INFLUENCE OF PRODUCT INNOVATIONS AND TECHNOLOGY ON GROWTH OF SMALL AND MEDIUM ENTERPRISES IN PETROLEUM INDUSTRY IN NAIROBI COUNTY IN KENYA

JIMMY MUGITHI THIONG'O

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DECLARATION

I Jimmy Mugithi Thiong'o, hereby declare that this Research Project titled Influence of Product Innovations and Technology on Growth of Small and Medium Enterprises in Petroleum Industry in Nairobi County in Kenya is my original work and that it has not been submitted to any other college, institution, or university for award of any certificate or degree.

Signed _____   Date_____

JIMMY MUGITHI THIONG'O
REG. NO D66/87282/2016
MSc Programme

SUPERVISOR'S APPROVAL

This MSc project prepared by Jimmy Mugithi Thiong'o has been submitted for examination with my approval as the appointed University supervisor.

Signed: _____   Date: _____

DR. JAMES GATHUNGU, PhD, CPS (K)

Department of Business Administration

School of Business,

University of Nairobi

DEDICATION

To my lovely mother Lucy Wangui Thiong'o who has been a strong pillar of strength through her prayers and encouragement throughout this academic journey. I owe her so much and love her dearly.

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ABBREVIATIONS

ANOVA - Analysis of Variance

CEO - Chief Executive Officers

CMV - Common Method Variance

EFA - Exploratory Factor Analysis

LPG - Liquified Petroluem Gas

NACOSTI - National Commision for Science, Technology and Innovation

PRC - People's Republic of China

R&D - Research and Development

RBV - Resource Based View

RMB - Rin Min Bi

SMEs - Small and Medium Enterprises

ABSTRACT

The main objective of this study was determining the influence of product innovation on the growth of Small and Medium Enterprises (SMEs) with focus on the petroleum industry in Nairobi County in Kenya. Product innovation is vital source of sustainable competitive advantage for any firm especially in a dynamic business environment. This is because product innovation leads to continuous product improvements that make the firm to survive in face of competitors. Product innovation may be internal or external. The specific objective were to determine the contribution of internal product innovation on the growth and to determine the effect of external product innovation on the growth. The study was anchored on diffusion theory of innovation, resource based view, product life cycle and innovation theory. The study was descriptive employing survey methods. The population was all the 986 SMEs in Nairobi County that sell ptroleum products. The study targeted a sample of 119 participants but only 81 successfully participated leading to a response rate of 68.07 percent. Data were collected using a questionnaire. Analysis was done using descriptive statistics. Graphical presentations were also used. Linear regression analysis was used to model the relationship connecting product innovation and growth. The study established that SMEs were generally growing with internal product innovation as a positive contributor to the growth. The SMEs focused only on things they could sustain, they spend more on market leadership and on strategic alliances especially on new projects. They, however did not have their own unique products availed for customers and did not have the technology to enable them to detect early enough whether a new product is profitable. External product innovation did not contribute favourably to growth of the SMEs despite the SMEs having strong policies on collaboration with other firms. However, the SMEs were inadequate in acquiring new ideas from external sources, did not invest heavily in technology and did not participate in in pooled R&D/product development. The study recommends stronger implementation of both internal and external innovation to enhance the growth of SMEs in the petroleum industry.

CHAPTER ONE
INTRODUCTION

1.1.   Background of the Study

Product innovation is an essential source of sustainable competitive advantage for a business especially in a dynamic business environment (Andersson, 2007). This is because product innovation leads to continuous product improvements that make the firm to survive in face of competitors (Reguia, 2014). The key benefit of the innovation is survival and growth. An innovating firm survives longer and grows faster that the non-innovator. When a firm focuses on product innovation, it enables production of products that are better than those provided by competitors through improving on features of the existing product for the current market. It may also involve disturbing the status of the market of existing products by introducing a new product or introducing a new product in a new market. A firm that successfully innovates may realize improved growth (Andersson, 2007).

This study is anchored on resource based theory by Penrose (1959) with support from product life cycle theory by Vernon (1966) and innovation theory of entrepreneurship by Schumpeter (1912). The resource dependent theory posits that the combination of different resources making up a firm creates efficiency through innovation. The theory by Vernon (1966) explains the cycle that products go through when it is exposed to an international market. Innovation theory of entrepreneurship innovation is any new policy an entrepreneur undertakes in order to either reduce cost or to increase the demand

Small and Medium Enterprises (SMEs) are also forced to be innovative to survive and grow (Njenga, 2015). The innovativeness of the SMEs has transcended into the petroleum industry which was a reserve for a chose few conglomerates (Aigboduwa & Oisamoje, 2013). Currently, small businesses are selling fuel, liquified petroluem gas (LPG), lubricants and other petroleum products to the customer. However, this has increased competition and SMEs that are not able

to play the market innovatively remain stagnated or are forced to exit the market (Sitharam & Hoque, 2016). This study assesses how the innovativeness of these SMEs contributes to their growth in the petroleum industry.

1.1.1. Product Innovation

Product innovation focuses on novel products, changing the design of current products or changing production methods (Reguia, 2014). Its emphasis is on the markets for current products, while using features and functions that not used by firms in the industry to differentiate the product (Danneels, 2002). Product innovations may be looked at considering whether they are internal or external (Koufteros, Vonderembse, & Jayaram, 2005). Internal product innovation arises from knowledge, capacities, resources and the technologies used by the firm. External product innovation arises from consumers' needs and firm owners' expectations.

With regard to petroleum products, innovation focuses on introduction of new petroleum products, making changes on existing products or applying new techniques in introducing petroleum products. The sources of the innovations may be from within the firm selling (producing) the petroleum products or from the customers who buy the petroleum products. These innovations are noticed when a firm introduces a new petroleum product in its petroleum products portfolio or when it makes a change, such as packaging, on its products. Innovation may be noticed also when the firm introduces a new method of availing the product to the consumer. The drivers of such changes may be within the petroleum products seller or from the pressure arising from the needs of the consumer of from the needs of those who own the firm (Reguia, 2014).

Business Innovation Capability refers to those capabilities a firm builds and employs strategically to discover the market gaps (Zawislak, Alves, Tello-Gamarra, Barbieux, &

Reichert, 2012). The capabilities created may be distinctive competencies, some specific skills, unique routines, core competences, absorptive capacity, organizational capabilities, ownership of invisible assets and marketing capability. Innovation culture focuses on the organizational culture that is uniquely out of the main-line organizational culture that stresses external orientation and internal flexibility in provision of products to the customer. In this study, the researcher will divide innovations in two categories: internal and external. Internal Product Innovations will focus on how SMEs that sell petroleum products in Nairobi County use their knowledge, capacities, resources and the technologies to drive growth of the firms. External Product Innovations will focus on how the firms use consumers' needs and expectations of the owners to drive growth.

1.1.2. Concept of Technology

Technology is the use of scientific understanding and information in designing, producing and utilizing products in the petroleum industry (Wahab, Raduan, & Osman, 2012). According to Volti (2009) technology is man-made and that applies knowledge and organization to produce articles and methods used for a specific goal. The definition indicates that technology does not occur by chance, but is deliberately engineered by intelligent humans.

Technology has material or physical connotation and informational connotation (Kumar, Kumar, & Persaud, 1999). The physical aspects of technology includes products, tools, equipment, methods and procedures. The informational aspect includes components of know-how in management, production chain and functional areas. Technology centers on achieving given results using given skills, understanding and assets (Lan & Young, 1996). Technology is not just limited to what is part and parcel of a product, but also includes the knowledge about product use, but also how it was developed.

Technology has a strong effect on business processes and affects the entire life cycle of a firm's products. The greatest effect is realized during research and development (R&D) phase, growth phase, maturity phase, and decline. During the R&D phase income from the inputs being used in making the technology are negative and make the chances of failure quite high. In the growth or ascent phase the firm starts to recover some of the costs incurred earlier and the technology developed starts to gain strength and goes past the initial development point and gets accepted in the market. During maturity stage, gains from technology are quite high and experience stability. The technology is now well accepted by the public and competitors are well aware of it. In the decline stage firms start witnessing reducing sales of its products creating a need for new the technology. The current technology calls for replacement if sales are to improve again (Volti, 2009).

1.1.3. Growth of a Small and Medium Enterprise

Growth of an SME is a difficult term to clearly define because it has a variety of connotations. However, its definition can focus on revenue, size, firm's change in value and changes in volume of trade. Growth can also focus on qualitative aspects like the firm's market position, product quality, and customers' goodwill (Insah, Mumuni, & Bangniyel, 2013). A positive quantitative change in revenue generation, size, firm's value, and volume of business will indicate growth. Growth can be noted when the firm shows improved revenues, an increment in its physical size, increased value of the firm as measured by market value or book value of its assets. An increase in the volume of trade can also indicate growth.

Growth includes perceived positive change in market position, the quality of products and the goodwill from the customer (Gupta, Guha, & Krishnaswami, 2013). The qualitative aspects of growth may heavily depend on expert opinion regarding the firm of concern. A perceived improvement in market position indicates growth. An upgrading in products quality also

indicates growth of a business. Further, when customers have a higher level of goodwill to the firm and its product, it indicates growth.

In this study, the growth of a firm considered both the qualitative and quantitative aspects. It was mixed measure that captured all aspects of growth. As a result the measure of growth considered numerical variables such as turnover/sales, number of employment, values of assets, estimated market shares, and profits (Insah, Mumuni, & Bangniyel, 2013). It also considered qualitative variables for example market position, product quality and customers' goodwill as suggested by Gupta, Guha, & Krishnaswami (2013).

1.1.4. Small and Medium Enterprises in Kenya

Researchers usually define SMEs according to the labour force employed. In the definition by Wynarczyk, et al (1994), for example, a micro-enterprise has between 0 and 9 employees, a medium enterprise has between 10 and 99 worker while medium-sized enterprises have between 100 and 499. However, Gunasekaran, Forker & Kobu (2000) asserted that economic context should be considered when defining SMEs. In Europe, an SME refers to any business, within all types of markets and at any age that has between 10 and 250 employees, has a turnover less than Euros 50 million, and assets with book values less than Euros 43 million. If a firm has less than 10 employees it qualifies as a micro-firm.

In Kenya an SME can be a microenterprise, a small enterprise or a medium enterprise. As defined by Stevenson & St-Onge (2005) a microenterprise has less than 10 employees; a small enterprise has between 11 and 50 employees; while a medium enterprise has a labour force of between 50 and 150. According to (Waweru, 2007) in Kenya SMEs' environment is easy to enter or leave; most firms undertake small scale activities; they provide self-employment; they widely spread use family labour; they use little amount of capital and few simple tools. Further,

their production is labour intensive with low level of skills. They are highly unregulated despite operating in competitive markets.

The aggressive cross-sectoral growth in the numbers of SMEs in Kenya has also been felt in the petroleum industry. The SMEs are major providers of employment and significant providers of products to the Kenyan economy (Wairimu, 2015). For instance, SMEs have significantly contributed to Kenyan economy by giving 13 percent of GDP 1993 and increasing the contribution to between 20-25 percent between 2011 and 2014. In 1999, more than 2.3 million people were employed by SMEs with the numbers rising to 4.6 million in 2003 and to 6.4 million in 2013. Over 84 percent of Kenya's work force is in the SME segment of the economy (Wairimu, 2015).

1.2.   Research Problem

Innovation is a key contributor to firm growth (Howell, 2017). If a firm focuses on innovation it will create and maintain growth. The two types of product innovation, internal and external product innovation widens the market for a firm's products making it grow. To enable this, a firm can come up with disruptive, incremental, architectural or radical innovation to keep its sustainable competitive edge for survival and growth (Reguia, 2014).

SMEs in the Kenya's petroleum industry face the problem of having to survive competition from each other and the competition from the larger firms. They are challenged by the ease with which firms enter or leave; their small size; self-employment objective of ownership and their small capital outlays. They also have limited access to technology, finance and to organized markets their businesses are highly unregulated despite operating in competitive markets (Stevenson & St-Onge, 2005). A successful SME in this sector has to be very innovative in selling their limited variety of products.

Research conducted has not been able to explain how the firms survive using innovation. Studies conducted by Ndemezo & Kayitana (2017) in Rwanda and by Tuan, Nhan, Giang, & Ngoc (2016) in Vietnam failed to answer how internal and External Product Innovation in an SME contributes to the growth of the SME. Other studies by Gunday, Ulusoy, Kilic, & Alpkan (2011) in Turkey and Howell (2018) in the People's Republic of China (PRC) also failed to address the issue. This is notwithstanding the significance of SMEs to growth of the economy and employment creation. Studies conducted in Kenya ignored the petroleum sector. For instance Muchoki (2013) and Njeri (2017) focused on mobile telephony companies in Kenya. Studies by Walobwa, Ngugi, & Chepkulei (2013), Njagi (2016) and Kiveu (2017) focused on the manufacturing sector and did not focus on SMEs in the petroleum sector. Research gaps were left regarding showing how internal product innovation contributes to growth and the contribution given by internal product innovation with regard to SMEs in the petroleum products business. This study address this gap by assessing how internal and external product innovation contribute to the growth of SMEs in Kenya's petroleum industry with focus on Nairobi County. It answered the question of how internal and external product innovation contributes to growth of SMEs in the petroleum industry in Nairobi County..

1.3. Research Objectives

The objective was to determine the contribution of product innovation on the growth of Small and Medium Enterprises (SMEs) in the petroleum industry in Nairobi County.

1.3.1. Specific Objectives

The specific objectives are:

i. To determine the contribution of internal product innovation on the growth of Small and Medium Enterprises (SMEs) in the petroleum industry in Nairobi County.

ii. To determine the effect of external product innovation on the growth of Small and Medium Enterprises (SMEs) in the petroleum industry in Nairobi County.

1.4. Value of the Study

Scholars in the field of entrepreneurship may find the study contributing to the scholarly discussion of whether and how product innovation affects the growth of a firm. Future researchers will have reference material which they may cite as they provide scholarly arguments.

Those in the petroleum industry may find the results of the research useful in explaining how innovation is driving the industry with regard to SMEs. This way they will make necessary adjustments in the industry to accommodate the SME business model. This may generate an industry that is profitable to both the SME owners and the large company owners.

The research may be useful to policy makers at national level regarding economic planning in general and to the energy sector in particular. Policy makers will have researched findings regarding how innovation is driving the growth of SMEs. This may be used as input when putting in place mechanisms to stimulate innovation as a way of improving business culture and driving economic growth. Further, the findings may be used as input when putting in place policies to make the energy sector in Kenya more efficient in serving Kenyans as they work towards Kenya's Vision 2030 development agenda.

CHAPTER TWO
LITERATURE REVIEW

2.1.   Introduction

This chapter discusses the theories guiding the study. It also discusses past empirical studies with regard to the study while identifying the research gaps. The conceptual framework and model of variables are also discussed.

2.2.   Theoretical Foundation

Four theories provide anchorage to the study. These theories include the resource based view of entrepreneurship supported by the resource dependence theory, the product life cycle theory and innovation theory of entrepreneurship. The theories are discussed as below.

2.2.1.   Diffusion Theory of Innovation

This is a theory by Rogers (1962) who posited that an innovation refers to an idea, practice, or project that is considered new by either the entity adopting it. The theory is based on communication in explaining how innovation spreads through a population. The result of the spread is that people adopt a new idea, behavior or product. The adoption has three stages, namely, knowledge, persuasion, and decision. It means the adopting entity has to know of the technology, be persuaded that the technology will satisfy a need in a better way and then decide to use the technology (Rogers, 2003).

Adoption of innovation by entities is done in five stages. In the first stage, the innovators take up the new innovation. Innovators are entities that first to try innovation and are take risk on new ideas. After innovators, the innovation is adopted by early adopters. This is the second stage of adoption. In the third stage, the innovation is adopted by the early majority who are not rarely leaders, but have the feature of adopting new ideas before average entities. In the fourth stage, the innovation is adopted by the late majority. The late majority are usually

distrustful to change, and will only approve an innovation after assessing its adoption by the early majority. They only adopt tried and tested innovations. In the final stage, innovations are adopted by laggards. These are entities that are traditional and very conservative and base their adoption of things like records and statistics regarding the performance of the technology (Rogers, 2003). This theory is important to this study since it demonstrate how firms in the petroleum industry gets to adopt innovations.

2.2.2. Resource Based View

The resources based view (RBV) by Penrose (1959) viewed an enterprise as a bundle of resources for creating products for a specific market. For every activity the enterprise needs allocation of resources. The combination of different resources creates efficiency (Teece, 2007). Managers' perceptions and decisions regarding entrepreneurship are influenced by resources. Key attributes of resources include availability, versatility, and specificity. The optimal use of resources stimulates a dynamic interaction process that encourages continuous growth. Those in management must take into account the dynamic adjustment costs that will enable effective development and deployment of resources.

This view is suitable for this study for it describes how product innovation creates products for the market. The scarcity of resources facing SMEs forces them to innovate ways to ensure efficient use of resources. Though Penrose fails to clearly define resources, she proposes that existing unused production capacity created by available resources is a waste of opportunity (Teece, 2007).

2.2.3. Product Life Cycle Theory

This theory by Vernon (1966) explains international trade patterns in the marketing literature. A product's Life Cycle is made up of introduction; growth, maturity and decline. According to

Kotler & Armstrong (2006), a product's life cycle is the path taken by a product. They identified five distinct stages: Product development, introduction, growth, maturity and decline.

During development stage which is the initial stage, the focus is on creation of a product. Costs accumulate at a high rate with no corresponding income and this may go on for even years and at high risk given limited funding. After this stage, the product enters the introduction stage. This stage is about developing the market that will consume the developed product. The focus is on building awareness. The costs are also high since expenses are incurred for reaching out to potential customers. During growth the product is accepted by customers and firms. If the product is highly innovative, it faces low competition. Its demand keeps rising and so is the realized income. At maturity stage the sales are their highest and they level off. The product faces stiffer competition and firms need to enhance features of the product if they want to maintain market share. In the decline stage the product generates decreasing revenues because the market is saturated, competition is high and the needs of the consumers are changing (Kotler & Armstrong, 2006).

The life cycle may apply to all products produced by a firm or to a set of products in the firm. The life-cycle my last a few months as for fad items or may last a century or more for other product. This explains why some innovations last longer than others, in effect, determining how they contribute to the growth of the firm (Vernon, 1966).

2.2.4. Innovation Theory

In this theory Schumpeter (1912) proposes that innovation is any new policy an entrepreneur undertakes in order to moderate the overall cost of production or to raise the demand for products. The role of an entrepreneur is the reorganization of the process of production. He can do this by exploiting an invention or a new technological possibility that will enable producing

a new product or producing current products in a new way. The manager may also get materials from a new supplier or sell products using a new outlet (Sledzik, 2013).

The idea of what entrepreneurship is according to Schumpeter (1912) deviated from the older version in that while in the older economic version the entrepreneur was a static organizer of the other factors of production, Schumpeter's entrepreneurship was dynamic. Typical entrepreneur is intelligent, alert, energetic and highly determined. Entrepreneurship is strictly about innovation as opposed to things such as risk-taking.

Schumpeter developed the entrepreneurship model in twofold: first approximation and second approximation. The first approximation emphasizes the innovation's primary impact while the secondary centers on responses consequent to the innovations. According to Schumpeter, innovation is a modification in production methods, bringing in of a new product, a change in the industry or even a change in the market. Innovation is not invention, but a commercial applications of either a new technology or material or procedure.

2.3.   Product Innovation, and Growth of Small and Medium Enterprises

Product innovation is divided into internal product innovation and external product innovation (Bianchini, Pellegrino, & Tamagni, 2016). Internal product innovation includes knowledge, capacities and resources. External product innovation will include consumers' needs and firm owners' expectations. The moderating variables include profitability, legal framework, market structure and technology while intervening variables include innovation capability and the innovation culture in the firms (Bianchini, Pellegrino, & Tamagni, 2016).

Findings regarding how internal product innovation contributes to the growth of a firm vary. Studies such as that conducted by Zhou & Wu (2010) demonstrated that product innovation contributed to the growth of a firm. This study focused on technological capability in product innovation. The study established that technology supported product innovation which, enabled

growth of a firm. However, excess use of technology was itself an impeding factor to innovation and growth of firms (Zhou & Wu, 2010).

Another study conducted by Ndemezo & Kayitana (2017) provided support to the proposition product innovation contributed to the growth of a firm. In their study Rwandese manufacturing firms, they assessed how innovation in the manufacturing firms contributed to performance. Their study used data obtained from a World Bank survey in Rwanda in 2006. The study proved that product innovation led to growth (Ndemezo & Kayitana, 2017).

A study by Bianchini, Pellegrino, & Tamagni (2016) explored the relations between sales growth and a set of innovation indicators. They exploited panel data on internal and External Product Innovation activities in Spanish manufacturing firms. Their innovation indicators included internal R&D and externally sourced R&D. Analysis of the panel data showed internal R&D positively contributed to sales. However, external sourcing of R&D as well as for output of innovation had no significant effect on sales (Bianchini, Pellegrino, & Tamagni, 2016).

A study by Llanto & del Prado (2015) aimed at establishing whether innovation mediates good firm performance. This study centered on new products, processes, and services. The study was conducted on 220 firms in manufacturing firms operating in CALABARZON. Firm performance was proxied by sales, in profits and in labor productivity. The study showed that incremental process innovations effected performance. Since the study was conducted in the manufacturing industry the findings may not apply to SMEs in Kenya despite showing that innovation contributed to firm performance (Llanto & del Prado, 2015).

A study by Karabulut (2015) explored how types of innovation affected the performance of a firm. This survey study centred on 197 manufacturing firms in Kabul. Performance was measured using a balanced scorecard. The study established that product, process and organizational innovation improved growth. However, marketing innovation negatively

affected learning and growth. This study showed that innovation can positively or negatively affect firm performance. This indicates that it is difficult to base on its findings to generalize how innovation will affect SMEs in Kenya's petroleum industry (Karabulut, 2015).

2.4. Product Innovation, Technology and Enterprise Growth

Product innovation is the making and exploitation of value built in newness. Product innovation technology is the application of scientific understanding and information in innovation (Wahab, Raduan, & Osman, 2012). Innovations are usually evidenced by the occurrence of events require problem resolution to enable delivery of expected value. Innovation is entrenched in ideation, conceptualization, the technology that subsequently become part of the design and development of new products (Kanagal, 2015).

Product innovation is motivated innovation events. There must be an innovation process to turn innovation events into innovations. The process is cross-functional and usually involves developing new teams supported by effective technology. Innovation may arise from the firm's value chain or the larger society and market environment. The market environment includes competitors, suppliers, customers, other innovators, learning centers and research laboratories. Innovation is driven by organization size, readiness to accept innovation, investment in R&D and the culture of the organizational. A firm that effectively uses product innovation translates it into business growth (Afuah, 2003).

Table 2. 1: Summary of Empirical Literature Review and Knowledge Gaps

STUDY	METHOD	RESULTS	KNOWLEDGE GAPS	FOCUS OF THIS STUDY
Establishing whether innovation mediates good firm performance (Llanto & del Prado, 2015)	Cross-Sectional Survey	process innovations had significant effect on firm performance	• Not done in petroleum industries. • Not done in SMEs • Not done in Kenya	• Petroleum industry. • Done in SMES • Done in Kenya
Effects of types of innovation on firm performance (Karabulut, 2015)	Cross-Sectional Survey	Innovation can positively or negatively affect firm performance	• Not done in petroleum industries. • Not done in SMEs • Not done in Kenya	• Petroleum industry. • Done in SMES • Done in Kenya
Effects of the various innovation strategies future performance (Karlsson & Tavassoli, 2015)	Cross-Sectional Survey	Innovation strategy could or could not lead to improved performance	• Not done in petroleum industries. • Not done in SMEs • Not done in Kenya	• Petroleum industry. • Done in SMES • Done in Kenya
Impacts of Innovation on the performance of a firm (Tuan, Nhan, Giang, & Ngoc, 2016)	Cross-Sectional Survey	Innovation had positively impacted on firm performance	• Not done in petroleum industries. • Not done in SMEs • Not done in Kenya	• Petroleum industry. • Done in SMES • Done in Kenya
Effects of innovation decision on innovation performance (Ndemezo & Kayitana, 2017)	Cross-Sectional Survey	Innovation contributed to financial performance	• Not done in petroleum industries. • Not done in SMEs • Not done in Kenya	• Petroleum industry. • Done in SMES • Done in Kenya

Source: Researcher (2019)

2.5.   Conceptual Framework

Figure 2.1 presents the conceptual model of the variables in this study. A conceptual framework is a graphic presentation of the relationships of variables in the study. As shown in the figure, the independent variables were Internal Product Innovation and External Product Innovation. Internal Product Innovation focused on knowledge, capacities and resources while External Product Innovation focused on consumer needs and firm owners, expectations. The independent variable was growth of an SME. This variable will consider both the qualitative and the quantitative aspects of firm growth. The intervening variable was technology.

INDEPENDENT VARIABLES   **DEPENDENT VARIABLE**

Product Innovation

Product Innovation
Internal Innovation
- Knowledge,
- Capacities,
- Resources

External Innovation
- Consumers' needs
- Firm owners' expectations

INTERVENING VARIABLE

Technology
- Knowledge
- Information
- Equipment
- Processes

Growth of an SME
- Quantitative measures
  - *revenue*
  - *size,*
  - *Firm value*
  - *volume of business*
- Qualitative Measures
  - *market position*
  - *quality of product*
  - *Customer goodwill*

Figure 2. 1: Conceptual Model

Source: Researcher (2019)

CHAPTER THREE
RESEARCH METHODOLOGY

3.1.   Introduction

In this chapter, the focus is on describing the methodology the researcher used in achieving the research objectives. It defines the target population and how the researcher determined the sample used in the research. The chapter also describes procedures of collecting data and how the data were be analyzed.

3.2.   Research Design

This study adopted the descriptive research design that used survey methods. It aimed to describe how product innovation technology affects the growth of SMEs. Such an approach is recommended for the purpose (Cooper & Schindler, 2006). As done in a survey, the researcher collected data by asking respondents from SMEs questions either in person or by questionnaire. The aim was to gather their opinions, beliefs and feelings concerning the topic (Creswell, 2013).

A similar approach was used by Tordo, Warner, Manzano, & Anouti (2013) when they conducted a study on firms that deal in oil and gas with the aim of consolidating existing knowledge and data on existing content policies, so as to come up guidelines to help in design and monitoring the implementation of the content policies. The study was conducted in sampled countries such as Uganda and Angola and data were collected using survey techniques. Given that this study also needs primary data from those in SMEs in the petroleum products market in Nairobi County, a similar approach was followed.

3.3.   Target Population

The population is all the SMEs in Nairobi County that sell ptroleum products. These are SMEs that sell petroleum fuels asphalt, paraffin wax, tar, petrochemicals, propane and other gases, sulfur, different kinds of lubricants for machines and different kind of industrial waxes. The

study focus on micro-enterprises, the small business and the medium-sized enterprises. According to Nairobi City Council, Licensing Department (2014) there were 98,608 SMEs licensed to operate in Nairobi City of which an estimated 1% dealt in petroleum products. This makes an estimate of 986 SMEs. Focusing on SMEs in Nairobi City County enabled close assessment of how innovation affects growth since competition among SMEs in the county is stiff requiring innovative trading methods.

3.4. Sample Design

The study used stratified random sampling in the 17 sub-county regions in Nairobi County. The SMEs In each of the sub-county the researcher selected 7 SMEs that trade in oil products whose managers participated in the research. The study expected to use a sample of 119 participants. According to Kothari & Garg (2014) carefully selected sample size larger than 30 may acurately estimate population parameters.

3.5. Data Collection

The researcher collected data from managers of the SMEs using two methods. In the first method, the researcher delivered a questionnaire to the managers of identified SMEs by way of drop and pick later. In the second complementary method, the researcher helped the manager of the identified SME to complete the questionnaire.

The questionnaire had four sections. The first part contained five items requiring the manager of an identified SME to provide general demographic information such as the total value of the business, size of labour force, location, time it had been operational and ownership. The manager provided the information by ticking from provided options. Sections two, three and four focused on Internal Product Innovation, External Product Innovation and Growth respectively. In these sections the manager of the identified SME provided answers by selecting the best option in a Likert Scale.

3.6.   Operationalization of Variables

Table 3. 1: Operationalization of Variables

Variable Name	Dimension	Measurement	Questionnaire item
Internal innovation	Knowledge, Capacities, Resources	Mean of choices in Likert scale in questionnaire	Section B
External innovation	Customer needs Owners' needs	Mean of choices in Likert scale in questionnaire	Section C
Technology	Knowledge Information	Mean of choices in Likert scale in questionnaire	Section C Section D
Firm Growth	Revenue, Size, Firm's value, Market position, Quality of product, Goodwill	Mean of choices in Likert scale in questionnaire	Section D

Source: Researcher (2019)

3.7.   Data Analysis

Data obtained by questionnaires were, first, coded stored in SPSS version 2.0 and MS Excel.

The researcher utilized descriptive statistics to analyze the data. The mean was, for instance,

be used to assess the overall responses to given items on variables. The data were presented by

means of graphical presentations.

The relationship between Growth and innovation was assessed using linear regression analysis.

The analysis model is as presented below.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + e$$

Where X_1 is internal innovation while X_2 is External Product Innovation, Y is the growth of

an SME. α is the intercept time, β_1 and β_2 are the sensitivity of Y to X_1 and X_2

respectively; e is the error term. The significance of α, β_1 and β_2 in the regression model was tested using the t-statistic at 95% confidence level. The strength of the relationship of the variables was assessed using the F-test. Before using the regression model the data were assessed for correlation using the Pearson correlation coefficient respectively.

CHAPTER FOUR
DATA ANALYSIS, RESULTS AND DISCUSSION

4.1.   Introduction

This chapter presents data analysis, results and discussions. Data analysis focuses on demographic description of the respondents. The chapter then presents linear regression analysis before presenting the findings with regard to how internal and External Product Innovation affect firm growth. The chapter also discusses the findings.

4.2.   Data Analysis

This section presents the data analysis of the study. It begins with the descriptive analysis of the respondents and describes the variables used in the regression analysis. It the presents a regression analysis of variables before showing how internal and external product innovation affect firm growth.

4.2.1.   Response Rate and Descriptive Analysis

Table 4. 1: Response Rate

Targeted Sample	119
Actual Respondents	81
Response Rate	68.07%

Source: Research Data (2019)

Table 4.1 indicates that the study targeted a sample of 119 SMEs that trade in petroleum products in Nairobi City County. However, only 81 provided responses that were used in data analysis. This resulted in a response rate of 68.07 percent.

Respondents were asked for estimations of the values of their firms by ticking on options given in the questionnaire. The options were: Less than Ksh. 1 million; Between Ksh 1 Million and Ksh 3 million; between Ksh 3 Million and Ksh 5 Million; and More than Ksh. 5 million.
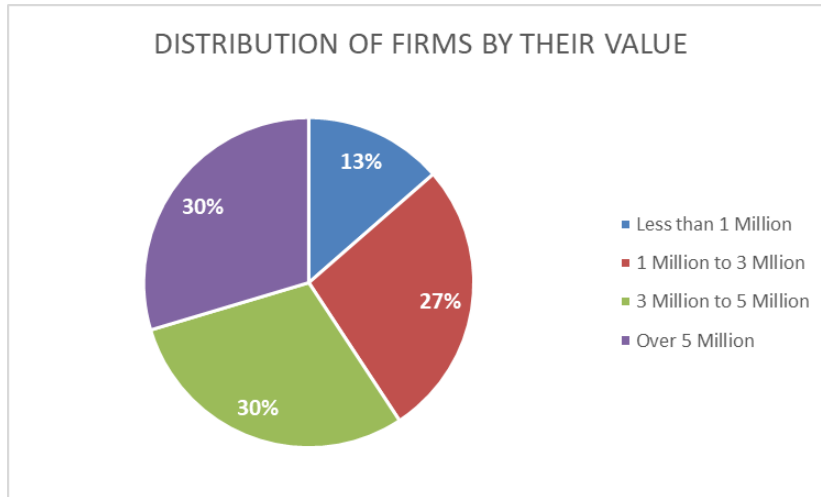
Figure 4. 1: Distribution of Firms by their Value in Ksh Million
Source: Research Data (2019)

Fig 4.1 shows that 30 percent of the SMEs were valued over Ksh 5 million while another 30 percent had values of between Ksh 3 million and Ksh 5 million. Further, 27 percent had values between Ksh 1 million and 3 million. The remaining 13 percent of SMEs were valued at less than Ksh 1 million. The sample was well spread across different valuations of the SMEs.

SMEs were required to indicate the size of their labour force. They responded by way of ticking on options in the questionnaire. The options were: 10 workers or less; 11 to 49 workers; and 50 to 150 workers.

Figure 4. 2: Distribution of Firms by Size of Labour Force
Source: Research Data (2019)

Fig 4.2 shows that 66 percent of SMEs had a workforce of less than 10 workers. 33 percent of SMEs had between 10 workers and 50 workers while the remaining 1 percent had more than 50 workers. The sample was spread across firms with varying labour force sizes.

SMEs were required to indicate the length of time they had been operating since their inception. They responded by ticking on three options provided in the questionnaire. The options were: Less than 5 years; 5 to 10 years; 10 to 20 years; and Over 20 years.
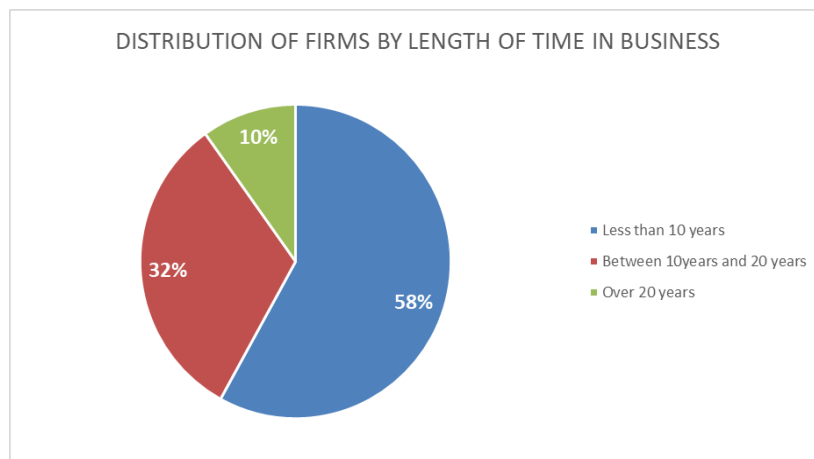
Figure 4. 3: Distribution of Firms by the Length of Time in Business
Source: Research Data (2019)

Fig. 4.3 shows that 58 percent of SMEs had been in the petroleum products market for less than 10 years. 32 percent had been in the market for between 10 years and 20 years while the remaining 10 percent had been in the market for over 20 years. The sample, therefore comprised of firms that had existed for different lengths of time.

SMEs were required to indicate their ownership structure by selecting the option of whether they were sole proprietorships or partnerships. The summary of their ownership was calculated.
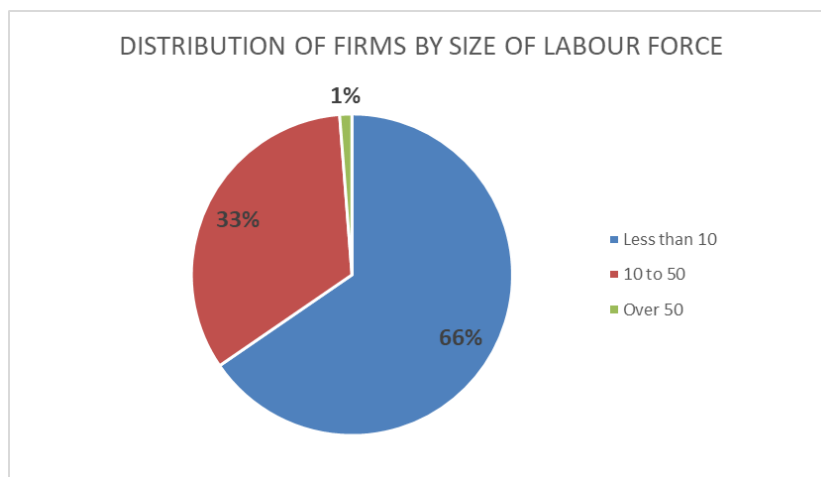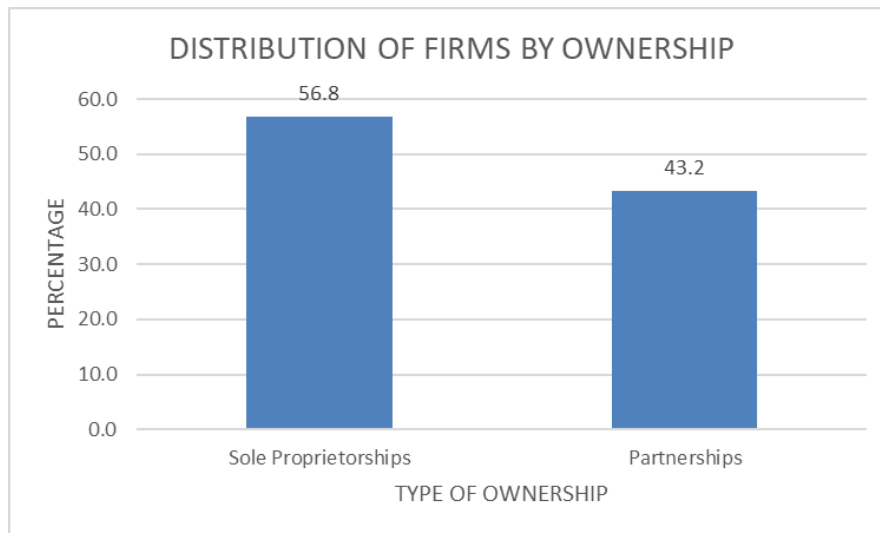
Figure 4. 4: Distribution of Firms by Ownership

Source: Research Data (2019)

Fig. 4.4 shows that 56.8 percent of SMEs were owned by sole proprietors while 43.2 percent were partnerships. The sample, therefore, included both sole proprietorships and partnerships.

4.2.2. Relationship between Product Innovation and Growth

Regression analysis was to assess the relationship between Internal Product Innovation, External Product Innovation and firm growth. The responses of each firm in sections B, C and D of the questionnaire were summarized into a mean for each section and recorded as shown in the table in Appendix III. A descriptive analysis of the generated variables was conducted.

Table 4. 2: Summary Statistics

Statistic	Internal Product Innovation	External Product Innovation	Growth
Mean	3.78	3.84	3.85
Standard Deviation	0.45	0.45	0.45
Minimum	2.62	2.85	2.43
Maximum	4.77	4.69	4.71

Source: Research Data (2019)

Table 4.2 shows that the mean of Internal Product Innovation was 3.78 (σ = 0.45) with a minimum of 2.62 and a maximum of 4.77. The mean of External Product Innovation was 3.84 (σ = 0.45) with a minimum of 2.85 and a maximum of 4.69. The mean of Growth was 3.85 (σ = 0.45) with a minimum of 2.43 and a maximum of 4.71.

Correlation was assessed using the Pearson Correlation coefficient to determine the level of correlation between the variables. The values of the Pearson's correlations were calculated.

Table 4. 3: Correlation Matrix

	Internal Product Innovation	External Product Innovation	Growth
Internal Product Innovation	1.00000		
External Product Innovation	0.47020	1.00000	
Growth	0.27340	0.01694	1.00000

Source: Research Data (2019)

Table 4.3 shows that there were generally low levels of correlation among the variables. However, the highest level of correlation was 0.47020 between Internal Product Innovation and External Product Innovation. The lowest level of correlation was 0.01649 between External Product Innovation and Growth. The correlation between Internal Product Innovation and Growth was 0.27340. The low level of correlation indicated that all the variables could be used in regression analysis.

Table 4. 4: Model Summary

Multiple R	R Square	Adjusted R Square	Standard Error
0.301	0.090 [a]	0.067	0.438

a. Predictors (Constant), internal innovation, external innovation

Source: Research Data (2019)

Table 4.4 displays the summary of the model. The R Square value for the model was 0.090 indicating only 9% of variation in growth is explained by innovation. The other 91% is attributed to factors not capture by the model.

Linear regression was conducted using the three variables with Growth (Y) as the dependent variable and Internal Product Innovation (X_1) and External Product Innovation (X_2) as the independent variables. The coefficients, their t-statistics and p-values were calculated.

Table 4. 5: Linear Regression Coefficients

Variable	Coefficients	t-Stat	p-value
Intercept	3.0952	6.3548	0.00000001
Internal Product Innovation	0.3471	2.7856	0.00670391
External Product Innovation	-0.1438	-1.1713	0.24504705
R^2	0.0907		
Adjusted R^2	0.0674		

Source: Research Data (2019)

(The model is: $Y = 3.0952 + 0.3471X_1 - 0.1438X_2$)

Table 4.5 indicates that the constant term was 3.0952 (t = 6.3548, p = 0.00000001) which was statistically significant. The coefficient of Internal Product Innovation was 0.3471 (t = 2.7856, p = 0.00670391) which was statistically significant. The coefficient of External Product Innovation was -0.1438 (t = -1.1713, p = 0.24504705) which was not statistically significant.

To assess the strength of the regression model, an analysis of variance (ANOVA) was conducted whose aim was determining the F-value and its significance.

Table 4. 6: Analysis of Variance

ANOVA					
	Degrees of freedom	**SS**	**MS**	**F**	**p-value**
Regression	2	1.49581	0.74791	3.89215	0.02448
Residual	78	14.98831	0.19216		
Total	80	16.48413			

Source: Research Data (2019)

Table 4.6 indicates that $F = 3.89215$ ($p = 0.02448$) which was significant. This shows the model was fit for the data used.

4.2.3. Growth of SMES

Growth of a SME is a multifaceted concept. In measuring growth, this study used Section D of the questionnaire. To measure growth, the study focused on measures such as demand; profit and losses; revenue; sales; workforce and market share. The respondent had to have information about these aspects of the SME before responding to the items in the questionnaire.

SMEs were required to provide an assessment of their growth by ticking on items in Section D of the questionnaire that showed the extent they agreed with the item. The section had 14 items each with five options. The options were: 1= Not at all, 2= little extent, 3=Moderate extent, 4=Great extent and 5=Very great extent. For each of the 14 items, the mean response was calculated and the items ranked from the one with the highest mean to the one with the lowest. The standard deviation for each item too was calculated. Further, the researcher calculated the grand mean and the Cronbach's Alpha.

Table 4. 7: Business Growth

BUSINESS GROWTH	MEAN	SD(σ)
Customers are increasingly satisfied with products	4.14	0.79
The image of the business has been improving	4.05	1.11
The number of business collaborating partners is increasing	4.05	0.71
Sales revenues have been significantly increasing	4.01	0.77
The book values of assets have been significantly increasing	3.99	0.94
It is easier to acquire a new customer	3.94	0.75
The presence of the business in the market is growing	3.94	1.08
The labour force has been growing	3.93	0.77
Profits have significantly increased	3.91	1.01
The number of repeat purchases is increasing	3.89	1.01
The business has a high customer retention rate	3.84	0.81
Sales volumes have been significantly increasing	3.81	0.81
There is a high employee retention rate	3.28	1.41
Inquiries about your products are increasing in number	3.19	1.29
GRAND MEAN	**3.85**	
CRONBACH'S ALPHA	**0.7268**	

Source: Research Data (2019)

Table 4.7 indicates that SMEs most strongly agreed that their customers were increasingly satisfied with products (Mean = 4.14, σ = 0.79); that the image of the business had been improving (Mean = 4.05, σ = 1.11); and that the number of business' collaborating partners was increasing (Mean = 4.05, σ = 0.71). However, they least agreed that sales volumes had been significantly increasing (Mean = 3.81, σ = 0.81); that there was a high employee retention rate (Mean = 3.28, σ = 1.41); and that inquiries about their products was increasing in number (Mean = 3.19, σ = 1.29). The grand mean was 3.85 indicating general agreement that the SMEs were growing. The Cronbach's Alpha was 0.7268 indicating the responses were reliable.

4.2.4. Effect of Internal Product Innovation on Growth of SMES

Internal Product Innovation focuses on innovative changes within the organization to address the needs of the organization and the wider market. The changes might be small or large; or may focus on the structures within a firm's team; or may be a change in in the production process with the aim of increasing efficiency. Internal Product Innovation can also be a change in the financial or technology systems in the organization. SMEs indicated the extent to which the agreed that various aspects of internal product innovation affected their growth. They provided responses in Section B of the questionnaire which had 13 items with options in which 1= Not at all, 2= little extent, 3=Moderate extent, 4=Great extent, 5=Very great extent. The mean, standard deviation and Cronbach's alpha were calculated.

Table 4. 8: Effect of Internal Product Innovation on Growth

INTERNAL PRODUCT INNOVATION	MEAN	SD
The business focuses only on things it can sustain	4.10	0.85
The business spends resources on ideas for market leadership	4.04	0.80
The business builds strategic alliances on new projects	4.04	0.77
Speed in implementing change is highly valued	3.91	0.81
The business regularity updates products and processes	3.91	0.85
Employees are allowed to collaborate and to experiment	3.89	0.88
Workers are always trained on new product marketing skills	3.89	1.02
Employees have freedom to take action towards perfect outcomes	3.85	0.87
There are effective of communication channels for innovations	3.81	0.90
Organizational structure keeps adjusting to internal needs	3.77	0.75
The business has its own unique products availed for customers	3.68	0.89
There are methods of detecting whether a new product is profitable	3.21	0.97
There are unique ways of delivering products to customers	3.00	1.27
GRAND MEAN	**3.78**	
CRONBACH'S ALPHA	**0.7362**	

Source: Research Data (2019)

Table 4.8 indicates that SMEs most strongly agreed that their business focused only on things it can sustain (Mean = 4.10, σ = 0.85); that the business spent resources on ideas for market leadership (Mean = 4.04, σ = 0.80); and the business built strategic alliances on new projects (Mean = 4.04, σ = 0.77). The SMEs least strongly agreed that they have their own unique products availed for customers (Mean = 3.68, σ = 0.89); that they have methods of detecting whether a new product was profitable (Mean = 3.21, σ = 0.97); and that they have unique ways of delivering products to customers (Mean = 3.00, σ = 1.27). The grand mean was 3.78 indicating general agreement that Internal Product Innovation contributed to firm growth. The Cronbach's Alpha was 0.7362 indicating that the responses were reliable. In the regression analysis the coefficient of Internal Product Innovation was 0.3471 (t = 2.7856, p = 0.00670391) which was statistically significant showing Internal Product Innovation improved business growth.

4.2.5. Effect of External Product Innovation on Growth of SMES

External Product Innovation refers to changes in an organization that directly impact on the consumer of the products of a firm. The change may focus on introducing new systems of service, or the putting into place a new product line to better meet your customers' requirements. External product innovation also arises from firm owners' expectations regarding the firm as regards its objectives and profitability. SMEs indicated the extent to which the agreed that various aspects of external product innovation affected their growth. This was done in Section C of the questionnaire which had 14 items each with five options in which 1= Not at all, 2= little extent, 3=Moderate extent, 4=Great extent, 5=Very great extent. The mean, standard deviation and Cronbach's alpha were calculated.

Table 4. 9: Effect of External Product Innovation on Growth

EXTERNAL PRODUCT INNOVATION	MEAN	SD
There is a strong policy in place to collaborate with other firms	4.31	0.68
The business has an active website for external interaction	4.07	0.86
The firm is always open to contributions from external sources	4.01	0.83
The business sends out scouts to assess moves by competitors	3.99	0.73
The business frequently uses IT to buy or sell products	3.96	0.93
There are mechanisms to change the supply chain if need be	3.93	0.85
There are contracts with other businesses for product repackaging	3.91	0.79
The business adopts new products designed by other businesses	3.88	0.89
Time is spent with the external partner to discuss new business	3.84	0.98
The business increasingly uses automation in selling to customers	3.83	0.86
The business supports external agents who bring in new ideas	3.67	0.91
There are rewards for technologies well implemented	3.27	1.27
The business participates in pooled R&D/product development	3.22	1.29
GRAND MEAN	**3.84**	
CRONBACH'S ALPHA	**0.7271**	

Source: Research Data (2019)

Table 4.9 shows that SMEs most strongly agreed that they have strong policies in place to collaborate with other firms (Mean = 4.31, σ = 0.68); that they have active business websites for external interaction (Mean = 4.07, σ = 0.86); and that they are always open to contributions from external sources (Mean = 4.01, σ = 0.83). The SMEs least strongly agreed that they support external agents who bring in new ideas (Mean = 3.67, σ = 0.91); that they have rewards for technologies well implemented (Mean = 3.27, σ = 1.27); and that they participates in pooled R&D/product development (Mean = 3.22, σ = 1.29). The grand mean was 3.84 indicating general agreement that external product innovation contributed to firm growth. The Cronbach's Alpha was 0.7271 indicating the responses were reliable. In the linear regression analysis, the coefficient of external product innovation was -0.1438 (t = -1.1713, p =

0.24504705) which was not statistically significant. This indicates that external product innovation contributed negatively to growth of the SMEs.

4.3. Discussion of Results

The general objective of this study was to determine the contribution of product innovation on the growth of Small and Medium Enterprises (SMEs) in the petroleum industry in Nairobi County. The study generally established that product innovation did not strongly predict changes in the growth of the SMEs. The specific contribution of internal and external product innovation are discussed below.

4.3.1. Effect of Internal Product Innovation on Growth

The first specific objective of the study was the determination of the contribution of internal product innovation on the growth of SMEs in the petroleum industry. This study established that internal product innovation positively contributes to growth. SMEs focused only on things they could sustain, spent resources on ideas for market leadership and built strategic alliances on new projects. However, they did not have their own unique products and were unable to detect early enough whether a new product was.

The findings agree with those of Ndemezo & Kayitana (2017) who studies innovation in Rwandese manufacturing firms and showed that innovation contributed to performance. The findings also agree with those of Zhou & Wu (2010) who demonstrated that product innovation contributed to the growth of a firm. The findings also agree with those of Bianchini, Pellegrino, & Tamagni (2016) explored the relations between sales growth and innovation in Spanish manufacturing firms and confirmed that innovation improved growth through sales.

4.3.2. Effect of External Product Innovation on Growth

The second specific objective of the study was the determination of the effect of external product innovation on the growth of Small and Medium Enterprises (SMEs) in the petroleum industry. The study established that external product innovation negatively contributes to growth of SMEs. The SMEs had strong policies for collaboration, had active websites for external interaction and were open to contributions from external sources. However, they did not have strong support mechanisms for external agents who bring in new ideas. They also did not reward excellent implementation of technology and did not participate in pooled R&D/product development.

The findings agree with those of Karabulut (2015) who explored how types of innovation affected the performance of firms in Kabul. In the study he established that innovation did not always improve the performance of a firm, but could also worsen its performance. For instance, in their study, marketing innovation worsened learning and growth. However, the findings of this study differ with those of Zhou & Wu (2010) who demonstrated that product innovation contributed to the growth of a firm except in situations where there is excess use of technology which impeded growth of firms.

CHAPTER FIVE
SUMMARY CONCLUSIONS AND RECOMMENDATIONS

5.1.   Introduction

The chapter provides study summary and draws conclusions. Further, it points out shortcomings of the research. It also makes suggests areas for further research.

5.2.   Summary of the Study

From data analysis it was noted that in general the SMEs were growing. The analysis also shows that customers were increasingly getting satisfied with petroleum products sold by SMEs; that the image of the businesses were improving; and that the number of business collaborating partners was increasing. However, sales volumes had been not been increasing as expected, employee retention rate was not very high and inquiries about their products was not increasing as expected.

As regards effect of internal product innovation on growth analysis shows that internal Product Innovation contributed positively to business growth. More specifically, an SME focused only on things it can sustain; there was expenditure of resources on ideas that strive for market leadership; and the business built strategic alliances on new projects. The SMEs indicated that that they did not have their own unique products availed for customers; that they did not have methods of detecting whether a new product was profitable; and that they did not have unique ways of delivering products to customers.

Regarding effect of external product innovation on firm growth data analysis shows that external product innovation contributed negatively to growth of the SMEs. The SMEs, however, have strong policies in place to collaborate with other firms; they have active business websites for external interaction; and are always open to contributions from external sources. The firms do not support external agents who bring in new ideas, neither do they have rewards for

technologies well implemented and neither do they participates in pooled R&D/product development.

5.3.   Conclusions of the Study

From data analysis the study the conclusion is that the SMEs in petroleum industry were growing. This is supported by the fact that customers were increasingly getting satisfied with petroleum products sold by the SMEs, the improving image of the SMEs and that the increasing collaboration among them. However, the growth is hampered by unimpressive increase in sales volumes, low employee retention rate and low numbers of customers making inquiries about their products.

With regard to internal product innovation, the study concludes that internal product innovation contributes positively to business growth. The SMEs are focusing only on things it can sustain, spend more on market leadership and on strategic alliances on new projects. However, they do not have their own unique products availed for customers and do not have the technology to enable them to detect early enough whether a new product is profitable. Further, they do not have unique ways of delivering products to customers.

Regarding external product innovation the study concludes that external product innovation is not contributing favourably to growth of the SMEs. This is despite SMEs having strong policies on collaboration with other firms and even having in place active business websites for external interaction. This is also despite being open to contributions from external sources.   However, the SMEs do not support external agents who bring in new ideas and do not have ways of rewarding good implementation of technologies. Further, they do not participates in pooled R&D/product development.

5.4.   Recommendations of the Study

i.   With regard to internal product innovation, the study recommends that SMEs put in place innovative mechanisms that will maintain and/or improve growth. The SMEs should continue focusing only on things they can sustain. The SMEs should invest more on market leadership and on strategies to create strategic alliances on new projects. SMEs should focus on providing unique petroleum products in unique ways to customers and put in place effective ways of detecting the profitability of innovations.

ii.   Regarding external product innovation the study recommends the strengthening of external product innovation to enable it contribute favourably to growth of the SMEs. The strong policies on collaboration with other firms should be strengthened and their use of business websites for external interaction enhanced. The firms should be more open to contributions from external sources. The SMEs should put in place policies to include external agents in innovation and encourage proper implementation of technologies. The SMEs should look for ways to participate in pooled R&D/product development.

5.5.   Implications of the Study

This section discusses study implications. It therefore, focuses on implication for knowledge, for practice and industry and for policy.

5.5.1. Implications for Knowledge

Regarding knowledge, this study implies that innovation is not a strong predictor of growth among SMEs in Kenya's petroleum industry. Though the SMEs attempt to employ internal product innovation in their growth strategy, external product innovation seems to contribute little to this strategy.

5.5.2. Implications for Practice and Industry

With regard to practice and industry the findings imply that product innovation can be effectively classified as internal and external. SMEs in Kenya's petroleum industry have fairly harnesses internal product innovation as a channel of growth. However, the use of external product innovation as a channel of growth is still weak. Innovative SMEs in Kenya's petroleum industry can now turn to external product innovation for competitive advantage.

5.5.3. Implications for Policy

Regarding policy in Kenya's petroleum industry, the study established that the current policies in the business's external environment are unfavourable to SMEs and are negatively contributing to their growth. The implication is that policies in the external environment are making it challenging for SMEs to compete in the petroleum market. A review of policy is necessary to aid the SMEs in order to improve their contribution to Kenya's development.

5.6. Limitations of the Study

The study is limited, first, by its descriptive nature. The use of primary data which the researcher collected using a self-administered questionnaire subjects the findings to respondents' opinions and biases. This means the accuracy of the findings is subject to how accurately the respondents from the SMEs provided the required data.

Secondly, the study has limited generalizability across time, within the within the whole petroleum industry in the whole country and beyond Kenya's borders. Due to the dynamic nature of innovation, the findings of this study might hold for a short period of time. The findings have only focused on SMEs in Nairobi City indicating they may not apply in the other 46 counties or the whole country. The findings may also not be applicable to SMEs outside petroleum industry. Further, it may be challenging to apply the findings outside the country given the variations in petroleum business environment across countries.

5.7.   Areas Suggested for Further Research

A longitudinal study can be done to assess how the relationship between internal and external product innovation and growth manifest as time passes. Secondary data can be used to control bias. The study can be done to include SMEs in the petroleum industry at national level and possibly in the East African region.

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APPENDICES

Appendix 1: Letter of Introduction

October 20, 2019.

P.O. Box 27157 -00100

Nairobi, Kenya.

Dear Respondent,

RE: COLLECTION OF RESEARCH DATA

I am an MSc student at the University of Nairobi undertaking a research on entrepreneurship in the petroleum industry in Nairobi County. The questionnaire issued to you is for collecting data. Kindly complete the questionnaire honestly. Do not indicate your name anywhere. The information obtained will be treated with utmost confidentiality. Your cooperation will be highly appreciated.

Thank you in advance.

Yours Sincerely,

Jimmy Mugithi

Researcher.

Appendix 2: Questionnaire

SECTION A

GENERAL INFORMATION

Complete this section by filling in the spaces or ticking (✓) as guided

1. Indicate the closest estimate of the total value of the business' assets (tick one)

Less than Ksh. 1 million	
Between Ksh 1 Million and Ksh 3 million	
Between Ksh 3 Million and Ksh 5 million	
More than Ksh. 5 million	

2. Indicate an estimate of the size of the business' labour force (tick one)

10 workers or less	
11 to 49 workers	
50 to 150 worker	

3. Indicate the sub county the business is located in (tick one)

Dagoretti North	Dagoretti South	Embakasi Central	Embakasi East	Embakasi North	Embakasi South
Embakasi West	Kamukunji,	Kasarani	Kibra	Langata	Makadara
Mathare	Roysambu	Ruaraka	Starehe	Westlands	

4. For how long has the business been operational (tick one)

Less than 5 years	
5 to 10 years	
10 to 20 years	
Over 20 years	

5. Indicate the ownership of the business

Sole Proprietorship	
Partnership	
Limited Company	

Indicate the extent to which you agree that you use each of the approaches below to influence growth of the business by ticking (✓) one option per item

(1= Not at all, 2= little extent, 3=Moderate extent, 4=Great extent, 5=Very great extent)

INTERNAL PRODUCT INNOVATION	1	2	3	4	5
Employees are allowed to collaborate and to experiment					
Speed in implementing change is highly valued					
Employees have freedom to take action towards perfect outcomes					
The business focuses only on things it can sustain					
The business spends resources on ideas for market leadership					
The business builds strategic alliances on new projects					
The business regularity updates products and processes					
There are effective of communication channels for innovations					
Organizational structure keeps adjusting to internal needs					
The business has its own unique products availed for customers					
There are unique ways of delivering products to customers					
There are methods of detecting whether a new product is profitable					
Workers are always trained on new product marketing skills					

What other Internal Product Innovation does the business have and that contribute to its growth?

_____

_____

_____

_____

_____

_____

SECTION C

Indicate the extent to which you agree that you use each of the approaches below to influence growth of the business by ticking (✓) one option per item

(1= Not at all, 2= little extent, 3=Moderate extent, 4=Great extent, 5=Very great extent)

EXTERNAL PRODUCT INNOVATION	1	2	3	4	5
There is a strong policy in place to collaborate with other firms					
The firm is always open to contributions from external sources					
The business supports external agents who bring in new ideas					
The business participates in pooled R&D/product development					
There are rewards for technologies well implemented					
Time is spent with the external partner to discuss new business					
The business adopts new products designed by other businesses					
The business frequently uses IT to buy or sell products					
The business increasingly uses automation in selling to customers					
The business has an active website for external interaction					
The business sends out scouts to assess moves by competitors					
There are mechanisms to change the supply chain if need be					
There are contracts with other businesses for product repackaging					

What other External Product Innovation does the business have and that contribute to its growth?

_____

_____

_____

_____

_____

_____

_____

SECTION D

Indicate the extent to which you agree with the following regarding the growth of the business by ticking (✓) one option per item

(1= Not at all, 2= little extent, 3=Moderate extent, 4=Great extent, 5=Very great extent)

BUSINESS GROWTH	1	2	3	4	5
Sales volumes have been significantly increasing					
Sales revenues have been significantly increasing					
It is easier to acquire a new customer					
The business has a high customer retention rate					
The book values of assets have been significantly increasing					
Customers are increasingly satisfied with products					
The presence of the business in the market is growing					
Profits have significantly increased					
There is a high employee retention rate					
Inquiries about your products are increasing in number					
The number of repeat purchases is increasing					
The image of the business has been improving					
The number of business collaborating partners is increasing					
The labour force has been growing					

What other indications show the business is growing?

_____

_____

_____

_____

_____

_____

Appendix 3: Regression Analysis Data

(Source: Prepared by Researcher)

Internal Product Innovation (X_1)	External Product Innovation (X_2)	Firm Growth (Y)
3.54	3.15	4.21
3.92	3.77	4.57
3.31	3.77	4.21
3.69	3.54	4.50
3.31	3.38	4.14
3.85	3.62	4.21
3.00	3.31	3.14
2.85	3.38	3.71
3.69	3.85	3.93
3.69	3.38	4.29
3.92	3.69	4.21
2.92	3.08	3.29
3.69	3.69	4.00
3.62	3.00	4.71
3.92	3.77	4.00
3.62	3.31	4.07
3.85	3.85	4.14
2.62	3.62	2.93
3.85	3.00	4.21
3.92	3.46	4.07
3.69	2.92	4.07
3.15	3.62	2.43
4.08	3.62	3.86
3.38	3.69	4.07
3.31	4.69	4.36
3.38	4.08	3.86
3.62	3.62	4.14
3.38	4.38	4.14
4.08	3.69	4.36
3.69	4.62	4.29
4.15	3.46	4.50
3.38	3.62	3.86
3.46	3.54	3.29
4.31	4.23	3.43
4.15	4.00	4.21
3.54	4.08	3.50
4.00	4.54	3.79
4.46	4.31	3.64
4.15	4.31	3.57
3.62	4.00	3.14

Appendix III Cont.

Internal Product Innovation (X_1)	External Product Innovation (X_2)	Firm Growth (Y)
4.00	4.31	3.43
3.23	3.23	3.21
3.08	3.08	3.21
3.92	4.38	3.86
3.92	4.00	3.64
3.92	4.54	3.43
3.46	2.92	3.14
3.23	3.92	3.79
4.08	4.31	2.93
3.54	4.08	3.50
4.15	3.92	3.64
3.85	4.23	3.86
2.62	2.85	3.93
3.85	4.15	3.36
3.77	4.00	4.00
3.46	4.00	3.43
3.00	3.08	3.86
3.85	4.15	3.50
4.38	4.38	3.21
3.69	4.08	4.00
4.00	4.00	4.21
3.92	3.77	3.14
4.23	4.00	3.29
4.31	3.31	4.14
4.23	3.38	3.93
4.69	4.15	4.07
3.85	3.85	3.86
4.08	4.00	3.29
3.77	4.00	3.93
4.23	4.23	3.86
4.62	4.23	4.50
3.85	4.38	4.29
3.77	4.62	4.36
4.77	4.38	4.43
4.31	3.92	4.07
3.92	4.38	4.00
4.08	3.85	4.00
4.38	3.92	3.86
4.00	4.23	4.36
4.38	4.00	4.29
3.77	4.00	4.36

Appendix 4: University of Nairobi Research Permit

UNIVERSITY OF NAIROBI
COLLEGE OF HUMANITIES & SOCIAL SCIENCES
SCHOOL OF BUSINESS

Telephone: 4184160-5 Ext 215
Telegrams: "Varsity" Nairobi
Telex: 22095 Varsity

P.O. Box 30197
Nairobi, KENYA

30 October 2019

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

INTRODUCTORY LETTER FOR RESEARCH
THIONG'O JIMMY MUGITHI- REGISTRATION NO.D6(/87282/2016

This is to confirm that the above named is a bona fide student in the Master of Science in Entrepreneurship and innovations management (Msc. Entrepreneurship and innovations management) option degree program in this University. He is conducting research on *"Influence of Product Innovations on Growth of Small and Medium Enterprises in Petroleum Industry in Nairobi County."*

The purpose of this letter is to kindly request you to assist and facilitate the student with necessary data which forms an integral part of the research project. The information and data required is needed for academic purposes only and will be treated in **Strict-Confidence**.

Your assistance will be highly appreciated.

Thank you.

for

Jane Muturi
For: MSc. Entrepreneurship and innovations management Co-ordinator
School of Business

Appendix 5: NACOSTI Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: 480698

Date of Issue: 01/November/2019

RESEARCH LICENSE

This is to Certify that Mr.. Jimmy Thiong'o of University of Nairobi, has been licensed to conduct research in Nairobi on the topic: INFLUENCE OF PRODUCT INNOVATIONS AND TECHNOLOGY ON GROWTH OF SMALL AND MEDIUM ENTERPRISES IN PETROLEUM INDUSTRY IN NAIROBI COUNTY IN KENYA for the period ending : 01/November/2020.

License No: NACOSTI/P/19/2578

480698

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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