needs to be done.	Section F. Supply chain management challenges, benefits and recommendations Questions 63 to 74 ask respondents to indicate severity of identified SCM challenges rating them from irrelevant to most critical. Section G Questions 75 to 83 ask respondents to show their level of agreement with the given benefits. These are rated from strongly agree to strongly disagree. Question 84 asks the respondents to give their opinions on what needs to be done going forward.

Source: Adapted from the Qualitative Interview Guide and Survey Questionnaire

Objective 1: To determine the Zimbabwe petroleum industry's business environment, supply chain management strategies and the industry structure

Effective management of supply chain activities is expected to influence company competitiveness. This objective was to test supply chain managers' knowledge and understanding of supply chain management activities and strategies used to ensure effective management of the supply chain by management from both the petroleum company and the associative organisations. In questions 1 and 2 of the qualitative research informants were

expected to individually identify the petroleum industry strategy, structure, environment and the different supply chain activities of the Zimbabwe petroleum industry which the associative organisations' executives have experienced. To achieve industrial growth and competitiveness Government and associative organisations must be supportive of the efforts and initiatives by players in a particular industry (Industrial Development Policy, 2012). Probing was used to encourage discussion of all the critical supply chain activities of procurement, inventory control, logistics (transportation and distribution), and information and communications technology and customer service. Question 3 further challenged the informants to explain the roles which their organisations played in dealing with the problems of environmental uncertainty and other challenges affecting the petroleum industry. This question was strategic and had potential to reveal the real source of some of the supply chain challenges faced by the petroleum industry of Zimbabwe.

Under quantitative research questions 10 through 14 focused on dealership arrangements. The type of dealership arrangements and the number of dealerships a petroleum company has determines the company's market position and the strength of its strategy. For example, the company owned and dealer operated (CODO) and company owned and company operated (COCO) service stations can indicate a petroleum company's asset base. Questions 16, 17 and18 were about outsourcing. Outsourcing is one of the recommended strategies to be used by supply chain management oriented companies. It is believed that outsourcing frees time for the focal company to concentrate on its core business and creates opportunities to get services done by the experts (Wisner, Tang, & Leong, 2012). Therefore, outsourcing is a strategy that is often used to strengthen an organisation's supply chain. The decision to outsource is influenced by the prevailing business environment. However, minimizing risk from an outsourcing strategy can be ensured through formalization of agreements with third party service providers and between internal departments. Question 7 also asks respondents to indicate the kind of support being given to the petroleum companies in order to implement the critical success factors.

Objective 2: To assess the attitudes of supply chain managers in the Zimbabwean petroleum industry towards adopting and implementing the supply chain management philosophy in the petroleum industry of Zimbabwe

Once the knowledge and understanding of supply chain management issues is known the research moves on to determine the respondents' views and attitudes towards adopting and implementing the supply chain management philosophy.

In the qualitative research, questions 4, 5 and 6 enquired about petroleum industry executives' attitudes towards supply chain management implementation and why supply chain management has failed in Zimbabwe. The researcher cannot solely dwell on what petroleum company supply chain executives say about implementing supply chain management in their company. Thus, independent opinions from other members of the supply chain (associative organisations) were sought about the attitudes of petroleum companies' executives towards implementing supply chain management. This enabled the researcher to identify if any perception gaps existed between the opinions of associative organisations and petroleum company management so that appropriate recommendations are made to cover any gaps. Question 5 required managers to commend on global market supply chain management issues in relation to what was happening in the petroleum industry of Zimbabwe. Responses to this question could indicate if the petroleum industry's activities were influenced by what was happening in the global market and possibly highlight trends and challenges affecting local companies in adopting and implementing supply chain management. Because successful companies are normally guided by international best practices the question can lead to the identification of regional and international collaborations and lessons learnt from such collaborative efforts and initiatives.

From the quantitative research view point questions in Section B of the questionnaire, questions 19 through 29 attempted to test if supply chain managers were satisfied with the way supply chain activities were being managed in their companies. Responses to these questions could show if petroleum companies' management were doing the right things, paying attention to critical supply chain activities such as customer service and staff issues.

Objective 3: To identify critical success factors required for implementing supply chain management in the Zimbabwean petroleum industry

In questions 7 and 8 of the qualitative research, respondents were asked to identify what they thought were the petroleum industry's critical success factors, to show how these were supported by the associative organisations and to indicate if petroleum companies met their

customers' expectations. Section C and questions 30 to 39 of the survey focused on the industry's different critical success factors including strategic partnerships, prioritisation of resources, information sharing and others. Findings must show the industry's critical success factors and if they were considered to be important. It is also important to determine the end users' feelings about the service they get.

Objective 4: To identify the Zimbabwe petroleum industry's supply chain collaboration drivers

In a supply chain management environment companies are expected to collaborate with supply chain members. Question 9 of the qualitative research would require a description of the collaborations taking place among petroleum companies and possible reasons why the collaborations were happening or not. The way informants will articulate collaboration issues among petroleum companies will shed light on associative organisations 'knowledge and awareness of the petroleum industry's supply chain strategy at industry and national levels and provide hints on the effects of the collaboration on a company's supply chain strategy and what these organisations can do to save the industry.

Collaboration prevails where relationships between supply chain members are strong hence the need to understand the kind of relationships that prevail between petroleum companies themselves and their relationships with other supply chain members. In the quantitative research the issues of supply chain collaboration can be driven by a variety of factors identified in Section D, questions 40 through 49. Respondents would be required to assert their knowledge and the extent to which the identified collaboration drivers such as more demanding customers, competition, relationships, information technologies, economic globalisation, cost of inventory, speed and staff training and development affected company operations. The collaboration drivers could be linked to the company's critical success factors and help developing a supply chain performance measurement tool.

Objective 5: To evaluate supply chain performance and measurement attributes relevant to the Zimbabwe petroleum industry's supply chain and how they affect operations of petroleum companies

Under the qualitative research, in question 10, informants were asked to state and explain any relationships between effective supply chain management and company competitiveness. An

assessment of supply chain management performance is also related to lessons and problems (questions 14 and 11 respectively). Similarly, in the quantitative research Section E, questions 50 to 62 asked respondents to indicate the effects of implementing supply chain management in their organisation. Respondents were asked to indicate if there have been changes in relationships, costs, competitiveness and other measures after the company implemented the supply chain management philosophy. There is no way to directly measure the effect of adopting supply chain management as a strategy except through assessing or measuring changes taking place in elements of the industry's critical success factors such as the ones mentioned earlier in questions 30 to 39. Responses to these questions could indicate if the supply chain programme brought about positive or negative changes to the company. There is a possibility of linking the changes and company competitiveness.

Objective 6: To Identify the Zimbabwe petroleum industry's supply chain management challenges and benefits and suggest ways to improve competitiveness in the Zimbabwean petroleum industry.

From the supply chain measurement attributes the researcher must identify the challenges and benefits of implementing supply chain management. In the qualitative research questions 11 and 12 focused on challenges and benefits while questions 13 to 15 focused on lessons learnt and recommendations. In the quantitative research Section F, questions 63 to 74 focus on supply chain management challenges and Section G, questions 75 to 83 on the benefits of implementing supply chain management. Finally and because sometimes researchers learn from those involved in the research process, the last question, question 84 asked individual managers to give their personal opinions on the way forward and expect the recommendations to be based on lessons learnt from others. The study's recommendations must aim at minimizing supply chain management challenges and reinforcing the benefits.

4.3 Research methodology

Research methodology is the overall plan for executing the whole project. The methodology discussion highlights the research philosophy, the research approach, research design, and research methods, and data collection issues, contribution of the study, and weakness of the methodology. Research methodology is about procedures through which researchers go about their work of collecting data, analysing, describing and explaining phenomena (Cooper &

Schindler, 2010). Every stage of the research methodology provides options or alternatives that the researcher chooses to follow. Therefore, alternatives available at the various stages of the methodology will be mentioned followed by a brief discussion of the preferred option and some justification of the selection of a particular alternative.

4.3.1 Research philosophy

The three research philosophies or paradigms incorporated in the study are positivism, phenomenology and pragmatism. The positivist philosophy is associated with quantitative research, the phenomenology is associated with qualitative research and pragmatism is associated with mixed methods research (Ceswell & Plano-Clark, 2011; Shannon-Baker, 2016). Table 4.2 below compares the phenomenology and positivism paradigms indicating the strengths and weaknesses of each paradigm.

Table 4.2: A Comparison of the Positivism and Phenomenology Research Paradigms

Positivist and quantitative strengths	Phenomenology and qualitative strengths
• Wider coverage of situation • Fast and economical as statistics are aggregated from large samples • More relevant to policy decisions • More objective	• Ability to understand people's meanings • Ability to adjust to new issues and ideas as they emerge • Provides a way of gathering data seen as mutual rather than artificial • Can contribute to evolution of theory
Positivist weaknesses	Phenomenology weaknesses
• Tends to be rigid and inflexible • Tends to be artificial • Not reflective of an understanding of processes or significance people attach to actions (there is no probing) • Historical, therefore it becomes difficult for policy makers to infer what changes and actions should take place in future.	• Time consuming and requires more resources • Analysis and interpretation is difficult and subjective • Given low credibility by policy makers • Difficult to control pace, progress and end points.

Source: Smith, Thorpe, and Lowe (2002).

Based on the above table the approach taken for the study aims to benefit from wider coverage and objective analysis offered by the positivism paradigm. However, the researcher was motivated to incorporate the phenomenology dimension in the study by the fact that positivism does not allow researcher access to finer details of the study and due to lack of probing and follow ups. Phenomenology allows the understanding of people's meanings and management's views towards the new management philosophy called supply chain management which becomes easily achieved through face to face interviews. At the same time, quantificating of supply chain manager's perceptions and collecting such data from respondents based at work centres dotted around the country can only be feasible using the questionnaire as a data collection instrument. Physical presence of the researcher is not an issue so questionnaires can be completed without the need for respondents to meet or know the researcher.

Pragmatism is one of the four philosophical foundations that have implications for mixed methods research. The other three which are not considered for the study are transformative emancipation, dialectics and critical realism (Shannon-Baker,2016). Researchers in mixed methods research agree that, pragmatism allows researchers to treat qualitative research and quantitative research as compliments, pragmatism is outcome oriented and interested in determining the meaning of things and pragmatists are able to maintain both subjectivity in their own reflection on the research and objectivity in data collection to determine practical solutions (Creswell, 2014; Maree, 2016; Shannon-Baker, 2016). The current study adopted the convergent parallel mixed methods design which uses elements of both the positivist and phenomenology paradigms because the supply chain activities being investigated possess complex issues that cannot be satisfactorily explained using the positivism or phenomenology philosophy alone (Creswell, 2014). However, when pragmatism is employed it tends to generate more views and a deeper analysis of the phenomenon being investigated (Smith, Thorpe & Lowe, 2002; Botha, 2011).

4.3.2 Research approach

There are three research approaches available for use by researchers. If you look at research as a continuum these approaches can be placed along the continuum as follows; qualitative research and quantitative research will be at the two ends of the continuum and mixed methods will be in between (Creswell, 2014).

Researchers are free to select any of the three research approaches on the continuum, provided the selected approach is appropriate for meeting the research goals that have been set for a study. The selection of any of the three approaches is contingent upon circumstances of an individual research situation and what the research ought to achieve. These three research approaches will be explained below, followed by a detailed explanation of the convergent parallel mixed methods design chosen for the study.

4.3.2.1 The Qualitative Research approach

Qualitative research is an approach for exploring and understanding the meaning individuals or groups ascribe to a social or human problem (Aaker, Kumar & Day, 2011). The process of research involves emerging questions and procedures, data typically collected in the participant's setting, data analysis inductively building from particulars to general themes, and the researcher making interpretations of the meaning of the data (Straits & Singleton, 2011). The final written report has a flexible structure and those who engage in this form of inquiry support a way of looking at research that honours an inductive style, a focus on individual meaning, and the importance of rendering the complexity of a situation (Creswell, 2014).

The above definition shows that qualitative research can be used for exploring or understanding meaning ascribed to a research problem by the respondents. The researcher is involved in collecting research data and will analyse the data and interpret the results. Therefore, in conducting qualitative research study the researcher must rely as much as possible on the participants' views of the situation being studied (Creswell, 2014). Qualitative research is more researcher-dependent hence the researcher extracts meaning from unstructured responses; the researcher interprets the data to extract its meaning and converts it to information (Zikmund & Babin, 2010). However, the fact that qualitative research results are researcher dependent implies that different researchers can come up with different conclusions on the same interview (Zikmund et.al, 2010). Technically, this requires the researcher to talk to the respondent most of the time. The two will talk on a one-on-one basis.

This raises the issue of subjectivity which is a major weakness of qualitative research. The other weakness is that a handful of people are usually the source of qualitative data (Ibid, 2010). The different qualitative research approaches are: descriptive qualitative research approach, exploratory qualitative research, and philosophically or theoretically grounded qualitative research.

- **Descriptive qualitative research approach**

According to Cooper and Schindler (2010), descriptive qualitative research approach aims to describe some group of people or phenomena. For example a study can attempt to answer questions about managers' attitudes towards supply chain management practices from external supply chain members' view point and also issues about environmental challenges faced by the industry at large. Based on received responses the researcher can organise, tabulate and describe data collected giving back what participants provided rather than interpreting it (Maree, 2016). In the qualitative component of the study elements of descriptive qualitative research design will be found though the study has a more exploratory orientation.

- **Exploratory qualitative research**

The qualitative research component of the study used exploratory qualitative research design. According to Elliott and Timulak (2007) qualitative research uses open exploratory research questions as opposed to close-ended questions and it places emphasis on understanding phenomena in their own right using special strategies for enhancing the credibility of the research design and data analysis. From a phenomenological view point, the idea behind exploratory qualitative research designs is to extract meaning that informants attribute to their experiences, circumstances and situations, as well as the meanings people embed into the texts and other objects (Maree, 2016). In the study, supply chain management implementation experiences at industry and national levels were seen as critical components of the respondents. The informants must have strategic information about the Zimbabwean petroleum industry's supply chain policies and strategies. This is why the study population included policy makers (Ministry of Energy and Power Development officials), regulators (ZERA officials) and logistics service providers (NOIC). These three organisations provided

standardised services to all petroleum companies and were adjudged to be neutral in providing views and opinions about the petroleum industry. It was anticipated that the design would provide rich information based on the strategic positions which the associative organisations occupy and the issues they deal with in the petroleum industry, personal knowledge as well as experience gained by the individual respondents over time.

- **Philosophically or theoretically grounded qualitative research**

Philosophically or theoretically grounded qualitative research is a scientific exploration that aims to establish existence of linear relationships between variables. It has elements of objectivism, rationalism and positivism (Cooper & Schindler, 2010). Creswell (2011) contends that, the role of the scientist in the interpretivist paradigm is to understand, explain and demystify social reality through the eyes of different participants. Additionally, Ngulube (2013) asserts that, interpretive studies generally attempt to understand phenomena through the meanings that people assign to them. This was one of the motivations behind the interviewing of people from different associative organisations of the petroleum supply chain and establishing if professionals from different organisations were consistent in the way they viewed the association between supply chain management and company competitiveness.

The Qualitative Research design

Bryman and Bell (2011) contends that, a research design provides a framework for the collection and analysis of data. Thus, the choice of research design reflects decisions about the importance attached to various dimensions of the research process including how to express causal connections between variables, whether and how the results can be generalized to a larger group of individuals or organisations than those actually forming part of the investigation. The design must help one to understand and explain behavior and meaning of that behavior in its specific social context and how to explain social phenomena, their interconnections and changes over time (Straits & Singleton, 2011).

The qualitative research enquiry taps into opinions of people, relies on linguistic (words) rather than numerical data, and employs meaning based rather than statistical forms of data

analysis (Maree, 2016). Zikmund et al. (2010) state that, qualitative research is interested more in qualities than quantities and qualitative research addresses business objectives through techniques that allow the researcher to provide elaborate interpretations of phenomena without depending on numerical measurement. The focus of qualitative design is on discovering true inner meanings and new insights. Some researchers argue that qualitative research methods are procedures for coming to terms with the meaning not frequency of a phenomenon by studying it in its social context (Piekkari & Welch, 2004; Babbie, 2007; Maree, 2016). A qualitative research design enables the researcher to probe deeply, analyse intensively and get an in-depth and detailed understanding of the phenomenon under review (Creswell, 2011).According to Pellissier (2007) qualitative research has the following advantages:

- It is more exploratory and less sophisticated than empirical testing(quantitative studies);
- It allows for deeper cross-cultural understanding of issues and takes a more holistic approach to the study objectives;
- It adopts a contingency approach because instruments are adopted to suit a particular location where the research is conducted;
- It goes beyond measuring observable behaviour and seeks to understand meanings and why certain behaviours, perceptions and attitudes prevail;
- Qualitative research provides answers to messy problems and complex issues that are typical of management research-the complexity of supply chain management tends to fit well in this element of qualitative research.

It is hoped that the qualitative design component of the study will enable the researcher to collect data that will help in understanding and explaining the behaviour of supply chain managers and relationships between the various elements of the Zimbabwean petroleum industry's supply chain. Therefore, successful research designs entail a lot of planning and organizing on the part of the researcher and making sure all the elements of the design process are effectively implemented (Creswell, 2014). Furthermore, a qualitative research strategy can adopt any of the five qualitative research designs or orientations which are: narrative research, phenomenology, grounded theory, ethnography and case study (Creswell & Plano Clark, 2007). These different designs associated with the qualitative research strategy are summarise in table 4.3 below.

Table 4.3: The five approaches to qualitative research designs

The qualitative traditions					
Dimensions	Narrative studies/ research	Phenomenology	Grounded theory	Ethnography	Case study
Focus	Exploring the life of an individual	Understanding the essence of experiences about a phenomenon. It describes, reflects upon and interprets experiences	Developing a theory grounded from data in the field. Researcher poses questions on answers provided by the respondent	Describing and interpreting the cultural or social group	Developing an in-depth understanding of a single case or multiple cases. Documenting history about a particular case
Data-collection method	Primary interviews and documents	Long interviews with up to 10 people	Interviews with 20 to 30 individuals to saturate categories and detail a theory	Primarily participant observation and interviews with additional artefacts during extended time in the field(e.g. six months to a year)	Multiple sources, including documents, archival records, interviews, observations and physical artefacts
Data-analysis strategy	Stories, Epiphanies, Historical content	Statements Meanings Meaning themes General description of the experience	Open coding Axial coding Selective coding Conditional matrix	Discussion Analysis Interpretation	Description Themes Assertions
Synthesis or reporting form	Detailed picture/ description of an individual's life	Description of the essence of the experience-provides opportunity for new insights	Theory or theoretical model derived from what is happening.	Description of the cultural behaviour of a group or an individual	In-depth description of the case or cases

Source: Adapted from Creswell & Plano Clark (2007:22).

Out of the five designs above, the case study design elements were found to be more characteristic of, and suitable for, the study of supply chain management activities of the

Zimbabwean petroleum industry. This component of the research study requires the researcher to obtain detailed descriptions of the supply chain management philosophy and how the philosophy has contributed towards petroleum companies' competitiveness. According to Creswell (2014) a case study design is a type of qualitative research in which the researcher explores a single entity or case within its real life context, bounded by time and activity. A case study looks at a set of values, feelings and beliefs that can only be discovered through an intensive study of that individual entity. The strengths of a case study are its contextuality. In a case study, the phenomena are studied within their natural setting allowing the level of depth with which issues are investigated to allow theory building and not just theory testing (Straits & Singleton, 2011; Creswell, 2014). Case studies are holistic and they permit the investigation of phenomena to be done from a variety of viewpoints, crossing boundaries between different factors. Case studies provide an opportunity for direct observation. Because a case study gives the researcher access to first hand experiences of decision making, implementation and change processes, it brings about a better understanding of business issues and the contexts in which such issues prevail (Zikmund et.al., 2010).

Advantages of case study designs

Some of the advantages of case studies include:

i. A case study enables close collaboration between the researcher and the participants which enables participants to share their stories (Maree, 2016);
ii. A case study tends to be researcher centred providing a holistic portrayal and understanding of the research setting. Its goal is to rely as much as possible on the participants' views of the situation being studied (Creswell, 2014);
iii. Rigour is a central concern in case-study research. This allows verification and validation of information including confirming results with participants (Zucker, 2009);
iv. In case studies conclusions are based on data collected and not on generalisation (Maree, 2016).

4.3.2.2 The Quantitative Research Approach

Quantitative research is an approach for testing objective theories by examining the relationship among variables. These variables, in turn, can be measured, typically on instruments, so that numbered data can be analysed using statistical procedures (Tichapondwa, 2013). The final written report has a set structure consisting of introduction, literature and theory, methods, results, and discussion (Creswell, 2014). Like qualitative researchers, those who engage in this form of inquiry have assumptions about testing theories deductively, building in protections against bias, controlling for alternative explanations, and being able to generalize and replicate the findings (Straits & Singleton, 2011). The fact that quantitative research is a process that is systematic based on its use of numerical data from only a selected subgroup of a universe to generalise findings to the universe that is being studied enables the use of statistical techniques in analysing the research data (Zikmund & Babin, 2010; Maree, 2016).

Quantitative research or surveys have the ability to provide quick and often inexpensive, efficient and accurate means of assessing information about a given population, and fairly straightforward statistical tools can be used to analyse survey results. Therefore, quantitative research can be used to test the theories about reality. It looks at the probable cause and effect relationships, and uses quantitative measures to gather data to test an hypothesis or to answer research questions (Bryman & Bell, 2011; Maree, 2016).

However, more effort and care will be required in designing survey instruments that produce accurate results which do not mislead users of research information. It is also critical to have a strong strategy to manage respondents and non-response errors especially when collecting business related data considered by many corporate clients to have a confidential classification (Zikmund et.al, 2010; Bryman et al., 2014). Typical surveys attempt to describe what is happening, what people believe, what they are like or to learn reasons for their particular behaviour (Zikmund et.al, 2010). Surveys have the advantage of providing quick, inexpensive, efficient and accurate means of assessing information about a population.

- **Quantitative research strategies**

Quantitative studies can be in the form of experimental designs, observations and descriptive studies. Bryman et.al (2014) asserts that, experimental designs require testing and retesting of samples in order to make some conclusions about causal relationships between cases being studied. This is usually suitable for laboratory experiments and it was not suitable for the current study. The same authors contend that, observations involve observing cases being studied over time. This is often done through longitudinal studies.

Longitudinal designs entail the interviewing of respondents more than once and at different times to capture consistencies and changes about people's behaviour and attitudes towards something (Aaker, Kumar & Day, 2011). Again this option was not suitable because of time constraints and because the units of analysis in the study do not remain static thereby making it difficult to study the same units over time. Many changes are happening in the petroleum industry making longitudinal studies not feasible.

The survey design was used in the study. Survey research or cross sectional design is a study in which various segments of the population are sampled and data are collected at a single moment in time (Zikmund & Babin, 2010). When using the survey design the researcher can collect data mainly by questionnaire or using structured interviews. Surveys can be in the form of unstructured questionnaires which do not restrict the respondent's answers. The survey design is associated with undisguised and structured questioning. The study used structured questionnaires which impose a limit on the number of allowable responses (Cooper & Schindler, 2010). This model gives all the respondents the same number of options to select answers from and it seems objective and easy to analyse (Ibid). This was done in order to collect a body of quantitative or quantifiable data in connection with supply chain management variables that were examined to detect patterns and associations (Bryman & Bell, 2011). Thus, the study used structured questionnaires as the tool(s) for data collection.

In the study, the researcher wanted to establish associations between several supply chain management variables and company competitiveness. For example, supply chain managers' attitudes towards variables that determine the impact of implementing supply chain management strategy on company competitiveness, identify supply chain management's critical success factors and supply chain management measurement attributes among other

issues. Although the main objective of scientific studies is to draw conclusions about populations by measuring a small portion of the population (sample) rather than taking census (investigating all the individual elements that make up a population, the quantitative research component of the study considered the entire population of supply chain managers (Zikmund & Babin, 2010).This was possible because the petroleum company that was surveyed together with its distribution agents had a total number of 96 people in Supply Chain Management. Therefore, all the subjects were sampled.

In survey research, researchers select samples of respondents before administering questionnaires or conducting interviews to collect information about the respondents' attitudes, values, habits, ideas, demographics, feelings, opinions, perceptions, plans and beliefs (Maree, 2016:174). Thus, survey research quality tends to depend on its reliability, sampling procedures, administration of the questionnaire and data analysis (Bryman, et al., 2014).

In the quantitative research category, the researcher was interested in a specific group of employees who were identified according to their professional specialization namely managers with supply chain management responsibilities. These managers were established beforehand with the help of the petroleum company's Human Resources department. The study required strategic and specialised information about the petroleum company's supply chain activities. The researcher therefore decided to interview all the 96 managers (census) working in the petroleum company's supply chain related operations of procurement, stores control, transport and distribution, information and communication technology and customer service. Distribution outlets associated with the surveyed petroleum company were not all owned by the petroleum company. The distribution outlets not owned by the company were considered relevant for the study because they were part of the petroleum company's distribution stream.

The study was made up of respondents who possessed homogeneous characteristics, hence studying a single case possessing all the required characteristics was deemed adequate for the study. Consideration of variation was limited to the petroleum company's head office where managerial staff from different supply chain activities of procurement, inventory control, logistics, ICT and customer service filled in the questionnaires. Managers at the services stations were in charge of all supply chain activities. However, two questionnaires were

distributed to four service stations which operated twenty four hours. Such outlets had two managers or team leaders, one for the day shift and the other for the night shift.

Advantages of quantitative research

Based on contributions by Saunders, Lewis & Thornhill (2009); Bryman & Bell (2011); Zikmund & Babin (2010) advantages of quantitative research include:

i. Survey research provides a quantitative or numeric description of trends, attitudes or opinions of a population by studying a sample of the population. The researcher does not need to interview the entire population;
ii. Quantitative research is objective and can be measured so that comparisons can be made. The use of standard and objective tools for collecting data makes the quantitative data more reliable when compared to qualitative data. Because the questions are predetermined and answer categories designed into the questionnaires, all respondents will answer the same questions;
iii. Generalisation from a sample to the bigger population is possible;
iv. When the results of a quantitative research are explained in detail it is easy to replicate and so has high reliability;
v. Results from quantitative research can be reduced to a few numeric statistics and interpreted in a few short statements.

In the study the quantitative research method was used to collect data from supply chain managers working for petroleum companies.

4.3.2.3 The Mixed Methods Approach

Proponents of the mixed methods research approach suggest that, owing to the complex nature of issues that researchers investigate and the need to have comprehensive knowledge and deeper understanding of such issues researchers nowadays believe that there is no major problem area that should be studied exclusively with one research method (Tashakkori & Teddlie, 2010). However, the use of mixed methods design requires more effort compared to research based on pure qualitative or quantitative designs. In-depth understanding of the industry's operations requires a great deal of data, much of which is not easy to find without

considerable effort. Such efforts can entail consulting people working in the right disciplines at different levels of the supply chain using different approaches and tools (Jogulu & Pansiri, 2011; Ngulube & Ngulube, 2015; Evans & Lindsay, 2017). Discussions in this section focus on mixed methods research design in general. However, section 4.3.3.4 will explain in detail the convergent parallel mixed methods design used in the current study.

Creswell and Plano-Clark (2011) define mixed methods research as a procedure for collecting, analysing and combining (mixing) both quantitative and qualitative data at some stage of the research process within a single study or a series of studies to understand a research problem more completely. Mixing is usually done to obtain breadth and depth of understanding, perspective, complexity, and difference and/or corroboration (Terrell, 2012).

Johnson and Christensen (2014) add that mixed methods research is the type of research in which a researcher or a team of researchers mixes or combines qualitative and quantitative research philosophies/paradigms, methodologies, methods, techniques, approaches, concepts or language into a single research study or a set of related studies. Mixed methods research is about collecting and analyzing both quantitative and qualitative data in a single study (Bryman & Bell, 2011) based on the premise that qualitative measures alone cannot adequately describe and explain a phenomenon in a study (Creswell &Tashakkori, 2007) and that, the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone (Creswell & Plano Clark, 2011). Bazeley (2015) contends that, a mixed methods approach is used for the purposes of breath and depth of understanding and corroboration. It is further argued that a mixed method way of thinking engages respondents with difference and diversity in search of both better understanding and greater equity of voice (Greene, 2008). In line with the above views, researchers in palliative care medicines Farquhar, Ewing and Booth (2011) advise that, the Medical Research Council (MRC) encourages combining quantitative and qualitative research methods because of its potential to provide comprehensiveness and greater knowledge yield. Thus, wherever possible, research evidence must be combined from a variety of sources that do not share the same weaknesses.

It was anticipated that more knowledge about and understanding of supply chain management in the Zimbabwe petroleum industry would emerge from combining qualitative and quantitative research. Use of the mixed methods design in the study is therefore in line with

developments and experiences in other disciplines and is deemed appropriate considering complex issues that make up the petroleum industry's supply chain, as discussed in Chapter 2. Mixing methods can also help in isolating similarities and differences among industry supply chain members and for the purpose of corroboration and validation (Bazely, 2015).

Mixed methods and the business research approach

The practice of the mixed methods approach has gained momentum over the years as a result of it being the one alternative researchers can rely upon when they deal with complex research situations such as those found in most business research including research on supply chain management (Ngulube, 2013). Proponents of mixed methods research propose that, continued growth in the use of mixed methods research is driven by:

- the recognition that the complexity of current research issues warrants multi-faceted research designs and methods;
- the ability of mixed methods to answer research questions that the other methodologies cannot;
- the ability of mixed methods to offer the researcher the possibility of simultaneously developing and verifying theory in the same study;
- the acceptance that bringing together both quantitative and qualitative research so that strengths of both approaches are combined, leads to a better understanding of research problems than either the quantitative or the qualitative approach alone (Teddlie & Tashakkori, 2012; Ngulube, 2013; Bazeley, 2015).

Johnson and Onwuegbuzie (2007; Terrell, 2012) agree with other mixed methodologists in that the mixed methods research movement is pragmatic, productive and offers a practical and outcome oriented method of inquiry that is based on action. The iterative nature of the mixed methods research can lead to rigour and further action which eliminates doubt. Mixed methods research offers a method for selecting methodological mixes that can help researchers better answer many of their research questions (Creswell, 2014). Findings from a study on the use of mixed methods in management doctoral dissertations show that divergent findings created through differing data collection and data analysis techniques appear to lead to greater depth and breadth in overall results from which researchers can make more accurate inferences with increased credibility (Jogulu & Pansiri, 2011). Similarly, Tashakkori

and Teddlie (2010), contend that their experience shows that adopting research designs that go beyond the conventional dominance of either qualitative or quantitative dichotomies will produce research outcomes of high standing.

Purists in research advocate the use of either quantitative or quantitative research methods without mixing them (Green, 2008). However, pragmatists contend that mixed methods design promotes the philosophy of pragmatism which calls for the efficient use of both approaches and this reflects a reaction to the split between quantitative research purists and qualitative research purists (Cameron, 2009; Farquhar, Ewing & Booth, 2011).The point of the pragmatist is the condemnation of excessively demonizing quantitative research or qualitative research at the expense of true facts on the ground and this is one of the reasons why there is growth in the use of mixed methods in contemporary research (Cameron & Miller, 2007; Ngulube, 2013). The mixed methods design is a holistic approach that highlights the interdependence of different methodologies which are often necessary when researchers want to understand complex phenomenon fully (Cameron, 2013; Ngulube & Ngulube, 2015). This study used a mixed methods approach combining quantitative and qualitative research methodologies which involved surmountable efforts to collect and compile the data from different petroleum industry supply chain members using different data collection approaches. All this was aimed at reporting comprehensively on a number of issues that affect the management of the Zimbabwean petroleum industry's supply chain. The multiplicity of the issues at different levels of the supply chain necessitated the use of both qualitative and quantitative approaches at the same time.

The main reasons and objectives proposed by Maree, et al. (2016) for combining quantitative and qualitative methods are as follows:

1. Gaining in-depth understanding of trends and personal perspectives;
2. Explaining the relationship among variables and how their linkage works;
3. Generating and testing the theories;
4. Developing and applying new measurement instruments;
5. Measuring and understanding outcomes in an experiment;
6. Developing an in-depth case analysis;
7. Identifying and taking action to improve a parallel problem;
8. Evaluating both the development and outcomes of a programme;

9. Advancing social justice based on multiple perspectives.

Like any other good research approach, Teddlie and Tashakkori (2012), argue that, the mixed methods approach is considered to possess some of the following good research characteristics,

- Methodological eclecticism;
- Paradigm pluralism;
- Iterative, cyclical approach to research;
- Set of basic research designs and analytical processes;
- Focus on research question or problem in determining the methods employed within any given study;
- Emphasis on diversity at all levels of the research enterprise;
- Tendency towards balance and compromise that is implicit of the 3rd methodological community;
- Reliance on visual representations e.g. figures and diagrams (Teddlie & Tashakkori, 2012).

The mixed methods research approach favours simultaneous use of different methods and allows for a holistic analysis of an organisation or setting that uncovers the understandings and shared meanings of the group or community under study (Green, 2008; Bazeley, 2015).This is the view that was selected for the study and it is supported based on the fact that, major discoveries are most likely to take place when several forms coincide (Creswell & Plano-Clark, 2011). Saunders et al. (2009); Bryman and Bell (2011) contend that it is generally good practice not to rely solely on questionnaire data but to use it in conjunction with at least one other data collection instrument. Johnson, Turner & Onwuegbuzie (2007); Farquhar, Ewing & Booth (2011) add that, multiple methodologies allow a clearer and more detailed picture of issues being investigated to be developed.

When using the mixed methods approach the researcher can collect more information and this can generate more confidence in the study findings. Saunders et al. (2009), further argues that use of multiple methods enables the researcher to increase the reliability and validity of findings when the weaknesses of one method are balanced by the strengths of other methods incorporated in the same study. It is however, different from triangulation because under

triangulation one can use different methods or instruments within the same paradigm as a triangulation strategy (Straits & Singleton, 2011). For mixed methods to prevail the research strategy requires both positivism and phenomenology tools and strategies to be combined in some way, whether there will be triangulation in one of the two approaches or in both becomes a different issue altogether. A mixed methods research design entails planned use of both qualitative and quantitative research strategies right from the beginning (Cameron, 2013).

Deciding on the suitability of Mixed methods research design

According to Creswell and Plano-Clark (2011), the following steps and questions must be taken and asked in order to arrive at the decision to use the mixed methods research design:

Step 1

Are both quantitative and qualitative data necessary to understand your research problem? Would the collection of only one form limit your understanding of the research problem or provide only a partial response to it or not be comprehensive enough? Are there advantages for collecting both sets of data?

Owing to the complex nature of petroleum business issues, the researcher found it necessary to use both quantitative and qualitative research and also perceived that either quantitative research or qualitative research alone was not adequate to provide a comprehensive coverage of the complex supply chain management issues of the Zimbabwe petroleum industry. Therefore, in order to have a clearer understanding of the research problem qualitative interviews were held with executives from associative organisations and survey questionnaires were administered among managers in charge of petroleum companies' supply chain activities such as procurement, inventory control, transport and distribution(logistics), information and communications technology and customer service. At service stations which are not owned by the investigated petroleum company the owners or proxies of those service stations completed the questionnaires. All the information required for the study could not be obtained from either managers of petroleum companies or managers from associative organisations alone. Neither qualitative data nor quantitative data alone would satisfy the

study's information requirements. Since the different sources operated at different levels of the industry's supply chain there was bound to be variations between information available at these different levels.

Step 2

What is the rationale for using the mixed methods research design in your study? Do you have specific objectives for using mixed methods?

The motive behind the selection of the mixed methods design was the need for the researcher to provide a detailed account of the Zimbabwe petroleum industry's supply chain management issues as seen by all key stakeholders right from the upstream activities of the petroleum industry's supply chain to the downstream activities dealing with service station issues. On the one end, the researcher observed that in the Zimbabwean petroleum industry's supply chain, associative organisations dealt with supply chain issues at industry and national level. This is where strategic decisions and policy issues affecting the entire industry were determined. On the other hand, supply chain managers from the petroleum companies dealt with supply chain issues and decisions at company level. Decisions at this level directly affected users of petroleum products. These differences motivated the use of a two pronged approach which involved collecting qualitative data through in-depth interviews from associative organisations and quantitative data using self-administered questionnaires to collect data from petroleum companies' supply chain managers.

Step 3

Based on your research purpose, intent, timing of data collection and analysis and other reasons, select the most appropriate design from explanatory sequential mixed methods, exploratory sequential mixed methods and convergent parallel mixed methods design.

Out of the three mixed methods designs listed above, the researcher selected the convergent parallel mixed methods design because it allowed the researcher to collect both qualitative and quantitative data simultaneously but independently. The convergent parallel mixed method design also allowed the researcher to explore emerging issues in finer details at the data interpretation phase of the study. The study design was also selected based on study objectives which were both qualitative and quantitative in nature and concern for time and

resource limitations among other reasons. A comprehensive discussion of the convergent parallel mixed methods design is in section 4.3.3.4.

Step 4

The researcher developed a detailed purpose statement for the selected design showing the overall intent of the study and the goal of both quantitative and qualitative research. These were discussed in chapter one of the study.

Step 5

Formulate your research question that spans both qualitative and quantitative research, specifying the dependent and independent variables for your quantitative study and themes of the qualitative study. These are the data analysis issues discussed in Chapter five of the study.

Step 6

Choose the qualitative and quantitative data to be collected, identify the sources of data, the data collection instruments and how data will be collected. Quantitative data for the study was collected from the petroleum company's managers with supply chain management responsibilities using objective self-administered questionnaires. Qualitative data was collected from managers responsible for supply chain activities in the associative organisations using in-depth personal interviews. Overall, both the qualitative data and quantitative data sought to evaluate uncompetitiveness factors of the Zimbabwean petroleum industry's supply chain.

Step 7

Draw diagram showing your research procedures so that it guides the execution of the plan. The procedure for the convergent parallel mixed methods design is shown in Figure 4.3 in section 4.3.3.4.

Finally, Creswell and Tashakkori (2007) emphasize that, by using the mixed methods approach, the expectation is that, by the end of the manuscript, conclusions gleaned from the qualitative and quantitative research strands are integrated to provide a fuller understanding

of the phenomenon under study and their integration might be in the form of comparing, contrasting, building on or embedding one type of conclusion with the other. Therefore, the discussion chapter shall combine results from the qualitative and quantitative research approaches and demonstrate the existence of similarities and contrasts in the findings.

4.3.3 Mixed Methods Research Designs

The mixed methods research designs have different typologies or classifications which take the parallel/concurrent form and the sequential form. In the concurrent form which the researcher used in the study, qualitative and quantitative data are collected and analysed simultaneously and independently and merged during interpretation. In the sequential typology one type of data provides a basis for the collection of another type of data. This means the researcher completes the first methodology before moving to the second methodology (Cameron, 2009).

In line with the above two classifications, Creswell (2014) proposes four main mixed methods designs namely, explanatory sequential mixed methods design, exploratory sequential mixed methods design, advanced mixed methods design and convergent parallel mixed methods design. These designs can be explained using the notation system for mixed methods proposed and developed by Morse (1991) who was a strong proponent of the use of simultaneous methodological triangulation and sequential research which used results of one method for planning the next method.

i. $QUAL \longrightarrow QUAN\ Notation$ ***or*** $QUAN \longrightarrow QUAL\ Notation$

In the above notation the arrow indicates sequential collection of quantitative or qualitative data as found in explanatory sequential mixed methods and exploratory sequential mixed methods which are explained in 4.3.3.1 and 4.3.3.2 respectively.

ii. $QUAN + QUAN$ ***or*** $QUAL + QUAN\ Notation$

In this second notation the plus sign entails concurrent collection of qualitative and quantitative data as in the convergent parallel mixed methods design to be discussed in

section 4.3.3.4 below and this is the alternative used in the study. Note that, writing the notations in capital letters means that, in the study, the two data bases are at par. The importance given to the qualitative data is as important as the importance given to quantitative data. The other three mixed methods designs are explanatory sequential mixed methods, exploratory sequential mixed methods and advanced mixed methods design. In line with the foregoing mixed methods research literature and the fact that there are more than one mixed methods design strategies the following factors have been suggested for consideration when choosing a mixed methods design to use (Creswell, 2014).

Table 4.4: Factors Important in Choosing a Mixed Methods Design

Reasons for Choosing Mixed Methods	Expected Outcomes	Recommended Mixed Methods Design
Comparing different perspectives drawn from quantitative and qualitative data	Merging the two data bases to show how data converge	Convergent Parallel Mixed Methods Design
Explaining quantitative results with qualitative data	A more in-depth understanding of the quantitative results	Explanatory Sequential Mixed Methods Design
Developing better measurement instruments	A test of better measures for a sample of a population	Exploratory Sequential Mixed Methods Design
Understanding experimental results by incorporating perspectives of individuals	An understanding of participant views within the context of an experimental interventions	Embedded Mixed Methods Design

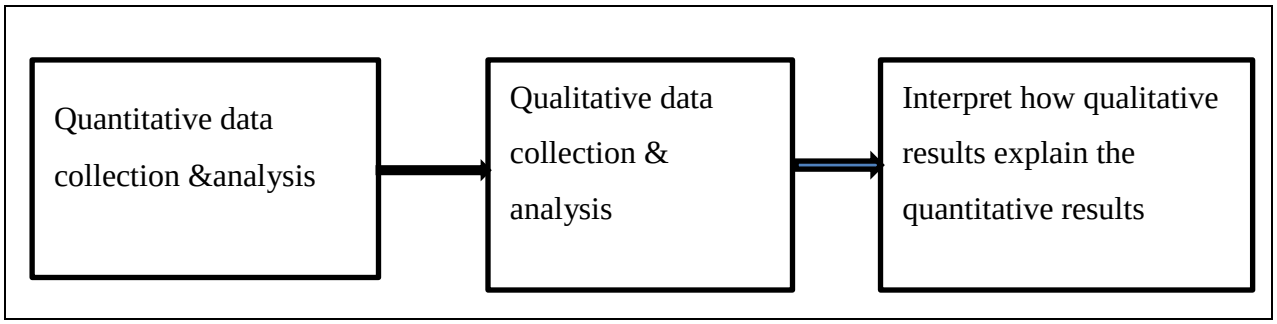
Source: Creswell (2014:282).

4.3.3.1 Explanatory Sequential Mixed Methods Design

The intent of the explanatory sequential mixed methods design is to use qualitative research findings to help clarify and explain certain quantitative results because the quantitative results provide a general picture of the research problem while the qualitative results refine, explain or extend the general picture (Creswell & Plano-Clark, 2011). In this design, data is collected

in two separate phases therefore the name explanatory suggests that the qualitative findings from the second phase help explain the quantitative results obtained from the first phase (Maree, 2016). The procedure for the explanatory sequential mixed methods design is shown in the diagram below.

Figure 4.1: Procedure for the explanatory sequential mixed methods design



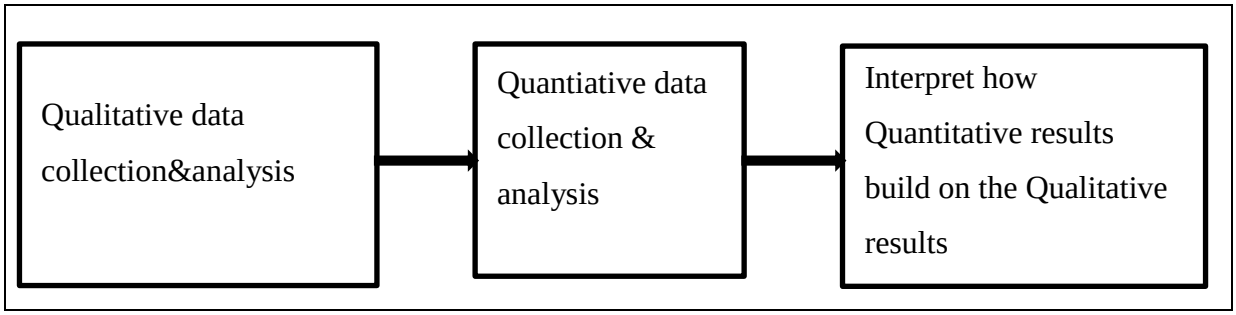
Source: Maree (2016:316)

The above model demonstrates that in the explanatory sequential mixed methods design the researcher first collects and analyses quantitative data which alone will not be adequate to address the research questions. This means that, the collected quantitative data alone does not permit the researcher to present conclusive study findings hence the researcher engages in qualitative data collection and analysis processes aimed at interpreting and/or explaining the quantitative results from the first phase of the study (Maree, 2016). Both quantitative research and qualitative research will be required but can only be implemented one after the other, starting with the former (Cameron, 2009).

4.3.3.2 Exploratory Sequential Mixed Methods Design

This design is used when the researcher first needs to explore a topic using qualitative data before attempting to measure or test it quantitatively (Creswell, 2014). For example, this can be experienced when you are studying a topic where no theory exists or when a researcher does not know which constructs are appropriate or how to measure important variables (Creswell & Plano-Clark, 2011). The procedure for the exploratory sequential mixed methods design is shown in Figure 4.2 below.

Figure 4.2: Procedure for the exploratory sequential mixed methods design



Source: Maree (2016:318)

According to the above model, the exploratory sequential mixed methods design permits the researcher to first collect and analyse qualitative data to explore a topic by identifying qualitative themes and generating theories. The researcher then uses that exploration to guide a subsequent quantitative examination of the initial qualitative results such as to test the new measures or to measure the new variables (Creswell & Plano-Clark, 2011). The qualitative phase of the research has to be completed then the quantitative phase is used to consolidate the first phase outcomes using quantitative techniques (Maree, 2016).

4.3.3.3 Advanced mixed methods design

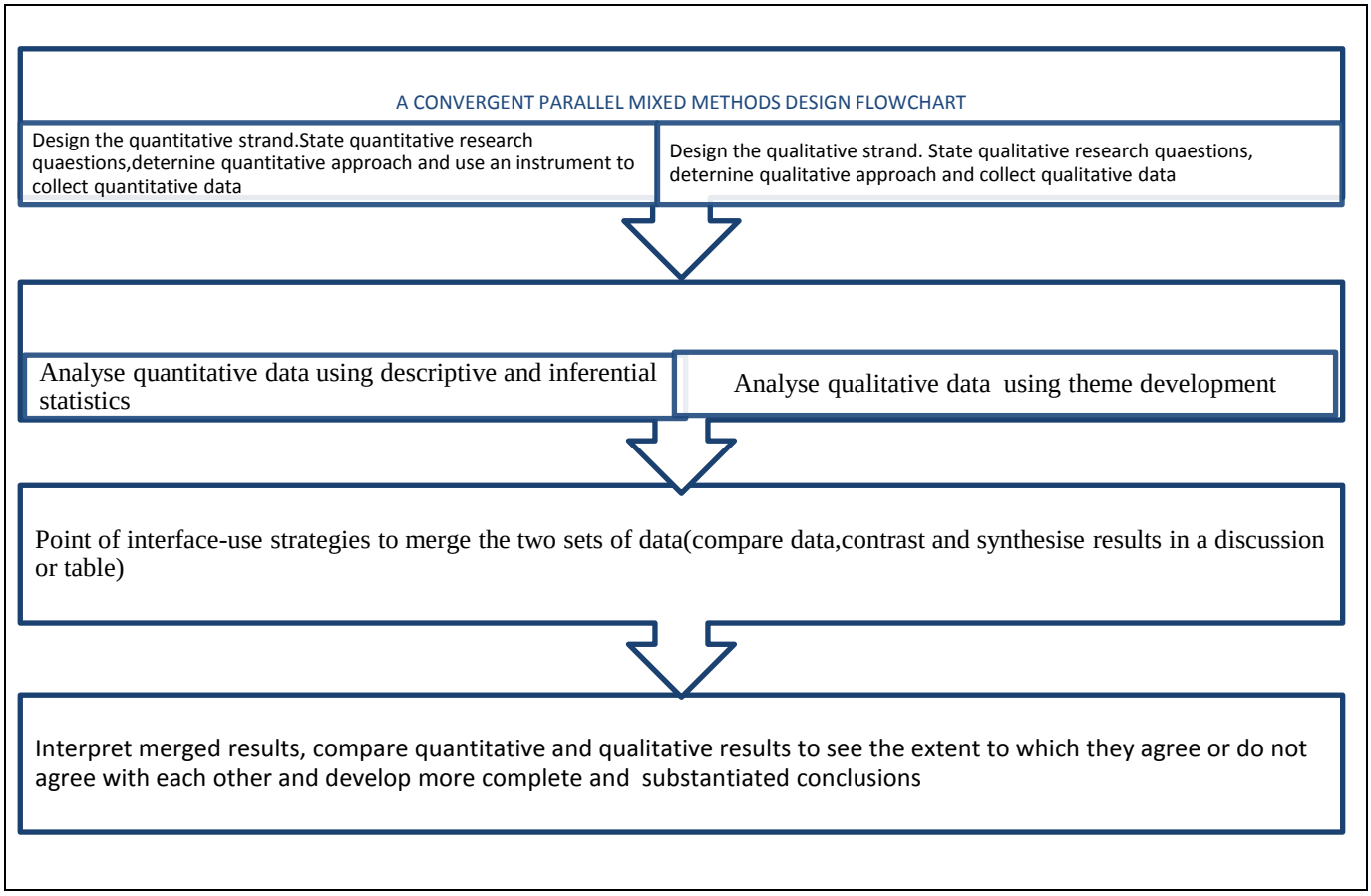
Advanced mixed methods design is where the researcher embeds one or more basic mixed methods designs within a larger methodological, programmatic or theoretical framework (Creswell & Plano Clark, 2011; Creswell, 2014). Embedded mixed methods are a type of mixed methods design that nests a convergent, explanatory sequential, or exploratory sequential method within a larger design or strategy. When applying the advanced mixed methods design the researcher chooses to collect, analyse and integrate quantitative and qualitative methods within a larger framework (Creswell, 2014). You can find quantitative experimental design, qualitative case study, action research and multistage evaluation design all in one study. The advanced mixed methods design requires more time and more resources which make it expensive.

4.3.3.4 Convergent Parallel Mixed Methods Design

The researcher adopted the convergent parallel mixed methods design for the study. Convergent parallel mixed methods is a mixed strategy in which a researcher collects both quantitative and qualitative data, analyses them separately, and then compares the two results to see if the findings confirm or disconfirm each other (Creswell, 2014). The design uses both quantitative and qualitative methods simultaneously and independently in order to develop more complete and valid understanding of the phenomenon of interest (Creswell & Plano-Clark, 2011). The convergent parallel mixed methods design was selected to explore uncompetitiveness factors of the Zimbabwean petroleum industry's supply chain in light of the implications this has on company operations. Convergent parallel mixed methods design involves the collecting of both quantitative and qualitative data at the same time about a single phenomenon in order to merge the different results by comparing and contrasting them to produce well-validated conclusions. The combination within the mixed methods allows the researcher to do a more complete examination of the research problem (Creswell, 2014).

The timing of the two methodologies is the same, the two methods have equal priority and both play equally important roles in addressing the research problem, both are independent during the data collection and analysis phases and both qualitative and quantitative results must be merged during the overall interpretation (Cameron, 2013; Maree, 2016). The merging of the parallel methods can be done to compare and contrast findings from the two methods for the purposes of corroboration or validation. Therefore, the merging of qualitative and quantitative results gives the researcher a more complete understanding of a phenomenon (Cameron, 2013). The integration of the two data sets must indicate the existence or lack of convergence that strengthens knowledge claims. The researcher therefore must have good knowledge of both quantitative and qualitative research procedures (Cameron, 2009; Tashakkori & Teddlie, 2010). Cameron (2009) further argues that, although the independent use of the two methods can provide insights into the topic, the researcher needs a strategy for dealing with the issue of different samples and sample sizes and merging different data sets. The proposed procedures for the convergent parallel mixed methods design are shown in Figure 4.3 below.

Figure 4.3: Procedure for the Convergent Parallel Mixed Methods Research Design



Source: Creswell and Plano-Clark (2011).

The above model of the convergent parallel mixed methods design demonstrates simultaneous but also independent collection of both quantitative and qualitative data sets through two separate processes which proceed to two separate analysis processes which are then merged at the interpretation stage, where the two sets of results can be compared and contrasted. The last and next stage in the process is to interpret the merged results from two sets of data and to arrive at research conclusion. Contrary to the explanatory sequential mixed methods and exploratory sequential mixed methods designs where one study is concluded in order to move to the second phase, in the convergent parallel mixed methods design both quantitative and qualitative research are concluded at the same time (Maree, 2016).

The presence of different supply chain members with different interests in the petroleum industry makes its supply chain complex and understanding these stakeholders' interests requires the use of a research approach that can handle complexity and this influenced the

decision to use the convergent parallel mixed method design which has potential to achieve depth, breadth and gathering accurate information about the petroleum industry's supply chain issues. By using mixed methods the researcher wanted to capitalize on the various strengths and offset weaknesses of quantitative research and qualitative research approaches (Bryman et al., 2014). It takes advantage of the fact that in practice, there is a thin line between quantitative and qualitative research approaches. This has given rise to the idea that the qualitative and quantitative methods might be combined (Creswell, 2015).

- **The Convergent Parallel Mixed Methods and its Application**

Researching on companies' supply chains is important because research has shown that above 80% of operational expenses of many companies' budgets go to their supply chain activities (Basu & Wright, 2010). Improving effectiveness in the supply chain through cost cutting initiatives and efforts to increase customer satisfaction are encouraged.

To effectively deal with supply chain problems in a complex environment researchers recommend the use of a robust research strategy such as the mixed methods research design (MMRD) because it takes into account multiplicity of variables, the need to understand how the different relationships have to work and the complexity of issues that are found in a supply chain environment (Creswell & Plano-Clark, 2011; Jogulu & Pansiri, 2011; Ngulube & Ngulube, 2015; Maree, 2016). All this is in sync with supply chain management environments which have multiple supply chain members who have different interests.

Supply chain management issues are naturally complex by virtue of the diversity and the dynamism they possess (Nag, Han & Yao, 2014). The fact that supply chain activities are implemented in almost every critical department of a company's operations requires supply chain staff to cooperate and collaborate with a number of external supply chain members as well. For example, the need for procurement staff to interface with different suppliers and their internal departments and the need for logistics staff to interface with suppliers and customers. People who are assigned to manage the different supply chain activities have different professional backgrounds and motivations, and integrating these varied differences to achieve an effective supply chain management system is a mammoth task on its own.

Therefore, investigating supply chain input activities requires the researcher to select and use robust and complex designs such as the convergent parallel mixed methods design.
The researcher perceived that any meaningful supply chain management research that has to come up with meaningful findings and conclusions must take into account the strategic nature and structural complexities of supply chain management. One strategic way of doing that is by using mixed methods research designs to investigate company issues related to supply chain management. Additionally, the fact that supply chain activities involve both intra-organisational and inter-organisational relationships entails the investigation of both internal and external supply chain stakeholders in a single study. Events simultaneously take place in both the internal and external supply chain domains hence research data about a particular issue are required to be collected at the same time. According to Creswell (2014), the convergent parallel mixed methods design is the most suitable design to achieve the goal of collecting both quantitative and qualitative data simultaneously.

That is the basic reason why the study adopted the convergent parallel mixed methods design which is a balanced aggregate mode where both quantitative and qualitative methodologies are equal in importance allowing the researcher to intentionally combine aspects of both paradigms throughout the study using the advantages of both where possible (Teddlie & Tashakkori, 2012). Farquhar, Ewing and Booth (2011) contend that, complementarity mixed methods design is used to investigate different aspects or dimensions of the phenomenon to deepen or broaden the interpretations and conclusions. The convergent parallel mixed methods design combines unique sets of data collected at the same time but could not be collected across both the qualitative and quantitative paradigms owing to the fact that the different sets of data needed could not be generated solely from either associative organisations or from petroleum companies' supply chain manager because these supply chain members have different mandates in the petroleum industry of Zimbabwe. The convergent parallel mixed methods strategy allowed the researcher to use both qualitative and quantitative research methods in order to produce a more holistic and contextual description of supply chain management activities of the petroleum industry of Zimbabwe. The study of supply chain management practices could uncover a unique variance that may not have been revealed through a single method.

4.3.4 Data collection

The study adopted the convergent parallel mixed methods design which combines qualitative and quantitative data collection methods. Quantitative data was collected using a survey questionnaire and qualitative data was collected through indepth interviews. The data collection processes are explained next.

4.3.4.1 Quantitative data collection

- **Population and sampling process**

The original plan was to collect data from managers with supply chain responsibilities in all the 23 licensed petroleum companies. However, only one out of the 23 accepted to participate in the study. Data for the survey research was therefore collected based on all managers in charge of supply chain activities in the Petroleum Company and companies it has dealership arrangements with.

All the ninety six (96) managers were targeted from the petroleum company and its distribution networks, 15 managers from head office and 81 managers or team leaders from the different service stations. The idea was to involve all the managers with supply chain responsibilities. In the study, respondents from the petroleum company were selected on a representative basis and according to the key supply chain processes they manage. The petroleum company owns and manages 19 service stations. Four of the service stations which are operated by the petroleum company operate on a 24 hour basis hence they have two shift managers each. The petroleum company has different dealership arrangements with the other 58 outlets. Thus, the study included 15 head office based managers, 23 own service station managers and 58 dealership service station managers making a total of 96 managers. According to Cuthbertson & Piotrowicz (2011) the selection of organisations involved in a supply chain to participate in a study could uncover characteristics of performance measures used in similar context as well as opportunities and challenges. Therefore, the sample size for the quantitative component of the study was made up of managerial staff from these departments at head office; Procurement, Inventory and Storage, Transport and Distribution (Logistics), ICT and Customer service. The 81 service station mangers (team leaders) were

selected on the basis that at their workstations they were in charge of all the operations of the service station which are mostly supply chain related activities. Their key areas of operation included stock replenishment and stock management, transportation scheduling, customer care and human resource management.

Osoro (2015) contends that total population sampling is a type of purposive sampling technique where you choose to examine the entire population that have particular set of characteristics such as specific experience, skills or exposure to an event. The entire population is often chosen because the size of the population that has the particular set of characteristics that you are interested in is very small (Meyer, 2010). Additionally, data collected from managers of supply chain functions and service stations were company specific and could not be provided by the associative organizations' under the phenomenological paradigm. The same information could also not be obtained from fellow employees since they were not involved in the companies' supply chain activities.

The selection of respondent for the study and the selection process adopted for the study involved stages of the sampling process identified by Zikmund and Babin (2010) which involves the following seven steps:

1. Defining the target population-employees with management responsibilities in supply chain management departments of the petroleum company and team leaders of distribution outlets. Both the company's own service stations and those service stations owned by dealership agents were included in the study;
2. Selecting a sample frame-sample members were taken from the company's employment records provided by the company's human resource department. A purposive sampling strategy ensured the inclusion of managers with supply chain management responsibilities only in the sample;
3. Determining if probability or non-probability sampling will be used- Some element of simple random sampling and stratified sampling were applied because all supply chain activities had to be represented in the sample;
4. Determining sample size- it is usually determined by the type of statistical analysis planned, accuracy of results required, and characteristics of the population. The study selected all the managers involved in supply chain activities. This included the 81 service station managers and 15 managers from the petroleum company's head office;

5. Selecting actual sampling units-a group of management employees at the petroleum company's head office functional units and at its distribution outlets dotted around the country were targeted. Only management employees with supply chain management responsibilities were selected for the final sample. For the quantitative survey the target sample was made up of 96 respondents;
6. Conducting field work-the researcher first dropped questionnaires for head office managers and proceeded to visit the various service stations. The researcher did not find some of the service station managers. These managers were asked to send their filled in questionnaire to head office using the petroleum company's overnight mailing system;
7. The next step was to ensure that collected raw data was effectively used after organising same through frequency distributions, proportions and determining measures of central tendency.

Research questions used were structured based on the five point Likert scales which ensure standard responses to the objective questions (Bryman & Bell, 2011). Under the Likert scale questions were developed to measure a sample of supply chain managers' attitudes towards adopting and implementing the supply chain management philosophy in their organisations. Pellissier (2007) notes that the Likert scale or attitudinal scales are rating scales that ask people to show the extent to which they agree or disagree with statements about a phenomenon under investigation. The use of the above strategy can enable the researcher to determine the result by calculating the mean and standard deviation of all the responses or doing frequency tables and graphs. The questions also allows for the calculation of total scores for the different objects in the questionnaire. The five point Likert scale was used in developing the questionnaire for the quantitative research. The Likert scale reduces potential for interview variability because possible answers are provided and respondents simply select answers that apply to them from a limited range. Respondents were required to answer questions in predetermined categories such as: strongly agree, agree, disagree and strongly disagree. Coding was used to allocate different numbers to categories and entering the numbers was linked to the selected categories.

- **Pre-testing the questionnaire**

The instrument was content reviewed by the researcher's work mates, senior academics and professors with research experience in marketing and management. The researcher also

benefitted from input from an international oil company executive who heads an international oil company's operations in Swaziland where the researcher was based during the period of the study. The research's supervisor and core- supervisor were involved in content reviewing the questionnaire that was eventually used in the quantitative study. The survey questionnaire was finally pre-tested with four managers who did not participate in the main study. Piloting or pre-testing the survey instruments is a screening procedure that involves a trial run with a group of respondents to iron out fundamental problems with the survey (Zikmund & Babin, 2010). This is to ensure that respondents will not experience problems in answering the questions. The main addition made during this process was the inclusion of clear instructions for respondents for questions about supply chain collaboration drivers, critical success factors, and supply chain management measurement.

The non-interactive survey approach involved managers completing objective questionnaires in their offices without direct interaction with the researcher. This gives respondents the opportunity to use their own discretion in responding to the questions and in the same process the researcher would not interfere with the questionnaire completion process. Respondents also have the latitude to decide when to complete the questionnaire based on given deadlines. However, in this self-administered type of questionnaire the researcher lacks control on who finally completes the questionnaire. Therefore, the researcher is not guaranteed that the person who completed the questionnaire is not the typical person in the sample especially when surveying corporate executives who have the tendency to pass on questionnaires to subordinates to complete (Zikmund & Babin, 2010). This is common because some managers can delegate subordinates like their secretaries to fill in the forms.

In an effort to avert the incidence of delegating the filling in of the questionnaire the consent form requested participating managers to fill in the questionnaires themselves. The approach which entailed absence of the researcher offered no opportunity for managers to interview the researcher who also lost opportunity of probing respondents. Information obtained using the survey questionnaires tends to be more reliable but it is limited to the issues asked in the questionnaire alone hence the approach has limited depth and breadth.The quantitative paradigm aimed to collect data about petroleum companies' supply chain operations and this kind of information is mostly company information that can be best sought from people occupying supply chain positions only. Those outside the petroleum companies and those in the company but in areas that have got nothing to do with supply chain management. They

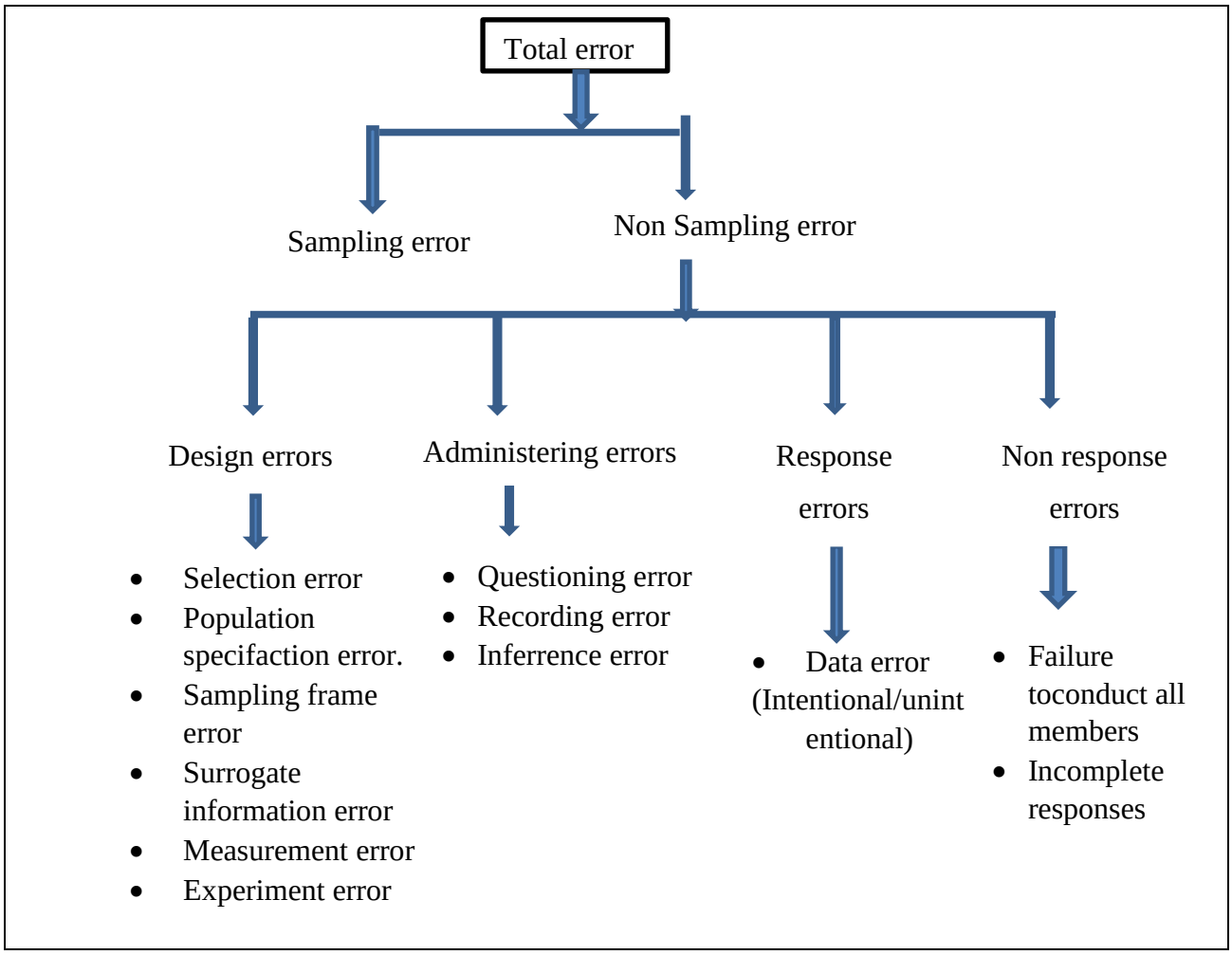
have little knowledge about the subject matter and possibly no idea about what will be happening and what ought to be happening in a company's supply chain. The researcher personally dropped off the questionnaires at all the service stations. Visiting the service stations gave the researcher an opportunity to experience what was happening at the service stations.

Using a standard tool to collect information from a homogenous group such as all managers responsible for a company's supply chain activities assisted the researcher in collecting data from many people at the same time. This became one of the study's strengths because petroleum products are merely commodities. Strategies used by companies selling commodities tend to be undifferentiated especially on the basis of elements such as product pricing and quality. Therefore, companies trading in commodities use undifferentiated management strategies in product pricing, promotion, distribution and so forth (Kotler, 2012). This makes it easy for researchers to use standard tools for collecting information from petroleum companies selling similar products. Thus, homogeneity of operations makes the collection of supply chain management information from any one of the significant players in the petroleum industry's downstream activities valid given the uniform nature of petroleum companies' operations and strategies.

- **Research design and implementation protocol**

The quantitative survey research was guided by the following research design and implementation protocol developed by Aaker, Kumar and Day (2011). This tool was adopted in an effort to minimise errors in the whole research process.

Figure 4.4: Errors in research design



Source: Aaker, Kumar and Day (2011:82).

Response errors and Non response bias

Response errors emanate from respondents' action or non- action which can lead to non-response and/or response bias. Non-response error is a result of statistical differences between a survey that includes only those who responded and a perfect survey that would also include those who failed to respond (Zikmund & Babin, 2010). Non respondents are people who are not conducted or who refuse to cooperate in the research. In the study, there was a single case of refusal to participate in the research project from the focal company's head office. The study also recorded five cases of no contacts, these were managers who were not at the work stations when they were visited. According to Zikmund and Babin (2010) a response bias occurs when respondents either consciously or unconsciously tends to answer questions with a certain slant that misrepresent the truth. This can be a result of deliberate falsification to get rid of the interview, to appear well informed, to please the researcher or a

result of people who respond more neutrally (Cooper & Schindler, 2010). After observing an element of response bias emanating from bias towards the neutral category which gave a biased outcome of the analysis, the study disregarded the neutral responses in the analysis.

Recording errors were addressed through employing a robust data capturing process. As questionnaires were being received from the respondents they were numbered and captured on a record sheet then locked away for safe keeping. When all the questionnaires had been collected the data capturing process began immediately with the assistance of two statistics undergraduate students who captured and compared the results. Data was captured using more reliable and stable Census and survey processing system (CsPro). CsPro is a public domain Windows based statistical data processing software package used by hundreds of organisations and individuals in for census and surveys (United States Census Bureau, 2016). However, the CsPro was limited to entering, editing, and tabulating, data. After data capturing had been completed all data were transferred to SPSS v.20 for further analysis. All the hard copies of the filled in questionnaires were kept under lock and key.

Random Sampling Error

Random sampling error is the statistical fluctuation that occurs because of chance variation in the elements selected for the sample (Zikmund & Babin, 2010). In the study this type of error was not considered to be relevant because the study did not use probability sampling methods.

Systematic sampling bias is a non-sampling bias resulting from some imperfect aspects of the research design that causes respondent and administrative errors. Zikmund and Babin (2010) posits that a sample bias can prevail when sample results show a persistent tendency to deviate in one direction from the population parameter systematically in a manner that will influence the respondent's answers. Respondent errors are therefore concerned about non-response or response bias. Response bias entail that there was some problem in the way the respondent consciously or unconsciously does not tell the truth when answering questions. The most common response bias includes acquiescence bias, extremity bias, and social desirability bias. Acquiescence bias occurs when respondents tend to agree with all or most of the questions. Extremity bias arises because some respondents tend to select the most extreme answers such as strongly agree or strongly disagree. Social desirability bias is when

respondents wish to create a favourable impression when they give answers they feel the researcher wants (Zikmund et.al, 2010; Maree, 2016).

Non-response is when there is no response or response bias. Non response can be a statistical difference experienced when researcher decides to include only those who responded as opposed to a perfect survey which would also include those who failed to respond. For example the study excludes those that failed to respond, yet it might be useful to investigate why there was no response from such people. Some of the reasons for non-response are that some managers were not at the work stations when they were visited and refusals (people who are unwilling to participate in the research study. Researcher experienced one refusal case at the petroleum company's head office.

Administrative errors

Administrative errors focus on data processing errors emanating from carelessness, confusion, neglect, omission, or some other blunder (Zikmund & Babin, 2010). The main types of administrative errors are to do with data processing errors such as capturing errors and omissions and sample selection errors which entails improper sample design.

All the above shows that surveys are amenable to many challenges and can therefore not solve all our research problems. Therefore, to optimise benefits from survey designs researchers need to carefully select and implement the most appropriate research design strategy for the study.

- **Response rate**

Response rate refers to the return rate and is the percentage of questionnaires sent out that is returned. According to reviewed social research literature, 50% response rate is considered adequate for analysis and reporting, 60% response rate is good and a response rate of 70% is very good (Bryman & Bell, 2011). Overall, response rate is one guide to the representativeness of the sample respondents. In the study, the response rate was 59.8%. Out of a total of 96 participants to whom the questionnaires were distributed, a total of 57 respondents filled in and returned the questionnaires. Out of a total of 81 questionnaires

administered among service stations only 43 were returned, and at the petroleum company's head office 14 responses were received out of 15 questionnaires.

According to Maree (2016) response rate is measured by the number of questionnaires returned or completed, divided, by the number of eligible people who were asked to participate in the survey. While a response rate of fifty per cent or greater are rare in such surveys, the researcher tried to improve the rate through use of an informative cover letter, asking interesting questions, good questionnaire design and using the phone in making follow ups. The researcher personally visited the petroleum company's head office and the service stations to drop off the 96 questionnaires. To save time, when the researcher was going to use a different route on the return journey, the researcher requested respondent to complete the questionnaire while he waited. The researcher dropped off the questionnaire and proceeded to the next service station if the same route was going to be used on the return journey. The researcher left questionnaires for managers who were not at their work stations when the researcher passed by. They were however followed up on by means of phone calls. Arrangements were also made with the petroleum company's head office to have dropped off questionnaire delivered to the company's head office through the company's overnight mail system and this worked well. Eight of the completed questionnaires were received via the company's overnight mail system. However, when the researcher visited the Matabeleland region most of the managers had gone to Harare for a training workshop hence the region's poor response rate of 30%.

Table 4.5: Questionnaire distribution by work station

Province	Locations	Distributed Questionnaires	Returned Questionnaires
Manicaland	Rusape, Nyanga, Zimunya, Mutare, Checheche, Birchenough, Chipinge & Murambinda	15	10
Mashonaland	Marondera, Mtoko, Mt.Darwin, Magunje, Guruve, Karoi & Chinhoyi	13	8
Harare	Goromonzi, Warren-Park, Msasa, Chitungwiza, Norton, Harare City	17	11
Midlands	Chegutu, Sanyati, Gokwe, Kadoma, Kwekwe, Mhandamabwe, Zvishavane, Mashava, Mberengwa, Zhombe, & Gweru	15	6
Masvingo	Chiredzi, Chatsworth, Masvingo, Ngundu, Zaka, Renco Mine, Nyika, &Roy	11	5
Matabeleland	Victoria Falls, Bulawayo, Gwanda, Plumtree & Brunapeg	10	3
Harare	Petroleum company head office	15	14
	TOTAL	**96**	**57 = 59.38%**

Source: Fieldwork

- **Data analysis strategy**

Quantitative research data was analysed using the Statistical Package for Social Sciences (SPSS) version 20. In the analysis focus was on descriptive statistics, frequency tables, cross tabulations, charts and graphs and inferential statistics to confirm existence of any association between variables.

- **Reliability of Data**

Cronbach alpha (α) values calculated using the SPSS were used to determine internal reliability or consistency of questionnaire items. In computations of the Cronbach (α) values,

when (α) is zero this means there is no consistency and when (α) is one this means there is complete consistency (Zikmund & Babin, 2010). Therefore, when a number of items are formulated to measure a certain construct there should be a high degree of consistency among them since they are supposed to measure one common construct (Maree, 2016). For items that are poorly formulated and do not correlate strongly, the alpha coefficient will be close to zero and results based on such items have low reliability. The suggested Cronbach alpha coefficient researchers uses as guidelines are: 0.9 for high reliability, 0.8 for moderate reliability and 0.7 for low reliability. Reliability of instruments of 0.8 is regarded more acceptable in most applications while values lower than 0.6 are regarded as unacceptable (Zikmund & Babin, 2011).

Table 4.6: Cronbach Alpha Reliability Coefficient Summaries

Reliability coefficient level	Comment
0.80 to 0.96	Very good reliability
0.70 to 0.80	Good reliability
0.60 to 0.70	Fair reliability
Below 0.60	Poor reliability

Source: Adapted from Zikmund & Babin (2010).

The following table shows reliability levels achieved in sections B to G of the survey questionnaire used in the study. These questionnaires sections represented the study objectives as indicated below.

Table 4.7: Reliability Levels of the current study

Study objective	Questionnaire section/Questions	Achieved reliability: SPSS determined
Managers' attitudes towards SCM activities	B/19 to 29	0.9
SCM's Critical success factors	C/30 to 39	0.8
SCM Collaboration drivers	D/40 to 49	0.8
SCM Performance measurement	E/50 to 62	0.9
SCM Challenges	F/63 to74	0.8
SCM Benefits	G/75 to 83	0.8
	Average	**0.843**

Source: Survey Questionnaire for the current study

On average this represents a very good reliability of 0.8 and suggests that items were thoroughly formulated.

- **Validity of data**

The extent to which the research instrument measures what it is supposed to measure is its validity. Instruments need to be scrutinised by experts to ensure a high degree of face validity which cannot be tested scientifically. The survey instrument was first discussed with a fuel supply chain expert who works for an international oil company that is based in Swaziland where the researcher stayed during the time of the study. Second, two professors in the Faculty of Commerce at the University of Swaziland where the researcher worked during the study period assisted in the questionnaire validation process. Third, the researcher's supervisors scrutinised the instrument before it was finalised. The last component of instrument validation involved a trial run of the instrument. This pre-test survey was done with four managers from the petroleum company's head office and four work colleagues (university lecturers). The screening process ensured the final questionnaire used had no fundamental problems.

Finally, study findings that combine the phenomenology and positivist orientations tend to have greater validity and less artificiality because observations are done in natural, real life

settings allowing researchers to also used more reliable research instruments to develop a more accurate evaluation of situations being studied (Saunders et al., 2009). On one hand phenomenology, has poor reliability of findings owing to the fact that different researchers may arrive at different conclusions and on the other hand positivism does not allow researcher to probe respondents for more detailed and valid data (Straits & Singleton, 2011).

4.3.4.2 Qualitative data collection

Apart from collecting data from managers of the petroleum company and its distribution outlets as explained under quantitative research the researcher found it necessary to also collect qualitative data from key external supply chain members of the Zimbabwean petroleum industry. Associative organisations were perceived to play the most critical role in the petroleum industry's support services. Therefore, the trio of Ministry, ZERA and NOIC constitutes the population of the qualitative research component of the study. These three organisations were selected based on the fact that they are the backbone of the petroleum industry in Zimbabwe because they provided key support services to the petroleum industry operators. They offer common strategic support services to all petroleum industry stakeholders. None of the trio is in competition with any other player in the industry. Therefore, issues to do with lack of transparency, accountability, conflict of interest and impartiality were not anticipated under the industry structure that prevailed.

In qualitative studies the informants must be sufficiently knowledgeable about the situation in the study hence the most appropriate way to extract as much information from them is through talking to them. Research methods used in qualitative research include focus group discussions, semi-structured interviews and in-depth interviews.

Focus group interviews are unstructured, free flowing interviews with small groups of six to ten people. Focus group interviews were not used in the study because focus group interviews are appropriate when the researcher targets to collect data from a large sample that can be subdivided into groups. According to Zikmund and Babin (2010), focus group discussions are suitable when the research is targeting many people with similar characteristics and when the researcher wishes to interview at least five groups. The target population in the qualitative research comprised of three associative organisations, Ministry of Energy and Power

Development, Zimbabwe Energy Regulatory Authority and National Oil Infrastructure Company of Zimbabwe. Six executives were sampled from the associative organisations based on the positions they occupied in the organisations and the experience they had in dealing with petroleum industry supply chain management issues. These six executives did not necessarily share any characteristics apart from being members of the Zimbabwe petroleum industry's supply chain. Therefore, the researcher wanted to benefit more from the six executives by engaging them individually.

Semi-structured interviews are one-on-one based interviews where open questions are asked. Semi-structured interviews can involve questions that require written and oral responses from the interviewees (Cooper & Schindler, 2010). The researcher did not use semi-structured interviews because of challenges associated with analysing them and asking industry executives to sit down and write essay type answers was not practical. Although the executives had busy schedules, they set aside time for the interviews out of respect of the physical presence of the researcher. Because of the above, the researcher used in-depth one-on-one interviews.

In-depth interviews are face to face interviews. They are open-ended interviews that permit the respondent to describe what is meaningful and salient without being pigeon holed into standardised categories (Pellissier, 2007). In-depth interviews are one-on-one interviews where the researcher aims to get considerable insight from the respondent. Respondents in such interviews must be experts in the area of study. Based on the fact that all the six executives were experienced experts in the petroleum industry, the researcher had an opportunity to ask many questions, particularly about strategic petroleum industry issues. The researcher was also able to ask follow up questions on emerging issues through probing. This can result in theory being developed from the way people react to something (Straits & Singleton, 2011). When using in-depth interviews data and findings are based on direct researcher-to-respondent conversations [in person or by phone] (Bryman, et al., 2014). Interview based research may be optimal when there is a small population of possible respondents, when focus is on depth of collected data and when breath is simply not attainable (Zikmund et al., 2010). However, in-depth interviews can be as long as one hour and above hence they are time consuming (Aaker, Kumar & Day, 2011). In the current study all the six interviews lasted between one hour to one and half hours.

Bryman and Bell (2011); Maree (2016) note that, the basis for sampling in qualitative research include the following:

1. The sampling strategy should be relevant to the conceptual framework and the research questions addressed by the research;
2. The sample should be likely to generate rich information on the type of phenomenon which need to be studied;
3. The sample should enhance transferability of findings;
4. The sample should produce credible descriptions/explanations (in the sense of being true to real life);
5. The sample should take ethical preconditions (such as vulnerability, informed consent, etc.) into consideration;
6. The sampling should be feasible in terms of money and time, and practical issues of accessibility have to be reconsidered.

A brief recap of the responsibilities of these three organisations follows. On behalf of Government the Ministry of Energy and Power Development provides policy guidelines and direction to the Zimbabwean petroleum industry, ZERA regulates the operations of petroleum companies and NOIC manages the national fuel pipeline and national storage facilities which are utilized by all petroleum companies for inbound and outbound logistics (fuel transportation and storage).

The strategic nature of the selected associative organisations and the diversity of petroleum industry issues they dealt with compelled the researcher to tap into their senior managers' knowledge and experience. Thus, in-depth interviews were conducted with them for the purpose of depth and breath, and seeking to explore, discuss and probe the issues raised during the in-depth interviews (Maree, 2016). The extent to which all key stakeholders were consulted and engaged in an inquiry enhances the "democratic validity'' of the study (Babbie, 2007). The interviews targeted senior managers in charge of the petroleum industry activities only because the researcher felt they were the best sources of information on the petroleum industry at both, industry and national levels. Attitudes and perceptions of these executives about the Zimbabwean petroleum industry's supply chain management were noted and recorded independently. Each respondent was given enough time to discuss pertinent supply chain management issues of the Zimbabwe petroleum industry.

However, the study did not include some organisations that are part of the petroleum industry's supply chain such as suppliers, customers, logistics service providers and others so as to keep the size and scope of the study within manageable levels and in tandem with time and economic constraints. Any impact of this exclusion was considered insignificant to affect the objectives of the study.

The fact that the researcher singled out special stakeholders, The Ministry, ZERA and NOIC, for inclusion in the study means the sampling process was targeted and this is called purposive critical case sampling. According to Babbie (2007; Maree, 2016),critical case sampling involves cases that are chosen on the basis that they are pivotal in the delivery of a process or operation explaining policy issues and giving personal judgements about the phenomena under study. The logic is that these cases will be critical to any understanding offered by the research.

A purposive or judgemental sample is one that is selected based on the knowledge of a population and the purpose of the study, and prior knowledge the researcher had (Bryman et.al, 2014). In purposive sampling individuals can be selected because of some defining characteristics that make them the holders of specific data needed for the study. Like in the study petroleum industry strategic issues are dealt with by the trio of Ministry of Energy and Power Development, ZERA and NOIC only. All the other stakeholders are traders or service providers. The logic and power of purposive sampling lies in selecting information rich cases for in-depth study (Stair & Singleton,2011).Purposive sampling dominates qualitative in-depth research studies and samples as small as 4 individuals can render extremely accurate information with a high confidence level (Maree, 2016).

Additionally, there are no rules for sample size in qualitative inquiry. Sample size depends on what you want to know, the purpose of the inquiry, what is at stake, what will be useful, what will have credibility and what can be done with available time and resources (Maree, 2016). What was important is that the sample generated rich information for the researcher on the supply chain management phenomenon being studied. The sample was also made up of people that the researcher knew to be the custodians of petroleum industry information and people who handled such information in trust. Information you would not get from any other sources in the industry was provided by the six executives. Focus on the six executives alone was also in line with the time and financial resources available for the study.

Thus, the sample size of six executives from the petroleum industry's associative organisations is justified on the basis that they have relevant experience in the Zimbabwean petroleum industry's supply chain issues, they have access to the local industry's supply chain information and they deal with strategic information. This guarantees the credibility of contributions from them. Bryman et al. (2014) argue that, it is fairly common in business survey research for one respondent, often a senior manager, to be asked to complete a questionnaire or to be interviewed about issues that are related to their organisation or workplace. Therefore, the researcher was convinced that the selection of six executives from the three associative organisations only was going to generate useful information to address the purpose and objectives of the study.

- **Sampling procedures for qualitative studies**

Qualitative studies are predominantly associated with non-probability sampling and the main non-probability sampling methods are convenience sampling, quota sampling, snow ball sampling and purposive sampling.

- **Convenience sampling**

A convenience sample is one that is available to the researcher by virtue of its accessibility. The convenience sampling method is too simplistic, subjective and makes it difficult to generalise findings to the population and was not used in the study.

- **Quota sampling**

Quota sampling is a non-probability sampling procedure that ensures that various sub-groups of a population will be represented on pertinent characteristics to the extent that the investigator desires (Zikmund et.al, 2010). The aim of quota sampling is to produce a sample that reflects population in terms of the relative proportions of people in different categories, such as gender, age groups and socio-economic classifications (Bryman & Bell, 2011). Again, this sampling method was not used because the said categorisations were irrelevant and not necessary in the study.

- **Snow ball sampling**

When using snowball sampling the researcher makes initial contact with a small group of people who are relevant to the research topic and then uses them to establish further contacts with others. Usually, snow ball sampling is relevant when the required informants are few and do possess some unique characteristics and also know each other. This sampling strategy was also not suitable and not used for the study (Jansen et.al, 2016).

- **Purposive sampling**

The qualitative research component of the study used purposive sampling. The researcher purposively targeted executives with supply chain knowledge and experience. Two senior executive were selected from each of the three associative organisations whose operations closely interfaced with the petroleum companies' supply chains (Government, ZERA, and NOIC). The selection of candidates for the in-depth interviews was influenced by the fact that informants in the study were required to have relevant supply chain specific experience including: policy formulation from ministry officials, logistics information from NOIC and regulation and compliance information from ZERA officials. All the six executives were in charge of relevant supply chain issues in their organisations. The goal of purposive sampling is to sample cases/participants in a strategic way so that those sampled are relevant to the research questions and sample members usually have a variety of characteristics. According to Cooper and Schindler (2010) and Zikmund et.al (2010), the goals of purposive sampling are to:

1. understand the selected respondents;
2. receive reliable representation;
3. receive data from the most relevant population for the study;
4. deliberately examine theories that you have started with or which have developed during the research process;
5. establish comparisons from different participants to further enlighten the research findings.

- **Data collection process**

Prior to conducting the interviews the interview guide was discussed with a petroleum industry expert working for an international oil company that is based in Swaziland and two Professors in a university faculty where the researcher worked during the period of the study. The questions were also discussed with the research supervisors. This was done to ensure appropriateness of the interview questions in achieving the objectives of the study. A pilot study was also conducted with two respondents similar to the six executives used in the full study to make sure language used and things asked were appropriate for the purpose of the study. The latter process resulted in two questions which were considered inappropriate for supply chain management being dropped. In qualitative research questionnaire pre-testing can serve as a guide for a large study. It examines specific aspects of the research to see if the selected procedures will actually work as intended (Zikmund & Babin, 2010).

The researcher was actively involved in qualitative research data collection by personally interviewing the six executives from the associative organisations. The researcher sought and obtained authorisation from heads of the three organisations to interview personnel from the organisations at the preliminary stages of the study. Interview appointments were made one month ahead of the planned interview dates and also confirmed a week before the interview dates. The researcher arrived in Harare (venue of all the six interviews) a day before the interviews and confirmed the appointments. All the six interviews were held according to schedule except two which had minor time adjustments due to business commitments on the part of the respondents. Otherwise all the planned interviews were successfully held. However, all the respondents did not accept to be video or tape recorded except one. Therefore, during the interviews the researcher took down some notes and recollections were done immediately after the interviews in the order of interview guides. This enabled researcher to compare responses from the different interviewees, identify key (dominant) themes and discussion points which became the basis for qualitative data analysis.

There was 100% response rate in the qualitative research because all the six executives were interviewed successfully and they were very cooperative.

- **Data analysis strategy**

According to Maree (2016) three levels used in analysing qualitative data include interpretation analysis, structural analysis and reflective analysis. Interpretation analysis involves the examining of data constructs, themes, categories and patterns in a discourse in order to explain a phenomenon. Structural analysis involves examining data patterns in a discourse and text with significant inferences to the meanings of the patterns. Reflective analysis entails making value judgements on the phenomenon and reconstructing respondents' reality through a rich descriptive narrative of their values and perceptions (Creswell, 2014; Maree, 2016). A combination of all the three levels of qualitative analysis was used to understand supply chain management as it relates to the Zimbabwean petroleum industry.

4.3.5 Ethical considerations

When carrying out research, both quantitative and qualitative researchers must conduct themselves in a professional manner ensuring the entire process does not violet the rights of those people who provide them with information. Listed below are some of the steps that the researcher took to ensure the study complied with research ethics and the steps were adopted from (Bryman, et al., 2014; Creswell, 2014; Maree, 2016).

Prior to the commencement of the study the researcher obtained appropriate permission and authorisation to access corporate information. Permission was granted by the organisations' Chief Executive Officers (CEOs) who also cleared the researcher to interview key personnel who had been identified as potential sources of information which was considered relevant for the study. When carrying out a business related study it is important to observe and comply with ethics provisions because the risk of compromising respondent companies' confidential information solicited during interviews has the potential to expose the company to more competition and eventually loss of market share and revenue (Zikmund et.al, 2010). Although the affected companies can access the whole or part of the project report upon request from the University the researcher does not intend to use any of the information in the final document for commercial purposes.

The researcher explained the problem and purpose of the study and how the participating organisations were going to benefit from the study. The researcher guaranteed privacy and confidentiality of information received during interviews and questionnaire administration and maintained the promise by ensuring that there was no information leakage what so ever. Interviews and the process of filling in the questionnaires were done during periods that were convenient to the respondents. This was done to minimise work disruptions. Except for the interviews which used open ended questions, the survey research used standard objective close ended questions. All those who participated in the survey received the same questions and they were given time to complete the questionnaire. At any one point in time all records pertaining to the study were kept under lock and key and will be kept under same conditions for at least five years.

Data analysis ensured a balanced disclosure which considered and reported both negative and positive aspects of the findings in a manner. Use of codes and pseudonyms in questionnaires and interviews guaranteed anonymity of participating organisations and individuals. The research reports contained the true reflections of the study findings without any falsification of evidence, findings and conclusions. Participating organisations were promised copies of the findings once the whole process was completed and efforts will be made to publish some of the research findings as a way of sharing information.

4.3.6 Shortcomings of the concurrent parallel mixed methods design

The problem with quantitative designs is that they can only describe the situation as it is now, or as it was in the past. They can give little guidance on what should take place in the future, and this is a limitation when research is supposed to be aiding policy formulation (Johnson, Turner & Onwuegbuzie, 2007). Another weakness is that when using the questionnaire to collect data some participants tend to be rather cautious when filling in the multiple choice rating forms because they could never be sure what the data would be used for, therefore, they usually avoid extreme responses in either direction (ibid). Respondents also feel frustrated as they cannot qualify or expand answers and they may be forced to choose among alternative answers that they find unsatisfactory (Straits & Singleton, 2011).

First, the core purpose of the study was to analyse uncompetitiveness factors of the Zimbabwean petroleum industry's supply chain and to advocate for effective strategies that could be implemented to solve the problem of uncompetitiveness problems which are faced by petroleum companies. Therefore, there was a need to understand supply chain managers' attitudes and perceptions towards implementing the supply chain management philosophy in a petroleum industry and its implications on operations. To achieve this goal, the original plan was to do a survey among all of Zimbabwe's 23 licensed petroleum companies and to interview six executives from the industry's associative organisations. The study was compromised by the refusal by petroleum companies to participate in the study, a move that resulted in the survey research component that focused on 96 supply chain managers of one petroleum company and its distribution network. Therefore, the sample was rather small. As a result the views expressed in the survey research cannot be a solid base of generalizing study findings beyond the investigated company and its distributorship. However, the findings are a good starting point for further studies on supply chain management issues in the petroleum industry of Zimbabwe. Strategies used by all companies selling similar commodities tend to be undifferentiated especially on the basis of elements such as product pricing and quality. Therefore, companies trading in commodities use undifferentiated management strategies in product pricing, promotion, distribution and so on (Kotler, 2012). This makes the study benefits beneficial even to petroleum companies which did not participate in the study. Thus, homogeneity of operations makes the collection of supply chain management information from any one of the significant players in the petroleum industry's downstream activities valid given the uniform nature of petroleum companies' operations and strategies.

Second, Bimha (2001) observed that, attitudes and perceptions change over time hence in order to improve accuracy attitudinal studies needed to be done in a phased approach over a period of time. The limited time frame for the current study, which was linked to financing problems and submission deadlines, was too short to implement follow up interviews and surveys. Therefore, the current research results can only be accepted as a basis upon which further detailed studies can be done, over time.

Last, it was surprising to discover an industry where companies resist the formation of an industry association which could be a platform where companies are expected to come together, cooperate and present industry issues to the authorities with one voice especially issues that affected all the players such as lack of foreign currency and high fuel duties in

Zimbabwe. Unfortunately both the qualitative interviews and the survey research could not get the reasons for the surprising negative behavior of petroleum companies towards forming a petroleum industry association. The researcher felt this was an issue that required a separate study to discover reasons behind this unexpected behavior from petroleum industry players. This was aggravated by the fact that planning for the industry required the involvement and participation of critical supply chain members, especially petroleum companies. Planning for the industry can never be effective without accurate information. The industry required forums for generating information which could be used to formulate strategies for the industry (Chopra & Meindl, 2013). Something needed to be done to encourage petroleum industry players to participate in research studies about different activities of the petroleum industry.

4.4 Chapter summary

The study methodology was highlighted with a focus on both, positivism and phenomenology paradigms. Three research approaches, qualitative research, quantitative research and mixed methods research were discussed emphasis being put on the latter which was selected for the study. Discussions of the chapter cascaded down to the specific research designs found under the mixed methods research. Four mixed methods designs were explained, explanatory sequential mixed methods design, exploratory sequential mixed methods design, advanced mixed methods design and the convergent parallel mixed methods design which was used in the current study. A detailed explanation of the convergent parallel mixed methods design was given based on both qualitative and quantitative data collection methods adopted for the study. The chapter explained the qualitative and quantitative research strategies to be employed in trying to achieve the objectives of the study. This led to specific questions being asked under both, the qualitative interviews and quantitative survey. The discussions explained the study population, sampling process and sample sizes under both qualitative and quantitative data collection. A detailed explanation was also made about how data was collected for both, the qualitative research using in-depth interviews and the quantitative research using self-administered questionnaires. The chapter ended with some discussion on the contributions of the study and some shortcomings of the convergent parallel mixed methods research design. The next chapter will present the results of both the survey research and the in-depth interviews.

CHAPTER 5: DATA ANALYSIS, RESULTS AND FINDINGS.

5.1 Introduction

The study used a convergent parallel mixed methods design strategy whereby quantitative data and qualitative data were collected simultaneously and independently from selected Zimbabwean petroleum industry supply chain members. The analysis aims to determine what supply chain management initiatives were being implemented in the Zimbabwe petroleum industry and any association between such initiatives and petroleum companies' competitiveness. In-depth interviews with supply chain management executives from the Ministry of Energy and Power Development, Zimbabwe Energy Regulatory Authority and National Oil Infrastructure Company (the associative organisations) and self-administered questionnaires with petroleum companies' supply chain managers provided primary data for the study. This chapter presents the study findings. When presenting mixed methods research design results the results from the qualitative and quantitative research will be presented separately, the two data sets are then merged when the study results are discussed (Cameron, 2013; Maree, 2016). In the study the merged results will be discussed in Chapter six.

5.2 Qualitative research analysis and findings

An interview guide that was prepared in advance guided the in-depth interviews with six executives from the associative organisations. Interviews were organised through email correspondence with the respective organisations' corporate communications officers. All the interviews were held at the executives' offices in Harare and they lasted between one to one and half hours each. There was a high level of cooperation from all the six executives.However, for anonymity's sake, the presentation shall identify respondents as Respondent One, Respondent Two, up to Respondent Six. The presentation of qualitative research results is theme based and organised under the following categories:

- The Zimbabwe petroleum industry's business environment;
- The petroleum industry's supply chain strategy;
- The petroleum industry's structure;
- Supply chain managers' attitudes towards implementing the supply chain management philosophy;

- Supply chain management's critical success factors;
- Supply chain collaboration;
- Supply chain management challenges and benefits.

5.2.1 Zimbabwe petroleum industry's business environment.

Under this theme respondents, talked about the macro environmental factors which influenced the petroleum industry's operations and this included political, economic, social, technological and environmental factors. These are not company specific issues but common factors affecting all the industry players.

5.2.1.1 Political factors affecting the Zimbabwe petroleum industry

Economic liberalisation of the petroleum industry which the Government embarked on in 2003 with the objective to create business opportunities for indigenous companies and to deregulate the petroleum industry's operations and the indigenisation policy of 2007 which restricted foreign ownership of companies to 49% were the political factors raised in the interviews.

Respondent One explained that;
The first political decision made by the Zimbabwean Government was liberalizing the petroleum industry. Before 2003 the Government procured fuel on behalf of petroleum companies. Therefore, the Government embarked on the petroleum industry's liberalization initiative so that petroleum companies could import fuel using their own resources. Under this arrangement, petroleum companies must find their own foreign currency and go into supply arrangements with suppliers of their choice.
He added that;
In a liberalised petroleum industry companies could operate as procurers, wholesalers, or retailers. Companies could operate at any level without any restrictions on what a registered operator can do or cannot do implying small companies were disadvantaged and were being muscled out of petroleum business and this needs to be revisited. Procurers were importers who could sell petroleum products to any licence holder. They paid USD 20,000 licence fees per year and earned a maximum of 6% margin prescribed by ZERA. Wholesalers were

operators who bought product locally from importers and resold it to retailers. They paid USD 10,000 licence fees per year and earned a maximum of 6% margin prescribed by ZERA. Retailers were operators who sold fuel direct to motorists, mostly at service stations. They paid USD 5,000 licence fees per year and earned a maximum of 7% margin prescribed by ZERA. Retailers usually operated DOCOs, COCOs, CODOs and other dealership arrangements. Producers were direct producers of ethanol which was used to blend petrol or operators with blending licences. Licence fees for producers were set at USD 15,000 per annum.

Green Fuels and Triangle were the only producers of ethanol at the time the study was carried out. However NOIC was registered as a producer for the purposes of providing blending services only.

Respondent One also said;

The second political decision was the Government's indigenization policy; the indigenisation policy was an affirmative action policy adopted in 2008 to promote entry into the petroleum industry by local black owned companies. The policy prescribed a 49 % share ownership limit for foreigners in petroleum companies.

Respondent Six noted that,

The liberalisation and indigenisation policies did not bring about the desired results because multinational companies that were already established in 2008 still dominate the industry's operations and local companies were struggling for market share owing to lack of capital. The liberalisation policy has also not achieved the anticipated results because right now all petroleum companies are struggling to get foreign currency for their fuel imports requirements and they can hardly pay their suppliers.

5.2.1.2 Economic factors affecting the Zimbabwe petroleum industry

Economic factors addressed in the interviews include foreign currency shortage, pricing policy, and the country's tax regime. Focus of the interviews was on how these factors affected petroleum companies' operations.

Respondent Three described foreign currency shortage as the worst hindrance that could cripple petroleum industry operations and added that;

Foreign currency shortage was a national problem. Owing to the fact that the country was not productive, there were no exports, Zimbabwe was a net importer of almost everything and there was under capacity utilisation of most infrastructures like the pipeline, it was a pity that operators did not access the dollar in a dollarized economy.

Respondent Two added that,

The foreign currency situation was exacerbated by the fact that motorists are now using plastic money and bond notes for their fuel purchases yet petroleum companies require the greenback to replenish stocks. At the same time there were issues with the way the Central bank managed the allocation of foreign currency.

Respondent Five said;

Because of foreign currency challenges the country was already experiencing fuel shortages and this reminded the public of the 2007and 2008 period when people slept in fuel queues at service stations.

The second economic issue to emerge from the interviews was that the petroleum industry's pricing regime was affected by cost of product, level of duties, transportation costs and prescribed margins.

Respondent Three said;

Zimbabwean petroleum companies procured expensive fuel because they did not have bargaining power. Their sources of supply were limited and therefore charged whatever prices they want and these prices are passed on to motorists. People could be buying cheaper fuel from South Africa but they are discouraged by the four cents surcharge ZIMRA charges for fuel imports by road and the Environmental Management Agency charges a flat US$84.00 per truck.

Respondent Two also pointed out that;

Apart from high prices our fuel is expensive because duty charged by Government on fuel was about fifty six cents per litre of petrol and forty four cents on diesel. I saw a report which said Zimbabwe's duties on fuel were the highest in the region. Our costs, even NOIC transport charges for storage and pipeline usage are very high. After having considered complaints from petroleum companies Government recently directed NOIC to reduce its charges. The Ministry of Energy and Power Development in December 2016 directed NOIC to revise its pipeline charges down with effect from January 1 2017. As a result pipeline

charges dropped from USD 80 per cubic metre to USD 60.5 per cubic metre for the benefit of all players. The Ministry, however, could not do anything about the high duties of 56 cents per litre on petrol and 44cents per litre on diesel because the Ministry of Finance was responsible for duties and other taxes.

Still on the issue of pricing Respondent Five added that;
The issue of the prescribed margins was another problem. A product cost build up template that determines the fuel selling prices at importer, wholesaler and retailer levels was set by the trio of Ministry, NOIC and ZERA. The template allows importers and wholesalers to charge a 6 % margin and retailers 7 %. The problem is that importers and retailers can also operate service stations. They will forego part of the retail margin to make their products cheaper than ordinary retailers. This price template does not cover all the costs that petroleum companies incur to land product at the service station that is why companies were struggling to survive.

Respondent four also linked the pricing challenges faced by petroleum companies to distortions caused by illegal importations, product adulteration, over blending, and false declarations. The implication of all these was that the practices gave the perpetrators an unfair advantage over genuine traders who complied with statutes governing the operations of the industry.

5.2.1.3 Social factors affecting the Zimbabwe petroleum industry

Under this section discussions focused on the petroleum industry's stakeholders' failure to organise a petroleum industry association, unethical practices by petroleum companies and how the Government intervened in these circumstances. Respondent One said;
It was common practice to have industry associations because they can lobby the Government whenever they wanted it to address an industry's common problems such as the prioritisation of the Energy sector in the allocation of foreign currency and reconsidering the issue of exorbitant duties. In order to achieve this there is need to form a petroleum industry association so that petroleum companies could speak with one voice. I am actually surprised that petroleum companies resisted Government efforts to organise them into an industry association.
Meanwhile Respondent Four added that;

The Government responded to the problem of product adulteration (mixing paraffin and diesel) by raising paraffin duty from zero to 44 cents per litre so that there was no incentive for operators to mix the two, but this is unfortunate for genuine users of paraffin. Petroleum companies or carriers in transit to other countries were not supposed to pay duty when they enter into Zimbabwe. However unscrupulous companies under this category offload their cargo in Zimbabwe when it is declared as in transit to other countries. After offloading product in Zimbabwe they proceed to their destinations with tankers reloaded with water.

When the researcher was in Zimbabwe collecting data for the study, 4 diesel tankers were intercepted by ZIMRA officials while carrying over 140 000 litres of diesel that were purportedly in transit to DRC. The diesel had been offloaded and replaced by water and Government was prejudiced of USD 55, 650.00 in duties in the process. The implication was that these anti-social and unethical practices forced authorities to implement measures which discouraged such practices. Unfortunately, measures that were taken against the offenders also affected innocent players who were not engaged in illegal activities.

Respondent Three said;

P*etroleum companies were concerned that although international oil prices were dropping they cannot afford to increase their margins or pass on the price advantage to customers because as prices go down the Government immediately increased duty on fuel. The same applies to it imposing blending regulations for petrol when companies imported refined petrol which was unblended and is recommended because it caused less contamination to the environment. Blending of petrol is a form of import substitution through which government wants to make fuel available at affordable prices and to support local biofuels producers find a market for their product. H*owever, *some stakeholders such as vehicle assembly companies thought blending of petrol was unnecessary because the country was already importing finished products that met the SADC region's fuel specifications which were the ones prescribed for new vehicle models they sold. Moreover ethanol suppliers did not have capacity.*

During the time the researcher was collecting data ethanol producers ran out of ethanol forcing the Government to reduce blending ratio of petrol from 15% to 5% and this was a typical case that caused uncertainty in the market. Respondent Two said;

It was common to experience product shortage and cited the December 2017 reduction of blending levels of petrol from 15% to 5% because producers of ethanol are failing to meet demand and the blending levels always change and petroleum companies are never certain

for how long they should plan for a particular blending ratio. Therefore, ethanol producers are enjoying Government protection yet they could not deliver. Liberalisation must cover all aspects of the supply chain.

5.2.1.4 Technological factors affecting the Zimbabwe petroleum industry

Under this section the technological factors addressed in the interviews focused on technology requirements for quality assurance and product testing, compliance and enforcement of petroleum industry regulations, fuel distribution infrastructure and transportation and information and communication technology.

Respondent Four confidently emphasised that*;*

There were no known incidents of quality problems along the chain from the suppliers up to Msasa because the entire system upholds stringent and professional quality checks. ZERA, NOIC and Government were individually and sometimes jointly holding awareness campaigns and workshops about product quality and safe handling among industry stakeholders. However, the industry begins to experience quality problems when fuel is in the hands of individual petroleum companies. Product quality problems are common among indigenous petroleum companies and transporters largely because of arbitrage practices.

Respondent Six talked about the need to emulate what other countries were doing in order to tighten the monitoring and controlling of elicit fuel practices. He pointed out that;

ZIMRA did not have capacity to check the quality of fuel imports by road that is why the country experienced many illegal fuel imports which affected the business of genuine traders.

During data collection one of the country's daily newspapers reported that the Electronic Cargo Tracking System (ECTS) that ZIMRA recently acquired helped to detect and track such kind of malpractices (Gumbo, 2017).

Respondent Five noted that;

As a result of regional and international training workshops attended by petroleum industry personnel Government plans were at an advanced stage to introduce product marking technology and product marking regulations to curb illegal practices particularly over blending, illegal imports and importation of high sulphur diesel. If this technology is in use genuine fuel imports were marked with a certain chemical. Quality control officers would randomly test fuel being sold at service stations and refer all players caught selling unmarked products for prosecution. Fuel marking tests can also flush out operators who over

blended their petrol, companies over blended because ethanol prices are much lower than petrol but over blended products can damage vehicle engines.

The use of fuel marking technology had potential to reduce the amount of illegal imports but none of the respondents could quantify the amount of savings the country was going to make if Government invested in this technology.Such technology was also expensive and was likely to result in a fuel pump price increase if implemented.

Respondent Six was of the view that;

T*he use of old infrastructure and technology in the petroleum industry made petroleum companies inefficient and companies could be losing a lot of fuel or cheating on motorists. If they used old fuel dispensers, faulty nozzles and tankers with inaccurate measurements which tended to over or under throw this led to shortfalls and disputes about actual delivered volumes. There were little investments on the technology side in the petroleum industry because companies did not have capital. As a result many petroleum companies still depended on manual systems and these were prone to making errors especially in recording fuel loaded, fuel received and pricing issues.*

5.2.1.5 Environmental factors affecting the Zimbabwe petroleum industry

Under this category, the country's geographical location and access to port facilities were identified as affecting product cost and eventually availability.

Respondent Six pointed out that;

The Beira port was a shallow port such that it accommodated only small vessels and this was associated with high costs which then filter down the supply chain. Port authorities in Mozambique were being engaged to find an alternative that could allow larger vessels to dock and offload petroleum products at cheaper prices.

Respondent One said that;

The alternative route was to transport fuel by road or rail from the Matola port but the disadvantage was the longer distance and the fact that fuel imports by road and rail were subject to an extra four cents charge. Companies that brought in fuel by road will hardly make profit unless they by passed customs at Beit-Bridge. The implication of this was that,

lack of standard customs rules made it difficult for petroleum companies to use the multi-modal transportation system.

Respondent Five added that;

Zimbabwe's geographical position affected product accessibility and delivery turn around. However, since 2012 the Government allowed international traders to keep their fuel in bond at Msasa in Harare so that local petroleum companies could have easy access and other countries like Botswana, DRC, and Zambia could collect their product from Harare. In addition, petroleum companies' fuel orders were accepted for pumping on a first in first out basis and to avoid waiting for their orders to be received in Harare operators received product on a litre in litre out basis.

5.2.2 Zimbabwe petroleum industry's supply chain strategy

Under supply chain management strategy respondents discussed what petroleum industry stakeholders were doing and what the respondents thought should be done to keep motorists and other fuel users happy, making fuel products available at affordable prices, having country wide service station networks and collaboration and cooperation among supply chain members and facilitating the exchange of information..

Respondent One pointed out that;

To ensure that fuel consumers were happy the Government dictated the overall industry strategy and was actively involved in some strategic activities of fuel distribution. However, the Government was struggling to finance pipeline operations. Its main focus was to effectively increase capacity utilisation of Government facilities such as the pipeline from Beira to Feruka and to Harare and storage facilities at Msasa and Mabvuku in Harare. While Government was pushing for lower administration cost it was struggling with debts from dead stock, pipeline rentals and strategic stock without the involvement and participation of petroleum companies. Yet in other countries which had pipelines the standard practice was that oil companies that used the pipeline owned dead stock.

He actually gave examples of South Africa's Transnet and Kenya Pipeline companies who demanded contributions towards dead stock and interface from petroleum companies based on the market share they held.To achieve the goal of capacity utilisation and to generate money to service the pipeline debts Government softened conditions for imports that came by

pipeline while tightening conditions for those bringing product by road and rail. As a result 90% of the country's fuel came by pipeline. This implies Government introduced some form of controls against the liberalisation policy it took when it allowed petroleum companies to handle their own imports orders.

Respondent Two added that;

The Ministry of Energy and Power Development directed NOIC to cut its storage and pipeline fees to achieve the product availability and affordability goals Government also enforced petrol blending with ethanol arguing that apart from increasing volumes blended product must be cheaper driven by lower costs of procuring ethanol. Government and associative organisations had worked out collaborative partnerships with their regional and international counterparts. The partnerships aimed to attract foreign direct investment which has potential to widen the fuel distribution network in the country. This is the sort of cooperation that could work well if all supply chain members cooperated. Unfortunately relationships between petroleum companies and some suppliers have gone bad owing to unpaid fuel debts and some corporate customers did not receive orders paid in advance.

The implication of poor customer and supplier relationships and weak collaboration among supply chain members was that it will be difficult for the petroleum industry to work as a system and work for the common interest of all players.

5.2.3 Zimbabwe petroleum industry's structure

This section spelled out the different petroleum industry stakeholders, the roles they played and structural challenges as seen and assessed by the industry's associative organisations.

The following specific Government responsibilities and assets were pointed out by the Respondent One and Respondent Two:

- *The Ministry of Energy and Power Development on behalf of the Government of Zimbabwe sets policies for the country's energy sectors made up of the electricity and petroleum sectors.*
- *The Ministry of Energy and Power Development oversees the operations of National Oil Infrastructure Company (NOIC) which is 100% owned by Government and owns 50% in PZL which owns the Feruka to Harare pipeline and storage facilities at Feruka and Msasa.*

- *NOIC controls and manages the national fuel pipeline and storage facilities on behalf of Government. These national assets were used by all industry players. NOIC was barred from venturing into petroleum trading because its participation in the petroleum industry's downstream activities would give the company unfair competitive advantages. NOIC also operated fuel blending facilities and this qualifies it to be a transporter and producer.*
- *Government also has 100% ownership in a petroleum company called Petrotrade Private Limited. Petrotrade operates like any other private petroleum company. Respondent one said, when NOCZIM was disbanded in 2010 it was replaced by NOIC, the pipeline company, and Petrotrade took over its retail outlets. According to Respondent two Petrotrade was created by the Government to stabilise fuel prices and ensure a wider distribution network-reaching even rural and poor communities in rural areas. He quickly pointed out that Petrotrade was struggling to build new outlets because it did not have the money to do so.*
- *On pipeline ownership the Government owns 50% in the Feruka to Harare pipeline which was owned by PZL and a 21kilometre stretch from the Mozambique border to Feruka. The other 387 kilometres to Beira port belonged to CPMZ and the Government paid about USD 2.2 million per month to CPMZ whether the pipeline was used or not.*

The implication of this is that, based on ownership of assets alone, the Government was a major supply chain member of the Zimbabwe petroleum industry.

Respondent Four said;

Another key player in this structure was Zimbabwe Energy Regulatory Authority (ZERA), the industry regulator. He noted that, ZERA implemented and enforced Government policy by creating regulations for the industry and it also dealt with compliance issues. For example, ZERA issued operating licences, set maximum petroleum products prices and enforced the industry regulations in liaison with other stakeholders such as ZIMRA, Municipal Authorities, Environmental Management Authority (EMA) and Ministry of Health.

The qualitative research interviews proceeded to record views executives held about the attitudes of petroleum companies' management toward implementing the concept of supply chain management, critical success factors for implementing supply chain management, collaboration in supply chain management and supply chain management challenges.

5.2.4 Attitudes of supply chain managers towards implementing supply chain management

The following section gives a summary of attitude of petroleum companies' managers towards adopting and implementing supply chain management as their business philosophy. This is an executive assessment and judgement by associative organisations and not petroleum companies' management because the latter were not part of the qualitative interviews. The views of managers from petroleum companies were assessed under quantitative survey.

Respondent One mentioned that;

There is no way the petroleum companies will say they do not like supply chain management because they benefited the most from it. Petroleum companies directly benefited from increased sales, reduced cost and more profit. As a result I think the petroleum companies had a positive attitude towards implementing supply chain management because their companies benefited.

Although he judged petroleum companies to be having positive attitude towards supply chain management he queried the behaviour of some of the petroleum companies saying;

*Although I agree that petroleum companies had a positive attitude towards supply chain management I dislike the fact that they expected the associative organisations to maintain order in the industry for the benefit of all players yet they were not cooperating and unwilling to comply with industry standards and regulati*ons.

To explain this point he cited the small players who complained that supply chain management standards set for the industry were too high and expensive for them and said the standards favoured the multinational companies only.

These small companies are the biggest violators of industry regulations.

Respondent Three talked about what he referred to as double dipping by multinationals:

We have a weak industry structure and poor regulations that is why importers and wholesalers operate at retail level and undercut retailers' margins. The Government needed to impose limitations on and what one could do with their import and wholesaler licences. On one hand they compete with smugglers who did not pay duties and therefore could charge

prices below those recommended by Government and on the other hand they were competing with retail outlets owned by multinationals that afforded to forego their retail mark up and still made profit.

5.2.5 Critical success factors for implementing supply chain management in the petroleum industry of Zimbabwe.

Under the following section executives from associative organisations expressed their opinions on what they thought to be the critical factors behind the success of petroleum companies in Zimbabwe. Factors such as availability of foreign currency, pipeline efficiency, product quality and collaboration among industry stakeholders were raised as part of petroleum business' critical success factors.

Respondent Three said;

A*vailability of adequate foreign currency was a critical requirement all petroleum companies should have based on the fact that the country was a net importer of fuel. --- Government introduced blending as a form of import substitution although issues have been raised by car distributors who sold cars that used pure unblended fuel.* Ethanol was a type of alcohol manufactured from molasses and used as a petroleum substitute. *We also read in the newspapers that companies were not happy with the way the country's foreign currency allocation was done.*

The second critical success factor was raised by Respondent Four regarding the need for an efficient pipeline.

Efforts by Government to improve product availability and access resulted in international suppliers being allowed to keep stocks in bond at Msasa to reduce delivery times, pipeline costs were reduced with effect from 1 January, 2017 and the litre in litre out concept was also convenient to petroleum companies. Under the litre in litre out concept, the petroleum companies received product at Feruka or Msasa the moment their order was injected into the pipeline at Beira. They do not have to wait for 6 to 7 days, the time required to push product from Beira to Harare.

Another important thing for the petroleum business to flourish was quality and safety. Respondent Five;

Although we already have perfect quality control systems from Beira Port up to Msasa there were a lot of quality challenges in the downstream and something needed to be done about this because quality problems were experienced after product had been picked from NOIC. I think some retailers were just greedy; they were bend on profiteering and making quick bucks.

He was referring to product contamination through over blending, adulteration, smuggling and the mushrooming of illegal traders in border towns like Forbes in Manicaland, Beit-Bridge and Plumtree in Matabeleland. He added that;

Strategies were needed to deal with quality problems after uplifts from Msasa. ZERA in conjunction with the National University of Science and Technology (NUST) conducted annual training and awareness campaigns on product quality, safety and environment, and 1000 people had been trained by end of December 2016.It is now the responsibility of individual petroleum companies to ensure they adhere to approved quality standards all the time

Resopndent One identified the need for collaboration and information sharing as important if supply chain management was to achieve better company performance. He said;

It is important to establish a petroleum industry association to provide players with a platform for sharing information and ideas for the benefit of every one. In that regard I think issues to do with good communication and technology integration was important. The situation we are experiencing in Zimbabwe is like the petroleum industry is a secretive industry, full of suspicions and lack of trust among different supply chain members. I believe that it is one of the reasons why Government efforts to establish a petroleum companies' association had not been successful.

Service delivery was mentioned by Respondent Three who emphasised that;

The quality of service at service stations was poor and companies needed to improve service levels to gain repeat business. Things like free tyre pressure, windscreen cleaning, and all the small things had disappeared from the service stations. NOIC needed to increase its pumping capacity and flexibility in its operating times so that during peak periods customers can load product any time of the day.

Respondent Six said;

In order to increase loading capacity and turnaround time NOIC had opened an additional loading gantry at Mabvuku to compliment the one facility that was at Msasa. --- ZERA and the Ministry was working in conjunction with the Office of the President and Cabinet (OPC) on an ease of doing business Government program. It was hoped that the petroleum industry would harmonise and customise some of the regulations in liaison with other Ministries. We will however not compromise on safety and environmental issues.

5.2.6 Supply chain collaboration issues in the Zimbabwean petroleum industry.

Petroleum industry's collaboration issues were divided into collaboration variables like customer relationship management (CRM), supplier relationship management, integrated management systems and petroleum industry association. This enabled respondents to address specific supply chain collaboration attributes and how they affected petroleum companies' operations.

Respondent Four commended that;

There seems to be collaboration between international fuel suppliers and local petroleum companies but mostly among multinational petroleum companies and the suppliers. I think small local companies were left out because they ordered small quantities at a time and most of their business was restricted to retail operations. Importers and wholesalers collaborated with retailers they had dealership arrangement with to protect their brand names.

Respondent Three said;

The relationship between petroleum companies and fuel consumers was not clear owing to the prevailing economic and political environments that favoured the consumers. For example petroleum traders are given directives to accept plastic money and bond coins when customers purchased fuel at the pump when they needed the green back to import stock. Some customers even swiped on behalf of motorists in exchange of hard cash which is supposed to be given to petroleum traders.

The implication was that when customers do not pay cash for fuel the petroleum companies will be forced to go and queue for foreign currency at the banks and getting their foreign currency allocation was a struggle.

Respondent Five added that;

The collaboration seen between supply chain members was limited because we do not notice suppliers and buyers whose data bases were integrated. Integrated systems allowed suppliers to automatically replenish customers' stock when their stocks reached reorder levels but in

our case this cannot happen if customers do not have foreign currency in their accounts to pay for the new orders.

Respondent Two charged that,

Supply chain members of the petroleum industry did not collaborate with each other. If there was any form of collaboration it was purely on a commercial basis. Otherwise there was no collaboration at dealers' level and industry players did not cooperate. This lack of collaboration created disharmony among the players, pushed up costs, and when there was no collaboration policies got skewed towards certain players with connections at the bank and high offices. He added that, this is why the companies were resisting formation of an industry association.

--- In my view the only collaboration to note was that associative organisations tended to collaborate with their regional counterparts, agreements on the standard regional fuel specifications that are used in Zimbabwe are a result of cooperation and some of the strategies being adopted, like fuel marking are a result of regional workshops and conferences that management attended, said the Respondent Four. Some decisions made in other Ministries contravened petroleum industry's priority goals, for example, when EMA prevents companies from delivering fuel overnight this affects fuel distribution efficiency and forces truck drivers to queue at NOIC loading bays for overnight loading and this is not healthy for the workers.

5.2.7 The petroleum industry's competitiveness challenges.

In this section respondents were given an opportunity to independently raise and discuss issues they felt to be the Zimbabwe petroleum industry's main challenges. Featuring prominently under challenges were issues like illegal practices, pricing, poor regulation and enforcement and quality of product.

Respondent Five said;

The most critical challenges that affected the industry's supply chain efficiency were fuel smuggling and adulteration which lead to profiteering and unfair competition because those involved landed fuel at below market prices and could afford to charge low prices. This

implied that customers will exhaust the cheaper fuel first before they buy from genuine importers. He added that, this challenge was worsened by inadequate control systems at ZIMRA and ZERA. Fuel imported through the official channels and properly cleared through ZIMRA should be marked with molecular markers to distinguish it from fuel that had not been cleared by ZIMRA and operators found selling unmarked fuel must be prosecuted.

Respondent Four suggested that;
The biggest challenge was poor product quality which was a result of over blending and product adulteration. This created an uneven playing field. I understand ZERA has one mobile quality testing laboratory for the whole country and ZIMRA does not test for quality at the country's entry points owing to lack of capacity. This is why we have cases of customers being sold high sulphur diesel which was banned a long time ago and as long as the foreign currency shortage problems were not addressed by the Ministry of Finance there was never going to be stability in the industry. This was unfortunate because the foreign currency issue was a national problem controlled by the Finance Ministry alone. Another critical challenge was the industry structure which did not quite protect the small operators (local participation). There were no restrictions on what a person could do. Total could be a procurer, wholesaler and a retailer at the same time and that was not proper.
The implication of the highlighted challenges was that appropriate solutions must be found to create competitiveness in the petroleum industry.

5.2.8 Benefits of effective supply chain management

Notwithstanding the challenges raised in the above section, respondents also observed the benefits industry players obtained from adopting and implementing supply chain management as a business philosophy. They noted that supply chain management philosophy had potential to unite industry players, brought about cost benefits to members and made communication and collaboration easier.

Commenting on potential benefits of adopting and implementing the supply chain management philosophy in the petroleum industry Respondent One retorted that;
This concept called supply chain management is a great management tool because it allows the whole industry to work as a system which enables all the supply chain members to have

some role to play, they must have common goals and share all the cost benefits. But all companies must be committed and a clear leader must be identified to lead the whole process.

Respondent Three suggested that;

The supply chain management orientation has helped our petroleum companies to communicate, cooperate and collaborate among themselves. This allows them access to strategic information they can use to make better business decisions. I however feel there are some issues with companies that do not cooperate whole heartedly leaving some information gaps.

Respondent Five said;

Your debate on supply chain management needs to be marketed widely. It is a good idea and our petroleum companies benefit a lot, they learn to share both costs and benefits, they learn from each other and this can result in the consumers of fuel benefiting. In the long term I think growth opportunities can be identified and investment strategies will be addressed by all concerned parties ensuring the country security of supply.

Implications of the identified benefits showed that the industry had interest in the supply chain management concept because it was seen to be offering benefits to players in the petroleum industry. Thus the last segment of the interviews asked respondents about what they learnt from their regional and international counterparts about supply chain management

5.2.9 Supply chain management lessons from regional and international counterparts

Based on the fact that earlier responses to questions indicated that there was collaboration between associative organisations and their regional counterparts respondents also gave personal opinions on supply chain management lessons the industry learned from the regional and international counterparts. The following lessons were highlighted.

Respondent Five said;

C*ountries that benefited from economies of scale through the importation of large volumes could afford to negotiate more favourable supply contracts with suppliers and charge competitive prices. It is difficult to do that when petroleum companies place orders individually. NOIC Operations Director added that centralisation of fuel procurement model used in Mozambique and Tanzania was seen as a better arrangement for fuel procurement at national level because the country benefited from economies of scale, volume discounts and*

transparent foreign exchange allocation process. That system was not as skewed and corrupted as the local system where there was a lot of favouritism and subjectivity.

Respondent Two observed that;

Government used to determine prices not considering costs associated with importing fuel. Political thinking would override economics and this led to the busting of NOCZIM. The new thinking was that petroleum companies in Zimbabwe were price takers given their weak bargaining power and lack of natural resources to produce petroleum products. Cost consideration and the charging of competitive pipeline fees has potential to make Zimbabwe's petroleum companies competitive and the country a regional distribution hub because it could offer logistical services for fuel destined to DRC, Botswana and Zambian markets.

Respondent Four said;

My main worry is was that while petroleum companies in other countries cooperated with Government and other stakeholders this was totally the opposite in our country. I am referring to the fact that in 2016 a consultant was hired to investigate pricing issues in the petroleum industry but she received a mere 30 responses out of a total of 500 questionnaires that were sent out to petroleum industry players. Petroleum companies did not want to share information with others and it's a big problem.

5.2.10 Suggestions on the way forward coming from associative organisations

Interviewees were given an opportunity to make recommendations on the way forward based on their personal assessment of supply chain activities of the petroleum industry and how these were being implemented. The following list represents the most frequently mentioned suggestions by the respondents. The list is not exhaustive and is not the respondents' priority list.

- Government was supposed to come up with strategies of raising revenue to finance the importation of fuel and other stuff;
- There was need for lobbying the Government for a reduction of fuel duties and levies;
- In order to compete for the regional markets NOIC was supposed to review its charges;
- A single procurer model system was recommended for fuel importation;
- There was need to ban importers and wholesalers from retail market activities;
- The industry's supply chain processes needed more efficient planning.

5.3 Quantitative research findings

Owing to the multidimensionality of supply chain management problems of the Zimbabwe's petroleum industry and the fact that most of the supply chain issues were intangible and qualitative, statistical analysis was not the principle point at issue in the study. Because total quantification of the results is not feasible, quantitative analysis was therefore limited to relations between selected supply chain management variables that could be used as a measure of the petroleum industry's supply chain management effectiveness. An analysis of these elements could increase insight and understanding in respect of supply chain management practices of the Zimbabwe petroleum industry and its characteristics.

Data was captured using census and survey processing system (CSPro), a free census software package supported and distributed by the United States Agency for International Development (USAID). Data was then exported to SPSS Version 20 which was used in processing and analysing the data. The results are organised according to the six survey questionnaire sections which are, demographic data, attitudes of supply chain managers towards implementing the supply chain management philosophy in the petroleum industry of Zimbabwe, petroleum industry's critical success factors, supply chain management collaboration drivers, supply chain management performance measurement, and supply chain management challenges and benefits. A summary of response rate is presented first. Second to be presented are demographic data which are summarised in one frequency table percentage responses only. Correlation analysis results are presented and finally a summary table of the multiple regression analysis is presented. P-values less than 0.05 were considered statistically significant.

5.3.1 Response rate

Under the quantitative research questionnaires were distributed to all the 96 managers with supply chain management responsibilities at the petroleum company's head office, the companies' service stations and at third party distribution outlets. The sample/population was small owing to the refusal by other petroleum companies to participate in the study as already explained in Chapter 4. The overall response rate from the quantitative research was 59.38 %.

Out of the 96 questionnaires distributed only 57 were received and found to be usable for the analysis of results.

5.3.2 Demographic characteristics

The results in Table 5.1 show that a majority 64.9% of management employees in supply chain management were females while more than one third, 35.1% were males. The study further shows that 71.9% of respondents were below forty years old, 22.8% were in the age group 41-50 years old, 3.5% were in the 51-60 years old category and only 1 respondent (1.8%) was above 60. One can conclude that that majority 98.2% of the respondents were still in the prime years (below 60) in the petroleum industry of Zimbabwe.

Investigating positions held by staff with supply chain management responsibilities was important to gauge the importance given to supply chain management personnel compared to those who worked in other functions. Table 5.1 shows that only four 7. 3% of the respondents occupied the head of department position. A total of 27.3% were section heads and the 41.8% were supervisors in the service stations. Of the remaining staff, 1.8% was an office clerk and 21.8% were operations supervisors. One can conclude that supply chain management staff did not occupy strategic positions in the petroleum companies they work. It was also necessary to establish the distribution of supply chain managers investigated and supply chain activities. Table 5.1 revels that 63.6% were at service stations, 16.4% in customer care, 9.1% in procurement, 5.5% in ICT and only one person in inventory control.

It was paramount to also investigate highest qualification attained by respondents. The findings show that 33.3% of the respondents were qualified with the diploma 28.1% had attained high school certificate while only 19.3% were qualified in the bachelor's degree level. Few (17.5%) had a master's degree qualification. Only 1.8% was found to have a PhD qualification. The findings showed that the surveyed companies employed highly qualified staff.

Areas of specialisation of supply chain management staff were also investigated. Table 5.1 shows that 29.8% supply chain staff had non-commercial qualifications and a majority of 63.2% had management and marketing qualifications. The rest (7.1%) had finance and accounting qualifications.

Staff's experience in the petroleum industry was also found to be important. Table 5.1 indicates that only 7% of the respondents had a working experience of more than 15 years in the petroleum industry, 15.8% had 11 to 15 years' experience, 40.4% had 5 to 10 years' experience and 36.8% had less than 5 years' experience. Therefore, a majority 77.2% had short industry experience which does not go beyond ten years. The companies are employing educated but inexperienced people.

Table 5.1 also shows that the majority of employees (80.7%) have less than ten years' experience with the company, 14% had 11 to 15 years' experience while 5.3% had over 15 years' experience. This showed that staff in supply chain management areas had short company experience.

Responses to the petroleum companies' experience in the industry were also recorded and show that two (3.5%) companies were new with 2 to 5 years' experience, 31.6% had been around for 6 to 10 years and 61.4% had over 15 years' experience. The results showed that there were few new entrants in petroleum industry. Based on the fact that implementing supply chain management requires companies to outsource some of their activities and therefore to have service agreements with the service providers, respondents were asked if they had service agreements with service providers of the outsourced activities. Table 5.1 shows that 75.4% of the respondents had service agreements with third party service providers while 3.5% did not have service agreements. However, 21.1% of the respondents did not respond to the question. The results showed that service agreements were common for outsourcing activities to third parties.

The respondents were also asked about the presence of service agreements between the supply chain department and internal service providers. Table 5.1 shows that 38.6% of the respondents had agreements with internal service providers, 45.6% did not have service agreements, and 15.8% of the respondents did not respond to the question. The results showed that service agreements were not common for interdepartmental outsourcing.

Responses to the petroleum companies' experience in the industry were also recorded and show that two 3.6% companies were new with 2 to 5 years' experience, 31.7% had been around for 6 to 10 years and 63.4% had over 15 years' experience. The results show that there were few new entrants in petroleum industry.

Based on the fact that implementing supply chain management requires companies to outsource some of their activities and therefore to have service agreements with the service providers, respondents were asked if they had service agreements with service providers of the outsourced activities. Table 5.1 shows that 95.6% of the respondents had service agreements with third party service providers while 4.4% did not have service agreements. One can safely conclude that service agreements were common when outsourcing activities to third parties.

The respondents were also asked about the presence of service agreements between the supply chain department and internal service providers and 54.2% confirmed there were no service agreements between supply chain and internal service providers. The results showed that service agreements were not common for interdepartmental outsourcing.

Table 5.1 Demographic Variables of Respondents

Characteristic of respondents	Respondents Petroleum company managers with supply chain responsibilities	
Gender (n=57)	**Frequency**	**Percent(%)**
Female	37	64.9
Male	20	35.1
Age (n=57)		
Below 30	12	21.0
31-40	29	50.9
41-50	13	22.8
51-6	2	3.5
Above 60	1	1.8
Position held (n=55)		
Head of department	4	7.3
Head of section	15	27.3
Service station team leader	23	41.8
Office clerk	1	1.8

Operations supervisors	12	21.1
Work station (n=55)		
Procurement	5	9.1
Inventory control	1	1.8
Transport and logistics	2	3.6
Information technology	3	5.5
Customer service	9	16.4
Service station	35	63.6
Highest qualification (n=57)		
High school certificate	16	28.1
Diploma	19	33.3
Degree	11	19.3
Master's Degree	10	17.5
PhD	1	1.8
Area of specialisation (n=57)		
Management	16	28.1
Marketing	20	35.1
Accounting	3	5.3
Finance	1	1.8
Non-Commercial	17	29.8
Years of experience in petroleum industry (n=57)		
Less than 5	21	36.8
5-10	23	40.4
11-15	9	15.8
16-20	2	3.5
More than 20	2	3.5
Years of experience in company (n=57)		

Less than 5	24	42.1
5-10	22	38.6
11-15	8	14
16-20	1	1.8
More than 20	2	3.5
Company's years of experience in petroleum industry (n=55)		
2-5	2	3.6
6-10	18	32.7
Above 15	35	63.4
Service agreements with third parties (n=45)		
Yes	43	95.6
No	2	4.4
Service agreements between internal departments (n=48)		
Yes	22	45.8
No	26	54.2

Source: fieldwork, 2017

5.3.3 Descriptive analysis.

In order to identify management attitudes towards implementing supply chain management in their companies the managers were required to indicate the extent to which they were satisfied with the way selected supply chain activities were being managed. Frequencies and percentages of respondents were recorded indicating levels of satisfaction with the way each activity was managed. Mixed feelings were expressed in the results. Table 5.2 shows an overall satisfaction of 57.8% of the respondents, 28% neutrals and 14.2% unsatisfied. One can conclude that, management were generally satisfied with the way these supply chain management activities were managed in their companies: customer relationship (80.7%), transport and distribution management (78.9%), customer services and linkages (66.6%), supplier relationship management (63.1%), inventory management (60.7%), procurement management (57.9%) and management of outsourced activities (57.9%).

Although management were satisfied with the way other supply chain management activities were managed the percentages of managers who gave neutral responses were high in these instances, staff motivation, training and development (57.1%) satisfaction and (28.6 %) neutrals, ICT management (53.6%) satisfaction and (26.8%) neutrals, staff knowledge and acceptance of supply chain management (36.9%) satisfaction and (52.6%) neutrals and IT integration with suppliers and customers had the lowest satisfaction (36.4 %) and (34.5%) neutrals. A sizable number of managers were not satisfied with the way some activities were managed, the outsourcing of activities (21%), procurement management, (24.6%) and IT integration with suppliers and customers (29.1%).One can conclude that people who are tasked to manage supply chain activities were not clear if supply chain activities were managed well or not.

Table 5.2. Managers' attitudes about how supply chain management is managed company

ITEM		VUS	US	N	S	VS
		%	%	%	%	%
1	Supplier Relationship Management	3.5	3.5	29.8	36.8	26.3
2	Customer Relationship Management	-	5.3	14	57.9	22.8
3	Procurement Management	3.5	21.1	17.5	36..8	21.1
4	Transport & Distribution Management	1.8	3.5	15.8	45.6	33.3
5	Inventory Management	1.8	10.7	26.8	44.6	16.1
6	ICT Management	5.3	14.3	26.8	39.3	14.3
7	Staff Knowledge & Acceptance of SCM	3.5	7	52.6	24.6	12.3
8	Management of Outsourced Activities	3.5	17.5	35.1	36.9	7
9	IT Integration with Suppliers and Customers	9.1	20	34.5	25.5	10.9
10	Customer service and linkages	-	7.1	26.3	56.1	10.5
11	Staff Motivation, Training and Development	1.8	12.5	28.6	46.4	10.7

VUS (very unsatisfied), US (unsatisfied), N (neutral), S (satisfied), VS (very satisfied)

Source: fieldwork, 2017

In the next section managers identified the petroleum industry's critical success factors by way of ranking the selected factors as critical or not critical to petroleum industry operations. Although all factors were identified as critical the top five critical success factors were shown in Table 5.3 as collaborative partnerships (98.2%), support from associative organisations (96.5%), strategic partnerships and trust (94.7%), development of effective supply chain management strategy (93%) and responsiveness to customer inquiries (93%). There were lower ratings for other critical success factors such as information sharing with supply chain members (86%), development of reliable sources (82.7%), top management support and commitment (80.7%), prioritising supply chain activities in resources allocation (80.7%) and the key success factor which received the lowest rating was delivery efficiency, speed and flexibility (70.9%).

Table 5.3. Supply chain management critical success factors in petroleum industry

ITEM		NI	SI	I	VI	EI
		%	%	%	%	%
1	Strategic partnerships & trust	3.5	1.8	35.1	22.8	36.8
2	Top Management Support & Commitment	5.3	14	26.3	31.6	22.8
3	Development of Effective SCM Strategy	-	7	33.3	43.9	21.1
4	Prioritizing SCM Activities in Resource Allocation	-	19.3	29.8	35.1	15.8
5	Development of Reliable Sources	3.5	14.1	10.5	49.1	22.8
6	Information sharing with supply chain members	5.3	8.8	38.6	31.6	15.8
7	Support from Associative Organisations (Government, ZERA & NOIC)	-	3.5	22.8	40.4	33.3
8	Delivery efficiency/speed/flexibility	9.1	20	34.5	25.5	10.9
9	Collaborative partnerships	-	1.8	21	38.6	38.6
10	Responsiveness to customer inquiries	-	7	43.9	35.1	14

NI (not important), SI (slightly important), I (important), VI (very important), EI (extremely important)

Source: fieldwork, 2017

Table 5.4 below shows that factors identified by respondents as those factors that push petroleum companies into wanting to collaborate with other supply chain members. These collaboration drivers are listed in order of their importance as increasing competitive intensity (92.9%), new information technologies (89.4%), the need for better information (85.1%), increasing transaction processing speed (84.2%), staff training and development about supply chain management (84.2%). Other drivers are economic globalisation (78.6%), more demanding customers (77.2%), tighter alliance relationships (77.2%), the need to reduce the cost of carrying excessive inventory (70.9 %) and the shifting of competition from competing as individual companies to competing as supply chains (66.7%). Questions under this section recorded a high percentage of neutral responses under shifting of competition from individual companies to supply chains (26.3%), tighter alliance relationships (22.8%) and the need to reduce the cost of carrying excessive inventory (21.8%).

Table 5.4. Factors that drive supply chain management collaboration

ITEM		SD	D	NO	A	SA
		%	%	%	%	%
1	More demanding customers	1.8	5.3	15.7	56.1	21.1
2	Greater competitive intensity	-	1.8	5.3	59.6	33.3
3	Tighter alliance relationships	-	-	22.8	42.1	35.1
4	The need for better information	-	7.1	7.1	50	35.7
5	New information technologies	-	7.1	3.5	52.6	36.8
6	Economic globalization	3.5	3.5	14.3	50	28.6
7	Shifting competition from companies to supply chains	-	7	26.3	50.9	15.8
8	Reducing the cost of inventory	5.5	1.8	21.8	50.9	20
9	Increasing transaction processing speed	3.5	7	5.3	47.4	36.8
10	Staff training and development about SCM	-	10.5	5.3	47.4	36.8

SD (strongly disagree), A (disagree), NO (no opinion), A(agree), SA(strongly agree)

Source: fieldwork, 2017

Table 5.5 responses reflect changes that respondents have experienced since their companies implemented supply chain management. Therefore, the responses show there have been notable changes in the following areas: distribution outlets have increased (84.2%), the company's supply chain strategy now driven from the top (79.4%), there has been improvement in the flow of information, funds and materials (75%), there has been greater ability to implement technology (71.5%), relationships with associative organisations have improved (71.4%), there has been more customer satisfaction (70.2%). Implementing supply chain management has also led to moderate changes in the following activities, the companies have managed to resolve customer complaints (69.6%), there has been positive improvement in company competitiveness (68.4%), there has been greater supplier relationships and support (67.9%), employee relationships have improved (66.7%), and supply chain activities are being prioritised when resources are being allocated (62.5%). However, (45.6%) of the respondents disagreed that there has been a decrease in the cost of product, (22.8%) are not sure if there has been a product cost improvement and only 31.6% are positive that there has been a product cost improvement. There were also relatively high neutral responses on whether supply chain activities were being prioritised in resource allocation (23.28%) and if there has been customer satisfaction (22.8%).

Table 5.5 Supply chain management performance measurement

ITEM		SD	D	NO	A	SA
		%	%	%	%	%
1	The company's supply chain management strategy is driven from the highest office	-	12.5	7.1	41.1	39.3
2	The flow of information, funds and materials has improved	3.6	8.9	12.5	58.9	16.1
3	There has been a positive improvement in company competitiveness	5.3	10.5	15.8	42.1	26.3
4	Supply chain management activities are being prioritised when resources are allocated	-	14.3	23.2	50	12.5
5	There has been a decrease in cost of products	14	31.6	22.8	22.8	8.8
6	The company has been able to resolve customer complaints	1.8	14.3	14.3	46.4	23.2
7	There has been greater ability in implement technology	7.1	12.5	8.9	55.4	16.1
8	Employee relations have improved	5.3	12.3	15.8	45.6	21
9	The company has increased its distribution outlets	1.8	7	7	47.4	36.8
10	There has been greater supplier relationships and support	7.1	8.9	16.1	53.6	14.3
11	There has been more customer service satisfaction	-	7	22.8	57.9	12.3
12	Relationships with associative organisations (NOIC&ZERA) has improved	3.6	5.4	19.6	48.2	23.2

SD (strongly disagree), A (disagree), NO (no opinion), A (agree), SA (strongly agree)

Source: fieldwork, 2017

In table 5.6 respondents identified the supply chain challenges faced by petroleum companies. The most important five petroleum industry supply chain challenges were identified as the cost of trading stock(100%), lack of top management support and commitment (98.2%), lack of fast and efficient decision making systems (98.2%), Government regulations (97%), and lack of infrastructure with storage facilities (93%). Other petroleum industry challenges include trust among supply chain members (91.2%), transportation cost (89.5%), poor product quality (89.4%), poor collaboration among stakeholders (89.1%), intra-organisational conflicts (87.7%) staff resistance to change (87.7%) and poor relations with associative organisations (87.5%).

Table 5.6 Challenges in petroleum industry

ITEM		IR	MI	I	C	MC
		%	%	%	%	%
1	Cost of trading stock	-	-	31.6	22.8	45.6
2	Government regulations	3.5	3.5	14	31.6	47.4
3	Product quality	5.3	5.3	22.7	35.1	31.6
4	Top management support & commitment	1.8	-	28.6	35.7	33.9
5	Cost of transportation	-	10.5	22.8	42.1	24.6
6	Collaboration with stakeholders	1.8	9.1	23.6	43.6	21.8
7	Infrastructure with storage facilities	-	7	26.3	50.9	15.8
8	Trust among supply chain members	3.5	5.3	22.8	45.6	22.8
9	Intra-organisational conflicts	5.3	7	26.2	40.4	21.1
10	Fast & efficient decision making systems	1.8	-	25	37.5	35.7
	Staff resistance to change	7	5.3	17.5	52.6	17.5
11	Poor relations with associative organisations (Ministry, NOIC & ZERA)	7.1	5.4	12.5	28.6	46.4

IR (irrelevant), MI (minimum importance), I (important), C (critical), MC (most critical)

Source: fieldwork, 2017

In table 5.7 respondents identified the benefits of having a supply chain management strategy when operating in the petroleum industry. Companies that have a supply chain management strategy were seen to be enjoying the following advantages: They have the ability to collaborate and coordinate more effectively with suppliers and customers (87.8%), they tend to be more competitive (87.2%), they enjoy higher market share and growth (85.9%), they have top management teams that are supportive (85.8%) and they have more knowledge about their supply chain members (84.2%). Other supply chain management benefits were identified as superior distribution channel relationships (82.5%), they have a higher delivery performance and are trusted (80.7%), they have better ICTs (77.2%) and they enjoy lower operational costs (67.9%).

Table 5.7. Benefits of supply chain management in the petroleum industry

ITEM		SD	D	NS	A	SA
		%	%	%	%	%
1	Enjoy higher market share & sales growth	-	1.8	12.3	33.3	52.6
2	Have lower operational cost	-	14.2	17.9	25	42.9
3	Have top management that is supportive	-	1.8	12.4	42.9	42.9
4	Are more competitive	-	-	12.8	43.6	43.6
5	Have better information and communications technology (ICT)	1.8	1.8	19.2	50.9	26.3
6	Collaborative and coordinate more effectively with suppliers and customers	-	-	12.2	47.4	40.4
7	Have a higher delivery performance they are trusted	-	1.8	17.5	45.6	35.1
8	Have superior distribution channel relationships	-	1.8	15.7	42.1	40.4
9	Have knowledge about supply chain members	-	-	15.8	59.6	24.6

SD (strongly disagree), A (disagree), NS (not sure), A (agree), SA (strongly agree)

Source: fieldwork, 2017

5.3.4 Correlation and Multiple regression analysis

Identifying relationships between variables can provide information on ways to improve competitiveness (Lind, Marshal & Wathen, 2013). The study therefore identified relationships between supply chain management variables as a way to improve cost management and customer satisfaction. Therefore, in addition to the foregoing descriptive analysis the study results were subjected to Correlation analysis and Regression analyses.

5.3.4.1 Correlation analysis

Correlation analysis is the most widely used method of studying relationships between inter-related phenomena. The correlation analysis measurement is called the correlation coefficient which is a quantitative measure of the strength of the relationship between two variables (Wegner, 2012). Correlation coefficient gives an idea about the co-variation of two series but also indicates the degree and direction of the correlation between two variables (Levin, 1986). Thus, Pearson's coefficient of correlation analysis was employed to test association between selected supply chain management variables of the Zimbabwe petroleum industry.

A correlation coefficient is interpreted in terms of "p-values" which represents the level of significance of the established relationship between two variables. A strong correlation exists whenever the p-value is below 0.05 (Lind, Marshal & Wathen, 2013). This indicates that the tested variable affects the performance of the other variable. A low level of significance which is achieved when the p-value is greater than.05 means that the measured variable does not necessarily affect the other variable. Whenever the p-value is less than 0.05 one can conclude that there is a significant association between two variables but when p-value is greater than 0.05 it statistically means that, there will be no evidence to conclude that the variables are associated (McHugh, 2013). In the correlations analysis, a relationship that is significant at less than .05 level is indicated by a single asterisk (*) and a significant level less than .01 by double asterisks (**) representing an even stronger association between the two variables. Management have to make decisions based on the evaluated strength of the association between variables.

In addition to the calculated p-values, Pearson correlation test identifies descriptors in the study which can be used to describe the magnitude of the calculated correlations (Davis, 1971; Miller, 1994). Table 5.8 shows a standard convention for describing magnitude of

correlations developed by Davis in 1971. The scale descriptors and the respective correlation coefficients they represent are tabled below.

Table 5.8 The Davis scale of descriptors of the magnitude of correlation coefficients

Correlation Coefficient	Descriptor
1.0	Perfect association
.70 - .99	Very high association
.50 - .69	Substantial association
.30 - .49	Moderate association
.10 - .29	Low association
.01 - .09	Negligible association

Source: Miller, L. E. (1994:6).

Correlation analysis has certain limitations. Correlation analysis offers very little in terms of understanding how two variables might be causally related (Bowers, 1991). This assumes spurious correlations because when two variables have a strong correlation it means there is a relationship or association not that a change in one variable causes a change in the other variable. It also assumes a linear relationship between the variables even though it may not be there (Wenger, 2012). In real life, environmental conditions change and invalidate findings. Therefore, there will be need to reappraise the data that achieved certain results. The method is liable to be misinterpreted because a high degree of correlation does not necessarily mean very close relationships between the variables and it is tedious to calculate (Lind, Marshal & Wathen, 2013).

From the results in Table 5.9 the Correlation value shows there was a substantial association between strategic partnerships and trust and the development of effective supply chain management strategy (.590) with significance (p) = .000. Therefore, there is a correlation between strategic partnerships and trust and the development of effective supply chain management strategy. For example, if a company can develop an effective supply chain management strategy it is likely going to have stronger strategic partnership and trust among the partners. One can therefore conclude that the development of an effective supply chain

management strategy by the petroleum company is associated with the existence of strategic partnerships and trust among the supply chain members.

From Table 5.9 the Correlation value shows there was a moderate association between development of effective supply chain management strategy and the flow of information, funds and materials strategic partnerships (.489) with a level of significance (p) = .000. Therefore, the correlation is significant and the development of an effective supply chain management strategy and improvement in flow of information, funds and materials are associated. One can conclude that improving the flow of information, funds and materials along the supply chain is associated with development of an effective supply chain management strategy. For example, if a company develops an effective supply chain management strategy it is likely to experience improved flow of information, funds, and materials along the supply chain.

From the results it can also be noted that the Correlation value shows there was a moderate association between company competitiveness and collaborative partnerships (.412) with a level of significance (p) = .001 which is less than .05. The Correlation shows the existence of an association between company competitiveness and collaborative partnerships. One can therefore conclude that having collaborative partnerships can lead to company competitiveness.

From the results in Table 5.9 the Correlation value shows there was a substantial association between staff knowledge and acceptance of supply chain management and supplier relationship management (.533) with a level of significance (p) = .000 which is less than .05. Therefore, the correlation is significant and the development of effective staff knowledge and acceptance of supply chain management is associated with effective supplier relationship management**.** One can conclude that having effective supplier relationship management can help staff accumulate knowledge and acceptance of supply chain management. For example a company that relates well with its suppliers and customers about the industry's supply chain will harness its acceptance of the supply chain management philosophy for improved competitiveness.

It can also be noted from the results that the Correlation value shows a substantial association between supply chain management strategy being driven from the top and the flow of information, funds and materials (.567) with a level of significance (p) = .000. Therefore, the correlation is significant and having a supply chain management strategy being driven from the top is associated with the flow of information, funds and materials in the supply chain. This means that, having a supply chain management strategy that is driven from the top is associated with effective movement of information, funds and materials. For example the participation of the CEO in developing a company's supply chain strategy can lead to allocation of adequate budgets that influence the movement of resources across the supply chain.

From the same table, the Correlation value shows there was a moderate association between increased transaction processing speed and prioritising supply chain management activities when resources are being allocated (.386) with a level of significance (p) = .003 which is less than .05. Therefore, the correlation is significant and increased transaction processing speed and prioritising supply chain management activities when resources are being allocated are related. We can conclude that prioritising supply chain management activities when resources are being allocated is related to increased transaction processing speed. For example, when an organisation allocates enough resources to its supply chain activities it can speed up the execution of tasks by its various departments.

From Table 5.9 the Correlation value shows there was a moderate association between ICT management and IT integration with suppliers and customers (.453) with a level of significance (p) = .001 which is less than .05. Therefore, the correlation is significant and ICT management and IT integration with suppliers and customers can be related. We can conclude that implementing ICT management can result in interaction between the company and suppliers and customers. For example, when an organisation has an effective ICT it is likely to integrate its IT with customers and suppliers.

It can also be observed that the Correlation value shows there was a substantial association between employee relations have improved and customer service and linkages (.576) with a level of significance (p) = .000 and is less than .05. Therefore, the correlation is significant and improved employee relations and customer service and linkages are related. We can conclude that good customer service and linkages is associated with improved employee

relations. For example, a company that strives to have better customer service must have good relations with its staff.

The Correlation value also shows there was a substantial association between customer satisfaction and staff motivation, training and development (.627) with a level of significance (p) = .000 which is less than .05. Therefore, the correlation is significant and customer satisfaction and staff motivation, training and development are related. One can conclude that staff motivation, training and development can result in customer satisfaction. For example, a company that motivates trains and develops employees is likely to have these virtues passed on to customers leading to customer satisfaction.

From Table 5.9 the Correlation value shows there was a moderate association between transport and distribution and company competitiveness (.404) with a level of significance (p) = .002 which is is less than .05. Therefore, the correlation is significant and transport and distribution and company competitiveness are related. One can conclude that good transport and distribution management can assist a company achieve company competitiveness. For example, you need to have effective transport and distribution systems to become more competitive.

Finally, the results in Table 5.9 show that the Pearson correlation value shows there was a moderate association between supplier relationship management and customer relationship management (.439) with a level of significance (p) = .001 which is less than .05. Therefore, the correlation is significant and supplier relationship management and customer relationship management are related. One can conclude that there was an association between good supplier relationship management and customer relationships management. For example, a company that has good relationship with suppliers is likely to have good relations with its customers.

Table 5.9 Pearson Correlation analysis

	Davis scale Value	**Level of Significance (p)**
Supply chain variables		
Strategic partnerships and trust and development of effective supply chain management strategy	.590**	.000
Development of effective supply chain management strategy and the flow of information, funds and materials	.489**	.000
Company competitiveness and collaborative partnerships	.412**	.001
Staff knowledge and acceptance of supply chain management and supplier relationship management	.533**	.000
Supply chain management strategy being driven from the top and the flow of information, funds and materials	.567**	.000
Increased transaction processing speed and prioritising supply chain management activities when resources are being allocated .	386**	.003
ICT management and IT integration with suppliers and customers	.453**	.001
Employee relations have improved and customer service and linkages	.576**	.000
Customer satisfaction and staff motivation,		

training and development	.627**	.000
Transport and distribution and company competitiveness	.404**	.002
Supplier relationship management and customer relationships management	.439**	.001

Source: fieldwork, 2017

5.3.4.2 Multiple Linear Regression Analysis

In addition to the strength of association tested through Pearson's correlation analysis, the Multiple linear regression analysis was also used it. Multiple linear regression analysis is a predictive statistical technique used to describe the relationship between two or more predictor variables which could be both continuous and categorical and a continuous dependent variable (Bluman, 2004). In multiple regression analysis several variables are used to predict the dependent variable (Wegner, 2012). In the study, the use of the multiple regression analysis was limited to the study's objective to evaluate supply chain management performance measurement attributes relevant to the Zimbabwean petroleum industry's supply chain. Therefore, the use of multiple regression analysis was limited to identifying explanatory factors and predictor variables of supply chain management performance in the petroleum industry.

Multiple regression analysis assumes that, there is linearity between the dependent variable and a set of independent variables, the independent variables are not correlated and normality [for any specific value of the independent variable, the values of the dependent variable are normally distributed] (Bluman, 2004). To run the multiple regression test, supply chain management performance measurement factors (questions 50 to 62 of the questionnaire) were combined and used as the dependent variable which was then tested against all the remaining variables (independent variables). Interpretation of a regression analysis results is based on the resultant p-values. For example, in the study, this kind of analysis will show only the variables that can influence supply chain management performance. This is a typical stepwise regression analysis which provides insight on independent variables with significant

regression coefficients (predictors of the dependent variable). It does not report anything on all the other independent variables and this is one of this approach's weaknesses.

The overall summary of the regression test is represented in Table 5.10 below. Results indicate that the development of effective supply chain management strategy (p=.001) and staff motivation, training and development (p=.001) were the only good predictors of supply chain management performance. One can therefore safely conclude that, although there are relationships between several supply chain management variables tested under the Correlation analysis, only two variables, the presence of an effective supply chain management strategy and staff motivation, training and development are good predictors of supply chain management performance.

Table 5.10 Multiple regression analysis results summary table

	R	R^2	B	Beta	t-stat	p-value
Development of effective supply chain management strategy	.532	.283	.439	.532	4.256	<0.01**
Staff motivation, training and development	.707	.217	.359	.467	4.424	<0.01**

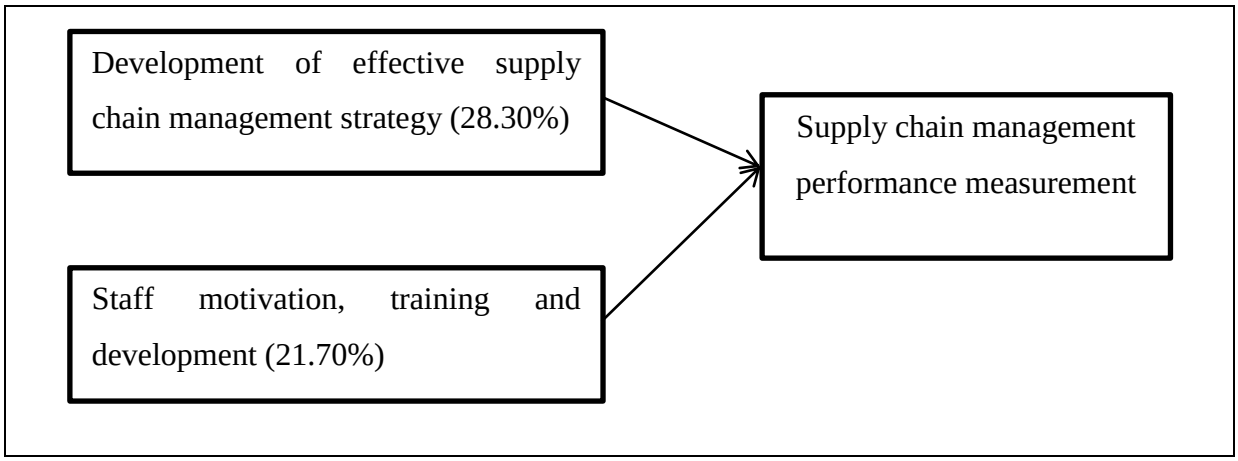
Constant= 2.048, standard error=.081, Adjusted R^2=.478 *P≤ .05, **P≤.01

Source: fieldwork, 2017

In regression analysis observers may also be interested in the R^2, the coefficient of multiple correlations which measures how well the multiple regressions fit the data (Wegner, 2012). The development of effective supply chain management strategy demonstrated to be the most explanatory variable of supply chain management performance as it contributed 28.30% to the overall model (R^2 change=.283). Staff motivation, training and development had a contribution of 21.70% (R^2 change=.2173) in explaining supply chain management performance. It can be concluded safely that, from all variables that were used as predictors of supply chain management performance, development of effective supply chain management strategy and staff motivation, training and development have a total contribution of 50%. We can therefore conclude that the other 50% contribution is due to variables that

were not included in the study. Figure 5 below is a model representing explanatory and predictor variables of supply chain management performance in the petroleum industry.

Figure 5: Model representing the explanatory and predictor variables in supply chain performance measurement.



Source: fieldwork, 2017

5.4 Chapter summary

This chapter considered the study's results from both qualitative research and quantitative research perspectives. Both results were in line with the research objectives. The qualitative research revealed that the state of the petroleum industry's business environment, supply chain strategies and structure have a number of supply chain issues that needed to be fixed for the industry to be competitive. These included economic, political and environmental challenges, lack of a vibrant petroleum industry supply chain strategy and a weak industry structure that failed to protect petroleum traders and attract investment. Quantification of the results in the form of frequency tables focused on management attitudes towards supply chain management, collaboration drivers, critical success factors, performance measurement issues and challenges faced during the implementation of supply chain management. Further analysis involved Pearson correlation and multiple regression analyses of associations between variables. Correlation examined association between supply chain management variables used to measure the attitudes of managers towards supply chain management, petroleum industry's critical success factors, the need for collaboration among supply chain members and challenges companies faced when implementing supply chain management. Results showed that generally relationships existed among the different variables that were

tested. The multiple regression analysis tests revealed that development of effective supply chain management strategy and staff motivation, training and development were good predictors of supply chain management performance. The next chapter discusses the research results in detail.

CHAPTER 6: DISCUSSION OF STUDY FINDINGS

6.1 Introduction

Results of in-depth interviews held with six executives from the industry's associative organisations and survey questionnaires administered among petroleum company supply chain management staff demonstrate that petroleum industry's supply chain professionals hold mixed views regarding the implementation of the supply chain management philosophy and achieving company competitiveness. In line with the mixed methods design described in Chapter 4, the qualitative and quantitative research methods used in the study converge at the discussion of research results (Creswell, 2014; Maree, 2016). Therefore, this chapter combines and discusses findings from both qualitative and quantitative research and demonstrates the extent to which the study objectives were achieved.

6.2 Findings about the Zimbabwe petroleum industry's business environment

The business environment is divided into three components, the macro environmental factors, market factors and micro environmental factors (Kavale, 2012; Brevis & Vrba, 2014; Nieman & Benett, 2014. Overall, the research showed that the petroleum industry faces a hostile environment mainly driven by a challenging macro and socio-political environment. As a result the analysed environmental factors possessed several issues that required to be fixed to address the petroleum industry's uncompetitiveness.

6.2.1 Macro-environmental factors

The PESTE model was used to summarise the petroleum industry's macro environmental factors. PESTE is an acronym standing for a business environment's political, economic, socio-cultural, technological, and environmental factors (Assen, 2009; Atkinson, 2014).

6.2.1.1 Political factors

World over when countries attain independence from their colonisers they make efforts aimed at economically empowering their local people (Kuiken, 2014). In South Africa this is enshrined in the country's Broad Based Black Economic Empowerment [BBBEE] Act, (2003) and in Zimbabwe in the Indigenisation and Empowerment Act, [General Regulations] (2010). The study revealed that an affirmative action programme was adopted by the Zimbabwean Government with the intention to correct historical inequalities that economically disadvantaged indigenous people before the attainment of independence in 1980. Strategies used by Governments to implement these policies determine the effectiveness of the policies and to what extent they influence competitiveness of industries and individual companies (Kuiken, 2014). This study has clearly demonstrated that in Zimbabwe the indigenous petroleum companies which are supposed to be beneficiaries of indigenisation and empowerment policies complain that the policy does not protect them owing to the fact that a licenced petroleum company can operate as an importer, or a wholesaler, or a retailer without any limitations. This favours established companies, particularly multinational corporations who can afford to invest at the different tiers of the supply chain,hence creating a competitive edge over indigenous companies whose operations were restricted to the retail sector of the industry and were not protected at law.Thus, 97% of the respondents cited Government regulation as one of the petroleum industry's challenges.

When a company operates at different levels it can lump together the margin it is supposed to earn at different stages to gain an unfair advantage over small companies registered as retailers. The practice is alleged to promote established companies (MNCs) at the expense of local entrepreneurs (NOCZIM, 2010). The study revealed that the negative effects of poor regulations which are not water tight are exacerbated by the fact that regulation and policy implementation enforcement for the petroleum industry was weak. For example, the qualitative interviews showed that ZERA which is charged with regulating and monitoring activities of the petroleum industry was under resourced and it does not have good relations with petroleum companies. The qualitative interviews showed that ZERA was failing to combat illegal practices such as quality control, smuggling, product adulteration and other

related practices that affected bonafide traders' competitiveness. In addition, under the quantitative survey, 96.5% of the respondents indicated the need for support from ZERA (the regulator) and other associative organisations as one of the petroleum industry's critical success factors and 74% saying relationship with associative organisation was a good measure of supply chain performance.Unfortunately a multiple regression test that was run did not confirm the latter point (Figure 5 of previous Chapter).

In addition to the above, the Government sets uniform and , stringent quality safety standards for all traders irrespective of geographical location. As found in the interviews, the MNCs are well established and they did not have any problems with that. However, it is difficult for the indigenous companies to comply and cope with the stringent requirements because they were under capitalised. As a result, it was felt that the small companies were being squeezed with demand for high quality and safety standards which MNCs did not have problems with. The implication is that the small players perceive themselves as victims of strict policies and unfair treatment and they therefore needed more sympathy and support from the authorities.

Some indigenous companies react to the above measures by not cooperating with Government and regulators. This contradicts a correlation analysis finding that showed a strong correlation ($p=0.01$) between collaborative partnerships and positive improvement in company competitiveness. Therefore, petroleum companies' uncooperativeness forced them to engage in illegal practices as a survival strategy. This behaviour actually weakens the petroleum industry's supply chain because it results in lack of trust among supply chain members. This was also cited as a critical challenge by 91.2% of the respondents in the survey. The fact that support from the associative organisations was listed as the second most critical success factor with 96.5% support yet Government regulations were the forth important challenge for the industry implies that regulatory challenges were a serious problem for the Zimbabwe petroleum industry. The regulations needed to be relooked so that they permit industry players to get the appropriate support they needed. Tsamela (2016) reiterates the need for Government to help business especially during difficult times. In South Africa the petroleum industry regulations do not allow petroleum companies to operate at retail sector level and this protects the retail operators (SAPIA, 2015).

The qualitative interviews showed that Government responded to the uncooperativeness of petroleum companies by making decisions that sometimes hurt the entire industry. For

example, when the Government realised that petroleum companies were abusing the zero duty facility on paraffin it imposed 44 cents per litre duty on paraffin in December 2016 to discourage the mixing of cheap paraffin and diesel (ZIMRA, 2016). As a result petroleum companies have stopped importing the paraffin but the businesses of genuine paraffin users have been affected. The implication here is that even when the Government wants to assist sometimes the behaviour of supply chain members forced it to pluck the loopholes by making decisions that affected the entire supply chain. Other studies revealed that, policy decisions are required to be made with the involvement and participation of stakeholders so that challenges were addressed in a sustainable manner (Gichuru, Ivaro & Ivaro, 2015; Arora & Sivakumar, 2016).

It was also gathered from the qualitative interviews that since implementation of the indigenisation policy in Zimbabwe, traditional petroleum companies like Chevron, BP & Shell and Caltex were seen leaving the Zimbabwean market because there was hesitation on the part of investors to commit their investment into the country owing to the uncertain and unpredictable environment. Under high uncertainty investors did not know what could happen to their investment in future and they opted to leave the country or slow down investments (Olson, 2012). The study revealed that companies that took over the assets of MNCs have got limited capacity (NOCZIM, 2010). As a result there has been marginal growth and expansion of fuel distribution facilities. This point is supported by the fact there were few new entrants into the petroleum industry. Only 3.5% of the petroleum companies had two to five years' experience in the industry confirming new entrants into the petroleum industry were low. There was under capacity utilisation given that the pipeline which had a capacity to pump up to 180 million of litres of fuel was pumping only 110 million litres leading to underutilization of capacity (ZERA, 2017). The implication was that the Government would struggle to raise the USD2.2 million per month it required to service the take or pay pipeline usage agreement it had with CPMZ. Achieving the USD 2.2 million monthly premium assumes full capacity utilization which the petroleum industry was failing to achieve because of the unfavourable business environment, poor structure and lack of strategy among other reasons. Petroleum traders were not likely to increase fuel imports as all of them cited high cost of product as their main impediment.

Contrary to the claim by associative organisations that the petroleum industry was liberalised, there were supply chain elements that were constrained by Government regulations. For

example, the interview results showed that companies were forced to sell (15%) blended petrol, the Environmental Management Authority (EMA) did not allow fuel tankers to transport fuel during the night and importation of fuel by road attracted a surcharge of USD0.04 per litre from the Zimbabwe Revenue Authority (ZIMRA). These are few examples of political decisions that have potential to keep the petroleum industry supply chain uncompetitive.

In the event of product shortage, which was more common with ethanol that was used for blending petrol, the Government altered blending levels and this brought about the issue of quality inconsistency and legislative uncertainty, factors that militate against the basic principles of supply chain management. For example, Kim and Chai (2015) strongly spoke against environmental uncertainty's negative impact on supply chain integrity which was key in achieving competitiveness. The study revealed that in December 2016 there was a forced reduction of blending levels of petrol from 15% to 5% because producers of ethanol were failing to meet demand. Ethanol was supplied by two companies only, Green Fuels and Triangle (NOIC, 2016). Ethanol was not readily available from these suppliers during the rainy season as they cannot harvest the cane used to produce ethanol. These developments are tantamount to overregulation; yet in a liberalised market it should not be Government's responsibility to find markets for private companies.

6.2.1.2 Economic factors

The Zimbabwean economy was underperforming to the extent that there were serious shortages of foreign currency to finance fuel imports. This was despite the fact that Zimbabwe was a dollarized economy since the beginning of 2009. From the study it emerged that petroleum companies queue at the commercial banks for foreign currency with other importers despite the fact that their cash sales were in USD. Traders did not have "dollars" in a dollarized economy and this was their biggest challenge. Banking regulations forced service stations to allow motorists to swipe for their fuel purchases but when petroleum companies wanted to pay for their imports the real money was not made available on time owing to liquidity challenges. Applications for foreign currency payments to suppliers were not approved on time. Sometimes importers were forced to cancel customers' orders. Meanwhile, queues were beginning to resurface at service stations owned by indigenous companies.

Interviews revealed that investors were not confident to invest in areas which used fuel as an input because they were not guaranteed consistent supply of fuel, meaningbtheir projects would not be viable. The implication of this finding is that lack of investor confidence will keep investors out of the petroleum industry and customers' frustrations rising. This tends to support the finding about low entrants of only 2 new companies in the past 2 to 5 years.

Economic de-industrialization had shrunk the country's economic activities fast and this affected the fuel companies' competitiveness. At the time the study was carried out the country had twenty three registered petroleum companies only (ZERA, 2017). This represented a drop from 40 companies in 2011 as alluded by the ZERA Compliance Director. Competition in the petroleum industry tends to be stiff and concentrated in urban areas. Lack of protection of the small players left them struggling to survive. However, some frustrated petroleum companies had turned to unscrupulous practices such as smuggling, product adulteration and tinkering with their metres and dispensers. Government tends to lose tax revenue in the process, customers often pay high prices for poor quality products and honest traders lose business to fly by night operators who sell their smuggled and adulterated products at heavily discounted prices. Despite the fact that the illegal practices were associated with revenue leakages they could also be linked to some of the supply chain management challenges revealed in the study.

In an effort to stop the illegal practices Government introduced more regulations yet Government regulations were identified as the fourth highest challenge the petroleum companies faced. Lack of trust among supply chain members which is the sixth highest challenge and poor product quality can also derail the industrialisation process. Malpractices by companies as a reaction to unfavourable economic and trade policies have been cited in other studies as a hindrance to company competitiveness (Chima, 2010; Muthu, 2010; Collins & Troilo, 2015; Tanco, Furburg & Escuder, 2015). Issues related to the country's economic policies which the survey research raised as challenges include cost of stock (100%), and government regulations (97%). Excessive duties and the lack of foreign currency were cited as challenges in the qualitative interviews.

The research confirmed revelations by NOCZIM (2010) that, in order to collect more revenue from pipeline usage the Government introduced a four cents surcharge for rail and road imports to encourage importers to use the pipeline. It appears this had however, diverted

Government attention from road construction and rehabilitation of the railway lines because there was no pressure for Government to maintain the railway and the road systems because the pipeline was shipping enough volumes of fuel in tandem with diminishing industry activities. On the other end, the poor state of the country's roads and railway systems affected inland fuel distribution because investors could not construct service stations in remote areas where there were no roads or where the existing roads were impassable. The implication to this observation is that Government policies needed to be long sighted and must to also look at the downstream effects they had across the entire economy.

Further implication of the above is that when competition for service station space is concentrated in urban and peri-urban markets only as also cited by the Regulatory Agent of Zambia (2010) this resulted in companies earning margins lower than the stipulated 7 % because under cut throat competition companies were forced to sacrifice part of their margins. However, it was feasible to reinvest the small margins and to achieve the required growth. This also caused shortage of infrastructure and storage facilities cited by 93% of the respondents as the number five industry challenge. In South Africa service stations earned up to 33 % margins (SAPIA, 2016). South Africa also had a rationalization plan (RATPLAN) which aimed to protect small business owners and offered job creating ability to such businesses. For example, the RATPLAN prohibited petroleum companies from self-service hence the RATPLAN created job opportunities for service station attendants (Matsho, 2010). RATPLAN also restricted distance between service stations to at least 15 kilometers in a geographical area as a strategy to limit competition and protecting companies that are already in the market. The Zimbabwe petroleum industry companies did not have any industry association to represent the petroleum companies' interest in a more professional way as witnessed in South Africa.

6.2.1.3 Socio-cultural factors

The Zimbabwean Government endorsed the importation of reconditioned vehicles at the beginning of the millennium in 2000. Since then, nearly every household owns at least one car and this development created business opportunities for petroleum companies given fuel demand that was associated with the increased number of vehicles in the market. This study however shows that there has been no significant increase in new fuel distribution outlets as

only 3.5% of the service stations were new (2 to 5 years old). Instead, 45.6% of the survey responses confirmed that there has been no improvement in the cost of product which was cited as a problem by all respondents. Worse still, the need for collaboration among supply chain members was driven by increased competitive intensity (question 40) and shortage of infrastructure (service stations and storage facilities). This implies motorists have to travel longer distances to refuel and limit the use of vehicles to critical activities alone. Most vehicles are underutilised owing to the high cost of fuel, there was low economic activity in the country, unavailability of service stations in remote parts of the country and poor road networks. Other studies in petroleum industry supply chain found that shortage of infrastructure and facilities were some of the petroleum industries' challenges (Chima, 2007; Kimani, 2013; Osoro, 2015).

Still on social factors, supply chain management as a business concept tends to do well when stakeholders embrace the culture of sharing and working together. Collaboration partnerships and development of effective supply chain management strategies were cited as the industry's critical success factors by 98.2% and 93% of respondents respectively. In addition the regression analysis test confirmed development of effective supply chain management strategies as the study's key determinant of supply chain management performance. Nieman and Bennett (2014) observed that, collaboration by sharing resources, operations and improvements within the supply chain was instrumental in the business success of Japanese manufacturers and initiating collaboration was seen as a sign of interdependence among supply chain members. This interdependence is central to supply chain performance because it allows firms to share competitive advantage over others (Kohli & Jensen, 2010).

All this can improve petroleum companies' revenue inflows and can therefore spur growth and competitiveness. The interviews showed that Zimbabwean petroleum companies were not eager to have a petroleum industry association of their own. They were not willing to collaborate and cooperate with each other. This unusual behaviour by petroleum companies tends to contradicts the point that the industry association plays an important role in South Africa (Matsho,2010) and in Kenya (Ng'ang'a, 2017). In the survey results a modest 67.9% respondents confirmed there was supplier relationships and support. This contradicted the findings by other researchers who identified collaboration and cooperation as important requirements for supply chain management effectiveness (Fawcett et al. 2015; Ogunlela & Lekhanya, 2016; Tadisina, 2016; Solaiman, 2016). The current study did not identify reasons

for the unusual behaviour and the refusal by Zimbabwean petroleum companies to form an association. This is despite the fact that petroleum companies used to import product as a group under the auspice of Zimbabwe Oil Procurement Consortium (ZOPCO) and the National Procurement Committee (NPC) which operated like associations in the past (NOCZIM, 2010).

6.2.1.4 Technological factors

This study demonstrated that companies that took over assets of MNCs that left the petroleum industry did not have capital or a solid supply strategy to improve or grow the assets. The Government had not put in place any strategy to upgrade the assets and equipment it had in order to penetrate the regional market which was reported to be readily available. Fuel marking equipment that the industry required to tame some of the illegal and unethical activities carried out by scrupulous petroleum companies was taking time to source. The implication of these findings was that investment in modern facilities, equipment and technology had eluded the Zimbabwean petroleum industry for a long time owing to lack of resources (Ministry of Industry and Commerce, 2012).

Despite the fact that lack of infrastructure and storage facilities was ranked as number five problem by 93% of the respondents it will be difficult to deal with the problem in an industry where 29.1% of supply chain managers indicated that delivery efficiency, speed and flexibility were not important. For example, due to the poor economic and political situation prevailing in the country it would not be prudent for the banks to provide loan facilities to petroleum companies for recapitalization purposes. The banks did not have confidence in the system owing to uncertainty and inability to predict what could happen to them in future. The lack of confidence can cripple the financing of developmental project and makes borrowing very expensive. This spurs deindustrialisation which negatively affects the competitiveness of petroleum companies.

Most of the vehicles used to transport fuel were old and inefficient causing transportation costs to remain high. The results of the study showed that after adopting supply chain management there were improved information, funds and materials flow (75%). Contrary to this finding the results also showed that a mere 36.4% of the respondents were happy with IT

integration with suppliers and customers. Innovation technology is heavily quoted as one of the strategies to achieve collaboration and integration which both drive competitiveness of companies (Ettlie, 2014). Companies that did not invest heavily in technology found it difficult to implement an effective supply chain strategy in order to be competitive (Laing,You & Lin, 2010; Laudon & Laudon, 2012; Ettlie, 2014; Arora & Sivakumar, 2016). Yet the basic objective of supply chain management includes optimization of performance in the chain and adding as much value at the least cost (Shukla, Garg & Agarwal, 2011). It implies there was a need to invest in technology as a strategy for taming key cost elements such as product cost and distribution costs to ensure viability and competitiveness. Unfortunately, not all investments in technology will benefit the industry based on the point raised earlier that, investing in fuel marking technology was likely to result in a fuel price increase to cover the cost of such technology.

6.2.1.5 Environmental factors

Under the qualitative research, the Finance Director of NOIC talked about Zimbabwe being a land locked less developed country (LLLDC) without any known fossil deposits and also mentioned that the country's only oil refinery in Mutare had not been functional since the country's attainment of independence from Britain in 1980. In its policy statement the Ministry of Energy and Power Development (2012) indicated that there were no hopes of having the refinery revived. This implied the country's petroleum industry activities were restricted to downstream, inbound and outbound supply chain activities alone. This underlines the significance of having a national border that was close to the port. The study interviews revealed that the Beira Port which was Zimbabwe's nearest outlet to the sea had a shallow harbour which limited the size of ship containers that docked at the Beira port. This was a limitation which implied Zimbabwe and other countries importing fuel through Beira port were deprived of volume discounts and economies of scale advantages.

At the same time, smaller ships tended to be affected by bad weather that affected the Beira port in summer periods more than larger ships. Therefore, between October and January volumes of fuel imported through Beira port are low owing to both constrained supply and bad weather. It also emerged that Zimbabwean fuel importers' situation was exacerbated by the fact that there was increased demand for petroleum products in Europe during the

European region's winter period. Companies that supplied fuel into the SADC region were the same ones that also serviced the European market. Thus, because of supply and demand challenges Zimbabwe's fuel imports were more expensive between October and January and the bad weather experienced at Beira port between October and January also made offloading difficult. These and other constraints of being landlocked and less developed made the importation of products and costs along the supply chain to be relatively high (Teravaninthorn & Raballand, 2008; Arvis, Marteau & Rabaland, 2010). However, owing to liquidity challenges, inadequate storage facilities and high storage costs Zimbabwean petroleum companies could not buy in bulk and store fuel for future use. Thus, the country's dependence on an already constrained Beira facility means its fuel industry's competitiveness was already under threat. Additionally, the industry's competitiveness would be affected by water shipment charges, Beira port storage charges, pre-shipment inspections and pipeline fees (Jean-Frangois, A., Jean-Frangois, M., & Gael, 2010). Unfortunately, the fact that Zimbabwe did not have viable alternative sources of supply put the country at a weak bargaining position to reduce costs. It also emerged that Zimbabwean petroleum companies and the Zimbabwean Government did not have investments in port facilities which made them price takers. Petroleum companies were forced to pay commercial rates for port services. As a result the competitiveness of the industry's supply chain suffers right from sourcing stage.

Another serious environmental issue was keeping the environment free of pollution and health and safety issues. The qualitative interviews revealed that implementing and enforcing safety, health, environmental and quality (SHEQ) programmes drained cash from the supply chain. Both Governments and the petroleum companies were required to fund the SHEQ programmes (Ministry of Energy and Power Development, 2012). For example, there have been international efforts to reduce the amount of carbon emissions into the environment Oakland, 2014). Petroleum companies are therefore forced to invest in appropriate equipment and distribute cleaner fuels that cause less pollution. However, clean fuels are expensive. In light of the above, the study revealed that Government allowed petroleum companies to import both Diesel 50 and Diesel 500 at the same time. The former was recommended for use in modern diesel engines than the Diesel 500 because it has less destructive effects to the environment than Diesel 500. However, interviews further revealed that Diesel 50 could not be pumped into the pipeline because there was no regulation authorising NOIC to pump the Diesel 50 into the pipeline. This was despite the fact that all fuel importations by road

attracted a four cents surcharge per litre. This implied that international travellers driving to and through Zimbabwe would be compelled to refuel their vehicles with high sulphur diesel (Diesel 500) when they are in Zimbabwe unless they risked carrying pure refuelling stocks in jerry cans. This issue was also linked to the country's policy inconsistencies. The Government did not follow through its commitment to adopt and implement international standards because at the lower end of the value chain consumers were still exposed.

Unfortunately corporate managers have limited control of macro-economic factors such as Government policy, national economic challenges, changing socio-economic characteristics, lack of technology and the natural geography of a country (Stevenson, 2012). Therefore, problems emanating from macroeconomic issues can only be fixed with concerted efforts and political will from Government and the intervention of policy makers (Thompson & Strickland, 1999). Fixing macro-economic issues also required companies in an industry to collaborate with each other and approach authorities with one voice so that their issues can be addressed (Matsho, 2010). However, in order to keep costs of fuel under control, an effective supply chain strategy required petroleum companies to be in control of the entire supply chain and not just a component of it. Other researchers had already found out that a company was bound to feel the consequences of not being in control of the key elements of her supply chain (Nakano, 2009; Muthu, 2010; Naude, 2013; Nag, Han & Yao, 2014).

6.2.2 The market environment

The market or task environment is the link between the organisation and the macro environment and it comprises variables such as competitors, customers, intermediaries, and suppliers. The market environment variables directly influence stability and growth of the company but cannot be controlled by management (Lazenby, 2016).

- Competitors

The study results showed that there was greater competitive intensity in the petroleum industry. Greater competitive intensity was identified by 92.9% of the survey respondents as the number one driver of collaboration in the petroleum industry. Competition to gain control of existing distribution outlets was rife among existing companies although there was modest

investment, growth and expansion. The fact that there were only 23 petroleum companies in the industry and that only two entered the industry within five years meant new players and existing companies that wanted to grow would target taking over existing facilities from each other. This kind of competition was however not strategy or innovation driven because it was limited to horizontal growth.

There was little in terms of creativity, innovation and vertical growth which the industry needed for improving its competitiveness. Therefore, there was cut throat competition which implies a survival of the fittest attitude. Competition was more intense in large cities like Harare, Bulawayo and Gweru. When a similar situation existed in Zambia the Regulatory Agency of Zambia (2010) observed that competition intensified in towns owing to lack of incentives for people to invest in the rural areas and this negatively affected competing companies' margins and profitability. In South Africa the RATPLAN limited the distance between service stations to fifteen kilometres in a geographical area and this protected existing players against competition (Matsho, 2010; SAPIA, 2016). The qualitative interviews showed that unavailability of distribution outlets puts petroleum companies in a dilemma because losing a dealer may entail loss of sales revenue. It would take some time for a trader to find another service station and securing a new outlet entailed more costs because one has to spend money renovating and rebranding the newly acquired service stations.

- Customers

Uncompetitiveness affected company growth because companies cannot stay close to the customers (Kotler & Keller, 2012). Opportunities for forging collaborative relationships between suppliers and customers were the only route left but also difficult owing to the fact that the uncertainty conditions and unfavourable business environment discussed earlier discouraged banks to give long term loans to investors. A slowdown in recapitalization, construction and industrialisation projects owing to limited access to loan facilities by petroleum industry players left petroleum product consumers unhappy. For example, limited outlets created room for arbitrage and profiteering practices that left customers worse off and unsatisfied. Although survey results revealed a p value of 0.01 between ICT management and integrating with suppliers and customers, the relationship cannot be beneficial when customers are not happy and integration cannot be achieved when companies have not invested in technology. Information and technology was listed as number eight out of nine

under benefits of supply chain management. The results also showed correlation of 0.00 between customer service and linkages and employee relations implying that the relationship between a company and its staff was linked to staff motivation. Unmotivated staff will find it difficult to resolve customer issues and in the study a total of 16.1% respondents disagree that a company implementing supply chain management has been able to resolve customer issues. This implies that adopting supply chain management is not the panacea of all the company's problems. Companies must continuously strive for improvement and adopt supply chain management as one of the many efforts they can use to spur their companie's competitiveness.

- Suppliers

There was a relationship between customer relationship management and supplier relationship management but only 63.1% of the respondents were happy with the way the company managed its relationships with suppliers, another 29.8 % were not sure. Petroleum products suppliers were paid in foreign currency. Qualitative interviews showed that foreign currency was the worst challenge.This was consistent with the survey results which showed high cost of product as the biggest challenge. This implied that suppliers' business was affected by petroleum companies' inability to pay on time because the industry faced payment bottlenecks which were linked to foreign currency shortages. The implementation of vendor managed inventory (VMI) which was beneficial, particularly to suppliers, was no longer feasible under the economic conditions that prevailed. The VMI strategy assumes an efficient payment system. Suppliers cancelled credit facilities for their customers and were reluctant to keep consignment stock in NOIC warehouses because the longer the stock stayed in the warehouse the higher the storage charges for them. The situation became worse where a supplier would have financed stock through a bank loan. The study revealed that 88% of the survey respondents agreed that companies with supply chain management strategy collaborated and coordinated more effectively with suppliers and customers. However, poor relationship between supply chain members seems to contradict the point that there was collaboration.

- Intermediaries

  In the backdrop of liquidity challenges intermediaries such as transporters, repair and maintenance service providers and other supply chain members preferred to engage petroleum companies on a prepayment or cash on delivery basis to cushion themselves against losses triggered by the slow payment process. Cash transactions squeeze petroleum companies' cash flow management processes and this actually affected sales, growth, profitability and ultimately competitiveness.

6.2.3 Internal environment

The internal environment is about micro economic factors; economic factors over which management of an organisation has a fair amount of control (Nieuwenhuizen, 2013; Hugo & Badenhorst-Weiss, 2016). This study determined supply chain managers' satisfaction with the way their management handled supply chain management activities based on the attitudes they developed about how six supply chain management practices of procurement, inventory control, transport and distribution, information and communication technology, customer service and service stations were managed in their companies.

- **Procurement management**

Twenty five percent of the respondents under quantitative research confirmed they were not satisfied with the way procurement of resources was managed and only 57.9 % were satisfied with the management of outsourcing which is basically about supplier relationship management supported by only 63.1 % of respondents. In addition development of reliable sources was relegated to position seven under list of critical success factors as opposed to the need for strategic partnerships and trust which was the most important critical success factor which got 100% support from respondents. As a result Zimbabwe's fuel was expensive relative to fuel prices in other SADC countries. This corresponded with statistics in table 1.1 which was based on data prepared by the Germany Agency for International Cooperation in 2015.

As revealed in the qualitative research of the study, the major reason behind the price disparities between Zimbabwe's fuel prices and prices charged by other SADC states was high duties and other tax levies. For example, duties for diesel and petrol were reported to be USD0.44 and USD0.56 per litre, respectively, when the study was carried out. The implication was that even though petroleum companies adopted the supply chain management strategy this had failed to bring down cost of product and distribution costs. The goals of supply chain management are efficiency (cost) and effectiveness (value) (Coyle et al., 2017). In the study all respondents (100%) agreed that cost of product remained the number one challenge for the industry. Forty six percent respondents confirmed that even after implementing supply chain management there was no improvement in product price. This implies that these were national issues that needed to be addressed through a national policy change. Otherwise supply chain management efforts alone could not fix the problem of high product prices under an environment where import duties which were determined by the Treasury. According to other study findings the above situation raises need for effective leadership (Achua & Lussier, 2013), the need for a national strategy to support local businesses (Naude, 2013; Tsamela, 2016) and the need for a robust integrated supply chain model (Ogunlela & Lekhanya, 2016).

Qualitative interviews revealed that some petroleum companies had benefited from having strategic partnerships with international suppliers who had agreed to deliver fuel on VMI arrangements and even on credit. However, these VMI facilities were under threat because petroleum companies' purchasing power was under threat owing to the country's dicey foreign currency situation. Through regional engagements and benchmarking programmes the associative organisations had observed that the current procurement strategy where individual companies sourced their own fuel was ineffective when compared to centralised procurement strategies employed in other countries like Tanzania and Ghana. This implies that the lack of an industry wide association which local petroleum companies resisted, created some opportunity costs for the entire supply chain. The study revealed that petroleum companies were not interested in forming an industry association and this created lack of harmony, trust, unity, and the sharing of information. It was surprising that petroleum companies did not want to have a national association because the industry used to have a National Procurement Committee (NPC) which operated like an industry association. The NPC disappeared from the market when NOCZIM was disbanded in 2010. It remains unknown why this was the case in Zimbabwe because in South Africa there were several

petroleum industry associations that represented the interests of petroleum companies at different levels of the supply chain where the (SAPIA) was the largest representative body (Matsho, 2010). In Kenya they have the Kenya Independent Petroleum Dealers' Association [KIPEDA] (Ng'ang'a, 2017).

Outsourcing is considered a critical component of an effective procurement strategy especially in companies that pursued the supply chain management philosophy (Hugo & Badenhorst-Weiss, 2016). The study showed that the following supply chain activities were outsourced transport and distribution (84.2 %), inventory management (36.8 %), ICT (33.3 %), procurement (21.1 %), and customer service (14 %). On average 21.1% of the respondents did not answer the questions about outsourcing. This implied that some managers were not familiar with the outsourcing strategy. In addition, only 38.6% respondents said they had internal service agreements between departments and 45.6% said they did not have such agreements. This implied that there were no clear guidelines on implementing the outsourcing strategy and how it ought to be managed. After studying factors affecting the Iranian industry's supply chain of which outsourcing was a key element, Soheila, Alizera and Alizera (2015) concluded that organisations that failed to recognise or overcome their weaknesses by not implementing valuable strategies that were being implemented by competing organisations, were likely to suffer from competitive disadvantage.

- **Inventory management and control**

The management of fuel stocks was done by NOIC on behalf of all the petroleum companies for a fee but only 60.7% of the survey respondents were satisfied with the way inventory was managed. The fact that inventory management was outsourced to NOIC could be the reason why the head office of the investigated petroleum company was manned by only one staff member. Petroleum companies did not keep stock at their own premises except stocks needed for immediate sale at the service station because they did not have storage facilities. As a result, petroleum companies travelled long distances to deliver fuel collected from NOIC's only two depots Msasa and Feruka, in Harare. This implied that the petroleum industry's fuel distribution costs remained high owing to distances that transporters travelled to deliver fuel to individual service stations scattered around the country.

In the qualitative interviews associative organisations denied being responsible for poor quality which they associated with bad practices by petroleum companies who practiced over blending, smuggling and product adulteration. To address the problem, associative organisations held joint workshops with the National University of Science and Technology (NUST) to educate motorists and other users about the dangers of mishandling and contaminating fuel products. Associative organisations revealed that retail companies were the main quality violators being pushed by profit motives and that there were no quality complaints along the supply chain from Beira up to Msasa. This meant that the supply chain's quality assurance system was weak because it did not protect the entire supply chain. Customers were not protected against the procurement of contaminated fuel. Therefore, there was need for tighter compliance systems. The presence of poor quality implied that the industry would struggle to meet sustainable development goals set to transform the world by 2030, particularly goal 7 about affordable and clean energy (Wildcat International FZ-LLC, 2013).

- **Logistics management**

Although 78.9% of the respondents to survey questions said they were satisfied with the way transportation and distribution was managed 89.5% were of the view that the cost of transportation was still a challenge. Under qualitative discussions use of old vehicles was highlighted as a cause for concern because they were not efficient.

The qualitative interviews revealed that there was no statute that gave NOIC permission to pump diesel 50 which is recommended for modern diesel engines. Only the diesel 500 was allowed in the pipeline. The implication is that both car dealers and importers of low sulphur diesel were forced to pay the 4 cents surcharge for importing by road because they could not pump diesel 50 in the pipeline for them to enjoy lower costs associated with transporting imported fuel by pipeline. This contradicted efforts by Government to fully utilise national assets which would result in improved revenue streams for the Government in form of duties.

The logistics of having a wider fuel distribution network was made difficult by by poor national road network which affected outbound activities of petroleum companies. The use of the pipeline as the only mode of fuel transportation had speed and low cost advantages but indirectly it reduced investment by Government in roads construction and maintenance

projects yet the pipeline does not reach the service stations. As a result petroleum companies did not pursue petroleum related projects in rural areas citing accessibility challenges as part of their reasons.

In addition, the study revealed that the Environmental Management Authority (EMA) imposed a ban on transporting fuel between 6.00 pm and 6.00 am. The ban was inconsistent with the need for accessibility and consistent fuel supply and macroeconomic challenges already raised. It was also inconsistent with supply chain objectives which encouraged the removal of inefficiencies, excess costs and inventory from the supply chain pipeline (Bala, 2014) and reducing or eliminating redundancy along the value chain, so as to improve product availability to the customer (Ogunlela & Lenkhanya, 2016). Earlier research findings showed that when the banning of overnight fuel deliveries was introduced to curtail accidents in Kenya it was met by wild cat strikes that crippled the entire industry and the reaction forced the ban to be lifted (Fahad, 2013).

The implication of these logistical issues was that although the flow of fuel was already affected by inconsistent in flows the situation was aggravated by the banning of overnight deliveries because petroleum companies already had limited time to fill up the supply gaps. This also implied goal conflicts among Government departments because EMA was prioritising its environmental protection goals ahead of NOIC's goal to make fuel available to the communities all the time. Therefore, Government departments needed to consolidate and streamline some of their responsibilities.

- **Information and communication technology**

The many neutral responses received to critical questions such as attitudes towards staff knowledge and learning about supply chain management (52.6%), IT integration with suppliers and customers (34.5%) shifting competition from suppliers to supply chains (26.3%) can indicate that there was poor communication, cooperation and collaboration among supply chain members. If information about the concept of supply chain was well publicised, people would be more knowledgeable and would provide specific responses to questions as opposed to saying they were unsure or undecided. This view is corroborated by the petroleum companies' refusal to form an industry association which interviewees felt was going to benefit the companies in particular and industry in general. This is also linked to

refusal by petroleum companies to participate in research initiatives targeted at improving the industry. The study revealed that in 2016 a Government sponsored research project to determine an appropriate fuel pricing template received a mere 30 responses from a total of 500 questionnaires that were distributed by a consultant who was hired to work with ZERA. The original plan for the current study was to involve all the 23 licenced petroleum companies but that plan failed and was dropped after resistance and refusal to cooperate and participate in the study by the petroleum companies.

On the survey research technology was listed as the least important critical success factor with only 70.9% support yet appropriate technology. On the other end 85.1 % said supply chain members were pushed into collaboration by the need for better information and 78.6% by need for better information technology. Petroleum companies used old technology and they were not integrated with their supply sources such as NOIC and customers. All this led to weak collaboration and ineffective management of the supply chain. Other studies on supply chain management emphasised collaboration and integration which are technology based as critical components of supply chain management (Katunzi, 2011; Fawcett et al., 2012; Tadisina, 2016). Unavailability of technology affected the quality of information used for planning purposes and service quality to customers. Based on the above outcomes 98.2% of the respondents identified lack of fast and efficient decision making systems as challenge number three while information sharing with supply chain members was listed as one of the industry's critical success factors. All these were not characteristic of supply chain management oriented practices because the chief supply chain aims remain the reduction of cost and optimized customer service (Janssen, Johnson & Schaltegger, 2015).

- **Customer Service**

The study revealed that players at the downstream of the supply chain often fidgeted with product quality and 87.7% of survey respondents cited intra-organisational conflicts and staff resisting change as some of the supply chain management challenges. This impacted customer service and customers were not happy with that. Only 66.6% respondents were satisfied with customer service and linkages. It also emerged that those around the border towns like Beit-Bridge, Plumtree and Forbes crossed borders to buy better quality products at competitive prices. There were accessibility problems in the local market given that 90% of the service stations were concentrated in urban and peri-urban areas. Findings emerging from

all areas that the study investigated converged at customer service because customers were the main reason why companies were in business. There were too many neutral responses to questions that evaluate issues about customer service. For example, there we 28.6% neutral responses to a question on staff motivation, training and development, 34.5% to IT integration, and 22.8% to customer satisfaction. This should not happen when interviewing people in management positions, especially those charged with supply chain management responsibilities.

Based on commitments made by the Government, ZERA and NOIC to make the petroleum industry supply chain competitive against the backdrop of many challenges and uncooperativeness from other supply chain members. The overall picture of the petroleum industry supply chain was that efforts to keep customers happy existed. However, customers were unsatisfied owing to the systemic problems and lack of commitment from certain supply chain members. A total of 97% survey responses identified Government regulations as number three of the challenges and 93% identified lack of infrastructure and storage facilities as challenge number four. However the sentiments expressed in the study excluded motorists and suppliers who were not part of the study owing to logistical challenges. The most correlated supply chain management variables in the study were transaction processing speed and prioritisation of supply chain activities when allocating resources. These were correlated at 0.03 and are both customer service drivers.

6.2.4 Supply chain management strategy

An effective supply chain management strategy is about working with others. The study actually showed that there was a strong relationship (p= 0.00) between strategic partnerships and development of effective supply chain management strategy. The latter also has a 0.00 association with flow of information, funds and materials.The multiple regression analysis further demonstrated that development of an effective supply chain management strategy was one of the two supply chain management performance predictors. The strategy discussion will be limited to capacity utilization and management of the supply chain, strategy implementation and supply chain challenges, and participation and involvement of supply chain members.

6.2.4.1 Capacity utilization and management of the supply chain

According to the Director, Petroleum, the overall goal of the Government of Zimbabwe was to effectively increase capacity utilisation of the Government's fuel distribution facilities. In line with that goal the Zimbabwean Government had invested in fuel distribution assets, two pipelines from Beira to Feruka in Mutare and Feruka to Msasa in Harare. Government also owned storage facilities with capacity to hold in excess of 300 million litres of fuel at Mabvuku. Unfortunately the Government did not own the pipelines itself but it had a pay or take agreement with CPMZ which owned the Beira to Feruka pipeline. That agreement compelled the Government to pay monthly pipeline usage fees of USD 2.2 million per month to CPMZ irrespective of the pipeline having been used or not (NOCZIM, 2010). The implication of the agreement was that Government must have adequate sources of funds to meet its obligations and the industry ought to be active to generate more demand for petroleum products. Other research studies concluded that stabilising and balancing demand, supply and capacity utilisation required strong supply chain strategies that involved all concerned stakeholders (Bowman, 2008; Basu, 2010; Arora & Sivakumar, 2016;). In the Zimbabwean case everyone over-depended on Government.

Logistically, one of the conditions for using the pipeline is that the pipeline must be full of product all the time. Therefore, the Harare to Beira pipeline requires 26.5 million litres to fill the entire pipeline. Assuming a fuel price of US$1 per litre this amounts to USD 26.5 million dollars' worth of investment. This is in addition to strategic reserve stocks that Government must keep in case of emergencies. With a consumption rate of four million litres per day (NOCZIM, 2010) three months buffer stock and strategic reserves $of\ 4 * 30\ days * 3\ months,$ (360 million litres) valued at USD 360 million will be needed. The study showed that the pipeline capacity was underutilized by 70 million litres per month. Failing to sweat the assets meant Government faced challenges to meet its financial obligations. Petroleum companies were not involved and did not directly contribute in these processes yet whatever decisions were made impacted their competitiveness. Correlation analysis demonstrated that there is a 0.01 correlation between improvement in company competitiveness and collaborative partnerships. This relationship is lacking between Government and petroleum companies. The implication is that, in practice, high statistical correlation does not automatically translate to close relationships between variables. Government decided to play

a central role in fuel logistics processes yet it was struggling and was not efficient. The standard practice in other countries that used the pipeline was that petroleum companies shared the cost of dead stock and interface based on their market shares (Matsho, 2010; Kimani, 2013; Babatunde, Gbadeyan & Bamiduro, 2016). This way the Government did not have the burden of financing the petroleum companies' operations.

6.2.4.2 Strategy implementation and supply chain challenges

There were several positives that emerged from implementing a supply chain strategy. The survey results indicated that 80% of respondents believe that a successful supply chain strategy must be driven from the highest office. Thus, the CEO ought to be directly involved in supply chain management issues if the strategy has to bring effective results. Results have demonstrated that there is a 0.00 correlation between a supply chain strategy that is driven from the top and effective flow of information funds and resources. We can conclude that the involvement of the highest office in supply chain management activities of the company results in more efficiency because the study also demonstrated a ($p=0.03$) correlation between prioritizing supply chain activities when allocating resources and transaction processing speed.

Resource allocation is one of the decision making roles of a leader. Therefore when the leader is seen to be supportive of the supply chain strategy we expect more resources to be channelled for implementing the supply chain strategy. Several issues were raised under qualitative interviews including scarcity of foreign currency which is the most important resource in petroleum distribution business. There is the issue of poor collaboration, Government regulations and unfavourable business environment among others. These stifle the implementation of the industry's supply chain strategies and alternative strategies were needed to fix the problems. For example, it was observed that there was limit to which industry players could be taxed because if investors are threatened by a country's policy they shift their investments elsewhere (Tsamela, 2016).

The study findings were able to demonstrate that when petroleum companies adopted and implemented a supply chain strategy they were able to resolve customer complaints. This view was supported by 70% of the respondents in the survey. Further still there was a

(p=0.01) correlation between more customer service satisfaction which emanates from resolving customer complaints and staff motivation, training and development. One can safely say that a strong supply chain strategy improves employee motivation which in turn brings about more customer satisfaction. There was also a (p=0.02) correlation between training and development management and improvement of company competitiveness. This entails that supply chain management issues were critical strategy issues that needed to be dealt with at the company's strategic apex. This could be the reason why 70 % of the respondents agreed that after adopting a supply chain strategy there has been more customer satisfaction and another 71% believe adopting a supply chain strategy improved relationships between petroleum companies and their strategic partners, mostly the associative organisations. The issue of human capital is also considered important in the study, as evidenced by the fact that staff motivation, training and development is one of the two determinants of supply chain management performance (see Figure 5 in previous Chapter).

It was also clear that Government played a central role in implementing the industry's supply chain strategy. However, the central role that Government played was largely driven by the need to meet its own financial obligations at the expense of addressing the problem of uncompetitiveness. Selling fuel was not the Government's core business hence the only way it could raise money to meet its obligations was to tax petroleum industry players. To accurately determine the appropriate tax levels authorities must have accurate information. In the study, information asymmetry emerged as one of the petroleum industry's main challenges owing to lack of trust among supply chain members. This compelled players to over protect information. Ironically, 91% respondents felt that the sixth greatest challenge was lack of trust among supply chain members. The lack of information made planning pipeline usage levels difficult. Therefore, the taxes that players pay were not based on accurate information. They were hugely influenced by Government's desire to meet its payments obligations. In the absence of accurate information Government could not scientifically determine appropriate levels of duty for petroleum products the Government did not consult widely with affected stakeholders. The rates that were charged were mainly driven by its own obligations. This affected the industry's supply chain and sometimes left the operators without a guarantee of supply because the Government sometimes skipped instalments owing to the liquidity challenges.

The above process denied supply chain members, particularly oil companies an opportunity to be involved in processes that had direct effect on their businesses. Research suggests that Governments should unleash the potential of the private sector by encouraging private sector investment, allowing the market to determine prices and creating a stable legal and regulatory framework to reduce policy uncertainty (Kavale, 2012). Inability by the Government to make bold decisions on time can lead to crises such as the one faced by Britain between 1967 and 1973 when the Government failed to change its national fuel policy in line with developments that were happening on the international market (Kuiten, 2014).

The current study has clearly demonstrated the existence of quality, timing and recovery strategy uncertainties and that the industry did not have clear strategies to deal with these critical strategy issues. Quality uncertainty was caused by frequent changes to blending percentages for petrol and the possibility of being sold smuggled high sulphur diesel. Timing uncertainty existed because payment challenges made it difficult for suppliers to accurately forecast delivery dates which made the ordering process unpredictable. Recovery strategy uncertainty was caused by the overall economic challenges that made planning difficult at all levels of the supply chain. One can therefore conclude that a paradigm shift was needed with regards to involvement and participation of petroleum companies in the country's petroleum industry strategy. It was necessary to change the way the industry's supply chain was managed.

During the study it emerged that participation and involvement of supply chain members in activities of the supply chain were limited by the lack of an organised forum where petroleum companies could share information about their industry experiences and challenges. For example the strategy to have every importer procuring their own fuel at the backdrop of foreign currency shortage was a big challenge that caused inconsistencies and bottlenecks in fuel flows along the supply chain. The implication of individual foreign currency applications to the banks and individual import orders was that when companies compete for limited resources the process tended to be biased, unfair and corruptible.

The qualitative study revealed that countries like Tanzania and Ghana which adopted the sole procurer status for the importation of fuel had a better procurement strategy compared to the Zimbabwe where individual importers sourced own foreign currency and conducted their own procurement. The sole procurer strategy proved to be a better strategy for countries that

did not have adequate foreign currency reserves because administering foreign currency allocated for fuel imports and accounting for same became it was easy when done by one company. The implication of this was that in a single procurer status authorities had a fair degree of control, they could easily manage and predict volumes and revenue inflows, and they could easily identify and arrest tax evasion incidences and illicit practices such as smuggling, product adulteration, and over blending. Before liberalisation the Government used to procure fuel through NOCZIM which then distributed fuel to petroleum companies on a first come first served basis (NOCZIM, 2010).

The current research results revealed that there were efforts to rationalise and harmonise the industry's regulatory framework in order to improve the industry's ease of doing business. This involved efforts to introduce light ended regulations such as customisation of certain regulations, harmonisation of regulations and removal of restrictions. Successful implementation of this strategy required benchmarking operations of other successful supply chains. For example, in South Africa the Government and petroleum industry associations agreed on the implementation of the RATPLAN which imposed restrictions on the number of service stations that are allowed to operate within a geographic area (Matsho, 2010). Other researchers concluded that characteristics underpinning ideally managed supply chains include a seamless flow from initial sources to final customers, shared information across the whole supply chain, collaboration and partnerships, information technology enabled processes and responsiveness to customer needs (Tanco, Furburg & Escuder, 2015; Yunus & Tadisina; Sohel et al., 2016).

Some of the strategy issues discussed related to human resource management and deployment issues. The connection between strategy and structure was emphasized because it was linked to company competitiveness and was driven by how people were deployed within an organisation or supply chain (Kavale, 2012). This was based on the fact that changes of strategy can be successful only if managers are willing to restructure (Kavale, 2012; Achua & Lussier, 2013). In supply chain oriented organisations supply chain strategic decisions and resource allocation decisions were made at the company's strategic apex (Jonsson, Rudberg & Holmberg, 2013). The strategic nature of supply chain management required it to have adequate representation at senior management level of the company (Scott, Lundgren, & Thompson, 2011). In the study only four of the fifty seven respondents occupied the position of head of department. This meant that the rest of the supply chain management activities in

the surveyed companies were controlled from non-supply chain departments. That way, the supply chain activities were likely to suffer when it comes to resource allocations and support. Reasons why company management relegated supply chain management activities to non-supply chain functions were not revealed but it was a worrisome development for the supply chain management profession. These organisational shortcomings did not represent and reflect the supply chain profession's true potential to contribute towards company competitiveness. This trivialised the role of supply chain management in a company and negatively affected efforts aimed to achieve company competitiveness.

A study of procurement challenges in the Zimbabwean public sector revealed that there was lack of strategic recognition of the procurement function and procurement policy leading to flawed procurement practices (Dzuke & Naude, 2015). The fact that supply chain activities were headed by people in non-supply chain professionals prevented petroleum companies from achieving their competitiveness goals. Another research showed that, in companies that still managed their supply chains as the back office you found supply chain in the spotlight and often taken for granted (Fawcett & Waller, 2013). The implication was that under this kind of organisation the company's supply chain was weak and the company's competitiveness would suffer. However, the study noticed some positive developments in that 65% of the managers were female, 71.7% of respondents had good qualifications (diplomas and degrees) and 94.7% of them were below 50 years of age. This implies the managers are in their prime age and had more time to accumulate experience about the petroleum industry and hopefully drive their companies out of the current situation by adopting and implementing appropriate strategies.

6.2.5 The Zimbabwe petroleum industry structure

Government through the Ministry of Energy and Power Development was in charge of industry policies, it oversees the ZERA which regulates the industry and NOIC the national logistics company. The petroleum retail sector is dominated by private players including multinational corporations (MNCs) like Engen, Total and Puma. Few indigenous companies which dominate the industry include Sakunda, Zuva, Redan, Petrotrade which is 100 % owned by Government. Under the prevailing structure petroleum companies can operate at retail, wholesale and importer level with no restrictions other than the normal registration

fees. This created tension along the supply chain because players with capital can invest at all the three levels and begin to undercut genuine players who did not have adequate capital. Different players could also collude and form cartels to muscle out the weaker companies, mostly, indigenous companies who were undercapitalised. The implication is that the so called small players in the supply chain felt they were caught in between the wrath of Government regulation and unfair competition from the MNCs. This forced them to behave unethically and sometimes illegally as a means of surviving.

Thus, after studying factors affecting the Iranian industry's supply chain Soheila, Alireza and Alireza (2015) concluded that effectiveness and efficiency of every organisation's supply chain depends on the management performance and structure of the supply chain. Therefore, any supply chain that experienced too many problems is likely to be inefficient and ineffective. According to feedback from interviews it was clear that the Zimbabwean petroleum industry structure was flawed and biased towards long established companies (MNCs) at the expense of small (indigenous) companies. Although the national policy speaks about levelling the playing field by empowering previously disenfranchised black people, the policy was not being enforced. This was evidenced by the perceptions held by petroleum company managers towards the industry policies. Responses to survey questionnaires showed that (97%) of the responses identified Government regulations as the fourth critical challenge the petroleum industry faced. This needed to change in line with structures adopted by other economies that were performing better than Zimbabwe. In South Africa the small business operators could choose to import own product, new players would inject fresh capital into service stations and as a result there was more throughput (Matsho, 2010).

6.2.6 Support given to the petroleum industry

In business, any form of success requires good conditions and targeted support, regulations and policies must be put in place to support and protect industry players, particularly small players (Tsamela, 2016). In that regard, The Energy Regulatory Act (2010) and the National Energy Policy (2012) clearly stated that some of their objectives are to ensure accelerated economic development, to facilitate rural development, to ensure efficient utilisation of energy resources and to promote small-medium scale enterprises. A research that looked at national factors affecting firm competitiveness and innovation concluded that effective

competitive actions depend on the level or stage of economic development and basic competitiveness requirements such as institutions, infrastructure, macroeconomic environment and health and primary education (Collins & Troilo, 2015). Although these elements existed in the Zimbabwean context the study showed that their impact was affected by lack of coordinated efforts by different support institutions.

The implication of this finding was that firms needed functional private and public institutions, a well-developed infrastructure and a stable macroeconomic environment to be competitive (Borenstein & Bushnell, 2015). The already discussed unfavourable macroeconomic environment factors and poor coordination made it difficult for the above imperatives to prevail. Notwithstanding the different challenges faced by Government the study had revealed that a lot of support had been given to the petroleum industry by Government and associative organisations.

Import substitution through mandatory blending of imported petrol with locally produced ethanol was one of the many Government efforts to make fuel available at affordable prices and to support local biofuels producers to find a market for their product. However, the study could not confirm economic benefits that were associated with the blending of petrol with locally produced ethanol. The unpopularity of the blending strategy was aggravated by other stakeholders like car assembly companies who questioned the appropriateness of the blending strategy when the country was already importing refined products.

One of the study's key findings, under survey was that adopting supply chain management did not bring down the cost of product and cost of transportation. This two were listed as challenges by 100% and 90 % of survey respondents respectively. It followed suit that although efforts were made to implement supply chain management the efforts had not managed to bring down the fuel and transportation costs.

Government has also helped with cost control though participating in the determination of fuel pump prices, pipeline and storage fees. Whatever prices are determined by the trio of Government, NOIC and ZERA without the involvement of petroleum companies themselves could never be accurate because of lack of information. The interviews showed that in 2016 a research project earmarked to determine a more accurate petroleum industry price template failed because petroleum companies refused to cooperate. Only 30 questionnaires were

completed out of the 500 the consultants had distributed. No one tried to establish reasons for such poor response. Notwithstanding the above development, Government went ahead and slashed pipeline fees from USD 80 per cubic metre to USD 60.5 per cubic metre with effect from January 1 2017. Unfortunately, almost at the same time, the Ministry of Finance increased duty on fuel from 40 cents to 56 cents per litre of petrol and from 35 cents to 44cents per litre of diesel (ZIMRA, 2017). The implication was that all these efforts benefited the Government more than they benefited petroleum companies and it was not clear if the pipeline and storage rates were now at the correct levels. The petroleum companies' uncompetitiveness therefore becomes a product of lack of coordination and policy inconsistencies among Government departments.

6.3 Attitudes of supply chain managers towards implementing the supply chain management philosophy.

Informants in the qualitative study indicated that petroleum company management welcomed the implementation of supply chain management. The main reason for this was that any business person was going to respond positively to a programme that brought money to their ventures. Supply chain management was therefore seen as a programme that generated competitiveness or more money for entrepreneurs. This was in line with similar research findings that confirmed the benefits and contribution of implementing the supply chain management philosophy towards company competitiveness (Saad, Udin & Hansan, 2014; Babatunde, Gbadeyan & Bamiduro, 2016; Frederico & De-Souza, 2017). The fact that overall satisfaction in this category was a mere 57.8% and that 28% of the managers preferred to take a neutral stance on whether they were satisfied or not raises questions about the petroleum industry's supply chain situation.

When supply chain managers were asked to state their level of satisfaction with the way selected supply chain activities were managed in their organisations responses showed there were mixed reactions. These ranged between 81% and 36 % satisfaction. Managers were more satisfied with customer relationship management (81%), transport and distribution (79%), customer service and linkages (67%), supplier relationship management (63%) and inventory management (61%). Like in the qualitative study, this also confirmed that staff had a positive attitude towards supply chain management. However, there was low satisfaction

with the management of IT integration with suppliers and customers (36%), staff knowledge and acceptance of supply chain management (37%), ICT management (54%), staff motivation, training and development (57%) and management of outsourced activities and procurement management, both at (58%). This demonstrated that supply chain management was not a panacea to all business problems. It could only complement other strategic efforts implemented by management.

Thus, in the review of the systems theory in Chapter three it was emphasised that supply chain management was just an off-shoot of the systems theory that emphasised effective management of the whole entity (Laszlo & Kripner, 1998; Mammy & Caddy, 2006). This entails that supply chain management on its own could not deal with all operational challenges that an organisation faced although it could address the majority of the challenges. The investigated case posed further complications given that some of the petroleum industry's supply chain issues were not controlled by the Energy Ministry. For example, issues like duty, import licences, state of the roads and environmental issues were not the responsibility of the Ministry of Energy and Power Development but these were basic operational issues which affected all petroleum companies.

6.4 Critical success factors for implementing supply chain management in the Zimbabwean petroleum industry

Empirical evidence from a study on critical success factors for implementing supply chain management in Indian small and medium enterprises identified the following critical factors; top management commitment, long term vision, focus on core strengths, devoted resources for supply chain and development of effective supply chain management strategy (Kumar, Singh, & Shankar, 2015).

Critical success factors for implementing supply chain management in the Zimbabwe petroleum industry were closely related to the above. Critical factors identified under the qualitative research included availability of adequate foreign currency, an efficient pipeline, quality and safety, collaboration and information sharing, service delivery, light ended regulations, support from associative organisations and delivery efficiency. The survey research identified the following critical success factors according to level of importance

collaborative partnerships (98%), support from associative organisations (97%), strategic partnerships and trust (95%), responsiveness to customer queries (93%) and development of effective supply chain management strategy (93%). A notable omission in the above critical success factors is the supply chain management performance predictor variables scientifically determined by the multiple regression analysis (Table 5.10).

Companies in different countries could share the same critical success factors and challenges and what was important was proper identification of these critical success factors and implementing appropriate strategies that operationalize these critical success factors (Lazarevic, Sohal & Baihaque, 2007; Tayet al., 2015; Tadisina, 2016). While critical success factors could be used to direct a company's efforts in developing its strategic plans (Wu et al., 2016), every firm would have different critical success factors depending on the firm's strategy, structure and position in the industry (Quesada et al., 2012). This implied that for the purposes of practice, each company needed to carefully study its own environment and focus management efforts on the most pressing critical success factors based on its own circumstances such as the company's vision, size, overall strategy and capacity (Naslund, 2010; Nag et al. 2014).

6.5 Supply chain management collaboration drivers

Ten factors perceived as forces driving collaboration in the petroleum industry of Zimbabwe were assessed. From these ten elements the five major supply chain collaboration drivers were greater competitive intensity (93%), new information technologies (89%), the need for better information (85%), increasing transaction processing speed (84%) and staff training and development about supply chain management (84%). Other studies about collaboration among supply chain partners found that in an increasingly complex world, the greatest growth opportunities would come more often by the interaction of multiple companies than from single visionaries acting on their own (Gichuru, Ivaro & Ivaro, 2015; Belyaeva, Krivorotov & Yerypalov, 2016). Supply chain management could therefore boost partnerships and in the process cooperation was necessary (Karagiannopoulos et al., 2005). Further empirical studies established that supply chain collaboration and supply chain integration were the key management strategies to increase supply chain performance (Kohli & Jensen, 2010; Yu, Xiong, & Cao, 2015; Ogunlela & Lekhanya, 2016). The study further

demonstrated existence of a (p= 0.01) correlation between collaborative partnerships and a positive improvement in company competitiveness. This implied that supply chain collaboration could reduce supply chain risk and ultimately increase company competitiveness. Another recent, related study's findings showed that, businesses that found themselves in cut throat competitions had learnt to collaborate, share information and knowledge with suppliers, customers and even competitors with the aim to creating a common supply chain capable of competing if not leading in the particular industry (Mwaura et al., 2016). In addition, findings also showed that collaboration could lead to reduced supply chain costs, better utilisation of resources and greater flexibility to respond to market changes (Katunzi, 2011).

6.6 Supply chain performance and measurement attributes

The evaluation of the selected supply chain performance and measurement attributes revealed that, after implementing supply chain management petroleum companies experienced major changes in the number of distribution outlets (84%), a supply chain strategy that was driven from the top (79%), improvement in the flow of information funds and materials (75%) and the ability to implement technology (72%). Modest changes were noticed in supplier relationships and support (68%), employee relations (67%) and prioritising supply chain activities in the allocation of resources (63%). A mere (31.6%) of respondents said there was an improvement in product cost.

The basic objective of a supply chain management programme was to optimise the performance of the chain, to add as much value as possible for the least cost possible (Shukla, Garg & Agarwal, 2011). However, if a supply chain management programme fails to lower key cost elements of the supply chain such as product cost and distribution cost as discovered in the study this indicates that the supply chain members had serious problems. The study showed that some of the assessed effects of implementing supply chain management included that companies that adopted supply chain strategies were driven from the top, there was easy flow of information, resources and money, and there was positive improvement in company competitiveness. This confirmed findings of a study about dynamic supply chain capabilities in an oil and gas industry of Malaysia which concluded that effective supply chain management will lead to a lowering of total amount of resources required to produce the

essential level of customer service through increased product availability (Saad, Udin & Hasnan, 2014). However, information exchange, collaboration and relationships were needed to achieve the assessed supply chain attributes (Kimani, 2013; Leyh & Thomschke, 2015; Kilubi, 2016). The study showed that though supply chain management could result in overall cost reduction, it may not necessarily cause a reduction in all supply chain cost elements. Under the supply chain management performance measurement objective a regression analysis test revealed that there were only two explanatory variables of supply chain management measurement, both with a p-value of .000. These were the development of an effective supply chain management strategy and staff motivation, training and development. Figure 5 show that out of all the examined variables only these two variables contributed a combined ratio of 50% to supply chain management performance measurement. The implication is that supply chain performance attributes which were excluded from the study contributes the other 50%, making this a potential area for further study.

6.7 Petroleum industry's supply chain management challenges

Complexity of the supply chain management process was associated with some strategy implementation bottlenecks that required management attention. Major challenges the qualitative research identified included foreign currency shortages, lack of collaboration, lack of information and general management challenges. Results from the survey research further revealed cost of product(100%), lack of top management support and commitment(98%), lack of fast and efficient decision making systems (98%)and Government regulations (97%) as the petroleum industry's main challenges. Other related studies on petroleum marketing companies in Nigeria showed that some determinants of company competitiveness included environmental sustainability, quality, sales revenue, business growth and market share (Bayode, 2016). On the contrary, the current study showed that petroleum companies were struggling to achieve these competitiveness factors. The study revealed that there other challenges petroleum companies faced when implementing supply chain management. Bottlenecks such as lack of infrastructure, product shortage, delayed deliveries, payment problems and product quality issues resulted in companies failing to follow and implement supply chain management best practices. This meant that the journey towards company competitiveness was challenging. The identified Zimbabwe petroleum industry's supply chain management challenges are presented in Table 6.1 and they are juxtaposed with supply

chain management challenges founded in other African countries 'supply chain business environments. The summary indicates existence of general similarities among the supply chain challenges among companies implementing the supply chain management philosophy in different countries.

Table 6.1 Supply chain management challenges faced by selected African countries

South Africa's Automotive component manufacturing sector (Naude, 2013)	Kenya's petroleum industry (Kimani,2013)	Petroleum industry of Zambia (Energy Regulation Board, 2010)	Zimbabwe Petroleum industry Current study
• Lack of technology • Lack of global supply chain capability • Lack of cost competitiveness • Geographical location • Poor infrastructure • Poor customer relationships	• Lack of strategic stock • Relatively high petroleum prices in Eastern Africa • Frequent fuel shortages • Substandard products • Diversion of products for export back into the country	• Old and inefficient infrastructure • Lack of refinery facilities • Concentration of service stations in urban and peri-urban areas • Lack of cost competitiveness (irregular review of prices) • Difficulties in determining pricing structure	• Unavailability of foreign currency • Government regulation • Lack of infrastructure and facilities • Lack of top management support and commitment • Poor relations with associative organisations • Lack of fast and efficient decision making system

Source: (Energy Regulation Board of Zambia, 2010; Naude, 2013; Kimani, 2013; Field work, 2017).

Serious foreign currency shortage along the Zimbabwe petroleum industry's supply chain and other sectors of the economy forced authorities to ration it. The study revealed that the process of allocating the available foreign currency was not fair and transparent. This influenced shortages which in turn forced some petroleum companies to engage in unethical and illegal practices including smuggling, product adulteration and product re-exportation. The implication was that in the presence of illicit practices Government could not afford to collect all taxes due to it. Consequent to that, Government failed to meet its industry obligation, particularly, the pay or take agreement's monthly instalments to CPMZ. In order to raise funds to meet its obligations the Government resorted to introducing new taxes or adjusting existing ones. This led to uncompetitiveness and continued tax increases were like a vicious circle with potential to cripple the entire petroleum industry's supply chain.

The industry regulations and the manner in which they were enforced was not right because it put the industry players in a dilemma. In the current study, on one hand Government claimed that the petroleum industry was a self-regulated industry but on the other hand Government Ministries of Energy and Power Development, Finance and Economic Planning, Industry and International Trade, and Environment and Tourism appeared to have conflicting policies regarding their treatment of the petroleum industry activities. All of them used different statutory instruments (SIs) and by-laws to tax petroleum companies at different stages along the supply chain. They also imposed other administrative rules that affected the logistics of the petroleum industry's supply chain. Under the survey research petroleum companies indicated that Government regulations were their number four challenge while in qualitative interviews respondents felt that over regulation was choking petroleum company operations. The implication was that uncoordinated policy decisions confused supply chain members and made it difficult for officials to accommodate all the policy changes in their planning. For example the fuel pricing template did not reflect all the supply chain costs and was therefore not accurate and gave players an unfair return to their efforts. The refusal by petroleum companies to participate in research and to share information which was needed for accurate planning aggravated the situation.

The pipeline and storage facilities were the main constrained infrastructure and facilities. The two depots in Harare and Feruka (Mutare) were not convenient to petroleum companies from the country's southern region such as Bulawayo, Victoria Falls, Kariba and Plumtree because petroleum companies travelled long distances to collect and deliver fuel to their customers. These companies were forced to sell at Government determined prices. This put pressure on product cost and distribution costs hence poor company competitiveness. There was no significant investment into storage facilities since the construction of the Mabvuku storage facility in the early 1980s (NOCZIM, 2010).

Price Waterhouse Coopers, in its Africa oil and gas review (2015) said that for the oil and gas industry in Africa to succeed, Governments needed to promulgate and ratify oil and gas regulations, encourage monetisation of assets and eliminate overly restrictive legislation when developing the industry. The current study showed that lack of a fast and efficient decision making system predominantly derived from the fact that Government was in control of most of the petroleum industry's supply chain operations including the pipeline, fuel depots, and quality control. In a study on procurement challenges in the Zimbabwean public sector it was concluded that Government systems are known to be slow at making decisions

owing to their administrative bureaucracy (Dzuke & Naude, 2013).This made planning difficult at company level. Examples of critical supply chain management elements that have been affected by frequent policy changes include the blending ratios which changed in tandem with ethanol suppliers' situation and fuel duties which change in response to petroleum price movements on the international markets. However, sometimes the imposed changes do not benefit all the supply chain members because in Zimbabwe fuel prices remained sticky downwards. This was despite the fall of oil prices on the international market. The Government usually increases duty in response to a fall in international prices implying an increase in petroleum imports cost and no downward price revision to benefit fuel consumers. In South Africa the fuel pricing policy allows fuel pump prices to be adjusted upwards or downwards depending on movements on the international market prices or the strengths of their currency (Chunda, 2007; SAPIA, 2016). A similar study on supply chain difficulties of the Uruguayan Small to Medium Enterprises' supply chain identified local warehouse infrastructure, customs processes and paper work, Government policies, political environment, macroeconomic and market environment, commitment of top management and information technologies as the main challenges (Tanco, Furburg & Escuder, 2015). A study on SCM challenges and practices in the Philippines petroleum companies are shown in Table 6.2 below. In the Philippines study Gloria &Talavera (2015) observed that, supply chains generally faced similar challenges and problems and companies implemented almost the same measures to address their supply chain challenges. Table 6.2 demonstrates some supply chain challenges and measures recommended to address the challenges in the Philippines petroleum industry.

Table 6.2 Supply Chain Management Challenges in the Philippines Petroleum Industry

SCM Challenges in the Philippines petroleum industry	Mitigation recommended to address challenge
• Prices were heavily affected by fluctuations from the world market • Supply chain volatility • Long and complex supply chains • High risk of product contamination, theft and pilferage • Difficulty in supply chain integration	• Acquisition of most economical product • Adopting optimal operating strategy • Minimization of inventory • Investing in infrastructure needed to move product to customers and security measures • End to end integration of supply chain planning, implementation, networking and coordination

Source: Gloria and Talavera (2015: 53-57).

6.8 Supply chain management benefits

The impact of supply chain management was also assessed against 9 benefits attributed to implementing supply chain management in an organisation. Respondents were supposed to indicate their level of agreement that these supply chain management benefits impact company competitiveness. These were some of the supply chain management benefits identified by respondents. They are listed according to responses received in support of each benefit. The identified benefits were that petroleum companies with a supply chain management strategy collaborate and coordinate more effectively with suppliers and customers (88%), they were more competitive (87%),enjoyed higher market share and sales (86%), had supportive top management (86%) and had more knowledge about supply chain management (84%). These benefits could influence company competitiveness.

The identified benefits were in line with supply chain benefits suggested by Fawcett, Magnan and McCarter (2008) in a study on benefits, barriers and bridges to effective supply chain management. The authors founded the following benefits of supply chain management unique products and services, superior quality, cost competitiveness, responsiveness to customer needs and superior channel relationships. The above benefits and current study findings implied that there were many benefits associated with supply chain management. Therefore there was need to encourage companies to adopt the supply chain management philosophy but appropriate action was needed to ensure implementation of the supply chain management philosophy benefited all supply chain members (Mathuramytha, 2011, Sheel, 2016). More benefits could be realised when supply chain management programmes were properly managed and there was a strong need for training and developing of staff in supply chain management issues (Shukla, Garg & Agarwal, 2011). A total of 41.81% of candidates that responded to the questions about staff training and development indicated that they were not satisfied with the way training and development, was being managed in their companies.This factor was also revealed to be a good predictor of supply chain management performance hence the unsatisfaction level of 41.8% is rather high for such an important variable.

6.9 Unique findings

Contrary to the suggestion that researchers have considered environmental uncertainty as an important driver of information sharing which tends to suggest that the industry structure and market environment encourage the formation of strategic partnerships and cooperation within the supply chain (Mathuramaytha, 2011), this study showed that supply chain members were not keen in partnering each other and did not cooperate with authorities. Yet, business that found themselves in cut-throat competition collaborated by way of sharing information and knowledge with their customers and even competitors with the aim of creating a common supply chain capable of competing and leading in their industries (Mwaura, Letting & Orwa, 2016).

6.10 Chapter summary

This chapter discussed several issues that emerged from the study findings. The findings and discussions showed that the petroleum industry's supply chain possessed strengths, weaknesses, opportunities and threats (SWOT) factors which management needed to sort in order to make their companies competitive. Some of them are presented in the table below.

Table 6.3 The Zimbabwe Petroleum Industry's SWOT factors.

Strengths.	Weaknesses
• Pipeline • Storage facilities • Subsidized dead stock and strategic reserve stock • Knowledge of determinants of supply chain management performance • Knowledge of supply chain management variabples and the nature of their relationships	• Inadequate facilities • Poor distribution network • Lack of foreign currency and poor management of same • Poor supply chain collaboration and cooperation • Combining of power generation and petroleum sectors under one ministry • Inadequate information about determinants of supply chain management performance

Opportunities	Threats
• Supportive Government • Regional and international collaboration • Potential to become hub for regional fuel distribution • Underinvestment in the rural markets • Diversifying and developing non-fuel offers (quick service restaurants, car wash and mart shops).	• Economic deindustrialisation • Regulatory framework that is not supportive of business • Indigenisation policy that discourage Foreign Direct Investment • Uncompetitive customs regime

Based on the study findings and discussions, the next chapter gives an overall summary, conclusions and recommendations of the thesis.

CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The following research questions were posed to try and address the Zimbabwe petroleum industry's supply chain management problems and combining qualitative and quantitative research ensured all research objectives and questions were addressed in detail.

- What are the characteristics of the Zimbabwean petroleum industry's business environment?
- What are the Zimbabwean petroleum industry's supply chain management strategies?
- How is the Zimbabwean petroleum industry structured and how does the structure influence petroleum companies' operations?
- What are the attitudes of supply chain managers towards implementing the supply chain management philosophy in the petroleum industry?
- What are the critical success factors of the petroleum industry's supply chain?
- What supply chain management challenges are faced by the Zimbabwean petroleum industry?
- Does supply chain management affect petroleum companies' competitiveness?
- How can the study results help improve competitiveness of the Zimbabwean petroleum industry?

Owing to the complex and sensitive nature of supply chain management issues facing the Zimbabwe petroleum industry, the robust convergent parallel mixed method research design which is driven by an expansionist drive was found suitable for the study. The convergent parallel mixed methods seeks to extend the breath and range of an inquiry by using different methods for different inquiry components (Botha, 2011) and it uses qualitative and quantitative approaches in combination to provide a better understanding of the research problem than when using either approach alone (Cameron, 2011). The study aimed to identify factors that led to the uncompetitiveness of the Zimbabwe petroleum industry. The concurrent parallel mixed methods design assisted in ensuring a detailed analysis of all the research objectives and research questions. Time was invested in trying to contribute something towards resolving real supply chain problems faced by petroleum companies in Zimbabwe.

The study involved all managers in supply chain functions of petroleum companies and supply chain executives from the Ministry of Energy and Power Development, Zimbabwe Energy Regulatory Authority and National Oil Infrastructure Company.Throughout the study the trio was referred to as the industry's associative organisations. From a population sample of 102 supply chain management professionals six in-depth interviews were held with managers from the associative organisations. Wide ranging issues and insights were learnt from the six executives' unreserved views about the petroleum industry's environment, supply chain strategy, the structure and challenges. Likert scale based survey questionnaires were administered among managers from one of the largest petroleum companies and all the companies with whom it had dealership arrangements. All the ninety six managers under this category were involved, questionnaires were distributed to all of them (census) and the process achieved a response rate of 59.38 %.

Spurred by the desire to deal with persisting petroleum industry's uncompetitiveness the process involved analysis of managers'attitudes towards supply chain activities, identification of the petroleum industry's critical success factors, supply chain collaboration drivers, supply chain management performance, and supply chain challenges and benefits. Both qualitative and quantitative data that were collected were presented in Chapter five and condensed as a SWOT model (Table 6.3) which forms the basis of the study's conclusions and recommendations.

Although both associative organisations and petroleum companies made efforts to improve the industry's competitiveness the business environment which was mired with economic, fiscal and management challenges put into question the effectiveness of the industry's fuel policy and strategy. The Government was solely responsible for financing dead stock required to fill in the Beira to Msasa pipeline, the country's strategic reserve stock and paying rentals to CPMZ which owns the Feruka to Beira pipeline.These three tasks required a total of 26.5 million litres of dead stock, 350 million litres of strategic stocks and USD2.2 million per month rental payment to CPMZ. In addition, the Government managed and maintained fuel distribution facilities such as the pipeline and storage facilities without significant involvement and participation of petroleum companies who were the main beneficiaries of all these assets.

The difficult economic situation and the financial obligations had compelled the Government to intervene in the way industry operations were carried out. However, the study showed that these interventions were seen as some kind of interference in an industry that had been liberalised. This and other issues constrained the industry's supply chain relationships, affected petroleum companies' performance and led to an uncompetitive petroleum industry.

The country's fuel imports are heavily taxed as a way of generating revenue for the Government. There has been modest developmental investment in the petroleum industry and the industry lags behind in ICT, integration, cooperation and collaboration among supply chain members. Facilities, technology and equipment used along the entire chain are aged, inefficient and they need to be replaced. All this and other organisational challenges made the Zimbabwe petroleum companies uncompetitive.

At national level, the petroleum industry's supply chain strategy emphasised the need to fully utilise the industry's current capacity, security of supply, quality and affordable prices. However, developments in the market have not been supportive of this vision as it emerged that the national assets which were supposed to support petroleum companies were either underutilised when they were available or the facilities were inadequate or not available.Thus, under capacity utilisation, lack of security of supply, poor product and uncompetitive prices were common bottlenecks that affected the industry's competitiveness. However, the research revealed that Zimbabwe had potential to become a regional fuel hub, transporting fuel destined to DRC, Zambia and Botswana markets. For this to happen, there was need to expand the petroleum industry's current fuel distribution facilities.

The petroleum industry has struggled to achieve the industry's objectives of security of supply, quality and affordability. Both the qualitative interviews and the survey agreed on the matter and that the main cause was the industry's weak structure which was too mechanistic. The mechanistic structure does not facilitate quick decision making and perpetuates lack of trust, uncooperativeness and transparency among supply chain members (Schermerhorn & Bachrach, 2015). All this culminates in uncompetitiveness at company, industry and Government levels. Without a supportive structure, even the best strategies can fail (Basu, 2010; Oakland, 2014). It was also noted that even the policy makers accepted and acknowledged that the petroleum industry structure had caused operational problems among supply chain members but they were not able or willing to decisively formulate effective

policies to deal with the problems of the industry structure (Kuiken, 2014). This problem was complicated by a status-quo which tend to assume a common Government view on petroleum industry policy but in reality Government departments were divided on what needed to be done for the petroleum industry. This was a product of disagreements between the Ministries of Energy and Power Development, Finance, Industry and Commerce and others which hampered decisive decision making.

Overall, the results from the study indicated that there were mixed feelings about supply chain management practices of the Zimbabwe petroleum industry and the implementation of a supply chain management philosophy as a strategy. Therefore, the problem of the study could be summarised as petroleum companies' uncompetitiveness owing to ineffective supply chain management strategies. Supply chain management strategies of companies focus on practices like procurement, logistics, inventory management, and ICT and customer service (Nag, Han, & Yao, 2014; Sweeney, Grant & Magnan, 2015). The study analysed all these supply chain management activities and found them to be requiring improvement in line with the supply chain management philosophy. Thus, the following summary of results in the form of supply chain management strengths, weaknesses, opportunities and threats (SWOT) could be used as the basis for recommending performance improvement. These SWOT factors emerged from the study and are therefore part of the study's contribution:

Strengths- availability of fuel distribution infrastructure (pipeline and storage facilities) and subsidized dead stock and strategic reserve stock. Through the multiple regression analysis results (Figure 5), the study clearly identified effective development of supply chain management strategies and staff motivation, training and development as determinants of supply chain management performance. Additionally, the correlation analysis results (Table 5.9) revealed strong association between the several supply chain management activities examined for same because they all had high levels of significance (p-values of less than 0.05) (Lind, Marshal & Wathen; McHugh, 2013). Management decisions need to be guided by the significance of association between the different decision variables.

Weaknesses- limited distribution facilities and distribution network, poor road network, lack of foreign currency and poor management of same, weak procurement and logistics policies, lack of collaboration, poor integration and cooperation among supply chain members, and the

lack of industry association, and the the fact that energy (petroleum) and power generation sectors were too large and critical to be administered under one Ministry. Until the weaknesses of a supply chain have been decisively addressed with the involvement of all key stakeholders there is not likely to be a solution to the supply chain's current problems.

Opportunities- a supportive Government, strategic partnerships with suppliers, regional and international collaboration, Zimbabwe had an opportunity of becoming a regional hub for fuel distribution to Botswana, DRC and Zambia, underinvestment in rural markets, opportunities to diversify and develop non-fuel offers. The fact that the study was one of the first moves towards documenting the petroleum industry's practices and challengesthe creates an opportunity for industry stakeholders to debate the issues raised in the study. These debates and emergent information can be critical in finding a lasting solution to the petroleum industry's uncompetitiveness.

Threats-Uncompetitiveness of Beira port, economic deindustrialization, regulatory framework which is not supportive of business, indigenization policy that discouraged foreign direct investment (FDI), uncompetitive customs regime, and lack of interest in participating in research and sharing information were threatening the petroleum industry's viability. The next section presents conclusions from the study.

7.2 Conclusions

Based on the results from the analysis of supply chain management practices of the petroleum industry of Zimbabwe presented in chapter five and the discussion of same in chapter six, the following conclusions were made based on those findings and discussions.

There were mixed feelings about attitudes towards implementing supply chain management in the Zimbabwe petroleum industry. On one hand, the petroleum industry's associative organisations (Government, ZERA and NOIC) were of the view that the industry's upstream supply chain activities were effective based on the fact that industry problems started surfacing in the downstream of the supply chain, an area that is dominated by petroleum companies. The trio of Government, ZERA and NOIC showed a lot of determination in achieving competitiveness because its level of support to the industry was significant.

Support from associative organisations also emerged as one of the industry's critical success factors. Contrary to the above, quantitative responses indicated that the cost of product was one of the industry's greatest challenges including Government regulations and general lack of capacity to enforce compliance with industry policies and regulations. The fact that decisions made in the upstream of the supply chain affected the industry's downstream activities entails that we can not dissociate associative organisations from the petroleum industry's uncompetitiveness. Therefore, one can conclude that competitiveness of the whole supply chain requires commitment, team work and cooperation by all parties at all the different levels of the supply chain. The supply chain must be managed as a unit or system.

On one hand, associative organisations felt that they were let down by the behaviour of industry operators who engaged in illegal practices such as smuggling, over blending of petrol, product adulteration, and the mushrooming of illegal vendors at the border towns. On the other hand, operators in the downstream areas of the industry attributed bad behaviour by petroleum companies to forced behaviour which emanated from lack of a clear industry structure, a harsh business environment, and unsupportive legislation. All these were the responsibility of Government. One can safely conclude that ineffective management of the industry's supply chain activities led to the country's petroleum products' becoming expensive relative to what was charged in other SADC member states. Lack of a harmonized industry structure, unfair business environment, lack of cooperation among supply chain members and lack of decisiveness exarcebated the problem of uncompetitiveness at national, industry and individual company level. All the players must have the correct attitude if the industry goals are to be achieved.

Critical success factors for implementing supply chain management in the Zimbabwean petroleum industry included the availability of foreign currency to import product, collaborative partnerships, support from Government and associative organisations and strategic partnerships and trust among other factors. The study however showed that there were a lot of challenges surrounding the same critical success factors and these negatively affected operations particularly the industry's downstream activities that directly interfaced with customers. At the same time respondents where not happy with the way outsourcing, procurement, IT and staff motivation and training were managed yet they are part of fuel distribution's core business activities. Another study concluded that, lack of adequate staff training hindered efficiency and could result in redundancy along the supply chain (Ogunlela & Lekhanya, 2016). It can therefore be concluded that those in leadership need to mobilise

resources and effectively utilize the resources prioritizing implementing the industry's critical success factors and factors identified as the deterninants of supply chain management performance.

Overall, the Zimbabwean petroleum industry suffered from a problem called opacity,which means that the petroleum industry lacked clear, accurate, easily discernible and widely acceptable practices covering the industry's supply chain issues (Shurchuluu, 2002; Groenewald, 2013, Collins & Troilo, 2015). Consequently, there are many challenges including expensive procuct, lack of top management support, slow and inefficient decision making and Government regulation. These were aggravated by the nonexistence of a petroleum industry association. Lack of an industry association made it difficult for petroleum companies to speak to policy makers with one voice. The wishes of those with power to influence decisions and not necessarily those who need genuine support prevailed. This made planning difficult for authorities because plans and decisions were not based on accurate information. Therefore, it can be concluded that low ratings on supply chain performance measurement attributes such as employees relations, prioritisation of supply chain activities and customer complaints to mention a few, was confirmation of modest changes that respondents associated with implementing supply chain management in the Zimbabwe petroleum industry. As a result, the problem of uncompetitiveness in the petroleum industry's supply chain remains unresolved owing to inability or unwillingness to cooperate and share information among supply chain members. Good supply chain management strategies and effective implementation of strategies required accurate information (Simchi-Levi, Kaminsky & Simchi-Levi, 2009). The study clearly reflected accurate information was lacking owing to lack of trust, poor cooperation and lack of coordination among other factors. In light of the above,it can also be concluded that as long as the industry's environmental, structural and strategy issues have not been corrected dealing with the rest of the supply chain management challenges identified will be a difficult process and which can make the dream to tame the industry's uncompetitiveness a nulity.

7.3 Recommendations

Three sets of recommendations are being proposed for implementation. These are policy setting, recommendations for practice and further research. Recommendations for practice can help company management who will learn and gain more information about different supply chain management issues emerging from the study. They would therefore need to realign with the views of the respondents and study outcomes should guide the the designing and implementing of supply chain management processes. Management may not be aware of some of the issues hence they need to rethink their strategies. The new knowledge can therefore influence management thinking and decisions. Practitioners can actually incorporate some of the issues raised in their supply chain strategies. The idea is to enable practitioners to replace bad supply chain management practices with good ones to strengthen their companies' chance of becoming competitive. Those with good practices can be motivated to continuously improve and strengthen their practices. Recommendations on policy setting require policy makers to revisit and review current policies and widely consult stakeholders before they introduce new policies. The recommendations for further studies are aimed at closing the information gaps among the issues that the study investigated like effective supply chain strategy formulation and motivation, training and development. There will be emerging issues which were not planned to be part of the study but could make valuable contribution to the understanding of supply chain management philosophy. For example, statistical significance that rules that there is no association betweencompany competitiveness and collaborative behaviour. Further research could also be valuable in areas where there were surprises or unexpected findings, and areas that may need to be strengthened through the use of a different research strategy or involving other participants who were excluded in the current study like motorists and suppliers.

7.3.1 Recommendations for policy makers

Entrepreneurs perform effectively when they are operating in an environment which is predictable and stable (Azfar, Khan & Gabriel, 2014). The Zimbabwean petroleum industry requires policy certainty to give confidence to both existing and would be investors. To this end, the following need to be done with the cooperation, involvement and participation of all relevant stakeholders particularly petroleum companies:

- There is need for de-bottlenecking the petroleum industry supply chain. Collaborating around the most important critical success factors such as collaborative partnerships and support from associative organisations, policy makers and petroleum companies must work together to achieve the goals of effective supply chain management which are cost minimization and customer satisfaction. Therefore, the Ministry of Energy and Policy Development and ZERA need to put in place research backed policies and regulations which were in line with international best practices. For example, benchmarking studies on harmonisation of tax collection could be conducted in more efficient economies that shared common petroleum industry practices with Zimbabwe. Similarly, ZERA could embark on such studies focusing on petroleum industry regulation and its enforcement so that Government regulation seized to a critical industry challenge. Government, ZERA and the petroleum companies must agree on principles of good practice, professionalism and business ethics. For example, policy must be clear on what should happen if there are international fuel price movements. The country requires a clear policy on price trigger mechanisms and fuel price determination. Clear policies will assist in debottlenecking the petroleum industry's supply chain and allow players to plan for the future with confidence. Petroleum companies must not be left out when all these studies and new policies are being developed.
- To address the problem of poor information sharing it is recommended that an industry association be put in place to represent the interest of petroleum companies. This is normal practice in other industries and energy sectors of other countries. The formation of an industry association can be a vehicle for developing an effective platform for information sharing and for improving collaboration and cooperation among supply chain members. In the case of this study the issue of industry association is urgent because there used to be a petroleum industry association before but the study showed that current petroleum companies were resisting the idea of forming an association. The study did not find any reasons for this behaviour. In organised markets the petroleum industry is structured in such a way that the industry association is central to key petroleum industry decision at national, industry and company levels (SAPIA, 2016). The industry association can be used as the industry's centre of excellence providing petroleum companies and policy makers with research services and advice. It is recommended that Government drives the studies and the formation of an association but such an association should not be an extended arm of Government.

The study showed that there was no clear Government policy and guidelines to address the financing of the petroleum industry's supply chain activities particularly the dead stock, interface and strategic reserve stock. The supply chain management philosophy advocates collaboration and sharing of gains and costs (Kim & Chai, 2015; Solaiman, 2016). The Government seems to be overburdened with funding activities along the petroleum supply chain yet the financing requirements seemed too huge to be left in the hands of Government alone. The following recommendations are therefore meant to deal with financing problems along the petroleum industry's supply chain:

- Collaborative planning, forecasting and replenishment, joint procurement and cooperative inventory management throughout the entire supply chain can drastically reduce costs. It is recommended that in the short term the collaboration extends to the contribution by all players towards financing dead stock, interface, buffer stock and strategic stocks. These are petroleum companies' core operational strategic issues and there was no commercial reason why these costs become a burden and responsibility of Government alone. To benchmark with economies that have successful pipeline management the Government need to quickly set up a team with members from associative organisations and petroleum companies to gather information from other petroleum importing countries and recommend how best the local situation could be managed. The focus must be on how to improve efficiency and involve the petroleum companies at all stages of the national fuel supply logistics chain. Such research can lead to the production of a national fuel funding model which the country can implement.
- If Government wants to promote affirmative action it must develop clear sector specific dispensations and incentives which will not contradict enforcement of existing regulations. For example the need to promote a particular group of supply chain members must be accompanied appropriate regulations. The rationale for adopting such policies must be clearly explained to all industry players. Implementation guidelines that do not contravene current policies and practices must be developed. To get to this end Government need information about how other states implemented such policies.
- For the medium to long term collaboration should take the form aggressive marketing activities to penetrate the regional market by importing fuel for exportation to markets such as Botswana, DRC and Zambia. In order to supply fuel to these countries the pipeline needed to be extended from Harare to Bulawayo. This will also benefit local

petroleum companies in the Southern part of the country. Project feasibility studies are required for this to happen and research also needed to be carried out on funding modalities. The proposition can help address product cost which is one of the biggest challenges identified in the study. Some of the practical funding options that could be studied are Build-Operate-and Transfers (BOTs), Build-Own Operate and Transfers (BOOTs) and Public Private Partnerships (PPPs) arrangements. BOTs, BOOTs and PPPs can make Zimbabwe's potential status as fuel distribution hub in the SADC region a reality.

- Another recommendation on funding is that once the Government has made a decision to expand the pipeline network it could use that as a strategy to renegotiate the Government's take or pay agreement with CPMZ. CPMZ would view the engagement of a different pipeline service provide as a threat to its current status and would be encouraged to renegotiate and review the terms of the take or pay agreement with Government. CPMZ would need to participate in the new facilities development projects, to expand its Beira to Feruka portfolio.

7.3.2 Recommendations for practice

There are supply chain management operational issues that require attention and the following recommendations are meant to address them.

- One of the identified benefits was that supply chain management has potential to increase company competitiveness. Practitioners can use the finding that supply chain management contributes to company competitiveness to justify funding and support for supply chain activities from company management. They can use this finding to ask for prioritisation of supply chain activities during budgetary processes of individual companies. Focus should be on effective supply chain management strategies and motivating, training and developing staff as these two determine the performance of supply chain management of an organisation. Operationalisation of these activities requires more support and resource allocation from management.
- Petroleum companies must lobby Government for the enforcement of regulations about licensing because licensed companies are no longer enjoying the benefits of their entrepreneurship or being good corporate citizens. Parallel activities being perpetuated by

smugglers and fly by night-brief case petroleum companies who do not comply with industry regulations were threatening viability of bonafide petroleum companies' businesses. However, the lobbying strategy requires petroleum companies to approach authorities as a team the need to have a functional industry association.

- The study results show that petroleum companies were not enjoying any economies of scale owing to depleted procurements and untransparency in the management of foreign currency which was one of the the petroleum industry's critical challenge. Changing the industry's overall procurement strategy so that the industry can have a sole importer who does not participate in the petroleum industry's downstream activities is recommended. With the sole procurer strategy the allocation of foreign currency for the petroleum industry will not be subjective and the sole importer will be able to place large orders that attract quantity discounts which must be passed down the supply chain. Government and ZERA can drive the process of regulating the sole procurer status but they must co-opt petroleum companies.
- Supply chain activities are not integrated and collaborated to the extent that smuggling and product adulteration were rife. Poor collaboration at the supply chain downstream existed because information in the petroleum industry was weak, there was unwillingness and low participation in research, the industry was enshrined with secrecy a lot of suspicion and lack of trust. Improving the above areas requires concerted efforts by all industry stakeholders. Government must ensure that better conditions and clear policy on targeted support exists, ZERA and NOIC must work together in liaison with their regional counterparts to ensure fair regulation and a level playing field for both big and small operators. These need to be based on international best practices

Last but not least, even though empirical evidence has shown multitudes of benefits of supply chain management including increased cooperation, collaboration competitiveness and increased market share. Rushing into the SCM mode is not necessarily the panacea of every petroleum company's problems. Implementing SCM is a process that requires resources and proper planning given that for it to work there is a lot of collaboration to be made with other supply chain members. A gradual or phased approach to implementing the supply chain management strategy is recommended as it gives the company time to learn how best to implement the programme and time to monitor and assess progress being made (Oakland,2014). For example you cannot start implementing when staff has not been inspired

to develop the right attitudes, commitment, team work and to identify and benchmark with international best practices.

7.3.3 Recommendations for further research

- Research is needed to find out ather determinants of supply chain performance measurement apart from the need for effective supply chain management and motivation, training and development
- An investigation will be needed to clarify the relationship between company competitiveness and collaborative relationships. Correlation analysis found that there is a relationship between these two variables but the Chi-square test failed to determine any significant relationship between the two variables
- Establishment of a centre for the petroleum industry operations will be a noble idea because of the importance of supply chain management issues to the industry. Research and business advice along supply chain management activities will be a critical component of the centre of excellence. To operationalize the establishment of the centre of excellence petroleum companies and motorists can contribute a development fee dedicated to finding solutions to supply chain members' common problems. For example, a percentage of the pump price to be approved by the petroleum industry association can be channelled towards this cause. The Government could provide the land and technical expertise while petroleum companies and tertiary institutions assign trainees and students to research on petroleum industry related problems.
- In the study, there was evidence that in other fuel importing countries it is normal practice to have an association of the participating petroleum companies to advance and represent the interest of association members. A surprising discovery in this study was that Zimbabwean petroleum industry players were resisting efforts by Government to have a petroleum industry association. However, there was no information to justify the uniqueness of the Zimbabwean scenario. It is recommended that a study be carried out to analyse the petroleum companies' attitudes towards the establishment of an industry association and how best supply chain members would contribute to the industry's supply chain.

- Product quality challenges are not an issue in the upstream area of the supply chain but quality is seriously compromised in the supply chain downstream. However, the study did not establish any reasons for this. Further studies may be required to establish the petroleum industry's retail sector's behaviour and handling of product and why the sector fails to uphold and pass on the goodwill received from the supply chain upstream to motorists. Related to this, a study may also look at why regulations and controls are effective at the upstream and weak or non-existent in the downstream of the petroleum industry supply chain.
- Studies on fuel procurement, financing and pricing models based on international best practices, especially, in land locked countries are recommended because results from such studies can go a long way in addressing these issues which appear to be causing bottlenecks which hinder the petroleum industry's competitiveness.
- Studies on petroleum industry policy development and implementation are also recommended to address the petroleum industry's policy regime that revealed so many grey areas and lack of uniformity. It may be helpful to do a detailed analysis of how successful petroleum industries developed and implemented their policies and strategies
- There is need for further examination of supply chain management issues in the petroleum industry based on the fact that this research did not pin point and determine the specific contributions of supply chain management to company competitiveness and that the current study had a very small sample which made it impossible to generalize the study findings.

REFERENCES

Aaker, D. A., Kumar, V. and Day, G.S. (2011). *Marketing Research*. 9th Edition. New York: John Wiley and Sons.

Abbasi, M. and Nilsson, F. (2012). Themes and Challenges in Making Supply Chains Environmentally Sustainable. *Supply Chain Management: An International Journal*, 17 (5), pp. 517-530.

Achua, C. F. and Lussier, R. N. (2013). *Effective Leadership*. 5th Edition. South Western: Cengage Learning.

Adoga, I. and Valverde, R. (2014). An RFID Based Supply Chain Inventory Management Solution for the Petroleum Development Industry: A case study for Shell Nigeria. *Journal of Theoretical and Applied Information Technology*, 62 (1), pp.199-203.

Alvesson, M. and Sandberg, J. (2011). Generating Research Questions Through Problematisation. *Academy of Management Review*, 36 (2), pp. 247-271.

Anderson, D. R., Sweeney, D. J., Williams, T. A., and Martin, K. (2011). *An Introduction to Management Science: Quantitative Approaches to Decision Making*, 13th Edition. South Western: Cengage Learning.

Arora, A., Arora, A. S. and Sivakumar, K. (2016). Relationships among Supply Chain Strategies, Organisational Performance and Technological and Market Turbulences. *The International Journal of Logistics Management*, 27(1), pp. 206-232.

Arvis, J. F., Marteau, J. F. and Raballand, G. (2010). *The Cost of Being Land Locked-Logistics Costs and Supply Chain Reliability.*Washington, D.C: The World Bank.

Assen, M.V., Vandenberg G., and Pietersma, P. (2009). *Key Management Models: The 60 Models Every Manager Needs to Know*. 2nd Edition, Finance Times. Beren Schot, BV: Prentice-Hall.

Atkinson, S. (2014). *The Business Book.* 1st Edition. London: Dorling Kindersley.

Azfar, K. R. W., Khan, N. and Gabriel, H. F. (2014). Performance Measurement: A Conceptual Framework for Supply Chain Practices. *Procedia-Social and Behavioral Sciences*, 150, pp.803-812. Available at: https://doi.org/10.1016/j.sbspro.2014.09.089 [2017, February 10].

Babatunde, B. O., Gbadeyan, R. A., and Bamiduro, J. A. (2016). Supply Chain Management Practices and Market Performance: Evidence from Selected Major Marketers of Petroleum Products in Nigeria. *Pacific Journal of Science and Technology*, 17(1), pp.129-139.

Babbie, E. R. (2007). *The Practice of Social Research.* 11th Edition. Belmont, C.A: Thomson Wadworth.

Badenhorst-Weiss, J. A. van-Biljon, E. H. and Ambe, I. M. (2017). *Supply Chain Management: A Balanced Approach*. 2nd Edition. Pretoria: Van Schaik.

Bala, K. (2014). Supply Chain Management: Some Issues and Challenges - A Review. *International Journal of Current Engineering and Technology*, 4(2), pp. 946-953.

Balfaqih, H., Nopiah, Z. M. and Saibani, N. (2016). A Conceptual Framework For Supply Chain Performance in Desalination Industry. *International Journal of Industrial Engineering and Management*, 7(2), pp. 95-101.

Barve, A. (2011). Impact of Supply Chains Agility on Customer Satisfaction, Paper presented at the 2010 International Conference on E-Business, Management and Economics, IPEDR Vol.3, pp.325-329. Hong Kong: IACSIT Press.

Basu, R. and Wright, J. W. (2010). *The Total Operations Solution.* Elservier: Butterworth Heinemann.

Bazeley, P. (2015). Mixed Methods in Management Research: Implications for the Field. *The Electronic Journal of Business Research Methods*, 13(1), pp. 27-35.

Beare, M. (2004). Oil and Gas Sectional Analysis Focusing on the Upstream Clustering Opportunities. Available at: http://www.intsokinoPHD/index.phd?_Category_1_d=1 [2015, May 1].

Belyaeva, Z., Krivorotov, V., Kalina, A. and Yerypalov, S. (2016). Competitiveness of Russian Regional Oil Complexes. *Competitiveness Review*, 26(2), pp.147-165.

Benton, W. C. (2013). *Purchasing and Supply Chain Management*. New York: Mc Graw-Hill.

Bimha, H. L. (2001). A Study on Customers' Perceptions in View of the Quality of Service they get from National Social Security Authority (NSSA): A Total Quality Management Approach. MBA Dissertation. Harare: Graduate School of Management, University of Zimbabwe.

Bluman, A.G. (2004). *Elementary statistics: A Step by Step approach*. 5th Ed. New York (NY): Mc Graw-Hill Irwin.

Bolumole, Y. A., Frankel, R. and Naslund, D. (2007). Developing a Theoretical Framework for Logistics Outsourcing. *Transportation Journal*, 46(2), pp. 35-54.

Borenstein, S. and Bushnell, J. (2015). *Retail Policies and Competition in the Gasoline Industry*. California: Center for the Study of Energy Markets.

Botha, L. (2011). Mixing Methods as a Process Towards Indigenous Methodologies. *International Journal of Social Research*, 4(4), pp. 313-325.

Bowers, D. (1991). *Statistics for Economics and Business*. London: McMillan.

Bowman, R. J. (2008). Global Logistics and Supply Chain Strategies– From Many to One: Managing the Multisourced Supply Chain. Available at: http://www.supplychainbrain.com/content/headline-news/single-article/ [2014, December 30].

Bowerman, P.L. and O'Connell, R.T. (2007). *Business Statistics in Practice*. 4th Edition. New York (NY): Mc Graw-Hill Irwin.

Bowersox, D. J., Closs, D. J. and Cooper, M. B. (2007). *Supply Chain Logistics Management*. 2nd Edition. New York: Mc Graw-Hill Irwin.

Braziotis, C., Bourlakis, M., Rogers, H. and Tannock, J. (2013). Supply Chains and Supply Networks: Distinctions and Overlaps. *Journal of SupplyChain Management: An International Journal*, 18(6), pp. 644-652.

Brevis, T. and Vrba, M. (2014). *Contemporary Management Principles*. Cape Town: Juta.

Broad-Based Black Economic Empowerment Act, No. 53 of 2003. (2004). *Government gazette*. 463 (25899). 9 January. Cape Town: Government Printer. Available at: https://www.environment.gov.za/sites/default/files/legislations/bbbee_act.pdf [2016, October 30].

Brown, S., Lamming, R., Bessant, J., and Jones, P. (2005). *Strategic Operations Management*. 2nd Edition. Elsevier: Butterworth-Heinemann.

Brown, S., Bessant, J. and Lamming, R. (2013). *Strategic Operations Management*.3rd Edition.London and New York: Routledge.

Bryman, A. and Bell, E. (2011). *Research Methodology: Business and Management Contexts*. 3rd Edition. Cape Town: Oxford University Press.

Bryman, A., Bell, E., Hirschsohn, P., Dos Santos, A., Du Toit, J., Masenge, A., Aardt, I. and Wagner, C. (2015). *Research Methodology: Business and Management Contexts*. Cape Town: Oxford University Press.

Butner, K. (2010). The Smarter Supply Chain of the Future. *Strategy and Leadership*, 38(1),p.22-31.
Availableat:http://www.emeraldinsight.com/doi/pdfplus/10.1108/10878571011009859 [2015, January 18].

Cameron, R. (2009). A Sequential Mixed Methods Model Research Design: Design, Analytical and Display Issues. *International Journal of Multiple Research Approaches*, 3(2), pp.140-152.

Cameron, R. (2011). Mixed Methods Research: The Five Ps Framework. *The Electronic Journal of Business Research Methods*, 9(2), pp. 96-108.

Cameron, R. (2013). Lessons from the Field: Applying the Good Reporting of a Mixed Methods Study (GRAMMS) Framework. *The Electronic Journal of Business Research Methods*, 11(2), pp.53-66.

Cao, M., Vonderembse, M.A., Zhang, Q. and Ragu-Nathan, T.S. (2010). Supply Chain Collaboration: Conceptualisation and Instrument Development. *International Journal of Production Research*, 48(22), pp. 6613-6635.

Carifio, J. and Perla, R. (2007). Ten Common Misunderstandings, Misconceptions, Persistent Myths and Urban Legends about Likert Scales and Likert Response Formats and their Antidotes. *Journal of Social Sciences 3(3)*, pp. 106-116.

Carter, C. R. and Rogers, D.S. (2008). A Framework for Sustainable Supply Chain Management: Moving Toward New Theory, *International Journal of Physical Distribution and Logistics Management*, 38(5), pp. 360-387.

Chima, C. M. (2010). Supply Chain Management Issues in the Oil and Gas Industry. *Journal of Business and Economic Research*, 5(6), pp. 27-36.

Chopra, S. and Meindl, P. (2013). *Supply Chain Management: Strategy, Planning and Operations*. Harlow, UK: Pearson Education.

Chunda, S. R. (2007). An Investigation into Mortality Rate of Small Businesses, with Specific Reference to Fuel Retailers with RSA. DBA Thesis. Durban: University of Kwa-Zulu Natal.

Collins, J. M. and Troilo, M. L. (2015). National Factor Effects on Firm Competitiveness and Innovation. *Competitiveness Review*, 25(4), pp.392-409.

Cooper, D. and Schindler, P. (2010). *Business Research Methods.* 11th Edition. London: McGraw-Hill.

Council of Supply Chain Management Professionals (CSCMP) (2010). Supply Chain Management Definitions and Glossary Terms. Available at: http://cscmp.org/CSCMP/Educate/SCM_Definitions_and_Glossary_of_Terms/CSCMP/Educate/SCM_Definitions_and_Glossary_of_Terms.aspx?hkey=60879588-f65f-4ab5-8c4b-6878815ef921 [2014, July 10].

Council of Supply Chain Management Professionals (CSCMP) (2015). *By-Laws of the Council of Supply Chain Management Professionals,* Revised 15 July 2015. Available at: http://staging.cscmp.org/sites/default/files/user_uploads/footer/downloads/bylaws/cscmp-bylaws.pdf [2016, May 15].

Coyle, J. J., Bard, E. J. and Langley, C. J. (2009). *Supply Chain Management: A Logistics Perspective*. South-Western: Cengage Learning.

Coyle, J. J., Langley, C. J. Jr., Novack, R. A. and Gibson, B. J. (2017). *Supply Chain Management: A Logistics Perspective*. 10th Edition. USA, Boston: Cengage Learning.

Creswell, J. W. (2011). *Educational Research: Planning, Conducting and Evaluating Qualitative Research*. 4th Edition. Upper Saddle River: Pearson.

Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*. 4th Edition. Thousand Oaks, CA: Sage publications.

Cresswell, J. and Tashakkori, A. (2007). Developing Publishable Mixed Methods Manuscripts. *Journal of Mixed Methods Research*. 1(2), pp.107-111. Available at: http://journals.sagepub.com/doi/pdf/10.1177/1558689806298644 [2016, December 2].

Creswell, J. W. and Plano-Clark, V.L. (2011). *Designing and Conducting Mixed Methods Research*. 2nd Edition. Thousand Oaks, CA: Sage Publications.

Cuthbertson, R. and Piotrowicz, W. (2011). Performance Measurement Systems in Supply Chains: A Framework for Contextual Analysis. *International Journal of Productivity and Performance Management*, 60(6), pp.583-602.

Devillers, G., Nieman, G., and Nieaman, W. (2015). *Strategic Logistics Management: A Supply Chain Management Approach*. 9th Edition. Pretoria: Van Schaik.

Dey, A., La Guardia, P., and Srinivasan, M. (2011). Building Sustainability in Logistics Operations: A Research Agenda.*Management Research Review*, 34(11), pp.1237-1259.

Dzuke, A. and Naude, M. J. A. (2015). Procurement Challenges in the Zimbabwean Public Sector: A Preliminary Study. *Journal of Transport and Supply Chain Management*, 9(1), pp. 1-9.

Energy Regulatory Board (2010). Report on Status of the Petroleum Industry, Paper Presented to the Parliamentary Committee on Lands, Energy and Water, January 2012, pp.1-16.

Emmet, S. and Granville, D. (2007). *Excellence in Inventory Management: How To Minimise Costs and Maximise Services*. Liverpool: Liverpool Academic Press.

Ettlie, J. E. (2014). *Managing Innovation: New Technology, New Products, and New Services in a Global Economy*. 2nd Edition. New York: Routledge.

Evans, J. R. and Lindsay, W. M. (2017). *Managing for Quality and Performance Excellence*. 10th Edition. USA, Boston: Cengage Learning.

Fadey, O., Adebuyi, A., Oke, O. and Ajagbe, M. A. (2015). Review of Organisational Strategy and Structure (1962-2015). InternationalConference on African Development Issues (CU-ICADI) 2015: Social and Economic Models for Development Track, pp.341-348.

Farquhar, M. C., Ewing, G. and Booth, S. (2011). Using Mixed Methods to Develop and Evaluate Complex Interventions in Palliative Care Research. *Palliative Medicine*, *25*(8), pp.748-757. Available at: https://doi.org/10.1177/0269216311417919 [2016, December 12].

Fawcett, S. E., Magnan, G. M., and Mc Carter, M. W. (2008). Benefits, Barriers and Bridges to Effective Supply Chain Management. *Supply Chain Management: An International Journal*, 13(1), pp. 35-48.

Fawcett, S. E., Walter, M. A. and Bowersox, D. J. (2011). Cinderella in the C-suite: Conducting Influential Research to Advance the Logistics and Supply Chain Disciplines. *Journal of Business Logistics*, 32(2), pp.115-121.

Fawcett, S. E., Fawcett, A. M., Watson, B. J. and Magnan, G. M. (2012). Peeking Inside the Black Box: Toward an Understanding of Supply Chain Collaboration Dynamics. *Journal of Supply chain management*, 48(1), pp.44-72.

Fawcett, S. E. and Waller, M.A. (2013). Considering Supply Chain's Professional Identity: The Beautiful Discipline or, We Don't Cure Cancer, But we do Make a Big Difference. *Journal of Business Logistics*, 34(3), pp.183-188.

Fawcett, S. E., Mc Carter, M. W., Fawcett, A. M., Webb, S. G. and Magnan, G. M. (2015). Why Supply Chain Collaboration Fails: The Socio-cultural View of Resistance to Relational Strategies. *Supply Chain Management: An International Journal*, 20(6), pp.648-663.

Flynn, A. E. and Fearon, H. E. (2010). *Purchasing and Supply Management*. Boston, Burr Ridge, I L:McGraw-Hill.

Frederico, G. and Trindale de Souza, T. (2017). Alighnment between Supply Chain Management and Practices and Maturity: A Framework Proposal. *International Business Management, Medwell Journals*, 11(3), pp. 807-813.

Gereffi, G. and Fernandez-Starke. (2011). Global Value Chain Analysis: A Pimer. Centre of Globalization, Governance and Competitiveness, Durham.

Germany Agency for International Cooperation (2015). Pump Prices for Gasoline. World Bank Group. Available at: https://www.scribd.com/. Last visited on 15August 2015.

Gichuru, M., Ivaro, M., and Ivaro, W. (2015). Collaborative Supply Chain Practices on Performance of Food and Beverages Companies: A Case Study of DelMonte Kenya Limited. *International Journal of Academic Research in Business and Social Sciences*, 5(11), pp. 17-31.

Gligor, D. M. (2014). The Role of Demand Management in Achieving Supply Chain Agility. *Supply Chain Management: An International Journal*, 5(6), pp. 577-591.

Gloria, M. and Talavera, V. (2015). Supply Chain Management Practices and Challenges: Case Studies of Four Supply Chains. *Philipine Management Review*, 22, pp.53-57.

Gonzalez, E. S. and Souza, M. J. F. (2010). A Conceptual Analysis of Supply Chain Management [Paper Presented at the 16th International Conference On Industrial Engineering and Operations Management in Sao Carlos, SP, Brazil 12 to 15 October].

Government of Zimbabwe (2007). Indigenisation and Empowerment Act 14/2007 [Chapter14:33] Harare: Government Printers.

Grant, M. R. (2005). *Contemporary Strategy Analysis*. 5th Edition. Oxford: Blackwell.

Greene, J.C. (2008). Is Mixed Methods Social Inquiry a Destructive Methodology? *Journal of Mixed Methods Research*, 2(1), pp.7-22.

Groenewald, D. (2013).*Contemporary Management Aspects*. Cape Town: Juta.

Gumbo, L. (2017). 4 Diesel Tankers Emptied, Filled With Water. *The Herald.* 1 February. Available at: https://www.pressreader.com/zimbabwe/the-herald-zimbabwe/20170201/281487866077261 [2017, February 2].

Habib, M. (2011). *Supply Chain Management (SCM): Theory and Evolution, Supply Chain Management-Applications and Solutions*. Bangladesh: INTECH. Available at: https://cdn.intechopen.com/pdfs-wm/17671.pdf [2015, July 2].

Handfield, R. B., Monczka, R. M., Guinipero, L. C. and Patterson, J. L. (2011). *Sourcing and Supply Chain Management.* 5th Edition. Toronto, Canada: South-Western-Cengage Learning.

Havenga, J. H. and De-Bod, A. (2016). *Customer Service: Business Logistics Management*. 5th Edition. Cape Town: Oxford University Press. pp.151-166.

Horn, G., Badenhorst-Weiss, H., Cook, G., Heckroodt, S., Howell, J., Phume, T. B. and Strydom, J. (2014). *Supply Chain Management: A Logistics Approach*. Cape Town: Oxford University Press.

Hugo, W. M. J., Badenhorst-Weiss, J. A., and Van Biljon, E.H.B. (2011). *Supply Chain Management: Logistics in Perspective*. Pretoria: Van Schaik.

Hugo, W. M. J. and Badenhorst-Weiss, J. A. (2016). *Purchasing and Supply Chain Management.* 10th Edition. Pretoria: Van Schaik.

Inwent, D. C. (2014). Components of a Logistics System. Available at https://gc21. giz.de/ibt/en/opt/site/ilt/ibt/…/sadc/inhalt/logistics/…/16_components.html/.[2017,August, 12].

Jacobs, F. R. and Chase, R. B. (2013). *Operations and Supply Chain Management: The Core*. 3rd Edition. Berkshire: McGraw-Hill Irwin.
Jacobs, F. R. and Chase, R. B. (2014). *Operations and Supply Chain Management.* Berkshire, UK: Mc Graw-Hill Irwin.

Janssen, P. B., Johnson, M. P. and Schaltegger, S. (2015). 20 Years of Performance Measurement in Sustainable Supply Chain Management-What has Been Achieved? *Supply Chain Management: An International Journal*, 20(6), pp.664-680.

Jean-Francois, A., Jean-Francois, M. and Gael, R. (2010). *The Cost of Being Land Locked-Logistics Costs and Supply Chain Reliability*. Washington, D.C : The World Bank.

Jogulu, U. D. and Pansiri, J. (2011). Mixed Methods: A Research Design for Management Doctoral Dissertations. *Management Research Review*, 34(6), pp. 687-701.

Johnson, R. D. and Siskin, B.R.(1976). Quantitative Techniques for Business Decisions, New Jersey: Prentice-Hall

Jonsson, P., Rudberg, M., and Holmberg, S. (2013). Centralised Supply Chain Planning at IKEA. *Supply Chain Management: An International Journal*, 18(3), pp. 337-350.

Johnson, R. B., Turner, L.A. and Onwuegbuzie, A. J. (2007). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher*, 33(7), pp.14-26.

Karagiannopoulos, G. D., Georgopoulos, G. and Nikolopoulos, K. (2005). Fathoming Porter's Five Forces Model in the Internet Era. *Emerald Group Publishing*, 7(6), pp.66-76. Available at: https://doi.org/10.1108/14636690510628328 [2016, October 3].

Katunzi, T. M. (2011). Obstacles to Process Integration along the Supply Chain: Manufacturing Firms' Perspective. *International Journal of Business Management*, 6(5).

Kathari, C. R. (2011). *Research Methodology.Methods and Techniques*, 2nd Edition, New Delhi: New Age International Publishers

Kavale, S. (2012). The Connection between Strategy and Structure. *International Journal of Business and Commerce*, 1(6), pp.60-70.

Kilubi, I. (2016). Investigating Current Paradigms in Supply Chain Risk Management-A Bibliographic Study. *Business Process Management Journal*, 22(4), 662-692.

Kim, M. and Chai, S. (2015). Assessing the Impact of Business Uncertainty on Supply Chain Integration. *The International Journal of Logistics Management*, 27(2), pp.463-485.

Kimani, C.W. (2013). Supply Chain Management Challenges in the Kenya Petroleum Industry: Case of National Oil Corporation of Kenya. *International Journal of Social Science and Entrepreneurship*, 1(3), pp. 231-246.

Kohli, A. S. and Jensen, J. B. (2010). Assessing Effectiveness of Supply Chain Collaboration: An Empirical Study. *Supply Chain Forum, An International Journal*,11(2), pp.1-16.

Kotler, P. and Keller, K. (2012). *Marketing Management*. 14th Edition. Upper Saddle River, New Jersey: Prentice Hall.

Kruger, D. and Ramphal, R. (2009). *Operations Management*. 2nd Edition. Cape Town: Oxford University Press.

Kruger, D. Ramphal, R. and Maritz, M. (2013). *Operations Management*. 3rdEdition. Cape Town: Oxford University Press.

Kuiken, J. (2014). Caught in Transition: Britain's Oil Policy in the Face of Impending Crisis, 1967-1973. *Historical Social Research.* 39(4), pp. 272-290.

Kumar, S. A., Datta, S and Mahapatra, S. S. (2014). Use of IVFNs and MULTIMOORA Methods for Supply Chain Performance Measurement, Benchmarking and Decision-making: An Empirical Study. *International Journal of Business Excellence.* Available at: https://doi.org/10.1504/IJBEX.2014.059572 [2017, March 20].

Kumar, R., Singh, R. K. and Shankar, R. (2015). Critical Success Factors for Implementation of Supply Chain Management in Indian Small and Medium Enterprises and Their Impact on Performance. *IIMB Management Review*, 27(2), pp.92-104. Available at: https://doi.org/10.1016/j.iimb.2015.03.001 [2017, June 1].

Laing, T. P., You, J. J., and Lin, C. C. (2010). A Resource Based Perspective on Information Technology and Firm Performance: A Meta-Analysis. *Industrial Management and Data Systems*, 110(8), pp. 1138-1158.

Lambert, D. M. (2008). *An Executive Summary of Supply Chain Management: Processes, Partnerships, Performance.* Supply Chain Management Institute.

Laszlo, E. and Krippner, S. (1998). Systems Theories: Their Origins Foundations and Development Published. In *Systems Theories a Priority Aspect of Perception*. Jordan, J. S. Amsterdam: Elsevier Science. pp. 47-74.

Laudon, C. K. and Laudon, P. J. (2012). *Management Information Systems.* New York: Pearson.

Lavassani, K., Movehedi, B. and Kumar, V. C. (2011). *Evolution of Supply Chain Theories: A Comprehensive Review.* Canada: Sprott School of Business, Carleton University.

Lazarevic, P. S., Sohal, A. and Baihaque, I. (2007). Supply Chain Management Practices and Supply Chain Performance in the Australian Manufacturing Industry. Australia: Monash University: Department of Management, Working Paper Series.

Lazenby, J. A. A. Ed. (2016). *General Management.* Pretoria: Van Schaik Publishers.

Lee, H. L. (2004). The Triple-A Supply Chain. *Harvard Business Review*, 82(10), pp.102-113. Available at: http://www.scap.pk/article/SupplyChaindd.pdf [2015, December 2] .

Leenders, M. R., Fearon, H. E., Flynn. A. E., and Johnson, P. F. (2002). *Purchasing and Supply Management*. 12th Edition. New York, NY: McGraw-Hill.

Leyh, C. and Thomschke, J. (2015). Critical Success Factors for ImplementingSupply Chain Management Systems- The Perspective of Selected Germany Enterprises. In *Computer Science and Information Systems (FedCSIS),* 2015 Federated Conference on pp.1403-1413.

Levin, R. I. (1984). *Statistics for Management*, 3rd Edition, London: Prentice-Hall

Lind, D. A, Marshal, W.G. and Wathen, S.A. (2013). *Basic Statistics for Business and Economics.* 8th Edition. New York (NY): Mc Graw-Hill Irwin.

Livohi, S.J. (2012). Downstream Supply Chain Performance Measurement by the Oil Marketing Companies in Kenya. Nairobi: University of Nairobi.

Loedolff, J. Ed. (2014). *Supply Chain Management: A Logistics Approach*. Cape Town: Oxford University Press.

Loedolff, J. Ed. (2016). *Principles of Business Management*. 3rd Edition. Cape Town: Oxford University Press.

Lubke G, H. and Muthen B. O. (2004). Applying Multigroup Confirmatory Factor Models for Continuous Outcomes to Likert Scale Data Complicates Meaningful Group Comparisons. *Structural Equation Modelling Multidisciplinary Journal*, 11(4), pp, 514-534.

Lysons, K. and Farrington, B. (2012). *Purchasing and Supply Chain Management.* United Kingdom, Harlon: Pearson.

Mammy, H. M. and Caddy, I. N. (2006). Definition Problems and General Systems Theory Perspective in Supply Chain Management.*Problems and Perspectives in Management,* 4(4), pp.77-83.

Maree, K. Ed. (2016). *First Steps in Research*. 2nd Edition. Pretoria:Van Schaik.

Marschan-Piekkari, R. and Welch, C. (2004). *Handbook of Qualitative Research Methods for International Business*. Massachusetts: Edward Elgar.

Matsho, J. (2010). The Retail Petroleum Industry in South Africa. M.Com in Economics dissertation. University of Zululand. Available at: http://hdl.handle.net/10530/387 [2017, April, 20].

Mathuramaytha, C. (2011). Supply chain collaboration - What's an outcome? A theoretical model. In *International Conference on Financial Management and Economics IPEDR, IACSIT Press, Singapore*, Vol. 11, pp.102-108.

McHugh, M. L. (2013). Lessons in Biostatistics.The Chi-Square Test of Independence,The Department of Nursing, School of Health and Human Services,National University, Aero Court,San Diego,Carlifornia.http://dx.doi.org/10/11613/BM.2013.018 [2017, October 9].

Mehrjerdi, Y. Z. (2009). The Collaborative Supply Chain. *Assembly Automation*, 29(2), pp. 127-136. Available at: http://www.emeraldinsight.com/doi/pdfplus/10.1108/01445150910945589 [2015, December 10].

Miller, L. E. (1994). Correlations: Description or Inference? *Journal of Agricultural Education*, 35(1), pp.5-7.

Ministry of Energy and Power Development. (2012). *Energy Policy*. Harare: Government Printers.

Ministry of Industry and Commerce. (2012). *Industrial Development Policy 2012-2016*. Harare: Government Printers.

Ministry of Youth Development, Indigenisation and Empowerment (2010). Indigenisation and Economic Empowerment [General Regulations] 2010, Harare: Government Printers.

Muthu, M. (2010). Supply Chain Constraints in the South African Coal Mining Industry. DBA Thesis. Vaal University of Technology.

Murphy. P. R. Jr. and Wood, D. F. (2004). *Contemporary Logistics*. 8th Edition, International Edition. New Jersey: Pearson.

Mwaura, A., Letting, N., Ithinji, G. and Orwa, H. B. (2015). Reverse Logistics Practices and Their Effect on Competitiveness of Food Manufacturing Firms in Kenya. *International Journal of Economics, Finance andManagement Sciences* 3(6), pp.678-684.

Mwaura, A., Letting, N., Ithinji, G. and Orwa, H. B. (2016). Green Distribution Practices and Competitiveness of Food Manufacturing Firms in Kenya. *International Journal of Economics, Commerce and Management*, 4(3), pp. 189-207.

Nakano, M. (2009). Collaborative Forecasting and Planning in Supply Chains: The Impact of Performance in Japanese Manufacturers. *International Journal of Physical Distribution and Logistics Management*, 39(2), pp.84-105.

Nag, B., Han, C., and Yao, D. (2014). Mapping Supply Chain Strategy: An Industry Analysis. *Journal of Manufacturing TechnologyManagement*, 25(3), pp.351- 370.

Naidoo, P. (2007). An Assessment of the Effectiveness and Efficiency of the Strategic and Operational Management of the Makana Municipality, Grahamstown: A Total Quality Management and Business Excellence Approach. DBA thesis. Durban: University of Kwazulu Natal (UKZN).

Narayanan, V. K. and Nath, R. (1993). *Organisation Theory: A StrategicApproach*. Illinois: Richard D. IRWIN.

Naslund, D. and Williamson, S. (2010). What is Management in Supply Chain Management? A Critical Review of Definition, Frameworks andTerminology. *Journal of Management Policy and Practice*, 11(4), pp.11-28.

National Oil Company of Zimbabwe [NOCZIM] (2010). *A brief on NOCZIM Operations to the Minister of Energy and Power Development*. Harare: NOCZIM.

Naude, M. J. A. (2013). Supply Chain Management Challenges in the South African Automotive Sector: Do Location, Size and Age Matter? *South African Journal of Economic and Management Sciences*, 16(4), pp.1-13.

Neerraj, A. and Neha, G. (2015). Measuring Retail Supply Chain Performance. *Benchmarking: An International Journal*, 22(1), pp.135-166.

Ngulube, P. and Ngulube , B. (2015). Mixed Methods Research, An Investigation of Trends in the Literature. *South African Journal of Economic and Management Sciences,* 18(1), pp.1-13. Available at: http://www.scielo.org.za/pdf/sajems/v18n1/01.pdf [2017, April 20].

Ngulube, P. (2013). Blending Quantitative and Qualitative Research Methods in Library and Information Science in Sub-Saharan Africa. *ESARBICA Journal: Journal of Eastern and Southern Africa Regional Branch of the International Council on Archives*, 32.

Nieman, G. and Benett, A. (2014). *Business Management: A value Chain Approach.* Revised. 2nd Edition. Pretoria: Van Schaik.

Nieuwenhuizen, C. (2013). *Basics of Entrepreneurship.* 2nd Edition. Cape Town: Juta.

Ng'angá, J. (2017). Petroleum Products Suppliers Condemned as Selfish. *Kenya News Agency*. January 29. Available at: http://kenyanewsagency.go.ke/en/petroleum-products-suppliers-condemned-as-selfish/ [2017, June 6].

Oakland, J. S. (2014). *Total Quality Management and Operational Excellence: Text with Cases*. 4th Edition. New York: Routledge.

Ogunlela, G. O. and Lekhanya, L. M. (2016). The Use of Integrated Supply Chain Management Model for Promoting Competitiveness in the Fast Moving Consumer Goods

(FMCG) Manufacturing Industry in Nigeria. *Problems and Perspectives in Management*, 14(1), pp.160-167.

Olson, L. (2012). *Introduction to Management Science*, 3rd Edition, Ohio: Cengage Learning

Osoro, A. (2015). Factors Affecting Performance of Supply Chain Systems in the Petroleum Industries in Kenya. *International Journal Scientific and Research Publications,*5 (4), 2250-3153.

Patton, M. Q. (2002). *Qualitative Research and Evaluation Methods*. 3rd Edition. California: Sage Publications.

Paradkar, S.S. (2011). Supply Chain Management-A practical Solution Approach, LinkedIn Discussion: BP trends. www.bptrends.com.

Pellissier, R. (2007). *Business Research Made Easy.* Cape Town: JUTA.

Piekkari, M. R. and Welch, C. (2004). *Handbook of Qualitative Research Methods for International Business*. Massachusetts: Edward Elgar.

Pienaar, W. J. (2010). Logistics Aspects of Petroleum Pipeline Operations. *Journal of Transport and Supply Chain Management,* 4(1). p.p. 221-242.

Pienaar, W. J. and Vogt, J. J. (2014). *Business Logistics Management. 5*th Edition. Cape Town: Oxford University Press.

Pienaar, W. J. and Vogt, J. J. (2016). *Business Logistics Management: A Value Chain Perspective*. 4th Edition. Cape Town: Oxford University Press.

Porter, M. E. (1980). *The Competitive Strategy: Techniques for Analysing Industries and Competitors*. New York: The Free Press.

Porter, M. E. (1990). *The Competitive Advantage of Nations*. New York: The Free Press.

Prajogo, D. and Sohal, A. (2013). Supply Chain Professionals: A Study of Competencies, Use of Technologies, and Future Challenges. *International Journal of Operations and Production Management*, 33(11/12), pp.1532-1554. Available at: https://doi.org/10.1108/IJOPM-08-2010-0228 [2015, December 2].

Prasad, S. and Tata, J. (2010). Micro-enterprise Supply Chain Management in Developing Countries. *Journal of Advances in Management Research*, 7(1), pp. 8-31.

Quesada, H., Gazo, R. and Saunchez, S. (2012). Critical Factors Affecting Supply Chain Management: A Case Study in the US. Pallet Industry. Available at: https://www.intechopen.com/books/pathways-to-supply-chain-excellence/critical-success-factors-for-supply-chain-management-in-wood-industry [2015, December 2].

Rana, S. M. S., Osman, A., Manaf, A. H. A., bin-Abttalim, M. S. and Solaiman, M. (2016). Drivers of Retail Supply Chain Efficiency: Moderating Effect of Lean Strategy. *International Journal of Supply Chain Management*, 5(1), pp.52-62.

Render, B., Rajaguru, R. and Matanda, M.J. (2013). Effects of Inter-Organisational Compatibility on Supply Chain Capabilities: Exploring the Mediating Role of Inter-Organisational Information Systems (IOIS) integration. *Industrial Marketing Management*, 42(4), pp.620-632. Available at: https://doi.org/10.1016/j.indmarman.2012.09.002 [2015, October 2].

Render, B., Stair, R. M. Jr. and Hanna, M. E. (2012). *Quantitative Analysis for Management.* 11th Edition. New York: Pearson.

Richey, R.G., Adams, F.G. and Delela, V. (2012). Technology and Flexibility: Enablers of Collaboration and Time Based Logistics Quality. *Journal of Business Logistics.* 33(1), pp.34-49.

Saad, S. Udin, Z. M. and Hasnan, N. (2014). Dynamic Supply Chain Capabilities: A Case Study of Oil and Gas Industry. *Supply Chain Management: An International Journal*, 3(2), pp.70-76.

Sangari, M. S., Hosnavi, R. and Zahedi, M. R. (2015). The Impact of Knowledge Management Processes on Supply Chain Performance: An empirical study. *International Journal of Logistics Management*, 26(3), pp.603-626.

Saunders, M., Lewis, P., and Thornhill, A. (2009). *Research Methods for Business Students*. 5th Edition. Harlow: Financial Times (Prentice-Hall).

Schaltegger, S. and Burriff, R. (2014). Measuring and Managing Sustainability Performance of Supply Chains. *Supply Chain Management: An International Journal*, 19(3), pp.232-241.

Scheaffer, R. L., Mendenhall, W. and Ott, R. L. (2006). *Elementary Survey Sampling*. 6th Edition. U.S.A. Belmont: Thomson Brooks/Cole.

Schermerhorn, J. R. Jr. and Bachrach, D. G. (2015). *Introduction to Management: International Student's Version*. 13th Edition. Singapore: John Wiley.

Schonberger, R. J. and Knod, E. M. Jr. (1994). *Operations Management: Continuous Improvement*. 5th Edition, Illinois: Irwin.

Schroeder, R. G. (2008). *Operations Management: Contemporary Concepts and Cases*. 4th Edition. McGraw-Hill.

Shannon-Baker, P. (2016). Making Paradigms Meaningful in Mixed Methods Research, *Journal of Mixed Methods Research, 10 (4) pp.319-334.*

Scott, C., Lundgren, H., and Thompson, P. (2011). *Guide to Supply Chain Management*. London: Springer.

Senge, P. (2006). *The Fifth Discipline: The Art and Practice of the Learning Organisation*. 2nd Edition. London: Century Business.

Sheel, A. (2016). Supply Chain Complexity Drivers and its Management.*Journal of Business and Management (IOSR-JBM),* 18(1), pp.39-43. Available at:

http://www.iosrjournals.org/iosr-jbm/papers/Vol18-issue1/Version-2/F018123943.pdf [2017, January 5].

Shi, Y., Zhang, A., Arthanari, T. and Liu, Y. (2016). Third Party Purchase: An Empirical Study of Chinese Third Party Logistics Users. *International Journal of Operations and Production Management,* 36(3), pp.286-307.

Shukla, R. K., Garg, D., and Agarwal, A. (2011). Understanding of Supply Chain: A Literature Review. *International Journal of Engineering Science and Technology (IJEST),* 3(3), pp.2059-2072.

Shurchuluu, P. (2002). National Productivity and Competitive Strategies for the New Millennium. *Integrated manufacturing systems*, 13(6), pp. 408-414.

Simchi-Levi, D., Kaminsky, P., and Simchi-Levi, E. (2009). *Designing and Managing the Supply Chain: Concepts Strategies and Case Studies*. 3rd Edition. Boston, MA: McGraw-Hill.

Stevenson, W. J. (2012). *Operations Management: Theory and Practice*. 11thedition. New York: Mc Graw-Hill.

Sohel, R. S. M., Osman, A., Manaf, A. H. A., Bin Ab Halim, M. S. and Solaiman, M. (2016). Drivers of Retail Supply Chain Efficiency: Moderating Effect of Lean Strategy. *International Journal of Supply Chain Management,* 5(1), pp.52-62. Available at: http://ojs.excelingtech.co.uk/index.php/IJSCM/article/view/1146/pdf [2016, November 5].

Soheila, A. Alireza, R. and Alireza, K. (2015). Ranking Factors Affecting Supply Chain Management: A Case Study of Shokoohiyeh Industrial Town, Iran. *International Journal of Economics, Commerce and Management,* 3(10), pp.439-468. Available at: http://ijecm.co.uk/wp-content/uploads/2015/10/31028.pdf [2016, January 5].

Soosay, C. A. and Hyland, P. (2015). A Decade of Supply Chain Collaboration And Directions for Future Research. *Supply Chain Management: An International Journal, 20(6),* pp.613-630.

Stevenson, W. J. (2012). Operations Management: Theory and Practice. 11th Edition. NewYork: McGraw-Hill.

Stoner, J. A. F. and Freeman, R. E. (1992). *Management*. 5th Edition. USA Indiana: Prentice Hall International.

Storey, J. and Emberson, C. (2006). Supply Chain Management: Theory, Practice, and Future Challenges. *International Journal of Operations Management and Production Management*, 36(7), pp.754-774.

Straits, B. C. and Singleton, R.A. Jr. (2011). *Social Research: Approaches and Fundamentals. International*. 5th Edition. New York: Oxford University Press.

Swanepoel, B., Erasmus, B., Van Wyk, M., and Schenk, H. (2003). *South African Human Resource Management: Theory and Practice*. 3rd Edition. Cape Town: Juta.

Sweeney, E. (2002). The four fundamentals of Supply Chain Management: Logistics solutions. *The Journal of National Institute for Transportand Logistics*, 5(1), pp.14-17.

Sweeney, E., Grant, D. B., and Mangan, J. (2015). The Implementation of Supply Chain Management Theory in Practice: An Empirical Investigation. *Supply Chain Management: An International Journal*, 20(1), pp.56-70.

Tadisina, S. K. (2016). Drivers of Supply Chain Integration and the Role of Organisational Capture: Empirical Evidence from Indonesia. *Business Process Management Journal*, 22(1), pp.89-115.

Tanco, M., Furburg, D., and Escuder, M. (2015). Main Difficulties Hindering Supply Chain Performance: An Exploratory Analysis at Uruguayan SMEs. *Supply Chain Management: An International Journal*, 20(1), pp.11-23.

Tay, M. Y., Rahman, A. A., Aziz, Y. A. and Sidek, S. (2015). A Review on Drivers and Barriers Towards Sustainable Supply Chain Practices. *International Journal of Social Science and Humanity*, 5(10), pp.892-897.

Teddlie, C. and Tashakkori, A. (2012). Common "Core" Characteristics of Mixed Methods Research: A Review of Critical Issues and Call forGreater Convergence. *American Behavioural Scientist*, 56(6), pp.774-788.

Teravaninthorn, S. and Raballand, G. (2008). *Transport Prices and Costs in Africa*. Washington, D.C: World Bank Publications.

Terrell, S. (2012). Mixed Methods Research Methodologies. *The Qualitative Report*, 17(1), pp.254-280. Available at: http://nsuworks.nova.edu/cgi/viewcontent.cgi?article=1819&context=tqr [2015, May 20].

Tichapondwa, S. M. (2013). *Preparing Your Dissertation at a Distance: A Research Guide*. Vancouver: Virtual University for Small States of the Common Wealth (VUSSCW).

Thompson, A. A. Jr. and Strickland, A. J. iii. (2000). *Strategic Management: Concepts and Cases*. 13th Edition. New York: McGraw-Hill Irwin.

Tracey, M., Lim, J. S., and Vonderembe, A. M. (2005). The Impact of Supply Chain Management Capabilities on Business Performanace. *Supply Chain Management: An International Journal*,10(3), pp.179-191.

Trkman, P., Budler, M. and Groznik, A. (2015). A Business Model Approach to Supply Chain Management. *Supply Chain Management: An International Journal*, 20(6), pp.587-602

Tsamela, D. (2016). Government's Helping Hand to Business is Vital in Hard Times. *The Business Times-Sunday Times.* November 13: 4.

United Nations (UN). 2017. Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all. Available at: http://www.un.org/sustainabledevelopment/energy/ [Last Accessed 15 July 2017].

Varma, S., Wadhwa, S., and Deshmuk, G. (2006). Evaluating Petroleum Supply Chain Performance: Application of Analytical Hierarchy Process to Balanced Score Card. *Asia Pacific Journal of Marketing and Logistics*, 20(3), pp.343-356.

Varma, S., Wadhwa, S., and Deshmuk, G. (2008). Implementing Supply Chain Management in a Firm: Issues and Remedies. *Asia Pacific Journalof Marketing and Logistics*, 18(3), pp. 223-243.

Veira, J., Yoshizaki, H and Ho, l. (2009). Collaboration Intensity in the Brazilian Supermarket Retail Chain. *Supply Chain Management: International Journal*, 14(1), pp.11-21.

Von Bertalanffy, L. (1968). *General systems theory: Foundations, development, and applications*. New York: Geroge Braziller.

Voortman, C. (2004). *Global Logistics Management*. Cape Town: JUTA.

Wang, E. T. G., Tai, J. C. F. and Grover, V. (2013). Examining the Rational Benefits of Improved Interfirm Information Processing Capability in Buyer-supplier Dyads. *MIS Quarterly*, 37(1), pp.149-173.

Weingarten, F., Humphreys, P., Mc Kittrick, A. and Fynes, B. (2013). Investigating the Impact of e-Business Applications on Supply Chain Collaboration in the German Automative Industry. *International Journal of Operations and Production Management*, 33(1), pp.25-48.

Wegner, T. (2012). *Applied Business Statistics: Methods and Excel Based Applications*, 3rd E dition, Cape Town: Juta

Wiid, J. (2013). *Distribution Management*. Cape Town: JUTA.

Wildcat International FZ-LLC.(2013). Sasol and Beira-Feruka Pipelines. Mozambique: The Oil and Gas Year.

Wisner, J. D., Leong, G.K. and Tan, K.C. (2012). *Principles of Supply Chain Management: A Balanced Approach*. 3rd Edition. South-Western: Cengage Learning.

Wu, L., Yue, X., Jin, A. and Yen, D.C. (2016). Smart supply chain management: a review and implications for future research. *The International Journal of Logistics Management.* 27(2), pp. 395-417.

Yauch, C. A. and Steudel, H. (2003). Complementary Use of Qualitative and Quantitative Cultural Assessment Methods. *Organisational Research Methods*, 6(4), pp.465-481.

Yu, Y., Xiong, W. and Cao, Y. (2015). A Conceptual Model of Supply Chain Risk Mitigation: The Role of Supply Chain Integration and Organizational Risk Propensity. *Journal of Coastal Research,* 73 (special edition 1), pp.95-98.

Yunus, E. N. and Tadisina, S. K. (2016). Drivers of Supply Chain Integration and the Role of Organizational Capture: Empirical Evidence from Indonesia. *Business Process Management Journal*, 22(1), pp.89-115.

Zachariasen, F. and Arlbjorn, J. S. (2008). Doctoral Dissertations in Logistics Supply Chain Management: A Review of Nordic Contributions from 2002 to 2008. *International Journal of Physical Distribution and Logistics Management*, 40(4), pp.332-352.

Zadek, S. (2006). Responsible Competitiveness: Reshaping Global Markets through Responsible Business Practices, *Corporate Gorvenance*, 6 (4), pp.334-348.

Zairi, M. (2013). The TQM Legacy: Gurus Contributions and Theoretical Impact. *The TQM Journal*, 25(6), pp.659-676.

Zhang, X., Van-Donk, D. P. and Vander Vaart, T. (2016). The Different Impact of Inter-organisational and Intra-organisational ICT on Supply Chain Performance. *International Journal of Operations and Production Management*, 36(7), pp.803-824.

Zhao, L., Hugo, B. F., Sun, L. Y. and Zhao, X. D. (2013). The Impact of SupplyChain Risk on Supply Chain Integration and Company Performance: A Global Investigation. *Supply Chain Management: An International Journal*, 18(2), pp.115-131.

Zikmund, W. G. and Babin, B. J. (2010). *Exploring Marketing Research*. 10th Edition. South-Western: Cengage Learning.

Zikmund, W. G., Babin, B. J., Carr, J. C., & Griffin, M. (2010). *Business Research Methods.* 8th Edition. South-Western: Cengage Learning.

Zimbabwe Energy Regulatory Authority [ZERA]. (2010). *Energy Regulatory Bill, 2010*. Harare: Government Publishers.

Zimbabwe Revenue Authority [ZIMRA]. (2013). *Statutory Instrument Number 31(2013). Customs and Excise (Tariff) (Amendment) Notice, No. 6. Supplement to the Zimbabwean Government Gazette Extraordinary, 8 March*. Harare: Government Printers.

Zimbabwe Revenue Authority [ZIMRA] (2015).*The Customs and Exercise* (Tariff Amendment Notice No. 18, 2015). Harare: Government Printers.

Zucker, D. M. (2009). How to do Case Study Research. School of Nursing Faculty Publication Series, Paper 2. Available at: http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1001&context=nursing_faculty_pubs [2015, November 5].

Appendix 1.

Cover Letter, Supply Chain Management Survey Questionnaire for Petroleum Companies

HB 214584220-17

Dear Respondent.

Thank you for agreeing to participate in this supply chain management (SCM) survey. Filling in the questionnaire will take almost 30 minutes of your valuable time. The study is purely academic and non- commercial. You were selected to participate in the study because of your position in the company's supply chain.

The questionnaire aims to gather the views that managers who are bestowed with supply chain responsibilities have towards implementing the supply chain management philosophy in the petroleum industry of Zimbabwe. Specific objectives of this survey are to: identify supply chain management practices and challenges of the Zimbabwe petroleum industry, assess the attitudes of managers towards supply chain management systems, identify critical success factors of the petroleum industry and evaluate supply chain performance and measurement attributes applicable to the petroleum industry.

For the purposes of the study, supply chain management entails achieving customer satisfaction and cost effectiveness through efficient and effective management of procurement, inventory, logistics, and customer service and information and communications technology activities of the petroleum company.

Please complete the questionnaire following instructions given at the beginning of each section of the questionnaire.

Thank you

Happyson Bimha

Appendix 2.

Supply Chain Management Survey Questionnaire for Petroleum Companies

HB 214584220-17

SECTION A. DEMOGRAPHIC DATA

Information in this section will be used for the proper interpretation of the data that you will provide in all the sections of this questionnaire: Please check the answer that best describes you and your company.

1. What is your sex?

0 = Female ( )

1 = Male ( )

2. What is your age group?

1 =Below 30 ( )

2 =31- 40 ( )

3 =41 - 50 ( )

4 =51 - 60 ( )

5 =Above 60 ( )

3. What is your position in the company?

1= Head of Department ( )

2= Head of Section ( )

3= Service Station Team Leader ( )

4= Office Clerk ( )

5= Operations supervisor ( )

4. What is your highest level of education?

1= High school certificate ( )

2= Diploma ( )

3= Degree ( )

4= Master's Degree ( )

5= Doctorate or PhD ( )

5. Is your qualification a----------qualification?

1= Management ( )

2= Marketing ( )

3= Accounting ( )

4= Finance ( )

5= Non-commercial ( )

6. How long have you worked in the petroleum industry?

1= Less than 5 years ( )

2= 5 to 10 years ( )

3= 11 to 15 years ( )

4= 16 to 20 years ( )

5= More than 20 years ( )

7. How long have you worked in this company?

1= Less than 5 years ( )

2= 5 to 10 years ( )

3= 11 to 15 years ( )

4= 16 to 20 years ( )

5= More than 20 years ( )

8. How long has your company been in the petroleum industry?

1= Less than 1 year ( )

2= 2 to 5 years ( )

3= 6 to 10 years ( )

4= 11 to 15 years ( )

5=Over 15 ( )

9. On average, how many people did your company employ in periods shown below?

	2013	2014	2015	2016
1= Less than 50	------	------	------	------
2=51 to 100	-------	-------	------	------
3=101 to 150	-------	-------	-------	-------
4=151 to 200	-------	-------	--------	--------
5=Above 200	-------	-------	--------	--------

N.B.QUESTIONS 10 T0 14 ARE FOR HEAD OFFICE STAFF ONLY.

State the number of outlets your company has throughout the country under the classifications shown in the table below. Harare=1, Bulawayo=2, Gweru=3, Mutare =4, Chinhoyi =5, Masvingo =6, Others =7

	Location						
Outlet type of service station	1	2	3	4	5	6	7
10 Company owned dealer operated (CODO)							
11 Dealer owned dealer operated (DODO)							
12 Dealer owned company operated (DOCO)							
13 Company owned company operated (COCO)							
14 Other arrangements							
Total							

15. In which department do you work?

1=Procurement ☐

2=Inventory control ☐

3= Transport and logistics ☐

4=Information technology and communications ☐

5=Customer services ☐

16. Which activities of your company are outsourced? Tick all appropriate boxes

1=Procurement services ☐

2=Inventory management ☐

3= Transport and logistics ☐

4=Information technology and communications ☐

5=Customer services ☐

17. If any of company activities are outsourced do you have service agreements with third party service providers (Tick YES or NO)
    YES---- NO----

18. Do you have service agreements between internal departments that provide services to each other (Tick YES or NO)
    YES---- NO----

SECTION B. MANAGEMENT ATTITUDES TOWARDS SUPPLY CHAIN MANAGEMENT ACTIVITIES

Please indicate your level of satisfaction with the way the following supply chain activities are managed in your company. Use the following ratings: 5=Very satisfied, 4= Satisfied, 3 =Neither satisfied Nor Unsatisfied, 2= Unsatisfied, 1= Very unsatisfied.

Supply chain activity	**5**	**4**	**3**	**2**	**1**
19. Supplier Relationship Management					
20. Customer Relationships Management					
21. Procurement Management					
22. Transport and Distribution Management					
23. Inventory Management					
24. ICT Management					
25. ICT Integration with Suppliers and Customers					
26. Staff Knowledge and Acceptance of SCM					
27. Management of Outsourced Activities					
28. Customer service and linkages					
29. Staff motivation, training &development					

SECTION C. SUPPLY CHAIN MANAGEMENT CRITICAL SUCCESS FACTORS FOR THE PETROLEUM INDUSTRY

The table below lists elements considered to the be critical success factors (CSFs) required for implementing a supply chain management strategy. In your opinion do you think your management consider these critical success factors as 1= not important, 2=slightly important, 3= important, 4= very important and 5= extremely important.

Critical Success Factor(CSF)	**Rating of CSF's Importance**				
	1	**2**	**3**	**4**	**5**
30. Strategic partnerships & trust					
31. Top Management Support & Commitment					
32. Development of Effective SCM Strategy					
33. Prioritising SCM Activities in Resources Allocation					
34. Development of Reliable Suppliers					
35. Information sharing with supply chain members					
36. Responsiveness to customer inquiries					
37. Support from Associative Organisations (Gvt., ZERA, NOIC).					
38. Delivery efficiency/speed/flexibility					
39. Collaborative partnerships					

SECTION D. SUPPLY CHAIN COLLABORATION DRIVERS.

In a supply chain management environment companies are expected to collaborate with supply chain members. The need for supply chain collaboration can be driven by a variety of factors. Please indicate the extent to which you agree that petroleum industry supply chain activities are driven by factors listed below. Place a number that represents your selection in the box opposite each question. 1= Strongly disagree, 2= Disagree, 3= No opinion, 4=Agree 5= Strongly agree.

Forces driving supply chain collaboration in the petroleum industry in Zimbabwe include:

40. More demanding customers ☐
41. Greater competitive intensity ☐
42. Tighter alliance relationships ☐
43. The need for better information ☐
44. New information technologies ☐
45. Economic globalisation ☐
46. Shifting competition from companies to supply chains ☐
47. Reducing the cost of carrying excessive inventory ☐
48. Increasing transaction processing speed ☐
49. Staff training and development about SCM ☐

SECTION E. SUPPLY CHAIN PERFORMANCE MEASUREMENT.

Please rate the performance of your company in respect of the following supply chain performance measures, 1=Strongly disagree, 2= Disagree, 3= Undecided, 4= Agree, and 5=Strongly agree

After adopting supply chain management in the company I can say;	**Level of agreement (Ratings).**				
	1	**2**	**3**	**4**	**5**
50. The company's supply chain management strategy is driven from the highest office in the company					
51. The flow of information, funds and materials has improved					
52. There has been a positive improvement in company competitiveness					
53. Supply chain management activities are being prioritised when resources are allocated					
54. There has been a decrease in cost of products					
55. There has been a decrease in distribution costs					
56. The company has been able to resolve customer complaints					
57. There has been greater ability to implement technology					
58. Employee relations have improved					
59. The company has increased its distribution outlets					
60. There has been greater supplier relationships and support					
61. There has been more customer service satisfaction					
62. Relationships with associative organisations (Gvt., NOIC and ZERA) have improved					

SECTION F: PETROLEUM INDUSTRY SUPPLY CHAIN MANAGEMENT CHALLENGES

Using a rating scale of 1 to 5 to what extent do you think the supply chain management challenges listed below affect the petroleum companies' competitiveness? Use the scale, 1 = irrelevant, 2 = minimal importance, 3= important, 4=critical and 5= most critical. A score of 5 is high and indicates the problem is a critical challenge and a score of 1 is minimal and indicates the challenge or problem is very weak.

Indicate your ratings on how these petroleum industry supply chain management challenges affect company operations	**Rating of SCM challenges.**				
	1	**2**	**3**	**4**	**5**
63. Cost of trading stock					
64. Government regulations					
65. Product quality					
66. Top management support & commitment					
67. Cost of transportation					
68. Collaboration with stakeholders					
69. Infrastructure and storage facilities.					
70. Trust among supply chain members					
71. Intra-organisational conflicts					
72. Fast & efficient decision making systems					
73. Staff resistance to change					
74. Poor relations with associative organisations(Gvt., NOIC &ZERA)					

SECTION G: PETROLEUM INDUSTRY SUPPLY CHAIN MANAGEMENT BENEFITS

Indicate your level of agreement with the following statements about implementing supply chain management and its impact on company competitiveness 1= Strongly disagree, 2= Disagree, 3= Not sure, 4 Agree, 5= Strongly agree.

Petroleum companies with a supply chain strategy---	**Level of agreement (Ratings).**				
	1	**2**	**3**	**4**	**5**
75. enjoy higher market share and sales growth					
76. have lower operational costs					
77. have top management that is supportive					
78. are more competitive					
79. have better Information and communications technology(ICT)					
80. collaborate and coordinate more effectively with suppliers and customers.					
81. have a higher delivery performance-they are trusted					
82. have superior distribution channel relationships					
83. have more knowledge about their supply chain members					

84. What recommendation can you make to your management to improve the company's supply chain management? ----------

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End of Questionnaire: Thank you for your time and valuable contribution to the study.

Appendix 3.

Supply Chain Management Questionnaire for Associative Organisations

H.B. 214584220-17

Dear Respondent

Thank you for agreeing to participate in the supply chain management interview. The interview will take 1 hour to 1 hour and 30 minutes of your valuable time. The study is purely academic and non- commercial.

The interview aims to gather your views about implementing the supply chain management philosophy in the petroleum industry of Zimbabwe. Specific objectives of this survey are to: identify supply chain management strategies and challenges in the Zimbabwe petroleum industry, assess the attitudes of supply chain managers and associative organisations' supply chain professionals towards supply chain management systems, identify key performance indicators for the petroleum industry and evaluate supply chain performance and measurement attributes applicable to the petroleum industry.

You were selected to participate in the study because of your involvement in the petroleum industry's supply chain activities. The researcher will ask the same interview questions to officials from the Ministry of Energy and Power Development, ZERA and NOIC.

For the purposes of the study, supply chain management entails achieving customer satisfaction and cost effectiveness through efficient and effective management of procurement, inventory, logistics, and customer service and information and communications technology activities of the petroleum companies.

Thank you

Happyson Bimha

Appendix 4.

Qualitative Research Questions H.B. 214584220-17

Introduction

This is a semi-structured interview in which the interviewer will ask questions listed in the interview guide and follow up questions when seeking clarification and further information about issues that will emerge from the interview. The idea is to capture your views and opinions about the Zimbabwe petroleum industry's supply chain management practices.

QUESTION 1.

What is the Zimbabwean petroleum industry's business environment, strategy and structure like and are these supportive of the petroleum companies' supply chain management activities?

QUESTION 2.

In order to be successful business requires good conditions and targeted support from Government and public entities. What kind of support are you offering to petroleum companies and in your view do you think petroleum companies are happy with the level of support that you give them?

QUESTION 3.

Petroleum companies have complained about a weak supply chain because of uncertainty which often leads to high landing cost of product, compromised product quality, and stringent regulations among other factors which they blame on Government, ZERA, and NOIC processes. What is your response to this?

QUESTION 4.

What are the attitudes of petroleum industry executives towards implementing supply chain management systems in their companies?

QUESTION 5.

What do you think are the industry executives' knowledge levels and commitment about supply chain management initiatives?

QUESTION 6.

On the global market supply chain management has been gradually embraced as a proven management approach to achieving sustainable profits and growth, why is this not the case in Zimbabwe's petroleum industry?

QUESTION 7.

What would you say are the petroleum industry's critical success factors and how does your organisation support these critical success factors?

QUESTION 8.

Do you think petroleum companies are performing to their customers' expectations in respect of the key performance indicators that you have identified?

QUESTION 9.

Is there any form of collaboration among petroleum companies and other supply chain members and what could be driving such collaboration?

QUESTION 10.

Can you explain the relationship that exists between supply chain management and company competitiveness?

QUESTION 11.

If you were to pick the most important and critical supply chain problems and benefits affecting the petroleum industry in Zimbabwe what would they be and why?

QUESTION 12.

What are the reasons for the challenges and benefits you mentioned in question 11 above?

QUESTION 13.

What do you think your organisation needs to do to improve the supply chain situation in the Zimbabwean petroleum industry and where do you think the industry will be if petroleum companies implemented your suggestions?

QUESTION 14.

What supply chain management lessons can the Zimbabwe petroleum industry learn from their regional and international counterparts?

QUESTION 15.

Overall, and from a supply chain management view point, what is the way forward towards enhancing competitiveness through effective management of supply chain activities in the petroleum industry?

Thank you for your time and valuable responses to the interview questions.