REVERSE LOGISTICS AND PERFORMANCE OF LIQUEFIED PETROLEUM GAS FIRMS IN KENYA

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DECLARATION

This research project proposal is my original work and has not been presented for a degree in any other university.

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D61/83131/2015

This research project proposal has been submitted for examination with my approval as the University Supervisor.

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First and foremost, I would like to convey my highest appreciation and special gratitude to my supervisor, Ernest Akelo and Salome Richu for their endless support, intensive guidance and valuable advice in the supervision of this project.

DEDICATION

I would like to express my appreciation to my family who have been very supportive all through the study.

“The future belongs to those who believe in the beauty of their dreams and fortune favours the brave.”

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LIST OF ABBREVIATIONS AND ACRONYMS

EOL	End of Life
ERC	Energy Regulatory Commission
GSCM	Green Supply Chain Management
KIPPRA	Kenya Institute of Public Policy Research Analysis
LPG	Liquefied Petroleum Gas
MOE	Ministry of Energy
PIEA	Petroleum Institute of East Africa
RL	Reverse Logistics

ABSTRACT

The objective of the study was to determine reverse logistics and performance of liquefied petroleum gas firms in Kenya. Study used descriptive statistics techniques to analyse the data since it was quantitative in nature. These techniques were measures of central tendency and measures of dispersion. The emerging findings were presented using tables. Pearson moment of correlation and regression analysis was used to determine the effect of reverse logistics on the performance of liquefied petroleum gas firms in Kenya. The study concluded that reverse logistics practices (closed loop supply chains, contracted third party and joint venture) influence the operational performance of LPG firms in Kenya to a great extent. The closed loop supply chains practices used were involved reuse of gas cylinders, recycling of gas cylinders, remanufacturing of products and recall of faulty products. Third Parties were contracted to market and transport LPG products. Joint Venture focused on combined transportation, joint conveyance, joint quality control, joint collection and recycling centers and joint waste disposal. The study also concluded that there is a strong relationship (R=0.793) between reverse logistics (closed loop supply chains, contracted third party and joint venture) and the performance of liquefied petroleum gas firms in Kenya with reverse logistics accounting for 63% of the liquefied petroleum gas firms operational performance. Challenges were faced to a minimal extent with the most faced challenges being the high cost associated with reverse logistics practice implementation; inadequate reverse logistics performance measures and existence of inadequate information systems linkages within the supply chain logistical network and changing organization culture while implementing reverse logistics practices. The study recommended that the management of the LPG firms should set aside adequate budgets for supporting reverse logistics endeavours as a way of boosting performance. LPG firms claimed their information was confidential and legally privileged and therefore the data collection process was slow. The researcher convinced the respondent that the data was needed to fulfill academic purpose only. The researcher also assured the respondents that the identity of their firms would not be revealed and that the information availed will not be divulged other than for the intended purpose.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The business world is becoming dynamic and organizations are looking for ways of becoming more competitive and increasing efficiency and effectiveness in order to improve their performance. Reverse logistics entails managing, controlling and sorting customer or market returns back to manufacturing or collection center. Rogers and Lembke (1999, 2001) posit that reverse logistics, main activities involves; material substitution, product return, waste management, remanufacture of goods and source reduction. Barry, Girard and Perras (1993) note that many firms are practicing reverse logistics as result of competition from rivalries, environmental and government regulations and as a cost saving strategy. According to Dowlatshahi (2012), reverse logistics recently started to gain additional prominence both in research and in the business community, bridging such varied areas as information technology application, remanufacturing, reusing, and warehousing operations, environmental sustainability and organizational activities among others. Globally, logistics management has realized that the reverse channel has enabled the achievement of overhead costs eradication and efficiency and has as a result started paying more attention to this area. Stock and Mulki (2009) argued that logistics management has thus noticed that adopting reverse logistics is a crucial market differentiator and profit center. Such differentiations will allow the organizations to sustain or increase income and market share and perhaps minimize carrying and inventory costs by increasing proficiencies within their supply chain practices (Manson, 2002).

In global perspective, Liquefied Petroleum Gas (LPG) availability and popularity has increased leading to its consumption in many developing countries use it for the first time. The LPG use in Kenya has grown tremendously over the years resulting in LPG companies seek an expansion path as they endeavour to provide the commodity even to poor households thus leading to the mushrooming number of LPG companies.

LPG Marketers number has more than doubled from eight LPG companies in 2009 to twenty two LPG companies in 2012. Currently, as per energy regulatory commission of Kenya websites indicates that a number of LPG transporters licensed as Sept 2017 is 71 while licensed LPG traders as at September,2017 is 151. New entrants and local investors have been encouraged by the LPG draft Legal Notice No. 121 of 2009 that requires the industry to use unified cylinder valve established by the LPG exchange pool which means consumers can exchange gas cylinders of any brand thus increasing access.

Government incentives have also played a role in expansion of the industry, for example, LPG companies have enjoyed tax exemptions on some of the fuel appliances since 2006. The ERC, the Ministry of Energy and other industry players have worked closely with LPG companies to ensure the commodity is readily available to the common Kenyan citizen. One of the major boosts in LPG companies rapid growth is tax exemption and legal regulations which were an obstacle has made easier to join the industry. In order for these companies long-term viability and achieve ongoing efficiencies within the industry, these LPG companies have relied much on reverse logistics in enhancing services to the consumer in terms of quality and cost thus improving organizational performance.

1.1.1 Reverse Logistics

Lysons and Farrington (2006) describe reverse logistics as “a process of planning, implementing and controlling the efficient , cost-effective flow of raw materials, in-process inventory, finished goods and related information from point of consumption to the point of origin for the purpose of recapturing value or proper disposal” It can also be explained as an enabler in an organizations that helps to be environmentally able by reprocessing, salvaging and eradicating quantity of materials used (Bedenhorst, 2013). These definitions make it clear that reverse logistics is basically the moving of materials used to deliver end products to the customer back manufacturers or suppliers and it can as well be referred as upstream supply chain. Therefore, it appears that the idea of reverse logistics seems to relate through closed loop supply chain, green logistics and reverse supply chain (Badebhorst, 2013).

There are many reasons an organizations may opt to use reverse. These include environmental regulation in which the organization is operating, financial muscles, stiff competition from rival organizations in the same industry and, probably, pressure from the customers (Badenhorst, 2013). These activities may be aimed at improving organizational performance which may be measured in terms of profitability, organizational growth, market share etc.

For a firm to adopt reverse logistics, it must consider the needs of its customers when executing a reverse logistics process so as to meet their expectations and top management should support and allocate adequate resources. Atasu (2006) argues that for an effective response to customers' needs and problems, it is important to ensure proper communication. RL helps in cost reduction through savings and use of environment-

friendly products which requires less processing unlike manufacturing a new one. Each company should take responsibility for the cylinders that bear its brand name because LPG marketing companies do insist that cylinders are potentially dangerous. It will also be difficulty determine for the defect where all retailers stocked a standardized form of cylinders. Where standardization has been attempted, it is contended the effects were judged as too modest to justify the costs contingent to the imposition of standardization (KPC, 2006)

1.1.2 Operational Performance

Operational Performance broadly refers to temporary goals whose accomplishment is considered to move an organization towards attaining its strategic or long-term goals. It can be viewed in a nut-shell as tactical objectives. Broadly organizational shareholder purposes forms an agenda for strategic operations but the daily operations requires more detailed well elaborated objectives. Performance objectives have both external and internal effects. Operational performance is disaggregated into four dimensions, namely quality, delivery speed, flexibility and cost (Swink et al., 2005).

Quality means 'conformance and consistency' i.e. the goods produced conforms to its stipulations steadily and no necessities for returns for re-work or repairs. Quality is a key factor in customer satisfaction. It decreases total costs and increases customers reliability on the firms' products as error free products are produced. Delivering of products promptly to the customer increases the value to the customer- it helps to respond quickly to customers' returns and replacements of defective products. Cooper et al. (1997) argued that cooperation, long term relationship, process integration, information sharing allows improvement of processes and inventories and also reduces lead time. Flexibility refers to

the firms capacity to adjust in either, how, what and when it is required to. Flexibility is of four types. These include product mix, volume and delivery flexibility.

Product flexibility refers to firm operations capacity to repair or modify returned products. Mix flexibility refers to the firm's ability to produce a diversity of products. Volume flexibility refers to the firm's capacity to change its level of output. Delivery flexibility on the other hand refers to the firm's capability to change time it is supposed to deliver. Flexibility enables the firm to saves time, speed up responses all of which enhance the firm's dependability capacity.

The cost components of diverse firms can vary greatly. If the other performance objectives are constantly managed, high speed, quality and flexibility can in additional to bringing the firm external rewards, save the firm's operation costs. Jarillo (1988) suggested that chain cooperation and processes integration can enable firms to focus on their core competencies which will enable them achieve time and cost reduction and quality and flexibility improvements. Return policies are an indication of suitability and quality assurance to the customers. The higher the LPG manufacturer is self-assured of their returns program of gas cylinders; the higher the customers trust on the LPG's firm quality assurance.

1.1.3 Liquefied Petroleum Gas Firms in Kenya

Liquefied Petroleum Gas is a combined mixture of hydrocarbon gases that are used as fuel energy for cooking or heating appliances and are flammable in nature. LPG is produced by sanitizing petroleum or natural gas which is a derivative from fossils almost entirely. In Kenya, there are 151 LPG traders and 71 LPG transporters licensed by

Energy Regulatory Commission of Kenya as at Sept 2017, (ERC 2017). It is viewed that LPG will replace heavy firewood and charcoal consumption in Kenya. LPG consumption in Kenya stood at 148,000 MT annually according to a report published by PIEA in the third quarter of 2016. It is more promising due to the fact that LPG consumption has increased by about 59% between the year 2003 and year 2016 according to a report available in the petroleum industry sub-sector in Kenya. Despite this rapid growth, LPG consumption in Kenya still compares poorly with the world average of 1434Ktoe 384Ktoe in low-income economies (Ministry of energy report-MOE) However, this consumption has been rising at the steady pace. At an average growth of 14% annually (PIEA 2016), it is projected that the country will have 70% LPG penetration by the year 2030 (Luogon, 2015). This growth, however, has been mainly concentrated in urban and peri-urban areas in Kenya.

The use of LPG has been hindered by the initial cost of acquiring equipment such as the cooker and gas cylinders. Such equipment is not that expensive but due to heavy taxation has rendered them hard to acquire them. Though the cylinder is exempted from duty, the reduction of tax has resulted from the increased use of the more efficient LPG with lots of spillover effects. As a policy issue, the introduction of revenue collection by the government from gas cylinder equipment serve to hinder the acquisition and use of that equipment altogether.

One of the key highlights of the legal notice No.121, 2009 was the establishment of the LPG cylinder exchange pool which is charged with regulating the exchange of LPG cylinders among LPG companies after implementation of the universal cylinder valve. This was a major milestone to independent marketers who mooted for the universal

cylinder valve in the industry view it as an encouragement to fair competition since once consumers have the cylinder, he/she can buy from any operator since the valve is standardized (Energy Act, 2006).

1.2 Research Problem

In the past, firms used to put more attention on refining their forward logistics operations; Majority of this firms used to put little attention on reverse logistics methods which meant treating the reverse logistics process with less care and diligence. Azevendo (2011) stated that majority of industrial organizations focuses much on forward logistics and in regard to this, they usually overlooked the significance of reverse logistic operations in improving the firms supply chain's performance. According to Horowitz (2010), reverse logistics may lead to a significant cost and on the other hand provides many prospects and can consequently be observed as a strategic, yet it is frequently not clearly identified. Scholars such as Zheng et al. (2005) and Ravi and Shankar (2005) suggest there being key obstacles and challenges that makes it challenging to accomplish reverse logistics proficiently and proactively. Consequently, several firms overlook the roles of reverse logistics and consider them as an irritant (Greve et al., 2010). Azevendo (2011) attribute this to the absence of topmost management attentiveness and obligation to reverse logistics.

Kenya faces an enormous duty of meeting energy requirements as a result of high anticipations in development to power and economy but it also seeks to be middle-class income economy as envisaged in vision 2030. Therefore, the country wishes to come up with strategic plan and investment plans to secure a maintainable amount of energy to meet the rising demand as it will reduce deforestation which is caused by scarcity of

cooking fuel. (Kenya Institute of Public Policy Research Analysis (KIPPRA, 2010) pointed out that wood fuel is the most potential used fuels in Kenya, petroleum is the most leading fuels in the commercial sector. Other main energy consumption sectors apart from commercial sector are transportation, industrial sector and domestic sector. LPG industry is largely depended on reverse logistics because the end product which is liquefied gas is refilled cylinders which a customer should own so as to use it to exchange when refilling it. The reason is that the cylinders are not sold cheaply and it was costly if it were to be sold together with the liquefied gas every time customer buys the commodity. As result of this, every time a customer purchases an LPG product exchanges an empty cylinder with the refilled one from the retailer and the empty one is collected and transported back to LPG companies for refilling. Therefore, researchers of this study believe that organizational performance is depended on this process referred as reverse logistics and to some extend it has effects on it.

Previous researches done on reverse logistics were dismissal to explain its effects on organizational performance. A study done by Huscroft, Dianne and Hanna (2013), concluded that reveres logistics was a significant tool in enhancing the profitability of manufacturing firms. Rogers et al. (1999) established those cost overheads used in running the organizations can be effectively eradicated by adopting return management programs. Furthermore to reducing costs comparative to returns processing, consumer service costs can be minimized if the return process is well-run from a customer's perspective. Mandota (2015) examined the impact that reverse logistics has on the supply chain performance Carlsberg manufacturing in Malawi and found that though reverse logistics faced some challenges, it impacted on supply chain performance. Sathiyagothai

and Saravanan (2017) conducted a research on Reverse Logistics in Food Processing Industries in India and concluded that application of reverse logistics helped manage future demand and environment.

In Kenyan context, Gitau and Shalle (2014) assessed the effects that reverse logistics adoption has on the supply chain performance of Hewlett Packard company in Kenya and established that reverse logistics implementation has an important effect on the supply chain performance in the manufacturing industry. Another study by Kabergey and Richu (2015) that sought to establish how reverse logistics affects operational performance of sisal processing firms in Nakuru County found that both product reuse and product recovery have positive effect the sisal processing firm's operational performance. Kiberenge (2014) conducted a research on reverse logistics in information and communication technology firms in Kenya and found that reverse logistics has been adopted in by ICT sector operators to an appreciable level.

From the above studies, it is clear that no research has sought to investigate the relationship between reverse logistics and performance, especially among LPG firms in Kenya. This study therefore seeks to fill the gap by answering the question: "what are the effects of reverse logistics on operational performance of LPG firms in Kenya?"

1.3 Objective of the Study

i. To determine the relationship between the level of implementation on reverse logistics and organizational performance of Liquefied Petroleum Gas (LPG) industries Companies in Kenya.
ii. To determine how reverse logistic practices impact operational performance of LPG firms in Kenya.

iii. To find out challenges of reverse logistics implementation on organizational performance of Liquefied Petroleum Gas (LPG firms in Kenya.

1.4 Value of the Study

This will research was of great significance to various stakeholders since it will induce new knowledge to the existing one. First and for most, the research will be of great significance to the LPG firms in Kenya and energy regulatory commission. The government will benefit much from this research for the purposes of taxation, formulation of rules and regulation and above all setting up the necessary infrastructures which support LPG industry.

Further, the study will be useful to scholars and students for the purpose research work. It will also point out the most effective strategies used by marketing companies to ensure the product reaches the customer in an effective and efficient way and will go a long way in helping LPG companies come up with policies which promote the industry and help to penetrate to rural areas.

The research will also be useful to potential entrepreneur who wishes to venture in the industry of liquefied petroleum gas industry. The research will important because it will provide an insight on how reverse logistic is a key component to the performance of LPG firms and understand the rules of the game in the Industry.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

An assessment of available literature on the field of reverse logistics is undertaken in this chapter starting with theories that support reverse logistics then its concept. Before ending with the forces that drive reverse logistics, a section that discusses its importance is included. This chapter then concludes with a summary.

2.2 Theoretical Literature Review

This section reviews the relevant theories of reverse logistics. The section also reviews other researchers work relative to the theory and its application into current day logistics management context.

2.2.1 Institutional Theory

The institutional surroundings is well described as a being that within the external to the borders of the business. It impacts the managerial outcome by causing constraints on organizational' processes and requiring getting used to organizational procedures with a view to continue. Institutional theory is acknowledged as a result of the pressure of social, traditional believes, politically aware, and above-board sector as key reasons inducing the processes of the administration's (Yang & Sheu, 2011). Conferring to the institutional tactic within the firm field requires three tools of pressure by which imitations in procedures and processes among organizations are motivated. These are: toughness, imitative, and normative (Furusten, 2013).

Forced imitations originate from casual and official pressures that are inserted on the organizations by other organizations which they depend on. Such forces can involve inducements, summonses, rules and guidelines, and government obligations. Forces that course the firm are typically granted to the governmental establishments which ought to delivering laws and regulations. Mimetic imitations is a firm's standard response to the environmental ambiguities by copying themselves as other firms for instance using practices such as agile or lean when manufacturing, efficient customer response when distributing and just in time when sourcing. Normative imitations originate from the high degree of relationships and socialization which frequently happens among participants of the similar organizational environment. When these participants interrelate, they strengthens and extent customs of behaviour0 between themselves (Furusten, 2013; Miles, 2012).

2.2.2 Social Development Theory

Social Development Theory involves a group of theories that focus on how various needs in the society are met (Stein & Valters, 2012). Improvement requires starting not with ambitions and strategies to uphold improvements, but with an idea of the necessary nature and attributes of growth itself, for growth is a process and not a set of strategies or plans or outcomes. The outcome of this course is determined by many factors. There must be a motivating urge that drives change or obstacles that hinder the procedure, a range of resources for instance technology and capital and which contribute to the procedure, along with numerous kinds and stages of infrastructure that support the growth. This study makes use of this theory in the capacity of theoretical base which is used to expound on the nature of development and implementation of reverse logistics

which is instigated from the process of maintainable growth (Retolaza, 2011; Stein & Valters, 2012).

Organizations today have gradually acknowledged their accountability for social and environmental issues as a prerequisite for operating in the environment, especially in the execution of firm social responsibility and viable management of their supply chain. Infrastructures are required to make the activity probable. For instance, the growth of sustainability is buttressed by various infrastructures for instance the diverse framework of law making, the methodologies of closed-loop economy, the doctrines of prolonged maker accountability, the cognizance of society, and the different level resource and technology investments (Midgley, 2013). In this theory an organization is the combined subliminal knowledge becoming a mechanism of work through the pioneering conscious individuals. According to Jacobs et al. (2007), the development of that organization is well-defined as the growth, whereby it translates its resources, powers, abilities, and expertise into social and economic results which enhances its innovations and performance.

In their work, Lange et al. (2012) suggested that logistics inventions and abilities play a significant role in enhancing organizational performance. Thus, proficiency and effective reverse logistics practices have a significant effect on organizations' strategic performance through client gratification, eradication of cost, and enhanced profitability. Lang et al. (2012) further suggested that it enables the firms to change its strategies, awareness and investment of resources into the management of environmentally oriented reverse logistics and customer services.

2.2.3 Resource Based View

Resource Based Theory is considered as one and only of the utmost dominant theories in planned administration. The word "resource" is suggested by Dietrich and Kraff (2012) to mean more than just physical (palpable) assets, such as apparatus, and locality. According to them, firm resources can also mean other intangible assets such as such management skills and firm knowledge. The theory suggests that the organization can use the resources it has to gain justifiable competitive advantage. Resource-based view explores the significance of organizational inner resources in defining organizational activities to generate and sustain reasonable benefit and increase performance (Sehgal, 2010). Nevertheless, only processing such resources doesn't offer enough assurance on the reasonable merit or formation of worthiness. Organizations should effectively manage, allocate and exploit resources so as to gain superior performance. Sehgal (2010) further points out that organization capable of appropriately tie to precise programs and proceedings or to environmental prospects are further to be expected to develop abilities that yield in better performance.

In their empirical research, Mellewigt and Nothnagel (2011) established that recently done literature methods have stretched to the theoretical outline of the resource-based view which differentiates among other resources and abilities and pinpoints the association between them as a basis for lengthy scheme. Abilities are the difficult bundle of skills, assets, and gathered information applied through administrative practices, which facilitate a firm to manage undertakings and make use of their resources. Researchers such as Mellewigt and Nothnagel (2011) and Taylor et al. (2012) suggest that organizational performance is determined by organizational resources, capabilities and

superior performance is sustained by organizational competitive advantage. Subject to resource allocations, organizations may have plans to increase potentialities or create relations (for instance, outsourcing though strategic partnership, forming of joint venture or strategic alliances) to efficiently adopt reverse logistics.

2.3 Reverse Logistics

Many types of research in supply chain Management rarely focus on reverse logistics but concentrate much on a movement that converts raw materials into finished goods, from supplier to the end consumer (Petersen & Kumar, 2010). Less attention has been paid to reverse material from consumer to supplier (Tibben-Lembke, 2002). Reverse logistics is also described as the "process of planning, implementing, and controlling the Efficient, cost-effective flow of raw materials, in-process inventory, finished goods, and related information from the point of Consumption to the point of recapturing value or proper disposal" (Reverse logistics executive council, 2007).

In some cases, reverse logistics is a profit-generating function and it is a significant component in a supply chain which needs to be managed properly in SCM. In other cases, reverse logistics is strategic because reverse logistics undertakings can make an organization more reasonable in the market by decreasing client's hazard when buying making a purchase of goods since they are aware product can easily be returned. This is because most clients choose little hazards and will comprise concerns of business risk when choosing the supplier.

Reverse logistics helps the firms to be responsive and majority of organizations have stock that does not vend well as anticipated. If they be able to deposition this quantifiable resources, and maybe get some of its costs back, the ability to be in effect in the open

market goes up (Jack, Power & Skienner, 2010). Various reverse logistics practices which are adopted by organizations recover profits do exist. This study was guided by some of the main reverse logistics practices commonly used I manufacturing organizations. These practices as Noted by Kulp et al. (2004) environmental issues, timing of operations, communication, top management support, costs, and customer practices.

2.3.1 Closed Loop Supply Chains

Closed-loop supply chains is the, design, control, and operation of a system to maximize value creation over the entire life cycle of a product with dynamic recovery of value from different types and volumes of returns over time (Guide & Wassenhove, 2009). This is ideally, a zero-waste supply chain that completely recycles, or re-manufactures all materials. A closed-loop supply chain is mostly about feeding the used products back into the system as raw materials unlike conventional supply chains which focuses on efficiently moving products in a linear fashion from raw materials to the end consumers. Close-loop supply chains are of four types. These include: distribution-related, production-related, use-related, and end-of life (Flapper et al., 2005). A close loop supply chain is suggested to combine both forward and reverse product flows within a supply chains.

2.3.2 Third Party Logistics 3PL

3PL (third-party logistics) services providers are companies which provide a range of logistic activities to their clients. These activities include transportation, warehousing, light manufacturing and reverse logistics. Outsourcing reverse logistics entails the manufacturers contracting 3PL providers to run the firm's reverse logistics programs on

their behalf so that they would not interrupt forward product flows. Organizations that partner with a third-party logistics service provider (3PL) benefit from greater controls over the entire supply chain resulting in improved inventory management, increased visibility, reduced costs and enhanced risk management (Mithemba, 2016). Specifically, making use of a 3PL expertise for reverse logistics process management helps the firm acquire benefits such as having greater controls over inspecting, recovering, testing and disposing of the products that are returned. A comprehensive 3PL solution with a holistic approach to all logistics aspects offers many strategic capabilities, operational and technical benefits such as: deep knowledge and expertise on the industry and region, scalability and flexibility, entire product life-cycle transparency and access to distribution and refurbishment centre management (Mithemba, 2016).

2.3.3 Joint Venture

Joint Venture (JV), that is, the synergetic horizontal alliance between companies in an industry doing related reverse logistics undertakings for example founding collection and recycling centers, joint quality control, conveyance and combined transportation (Kasper et al., 2011). According to Nnorom et al. (2009), distinctive joint reverse supply chain comprises of four areas of collaboration. These include: product, part or material in sales, waste disposal, profit distribution and cost sharing. JVs offers a better methods of managing vagueness in reverse logistics as a result of the following reasons: uncertainty in timing and volume of returns, striking a balance between demand and returns, requirement of disassembling returned products, uncertainty in eventual recovery from returned products, materials matching complications and restrictions owing to variable processing times. According to Haakansson et al. (1999), efficiencies in JV are not only

attributed to production mix, productivity terms, efficiencies or product route efficiencies, but also in organization's ability to explore and exploit the partner's core competencies through the contractual agreements as substitute to developing these competencies within the organization.

2.4 Empirical Review

In the international perspective, a number of researches were conducted find out the relationship between adoption of reverse logistics practices and the firm's performance. Green et al. (2011) established that prosperous carrying out of GSCM activities like green purchasing and others enhanced the performance of firms. The researcher further found that reduced expenditure of reverse logistics would enhance financial performance whereby both the economic and environmental performance will yield enhanced operational efficiency. This result reduced expenditure and improved on capabilities of fulfilling fluctuating customer needs for environment friendly goods and services.

Rao and Holt (2005) argued that green supply chains will give firms reasonable merit and cause enhanced economic performance. They established that practicing reverse logistics positively affected the way firm products appeared which earned organizations a reasonable fair competitive edge in the Philippines. Their research concentrated much on the financial results on performance of the organization. This study will fill the gap left by Rao and Holt (2005) through focusing more on reverse logistics and the operational performance of firm.

Eltayeb et al. (2011) examined the relationship between green supply chain initiatives and environmental sustainability among companies that were certified in Malaysia. Of the four likely anticipated results they were finding out, which also involved

environmental effects, economic effects, cost decreases and insubstantial results, reverse logistics was recognized to have positive effect on cost reduction . As per study by the De Giovanni and Esposito Vinzi (2012) to establish the relationship between green supply chain management practices and organizational performance using covariance and component-based estimations in green supply chain management performance, established that there was no important correlation between the two variables especially when it comes to economic performance.

Azevedo et al. (2011) assessed how green practices influence the supply chain performance of the automotive industry in Portugal. The study presented facts that green practices have some impact on the quality, client fulfilment and good organization. Nevertheless, the aforementioned did also identify that green practices are expensive on the way to adopt and consequently devour an undesirable impact on the monetary performance of the organization.

Some studies have also been reviewed on reverse logistics in Kenya. For instance, Luogon (2015) examined the relationship between logistics management practices and the performance of liquefied petroleum gas firms in Kenya. The research used descriptive research design to collect from the respondent and the target population was entire gas firms in Kenya whose total number was 12 by then. The study established that LPG organizations in Kenya employed logistics management practices which enabled timely delivery of products and services to customers, inventory management practices which enabled an organization to avoid the bottleneck in production. In addition, the study also found out that warehouse management practices facilitated product delivery at the right quantity to the customers and packaging practices. The study recommended that the

management of port authority should move in quickly to expand petroleum storage capacity in Mombasa as a way of improving the performance of the LPG firms. The researcher had a problem with respondents for not being corporative and accuracy of data collected could not be ascertained.

Wanaina (2014) did a research a research on reverse logistics practices and profitability of large-scale manufacturing firms in Nairobi, Kenya. The research adopted descriptive survey design with the study targeting large manufacturing organizations in Nairobi. The research concluded that reverse logistics adoption in manufacturing organizations Nairobi is moderate. The results of the study as well showed that reverse logistics adoption among large manufacturers is still low. The study also recommended organizations should adopt reverse logistics since it is expected to create new products or even improve their current product, improve the relationships with its customers and enhance firms' reasonable merit. The limitation of the study was that the finding cannot be used to make the generalization on all the large-scale manufacturing in Kenya since it was carried on a few firms.

Gitau and Shalle (2014) assessed how reverse logistics adoption affects the supply chain performance of Hewlett-Packard a firm in the manufacturing sector in Kenya. The study adopted descriptive research design which was used to outline the situation in respect to variables being investigated. The research concluded that reverse logistics adoption has an important effect on the firm's supply chain performance, especially among the firms in the manufacturing sector. However, the study didn't give any recommendations or limitations encountered in the cause of doing it.

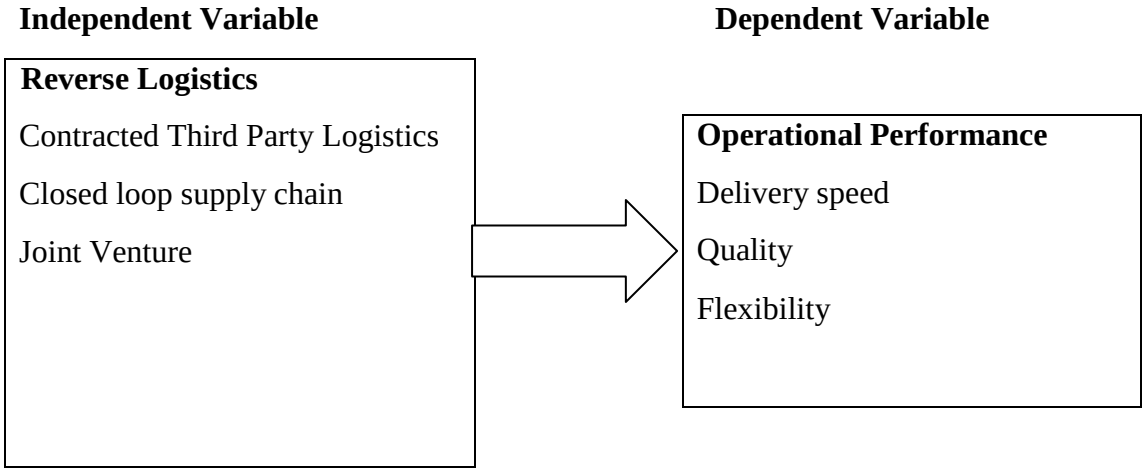
2.5 Summary of Literature Review

Review of literature is done using theories which support it. One of the theories is the theory of institutional which is acknowledged due to the pressure of societal factors like social believes cultural wellbeing of a particular group, political dynamic and climate, and legal sector and its framework as the main factor influencing the operations of the organization. The independent variable which is reverse logistic is explained and comes with other three factors which are Closed Loop, Joint Venture and Contracted 3PL. An empirical review of other researchers done before has been analyzed in order to provide more insight about the research topic.

2.6 Conceptual Framework

This conceptual framework identified two variables whereby reverse logistics is the depended variable with factors like joint venture contracted 3PL and closed loop supply chain. It is assumed that to some extent that these practices will affect organizational performance which has been identified as the depended variable.

Figure 2.1: Conceptual Framework



Source: Own Compilation

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter explains the method that was used by study in conducting its research. Research design, population and sample, data collection and data analysis was explained in this chapter.

3.2 Research Design

The study used a descriptive survey design. Robison (2002) observes that descriptive research design gives the correct profile a person, occurrence or situation. Chandran (2004) further notes that descriptive design elaborates on current situation and attitudes through observation and interpretation techniques. Therefore, design adopted by this study is assumed to be the best method of conducting the research study in the peoples in context because they provide accurate and current facts by away collecting for hypothesis testing or answering research questions to conclude a study (Roson, 2002).

3.3 Population

There are 40 LPG licensed company and cylinder brands licensed by the Energy Regulatory Commission. Since this population was relatively small, the study was a census. All the respondents participated in the study.

3.4 Data Collection

The study employed primary data to conduct the study whereby researcher collected data from the following respondents' warehouse manager, supply chain manager, storekeeper and production manager or any other respondent who was relevant to this study. The

targeted respondents are deemed to be competent provide required answers in regard to reverse logistics. This study will target people working in warehouses especially in the department of warehousing, dispatch section of organization supply chain and production department. Questionnaires were used as collection instruments and were overseen by a way of drop and pick since the researcher was dealing with many organizations. Kothari (2004) posits that primary data gives the researcher the first had information which is reliable and accurate for analysis.

3.5 Data Analysis

Data was analysed using descriptive statistics, correlation analysis and regression model. This included mean standard deviation percentages and frequency distribution tables which will be showing the relationship between variables.

The study adopted regression model to establish the relationship between reverse logistic and operational performance of LPG firms in Kenya.

The summary of the output was used to determine correlation and coefficient determination while the tests if coefficient will be used to determine P-values. Analysis of variance (ANOVA) will be used to test the hypothesis of this study which predicts positive relationship between reverse logistic and operational performance.

The regression model adopted in this study will be as follow

$Y= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$
Where: Y = Operational Performance of LPG company
X_1 = Closed Loop Supply Chain; X_2 = Contracted Third Party Logistics
X_3 = Joint Venture
β_0 = the constant; B_i = regression coefficients (i=1 to 3)
ϵ = error term

CHAPTER FOUR

DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents the findings and discussions after data analysis of the data collected from liquefied petroleum gas firms in Kenya. The study objective of the study was to determine the reverse logistics and performance of liquefied petroleum gas firms in Kenya. Study used descriptive statistics techniques to analyse the data since it was quantitative in nature. These techniques were measures of central tendency and measures of dispersion. The emerging findings were presented using tables and charts. Pearson moment of correlation and regression analysis was used to determine the effect of reverse logistics on the performance of liquefied petroleum gas firms in Kenya.

4.2 Response Rate

A total of 40 questionnaires were administered to all the 40 licensed domestic LPG brands in Kenya. Out of the 40 questionnaires, 35 were filled and collected by the researcher. This amounted to 87.5% response rate. The researcher considered this as an adequate representation of the target population. The results of response rate as shown in Table 4.1.

Table 4.1: Response Rate

Response Rate	Frequency	Percentage
Filled and Collected	35	87.5
Not Collected	5	12.5
Total	40	100

Source: Research Data

4.3 Demographic Information

The study sought to obtain the general information about the respondents' and the LPG firms they worked for. The information sought was in regard to job position held, work experience, category of your LPG firm, education level and firms years in operation. The findings are discussed as follows.

4.3.1 Job Position Held in the Organization

The respondents were requested to indicate the job positions they held in the LPG firms. The results of the study are as shown in Table 4.2.

Table 4.2: Job Position Held in the Organization

Position	Frequency	Percent
Supply Chain Manager	11	31.4
Transport Manager	9	25.7
Production Manager	8	22.9
Warehouse Manager	7	20.0
Total	35	100.0

Source: Research Data

The results indicated that 31.4% of the respondents were LPG firms supply chain managers while 25.7% were transport managers followed by production managers at 22.9%. Warehouse managers were the least at 20%. These findings indicate that the respondents held positions that placed them in a position to understand the the effect of reverse logistics on the performance of liquefied petroleum gas firms in Kenya.

4.3.2 Duration on the Position

The respondents were further requested to indicate how long they had been holding their job positions. The results of the study are as tabulated in Table 4.3.

Table 4.3: Duration on the Position

Duration	Frequency	Percent
Between 2-5 years	14	40.0
Below 2 years	9	25.7
Between 6-10 years	8	22.9
Between 11-15 years	4	11.4
Total	**35**	**100.0**

Source: Research Data

The findings above revealed that most (40%) of the respondents had been working for the LPG firms for between 2-5 years followed by those who had been working for a duration of less than 2 years at 25.7%. Those who had been working for between 6-10 years accounted for 22.9%. Only 11.4% had a working duration of between 11-15 years. This indicates that the respondents had been working for LPG firms in Kenya long enough to understand the effect of reverse logistics on the performance of liquefied petroleum gas firms in Kenya.

4.3.3 Category of LPG

The study also sought to establish the categories to which the LPG firms belonged to. The study findings are shown in Table 4.4.

Table 4.4: Category of LPG

Category	Frequency	Percent
LPG Transporter	15	42.9
Independent Distributor	13	37.1
Oil marketing firm	7	20
Total	35	100

Source: Research Data

The above results reveals that most (42.9%) of the respondents were from LPG transporters category followed by 37.1% of the respondents from independent distributors. Further, 20% of the respondents were from Oil Marketing firms. This is a clear indication that the questionnaires were distributed to the target population.

4.3.4 Academic Qualification

The study further sought to establish the academic qualifications of the respondents. The results of the study are as tabulated in Table 4.5.

Table 4.5: Academic Qualification

Level	Frequency	Percent
University Degree	20	57.1
College Diploma	8	22.9
Post Graduate Degree	7	20.0
Total	35	100.0

Source: Research Data

The study found out that majority (57.1%) of the respondents had university level of education followed by 22.9% of the respondents who had a college level of education. Only 20% of the respondents reported to have had post graduate degree. This indicates that the respondents were well educated to know how reverse logistics affects the performance of liquefied petroleum gas firms in Kenya.

4.3.5 Years in Operation

The study further sought to establish the number of years in operation in the LPG business. The results of the study are as tabulated in Table 4.6.

Table 4.6: Years in Operation

Year in operation	Frequency	Percent
Below 5 years	7	20
6 – 1- years	8	22.9
11-15 years	8	22.9
16-20 years	11	31.4
21-25 years	1	2.9
Total	35	100

Source: Research Data

The results reveal that 31.4% of the LPG firms had been in operation between 16-20 years followed by 22.9% of the firms that had been in operation for between 6-10 years and then those that had been in operation for between 11-15 years also at 22.9%. Only 2.9% of the firms' reported to have been in operation for between 21-25 years. This is a clear indication that the firms were in operation long enough to the effect of reverse logistics on the performance of liquefied petroleum gas firms in Kenya.

4.4 Reverse Logistics

The study sought to know the extent to which reverse logistics practices (Closed Loop Supply Chains, Contracted Third Party and Joint Venture) influence the operational performance of LPG firms in Kenya. The respondents were requested to indicate the extent to which they agreed or disagreed on various statements. The statements were rated on a Likert scale of 1-5 where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, And 5 = Strongly Agree. The recorded mean scores were interpreted as follows:

4.4.1 Closed Loop Supply Chains

The study sought to determine the extent to which Closed Loop Supply Chains influence the operational performance of liquefied petroleum gas firms in Kenya. The results are shown in Table 4.7.

Table 4.7: Closed Loop Supply Chains

Statement	Mean	Std. Deviation
Reuse of products such as gas cylinders	4.69	0.471
Recycling of gas cylinders	4.60	0.497
Remanufacturing of products	3.66	0.938
Recall of faulty products	1.89	0.676
Aggregate Mean	3.71	0.645

Source: Research Data

The study recorded an aggregate mean of (*M*=3.71, *SD*= 0.646) was implies that the respondents agreed that Closed Loop Supply Chains influence the operational performance of liquefied petroleum gas firms in Kenya. There was a strong agreement among respondents that "reuse of products such as gas cylinders" and "recycling of gas cylinders" influences firms' operational performance as evidenced by mean scores of (*M*=4.69, *SD*= 0.471) and (*M*=4.60, *SD*= 0.497) respectively. The respondents also agreed that the LPG firms "Remanufacturing of products" as shown by a mean score of (*M*=3.66, *SD*= 0.938). "Recall of faulty products" was the least agreed upon statement with a mean of (*M*=1.89, *SD*= 0.676).

4.4.2 Contracted Third Party

The study further sought to determine the extent to which Contracted Third Party influence the operational performance of liquefied petroleum gas firms in Kenya. The results are as shown in Table 4.8.

Table 4.8: Contracted Third Party

Statement	Mean	Std. Deviation
Marketing and sorting	4.11	0.583
Transportation to the warehouses	3.80	0.584
Collection /consolidation centers	3.60	0.651
Waste collection, sorting and marketing	3.29	0.893
Green product validation	3.17	0.891
Recovery plants -value adding activity	3.17	0.822
Aggregate Mean	3.52	0.737

Source: Research Data

The study found out that the respondents agreed that Contracted Third Party influence the operational performance of liquefied petroleum gas firms in Kenya as shown by the aggregate mean of (*M*=3.52, *SD*= 0.737). "Marketing and sorting" with a mean score of (*M*=4.11, *SD*= 0.583) indicated that the respondents agreed on the influence of Contracted Third Party on the operational performance of liquefied petroleum gas firms in Kenya. "Transportation to the warehouses" and "Collection /consolidation centres" recorded mean scores of (*M*=3.80, *SD*= 0.584) and (*M*=3.60, *SD*= 0.651) respectively which shows agreement among the respondents. The respondents also agreed that "Waste collection, sorting and marketing, Green product validation and Recovery plants - value adding activity" influence the operational performance of liquefied petroleum gas firms in Kenya.

4.4.3 Joint Venture

Further, the study sought to determine the extent to which Joint Venture influence the operational performance of liquefied petroleum gas firms in Kenya. The results are as shown in Table 4.9.

Table 4.9: Joint Venture

Statement	Mean	Std. Deviation
Combined transportation of products	4.49	0.612
Joint conveyance	4.46	0.906
Joint quality control	4.40	0.775
Joint collection and recycling centers	3.74	0.817
Joint Waste Disposal	3.56	0.780
Aggregate Mean	4.07	0.778

Source: Research Data

The respondents agreed that Joint Venture influences the operational performance of liquefied petroleum gas firms in Kenya as evidenced by an aggregate mean of (*M*=4.07, *SD*= 0.778). "Combined transportation of products", "Joint conveyance" and 'Joint quality control" were the most rated indicating that the respondents agreed that they influence operational performance as evidenced by the means cores of (*M*=4.49, *SD*= 0.612), (*M* =4.46, *SD*= 0.906) and (*M* = 4.40, *SD*= 0.775) respectively. "Joint collection and recycling centres" and "Joint Waste Disposal" with mean scores of (*M*=3.74, *SD*= 0.817) and (*M*=3.56, *SD*= 0.780) respectively indicated that the respondents agreed the two influence LPG firms operational performance. The respondents had differences in opinions in regard to the influence of Joint Venture on the operational performance of LPG firms in Kenya as indicated by the standard deviations.

4.5 Operational Performance

The study further sought to establish the extent to which reverse logistics influences the performance of liquefied petroleum gas firms in Kenya. The recorded mean scores were interpreted using the following scale: 1.00 - 1.49 = Not At All; 1.50 - 2.49 = Low Extent; 2.50 - 3.49 = Moderate Extent; 3.50 - 4.49 = Large Extent; 4.50 - 5.00 = Very Large Extent as shown in Table 4.10.

Table 4.10: Operational Performance

Measure	Mean	Std. Deviation
Quality		
There is increased customer satisfaction levels	4.66	0.591
There is high efficiency of assets utilization	4.60	0.497
Conformance to product specification	4.46	0.701
Product performance	4.23	0.426
Number of product defects	1.31	0.471
Aggregate	3.85	0.537
Delivery Speed		
Improved production cycle time	4.77	0.426
There is increased speed with which decision making can be undertaken within the firm	4.43	0.558
Reduced customer complaint resolution time	4.29	0.710
Delivery lead time	1.34	0.482
Aggregate	3.71	0.544
Flexibility		
Faster response to returns and repairs	4.40	0.604
Enhanced process /production flexibility	4.20	0.473
Number of customer complaints	1.54	0.701
Aggregate	3.38	0.593

Source: Research Data

The respondents agreed to a large extent that reverse logistics influences the performance of liquefied petroleum gas firms in Kenya as shown by the aggregate mean of (M=3.69, SD= 0.553). Reverse logistics had the greatest impact on quality as evidenced by an average of (M=3.85, SD= 0.537). This indicates that quality was affected to a great extent. The respondents agreed to a Very Large Extent that reverse logistics has led to "increased customer satisfaction levels (M=4.66, SD= 0.591)" and "There is high efficiency of assets utilization (M=4.60, SD= 0.497)".

Reverse logistics also affected delivery speed of LPG firms to a moderate extent as shown by a mean of (M = 3.38, SD = 0.593). The respondents agreed to a Very Large Extent that reverse logistics has led to "Improved production cycle time (M=4.77, SD = 0.426) followed by "There is increased speed with which decision making can be undertaken within the firm" with a mean score of (M = 4.43, SD= 0.558).

Further, reverse logistics also affected flexibility of LPG firms to a great extent as shown by a mean of (M=3.71, SD = 0.544). This has led to "Faster response to returns and repairs (M = 4.40, SD = 0.604) followed by "Enhanced process /production flexibility" with a mean score of (M = 4.20, SD = 0.473). The variation in the respondents' opinions was accounted for by the recorded standard deviations recorded.

4.6 Correlation Analysis

The study used Pearson correlation analysis to estimate the extent to which reverse logistics influences performance of liquefied petroleum gas firms in Kenya. The study adopted a correlation coefficient r and p value value-0. 05. This helped to ascertain the extent to which each individual dependent variable moved together in explaining the independent variable. The Association between operational performance and reverse logistics is as shown in Table 4.11.

Table 4.11: Correlation analysis between Operational Performance and Reverse Logistics

Correlations						
		Reverse logistics	Delivery speed.	Quality	Flexibility	Cost
Reverse logistics	Pearson Correlation	1	.537**	.164	.124	.112
	Sig. (2-tailed)		.001	.000	.000	.000
	N	35	35	35	35	35
Delivery speed.	Pearson Correlation	.537**	1	.065	.504**	.296
	Sig. (2-tailed)	.001		.000	.002	.000
	N	35	35	35	35	35
Quality	Pearson Correlation	.164	.065	1	.167	.594**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	35	35	35	35	35
Flexibility	Pearson Correlation	.124	.504**	.167	1	.435**
	Sig. (2-tailed)	.000	.002	.000		.009
	N	35	35	35	35	35

**. Correlation is significant at the 0.00.

Source: Research Data

From the findings provided above, it can be concluded that reverse logistics is statistically associated to the firm's operational performance since it provided an r value of 0.537 and p value of 0.001, that delivery speed is statistically associated with reverse logistics as evidenced by a p value of 0.000, that quality is statistically associated with reverse logistics and that flexibility is statistically associated with reverse logistics as indicated by of 0.124 and p value of 0.000 All the p values were less than the

conventional 0.005 thus it can be concluded that the dependent variables were linked with reverse logistics.

4.6.1 Effects of Reverse Logistics and Performance of LPG firms in Kenya

Multiple regression analysis was performed to establish the effect of reverse **logistic** and performance of LPG firms in Kenya.

4.6.2 Model Summary

The study sought to establish the effect of reverse logistics (closed loop supply chains, contracted third party and joint venture) on the performance of liquefied petroleum gas firms in Kenya. The results are as shown in the Tables 4.12.

Table 4.12: Model Summary

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.793a	0.629	0.592	0.15554

a. Predictors: (Constant), Joint Venture, Closed Loop Supply Chains, Contracted Third Party

Source: Research Data

The model summary results indicate that 63% of the variation in operational performance of liquefied petroleum gas firms in Kenya is explained by reverse logistics practices (i.e. closed loop supply chains, contracted third party and joint venture).

4.6.3 Analysis of Variance (ANOVA)

Anova was done to establish the regression model's reliability, internal consistency and goodness of fit. The Anova results revealed a significance level (p-value) of 0%. This shows that the regression model used in this study was internally consistent, had

goodness of fit and therefore reliable in establishing the effect of reverse logistics on the performance of liquefied petroleum gas firms in Kenya. The results are as shown in Table 4.13.

Table 4.13: Analysis of Variance (ANOVA[a])

ANOVA[a]

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	.471	3	.157	7.47	.000[b]
Residual	.650	31	.021		
Total	1.121	34			

a. Dependent Variable: Operational Performance

b. Predictors: (Constant), Joint Venture, Closed Loop Supply Chains, Contracted Third Party

Source: Research Data

4.6.4 Test of individual Regression Coefficients

The study further sought to establish the individual effect of closed loop supply chains, contracted third party and joint venture on the performance of liquefied petroleum gas firms in Kenya. The results are as shown in Table 4.14.

Table 4.14: Significance of Regression Coefficients

	Coefficients[a]				
	Unstandardized Coefficients	Standardized Coefficients			
Model	B	Std. Error	Beta	t	Sig.
(Constant)	4.048	0.374		10.824	0.000
Closed Loop Supply Chains	0.317	0.079	0.338	4.013	0.000
Contracted Third Party	0.338	0.083	0.32	4.072	0.000
Joint Venture	0.291	0.054	0.129	5.389	0.000

a. Dependent Variable: Operational Performance

Source: Research Data

At 95% confidence regression coefficients revealed that closed loop supply chains, contracted third party and joint venture had a combined positive effect on the performance of liquefied petroleum gas firms in Kenya. The findings reveals that Closed Loop Supply Chains (t= 3.17, p= 0.000), Contracted Third Party (t= 4.072, p= 0.000) and Joint Venture (t= 5.389, p= 0.000) produced statistically significant values (high t-values, $p < 0.05$). This indicates that closed loop supply chains, contracted third party and joint venture had a positive effect and significant effect on the performance of liquefied petroleum gas firms in Kenya.

The equation for the regression model is expressed as:

$Y = 4.048 + 0.317X_1 + 0.338X_2 + 0.291X_3$

Where:

Y – Operational Performance

X_1- Closed Loop Supply Chains

X_2- Contracted Third Party

X_3- Joint venture

Constant = 4.048 shows that if all there was no reverse logistics (closed loop supply chains, contracted third party and joint venture), the operational performance of liquefied petroleum gas firms in Kenya would be at just 4.048. A unit increase in closed loop supply chains, contracted third party and joint venture would lead to improvement in operational performance by 0.317, 0.338, and 0.291 respectively. The study assumed that the error term value was zero implying that there were no other factors that could have influenced the operational performance of the liquefied petroleum gas firms in Kenya.

4.7 Challenges of Reverse Logistics Practices

The study sought to establish challenges faced while implementing various logistics management practices by liquefied petroleum gas firms in Kenya. Respondents were asked to indicate to which various challenges are faced by the firms on a scale of 1 to 5 (where 1 = No Extent, 2 = Small Extent, 3 = Neutral, 4 = Large Extent, and 5 = Very Large Extent). The results of the study are as shown in Table 4.15.

Table 4.15: Challenges of Reverse Logistics Practices

Statement	Mean	Std. Deviation
High cost associated with reverse logistics practice implementation	2.20	0.759
Inadequate reverse logistics performance measures	1.91	0.284
Existence of inadequate information systems linkages within the supply chain logistical network	1.57	0.608
Changing organization culture while implementing reverse logistics practices	1.54	0.701
Lack of training and sensitization of logistics practices	1.54	0.505
Resistance to implementation by logistic staff and distributors	1.47	0.497
Ineffective communication of the vision and plan for reverse logistics practices	1.39	0.471
Failing to tie the logistics activities with specific logistics deliverables	1.28	0.426
Existing conflicts amongst logistics partners	1.24	0.355
Lack of top management support and commitment	1.16	0.236
Aggregate Mean	**1.53**	**0.484**

Source: Research Data

The study established that generally, implementation of reverse logistics among liquefied petroleum gas firms in Kenya faces challenges to a small extent (M = 1.53, SD = 0.48). in particular, high cost associated with reverse logistics practice implementation (M = 2.20, SD = 0.76) , inadequate reverse logistics performance measures (M =1.91, SD = 0.28), existence of inadequate information systems linkages within the supply chain logistical

network (M = 1.57, SD = 0.61), changing organization culture while implementing reverse logistics practices (M = 1.54, SD = 0.70), and lack of training and sensitization of logistics practices (M = 1.54, SD = 0.51) largely contribute to the challenges faced. The others do not seem be a challenge at all.

4.8 Discussion of Findings

The objective of the study was to determine the reverse logistics and performance of liquefied petroleum gas firms in Kenya. On the extent to which reverse logistics practices (Closed Loop Supply Chains, Contracted Third Party and Joint Venture) influence the operational performance of LPG firms in Kenya, the study found out that Closed Loop Supply Chains, Contracted Third Party and Joint Venture influence the operational performance of liquefied petroleum gas firms in Kenya to great extent.

The study found out that there is strong relationship (R=0.793) between reverse logistics (closed loop supply chains, contracted third party and joint venture) and the performance of liquefied petroleum gas firms in Kenya. Reverse logistics (closed loop supply chains, contracted third party and joint venture) accounts for 63% of the total variance in the performance of liquefied petroleum gas firms in Kenya. At 95% confidence regression coefficients revealed that closed loop supply chains, contracted third party and joint venture had a combined positive effect on the performance of liquefied petroleum gas firms in Kenya.

Existing literature supported these findings. Gitau and Shalle (2014) sought to establish the effects of reverse logistics adoption has on the supply chain performance of Hewlett Packard company in Kenya and established that reverse logistics implementation has

positive effect on the supply chain performance and so the study relates to my findings that reverse logistic influences the operational performance of a firm. Richu (2015) sought to establish how reverse logistics affects operational performance of sisal processing firms in Nakuru County and found that both product reuse and product recovery have positive effect the sisal processing firm's operational performance and so the study relate to my findings that reverse logistic(Closed loop ,Joint Venture and Contracted 3PL) influences firms operational performance.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary, conclusion and recommendations of the study where the objective was to determine reverse logistics and performance of liquefied petroleum gas firms in Kenya. The chapter also presents recommendations for practice and policy as well as suggestions for further research.

5.2 Summary of Findings

The objective of the study was to determine the reverse logistics and performance of liquefied petroleum gas firms in Kenya. Study used descriptive statistics techniques to analyse the data since it was quantitative in nature. These techniques were measures of central tendency and measures of dispersion. The emerging findings was presented using tables, Pearson moment correlation and regression analysis was used to determine the effect of reverse logistics on the performance of liquefied petroleum gas firms in Kenya.

On the extent to which reverse logistics practices (Closed Loop Supply Chains, Contracted Third Party and Joint Venture) influence the operational performance of LPG firms in Kenya, the study found out that Closed Loop Supply Chains, Contracted Third Party and Joint Venture influence the operational performance of liquefied petroleum gas firms in Kenya to great extent. Closed Loop Supply Chains involved reuse of products such as gas cylinders, Recycling of gas cylinders, Remanufacturing of products and recall of faulty products. Third Parties were contracted to marketing, transportation to the warehouses, collect waste and add value to products. Joint Venture focused on combined

transportation of products, joint conveyance, joint quality control, joint collection and recycling centers and joint waste disposal.

The study found out that there is strong relationship (R=0.793) between reverse logistics (closed loop supply chains, contracted third party and joint venture) and the performance of liquefied petroleum gas firms in Kenya. Reverse logistics (closed loop supply chains, contracted third party and joint venture) accounts for 63% of the total variance in the performance of liquefied petroleum gas firms in Kenya. At 95% confidence regression coefficients revealed that closed loop supply chains, contracted third party and joint venture had a combined positive effect on the performance of liquefied petroleum gas firms in Kenya.

On the challenges faced during implementation of reverse logistics practices by liquefied petroleum gas firms in Kenya, the study concludes that there were minimal challenges. The most faced were: the high cost associated with reverse logistics practice implementation; inadequate reverse logistics performance measures and existence of inadequate information systems linkages within the supply chain logistical network and changing organization culture while implementing reverse logistics practices.

5.3 Conclusion

The study concludes that reverse logistics practices (closed loop supply chains, contracted third party and joint venture) influence the operational performance of LPG firms in Kenya to a great extent. The closed loop supply chains practices used were involved reuse of gas cylinders, recycling of gas cylinders, remanufacturing of products and recall of faulty products. Third Parties were contracted to market and transport LPG

products. Joint Venture focused on combined transportation, joint conveyance, joint quality control, joint collection and recycling centers and joint waste disposal.

The study concluded that there is a strong relationship (R=0.793) between reverse logistics (closed loop supply chains, contracted third party and joint venture) and the performance of liquefied petroleum gas firms in Kenya. Reverse logistics accounts for 63% of the total variance in the performance of liquefied petroleum gas firms in Kenya. Closed loop supply chains, contracted third party and joint venture had a combined positive effect on the performance of liquefied petroleum gas firms in Kenya.

The study concludes that during the implementation of reverse logistics practices by liquefied petroleum gas firms in Kenya, challenges were faced to a minimal extent with the most faced challenges being the high cost associated with reverse logistics practice implementation; inadequate reverse logistics performance measures and existence of inadequate information systems linkages within the supply chain logistical network and changing organization culture while implementing reverse logistics practices.

5.4 Policy Recommendations

The study found out that reverse logistics (closed loop supply chains, contracted third party and joint venture) affects the operational performance of liquefied petroleum gas firms in Kenya positively and significantly. This study therefore recommends the management of all other liquefied petroleum gas firms should implement reverse logistics as a way of increasing their operational performance.

The study also established that the most faced challenges during the implementation of reverse logistics practices by liquefied petroleum gas firms in Kenya are high cost

associated with reverse logistics; inadequate reverse logistics performance measures and existence of inadequate information systems linkages within the supply chain logistical network and changing organization culture while implementing reverse logistics practices. The study recommends that the management of the LPG firms should set aside adequate budgets for supporting reverse logistics endeavours as a way of boosting performance.

5.5 Limitations of the Study

LPG firms claimed their information was confidential and legally privileged and there the data collection process was slow. The researcher convinced the respondent that the data was needed to fulfill academic purpose only. The researcher also assured the respondents that the identity of their firms would not be revealed and that the information availed with not be divulged other than for the intended purpose.

Further, the respondents had busy working schedules which delayed the completion of questionnaires. The researcher had to exercise patience until adequate questionnaires were filled. Through this patience the researcher managed to get a 87.5% response rate.

5.6 Suggestions for Future Studies

The study established that reverse logistics (closed loop supply chains, contracted third party and joint venture) only affected 63% of the operational performance of liquefied petroleum gas firms in Kenya. This indicated that there were other determinants of operational performance that this study never addressed. Therefore, it was necessary for these determinants to be identified in future studies.

This study only focused on the effect of logistics (closed loop supply chains, contracted third party and joint venture) on the operational performance of liquefied petroleum gas firms in Kenya. This implies the findings of this study might not necessarily apply in other forms of business. Therefore, there is need for more research to understand how the operational performances of other none-LPG firms are affected by reverse logistics.

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APPENDICES

Appendix 1: Questionnaire

This questionnaire is aimed at collecting data in regard to reverse logistics and performance of LPG firms in Kenya. Data collected was treated with maximum confidentiality and the overall purpose is for academic furtherance. Please tick (√) where appropriate

Section A. Demographic Information

1. Position held:

   Warehouse Manager ☐ Supply Chain Manager ☐ Production Manager ☐

   Transport Manager ☐ Others _____

2. How long have you been in this position?

Below 2 years ☐ Between 2-5 years ☐ Between 6-10 years ☐

Between 11-15 years ☐ Between 16-20 years ☐ above 20 years ☐

3. Please indicate category of your LPG firm

Oil marketing firm ☐ Independent Distributor ☐ LPG Transporter ☐

4. What is your education level?

Secondary ☐ College Diploma ☐

University Degree ☐ Post Graduate Degree ☐

Others (Specify) _____

5. How long has the firm been in operation?

Below 5 years ☐ Between 6-10 years ☐ Between 11-15 years ☐

Between 16-20 years ☐ Between 21-25 years ☐ Above 25 ☐

Section B. Reverse logistics

6. Indicate using a tick (√) to what extent do you agree that reverse logistics practices below have influenced the operational performance of liquefied petroleum gas firms in Kenya. Rate using a scale of 1-5, where: **1** strongly disagree, **2** Disagree, **3** Neutral, **4** agree, and **5** strongly agree

Reverse logistics practices	**1**	**2**	**3**	**4**	**5**
Closed Loop Supply Chains					
Recycling of gas cylinders					
Remanufacturing of products					
Reuse of products such as gas cylinders					
Recall of faulty products					
Contracted Third party (3PL)					
Collection /consolidation centers					
Transportation to the warehouses.					
Marketing and sorting					
Waste collection, sorting and marketing					
Recovery plants -value adding activity					
Green product validation					
Joint Venture					
Joint Waste Disposal					
Joint collection and recycling centers					
Combined transportation of products					
Joint quality control					
Joint conveyance					

PART C: OPERATIONAL PERFORMANCE

7. Below are statements describing on operational performance. Kindly indicated the level to which you agree with them in accordance to the following scale: **1**-Not at all, **2**-low extent, **3**-moderate extent, **4**-large extent, **5**-very large extent.

Operational performance indicators	**1**	**2**	**3**	**4**	**5**
There is increased customer satisfaction levels					
Product performance					
Number of product defects					
Conformance to product specification					
Number of customer complaints					
Delivery lead time					
Faster response to returns and repairs					
Reduced customer complaint resolution time					
Improved production cycle time					
There is high efficiency of assets utilization					
Enhanced process /production flexibility					
There is increased speed with which decision making can be undertaken within the firm					

PART D: CHALLENGES

10.) Please indicate the extent to which each of the following challenges are faced during implementation of reverse logistics practices by liquefied petroleum gas firms in Kenya?

Use a scale of= **1**.No extent **2.**small extent**3.**Medium extent **4**.large extent **5**.Very large extent.

	Challenges	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
I	Changing organization culture while implementing reverse logistics practices					
ii	Lack of top management support and commitment					
iii	Lack of training and sensitization of logistics practices					
iv	Existing conflicts amongst logistics partners					
v	Failing to tie the logistics activities with specific logistics deliverables					
vi	Ineffective communication of the vision and plan for reverse logistics practices					
vii	High cost associated with reverse logistics practice implementation					
viii	Inadequate reverse logistics performance measures					
ix	Existence of inadequate information systems linkages within the supply chain logistical network					
x	Resistance to implementation by logistic staff and distributors					

I sincerely appreciate the time you spared to complete this questionnaire

Appendix II: List of Licensed Domestic LPG Gas Brands

SR	COMPANY	BRAND
1.	Alfa Gas Limited	Alfa Gas
2.	Aspam Energy Kenya Limited	Gulf Petrochem
3.	BOC Kenya Limited	Handi Gas
4.	Capital Gas Consumer Co-operative Society	Capital Gas
5.	City Gas Limited	City Gas
6.	Depar Limited	Gasky
7.	Eco –Energy (EA) Limited	P-Gas
8.	Fast Gas Limited	Fast Gas
9.	Fossil Fuels Limited	Pet Gas
10.	Galana Oil Kenya Limited	Delgas
11.	Green Energy Limited	G-Gas
12.	Green Gas Company Limited	Amaan Gas
13.	Hashi Energy Limited	Hashi gas
14.	Hass Petroleum Kenya Limited	Hass Gas
15.	Hunkar Trading Co. Limited	Hunkar Gas
16.	Jamii Gas Limited	Jamii Gas
17.	KenolKobil Limited	K-Gas
18.	Kerry Gas Limited	Kerry Gas
19.	Lake Gas Limited	Lake Gas
20.	Libya Oil Kenya Limited	Mpishi Gas
21.	Megtraco Limited	Kapri Gas
22.	Midland Energy Limited	Mid Gas
23.	Moto Gas Company Limited	Moto Gas
24.	Multi Energy Limited	Men Gas
25.	National Oil Corporation of Kenya	Supa Gas
26.	Oilcom (K) Limited	Oilcom Gas
27.	Orange Energy Limited	Orange Gas
28.	Oryx Energies (K) Limited	Oryx Gas
29.	Safari Petroleum Limited	Safari Gas
30.	Safe Energy Limited	Safe Gas
31.	Salama Gas Limited	Salama Gas
32.	Solutions East Africa Limited	Sea Gas
33.	Spareman Trading Company Limited	Home Gas

SR	COMPANY	BRAND
34.	Syzo International Limited	Future Gaz
35.	Tex Trading Limited	Tex Gas
36.	Tosha Petroleum Kenya Limited	Tosha Gas
37.	Total Kenya Limited	Total Gaz
38.	Tuangaze Limited	T- Gas
39.	Venus Energy	Venn Gas
40.	Vivo Energy Kenya Limited	Afri Gas

Source: https://www.erc.go.ke/