

**THE EFFECT OF CUTTING-EDGE TECHNOLOGY ON
FIRM PERFORMANCE: A CASE OF SEVENSEAS
TECHNOLOGIES GROUP**

BY

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UNITED STATES INTERNATIONAL UNIVERSITY – AFRICA

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**A Research Project Report Submitted to the Chandaria School of
Business in Partial Fulfillment of the Requirements for the
Degree of Masters of Business Administration (MBA)**

UNITED STATES INTERNATIONAL UNIVERSITY – AFRICA

SUMMER 2018

STUDENT'S DECLARATION

I, the undersigned, declare that this is my original work and has not been submitted to, any other college, institution or university other than the United States International University in Nairobi for academic credit.

Signed: _____

Date: _____

Pauline Wanjiku Njaramba (ID NO: 653013)

This project has been presented for examination with my approval as the appointed supervisor

Signed: _____

Date: _____

Prof. Paul Katuse

Signed: _____

Date: _____

Dean, Chandaria School of Business

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ABSTRACT

The general objective of this study was to establish the effect of cutting-edge technology on firm performance. The specific objectives were; to determine the effect of product innovation on performance of the firm, to investigate the influence of service innovation on performance of the firm: to determine the effect of process innovation on performance of the firm and finally; to establish the effect of management innovation on performance of the firm.

The study adopted descriptive research design. This research design was deemed appropriate as the study sought to examine the effect of cutting-edge technology on firm performance. Stratified random sampling technique was used in the selection of sample elements from the sampling frame. The study used primary data which was collected with the aid of a self-administered semi-structured questionnaire. Descriptive statistics such as frequency distribution were used to analyze the data. Data presentation was done using percentages and frequency tables. The sample of the study was a total of 100 employees at Seven Seas Technologies Group. From the study, 60 out of 100 sample of the employees filled in and returned the questionnaire contributing to 60% response rate.

The correlation coefficient of the first objective ($r=0.714$, $p<0.001$) indicated that there was a strong positive correlation between product innovation and firm performance. The coefficient of determination value $R=0.510$ implied that the changes in firm performance is explained by 51.0% of the variations in product innovation. The correlation between service innovation and firm performance ($r=0.796$, $p<0.001$), indicated a strong relationship. The coefficient of determination value was $R=0.634$ which indicated that the changes in firm performance is explained by 63.4% of the variations in service innovation. The relationship between process innovation and firm performance was highly correlated where the correlation coefficient was ($r=0.625$, $p<0.001$) indicating a strong relationship. The coefficient of determination value $R=0.391$ indicated that the changes in firm performance is explained by 39.1% of the variations in process innovation. Lastly, the correlation between management innovation and firm performance was highly correlated where the correlation coefficient was ($r=0.528$, $p<0.001$) indicating a strong relationship. The coefficient of determination was 0.279 indicating that changes in the firm performance is explained by 27.9% of the variations in management innovation.

The relationship between product innovation and firm performance indicated a strong positive correlation between product innovation and firm performance. The relationship between service innovation and firm performance indicated a strong correlation between service innovation and firm performance. The relationship between process innovation and firm performance was highly correlated indicating a strong relationship. Lastly, the relationship between management innovation and firm performance was highly correlated indicating a strong relationship.

The study recommended that managers of the firms should consider increasing product innovation budgets. With higher innovation intensity, firms can develop new market offerings more thoroughly by intensive testing and prototyping with customers. Secondly, the study recommended to the government to provide incentives for research and development for researchers to continue to invest their time and skills in discovering more service innovations in the firms. Thirdly, the study recommended that managers in the company should focus on improving innovation at firm process level to achieve superior performance over time. Lastly, researchers should be encouraged to develop and study the same topics about the external and internal factors of management impacting on innovation activities or the effect of management innovation activities on firm performances. Future research studies should therefore be undertaken to incorporate a larger number of firms in the study so assess the impact on the firms which will give more insights for the different firms.

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DEDICATION

I dedicate this work to the Almighty God for giving me the strength, wisdom and good health. A special tribute also goes out to my family members who have encouraged and supported me throughout this study.

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LIST OF ABBREVIATIONS AND ACRONYMS

ANOVA:	Analysis of Variance
IT:	Information Technology
MS:	Microsoft Excel
RBV:	Resource-Based View
R&D:	Research and Development
SST:	Seven Seas Technologies
SPSS:	Statistical Packages for Social Sciences

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Over the last few years extraordinarily important socio-economic phenomenon has changed the corporate world today. As competitive pressures increase, the need to continuously adapt, develop and innovate has become a basic building block for organizational performance. Most industry analysts agree that innovation is the key to successful competition (Karagouni & Papadopoulos, 2016). At the same time, researchers in the areas of sustainable competitive advantage have come to the conclusion that one of the critical things that give an organization a sustainable edge, are the development of core capabilities which includes the use of cutting-edge technology (Brown, 2015). According to Fenny and Rodgers (2013), studies have rarely incorporated the concept of cutting-edge technology capabilities in understanding the links between technological capabilities and firm performance.

Most recent studies have advocated different technological innovation capabilities and discussed their impact on a firm's performance. According to Freeman (2009), adoption of cutting-edge technology with the aim of improving firm performance includes technical, design, manufacturing, management and commercial activities involved in the marketing of a new or improved product or service. Afuah (2016) suggests that cutting-edge technology or innovations do not have to be breakthroughs or paradigm shifting. However, to realize a better firm performance the overall management of technological innovation includes the organization and direction of human and capital resources towards effectively creating new knowledge, generating ideas aimed at new and enhanced products, manufacturing processes and services (Guan & Ma, 2008).

Cutting-edge technology adoption represents the ability of the firm to combine efficiently a number of resources, to engage in productive activity and attain improved firm performance. Despite the potential benefits of cutting-edge technology, there is debate about whether and how their adoption improves firm performance. From this perspective, use of cutting-edge technology would be expected to be closely linked to firm performance. Kariuki (2005) argues that there exist positive impacts of cutting-edge technology on firm performance.

Cutting-edge technology is a special asset of a firm (Christensen, 2010). Cutting-edge technological assets can be classified based on the use of technology in scientific research, process innovations, product innovations and aesthetic design assets and the need of the combination of more than one of these types for a company to be successfully innovative (Tyabji, 2000). Researchers have acknowledged that, among the major factors impacting economic progress in today's global business atmosphere is the transmission and application of latest technologies in organizations. Cutting-edge technological investments signify the major money expenditure items on several firms and possess a significant effect on performance. Scientific investigation and advancement of latest technologies alone does not guarantee complete technological improvement (Zehir, Muceildili, & Akyuz 2010).

Firms, in order to improve performance, attempt to improve their infrastructure investment in capital, new cutting-edge technology and acquiring new machinery and equipment (Stergios & Prodromos, 2012). Investment in physical, capital, and specific plant and machinery, information technology is associated with the adoption and diffusion of the latest cutting-edge technologies key to improving performance. According to Piana (2004), technological investment within the firm can be classified as information technology investment, operational technology investment, administrative technology investment and advanced manufacturing technology investment. To sustain in encountering the rapidly changing environments, technological change and globalization, firms require recurring technological innovation to continuously retain their competitiveness and firms to face new challenges (Cheng & Liu, 2012).

In Kenya's dynamic environment with its rapid changes, tangible assets have become easily reachable, imitable, and interchangeable. It is essential for a firm to improve its competitiveness and to manage its external resources. As such, competitive pressures, the need to continually adapt, develop and innovate has become important for firms to have superior performance. According to Yam, Guan, Pun, and Tand (2004) in a dynamic environment, an inability to innovate eventually causes businesses to deteriorate and firms to go out of business. In accordance, scholars have emphasized that while facing rapidly changing environments, firms need recurrent technological innovation to continually maintain their competitiveness (Bolo, 2011).

While there are several definitions of firm performance in the literary works, but the simplest definition is to measure productivity. Vorhies and Morgan (2005) defined firm performance as a three-dimensional construct that comprises the dimensions of customer satisfaction, market efficiency and corporate profitability. Furthermore, the performance measurements and its indicators were variously described by different scholars. Tze and Boon (2008) discussed performance measurement as a periodic measurement of improvement towards a long and short period goals and revealing of the outcomes to the decision makers so as to enhance program performance. Heshmati and Loof (2008) stated that a measure of firm performances consists of financial and operational performance. Firm performance is measured with the return on investment and cost reduction in a study of the relationship between technology investment and firm performance.

Firm performance may be measured by different indicators, such as internal measures of efficiency and productivity, outcome measures like profit, marketing measures such as market share. Previous studies have used both hard performance measures, i.e. financial outcomes such as return on assets, market share, sales, and other financial ratios; and soft measures of performance, including innovation, learning, and customer satisfaction (Shen & Gentry, 2010). Dess and Robinson (2012) suggested that performance could be measured either objectively or subjectively. While objective measurements in general relied on financial data, subjective measurements depended upon managerial assessments. Kaplan and Norton (2004) set up an approach of Balance Scorecard that interprets and transforms a firm's mission and strategy into a full set of performance measures.

Measurement of performance of large firms is based on both quantitative and qualitative performance indicators. Valuating the direct effect of cutting-edge technology outputs on firm performance, without considering the inputs, could overestimate the effect. According to Bolo (2011), not only the innovation inputs or outputs that determine the effect on firm performance; rather, the key for increasing the firm performance through innovation activities is the efficiency of the type of technology adopted. According to Kariuki (2005) stated that the adoption of various types of innovation has a positive impact on the performance of the firm. Hence, a conclusion can be drawn that cumulative adoption of cutting-edge types over time has a positive relation with firm performance.

Seven Seas Technologies (SST) Group is one of Africa's fastest growing, diversified ICT businesses. Award-winning and visionary entrepreneur, Mike Macharia, founded the company 19 years ago in 1999. SST is a leading provider of integrated business and technology solutions to customers, spanning the Healthcare, Homeland Security and Social Services spaces; three of the African continent's most-needed areas of improvement. The Company utilizes technology through innovation to deliver products that enhance efficiency in service delivery in the private and public sector, by targeting sectors that have the greatest transformational impact in Kenya and Africa.

As a corporate innovative leader, SST is evolving with Kenya's changing healthcare needs. In the field of healthcare, SST has been involved in deploying national wide cutting-edge medical infrastructure, health care programs and solutions for enhanced management of healthcare institutions and resources including; turnkey healthcare project management, healthcare information technology and deployment of end to end health information systems. SST also has recently partnered with General Electric Healthcare through the Kenya Ministry of Health's managed equipment services project for the installation and upgrading of medical infrastructure in ninety-eight hospitals distributed in the forty-seven Counties in Kenya. SST is also working on transformative oncology and laboratory diagnostic programs that focus on affordable, accessible and quality healthcare delivery. Additionally, SST will deploy and manage fully self-contained, customizable container clinics, which will be positioned as a triage service and primary healthcare provider throughout Kenya.

Seven Seas Technologies Group is equipped with the latest technologies and expertise offering professional Information Technology training through the Knowledge Transfer Centre. The company empowers both IT professionals and companies that invest in technology to derive maximum benefit from technology as well as effectively meet the needs of their employers and customers using technology.

1.2 Statement of the Problem

Cutting-edge technology capabilities are viewed as a comprehensive set of elements of a firm that facilitates and supports its technological innovation strategies (Burgelman, 2009) in the business environment and successful use of these capabilities to sustain firm performance. Adopting the use of cutting- edge technology allows firms to improve their competitive edge in terms of diminishing costs, achieving a strong reputation among customers and raising their competitiveness in international markets. These advantages may, in turn, positively impact on the firm's overall performance (Kamukama, Ahiauzu, & Ntayi, 2010). However, scientific investigation and advancement of latest technologies alone does not guarantee complete firm performance (Shan & Jolly, 2012).

A study by Kamukama, et.al, (2010), a two-staged approach was used to model the firm-level performance measures based on the use of cutting-edge technology. Competitive advantage was directly influenced by the four intangible resources under consideration. A study by Baldwin and Sabourin (2012) that links cutting-edge technology use with firms that were using new computer-driven advanced technologies established that the firms experienced greater performance. Aduda and Kingoo (2012) investigated the relationship between cutting-edge technological innovation and bank performance concluded that there exists positive relationship between cutting-edge technological innovation and bank performance. Nyawembe (2011) conducted a study on factors hindering the adoption of cutting-edge technology innovation by commercial banks in Kenya and established that change, internal politics and fear of cannibalizing existing products hindered adoption of cutting-edge technology.

The issues of cutting-edge technology and its relationship with firm performance in Kenya is an area of study that has not been properly researched on. There is inadequate investigation focusing on cutting-edge technology and firm's performance particularly in Kenya. The majority of published studies in journals and periodicals dwell mainly on information technology investment and firm performance, advanced manufacturing technology investment and firm performance and investment in human resources management and firm performance. This study therefore aimed at filling this gap by determining the effect of cutting-edge technology on firm performance.

1.3 General Objective

The general objective of this study was to establish the effect of cutting- edge technology on firm performance in Kenya.

1.4 Specific Objectives

1.4.1 To determine the effect of Product Innovation on the Performance of Seven Seas Technologies Group.

1.4.2 To investigate the influence of Service Innovation on the Performance of Seven Seas Technologies Group.

1.4.3 To determine the effect of Process Innovation on the Performance of Seven Seas Technologies Group.

1.4.4 To establish the effect of Management Innovation on the Performance of Seven Seas Technologies Group.

1.5 Scope of the Study

This research was limited to Seven Seas Technologies Group headquarters based at Riverside Office Park Riverside drive, Nairobi. Other organizations were not studied due to financial and time constraints. The population of the study was drawn from Seven Seas Technologies Group employees and managers. The study was conducted for a period of six months from January 2018 to June 2018.

1.6 Significance of the Study

1.6.1 Seven Seas Technologies Group

The findings of this research will be vital to the management of Seven Seas Technologies Group as it will provide information on how to improve performance and how to remain competitive in the industry.

1.6.2 Academicians and Researchers

This research will be significant to researchers and academicians who are interested in examining the extent to which cutting-edge technology influences firm performance. Scholars who wish to extend the research on this area of study will use research as a reference point.

1.6.3 Investors

This research will shed light on individuals who want to know what Seven Seas Technologies Group is offering and what is the best deal in the market. They will be

informed on whether they can get true value for their money and making wise investment decisions.

1.7 Definition of Terms

1.7.1 Firm Performance

Firm performance is a three-dimensional construct that comprises the dimensions of customer satisfaction, market efficiency and corporate profitability (Vorhies & Morgan, 2005).

1.7.2 Management Innovation

Management innovation is defined as the invention and implementation of a management practice, process, structure or technique that is new to the state of the art and is further intended to further organizational goals (Hamel, Birkinshaw, & Mol, 2008).

1.7.3 Product Innovation

Product innovation is the development of new products, making changes in the current product design or using new techniques and means in the current production methods (Johannssen, Oslen, & Lumpki, 2014).

1.7.4 Process Innovation

Process innovation is a type of innovation that leaves product characteristics unchanged while lowering the cost of production of one unit of a product (Adner & Levinthal, 2001).

1.7.5 Service Innovation

This process of value creation provides organizations with an enhanced opportunity and ability to deliver elevated service offerings resulting in service innovation (Agarwal & Selen, 2014).

1.8 Chapter Summary

This chapter introduced the study by explaining the background of the problem followed by the problem statement which explained why the study was carried out. It also covered the general objective of the study, the specific objectives, scope and significance of the study and definition of terms. The next chapter is literature review which gave an account of what other authors have said about the subject matter. After the literature review, chapter three followed which explained the methodology of the research that was adopted. Results and findings were discussed in chapter four while chapter five provided the summary, discussions, conclusions and recommendations of the study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter reviewed literature based on the study topic which was to establish the effect of cutting edge technology on firm performance. The literature review was based on the research objectives which were; to determine the effect of product innovation on the performance of Seven Seas Technologies Group, to investigate the influence of service innovation on the performance of Seven Seas Technologies Group, to determine the effect of process innovation on the performance of Seven Seas Technologies Group and to establish the impact of management innovation on the performance of Seven Seas Technologies Group.

2.2 Product Innovation and Firm Performance

2.2.1 Relationship between Product Innovation and Firm Performance

Product innovation is considered as one of the success features in firms, it is regarded as the basic element to reach customer satisfaction and to realize their desires (Reguia, 2014). The continuance and the persistence of any company depends on its capacities to maintain its market place and face the competition which spreads rapidly and aggressively with the globalization and the expansion of the new technologies, and while product reflects the company's image its whole success depends also on the product success through realizing consumers desires and needs, and developing new products (Rainey & Fernandez, 2006). Product innovation is the development of new products, making changes in the current product design or using new techniques and means in the current production methods (Johannssen, Oslen, & Lumpki, 2014).

From a competitive perspective, product innovation can be seen as a tool for achieving a competitive advantage, alongside other tools such as price reductions on existing products, the development of new customer services, and new communication and distribution programs (Artz, 2010). The competitive advantage created by product innovation manifests itself in the speed and magnitude of market acceptance. In the longer term, the sustainability of the competitive advantage is reflected by the market share which the innovative product is able to maintain against follower products launched by competitors. Major product innovations often provide the basis for an existing or new

firm. According to Reinhard (2014), evaluating the sustainability of a competitive advantage due to innovation at the business level typically requires a longer-term view as compared to analysing a specific product innovation. Empirical studies have established a close link between product innovations and competitive advantage (Ahmed & Shepherd, 2010).

Organisations can gain competitive advantage only by managing effectively for today while simultaneously creating product innovations for tomorrow (Hamel & Green, 2007). Martín-de Castro (2013) argues that developing successful product innovations is essential for creating and sustaining an organisation's competitive advantage. According to Zemplerova (2010) the expenditures on research, development and introduction of product innovations are the determining characteristics for gaining a dominant part of the market. Autant-Bernard (2013) shows the importance of the role of product innovation and they argue that organisation must have original strategies and support the knowledge flows from and to organisation. Product innovation activity of firms significantly influences competitiveness which is based on inimitable skills and abilities.

An organisation not capable of introducing product innovations, risks that it will fall behind, and the initiative will be taken over by its competitors as argued by Molina-Morales (2011). Kariuki (2005) asserts that entrepreneurs attempt to use product innovation on a new product or service or perhaps a new process during their production – provided they gain a strategic competitive advantage. This creates competition that does not attack profit margins or the outputs of existing organisations. The present concept of product innovations is that they represent an open approach that reaches beyond the threshold of an organisation and thus exploits not only inspections and changes in the internal environment, but also changes in the external environment. The internal environment of an organisation needs to have a suitably product innovative culture, since this type of culture is characterised by the transience of organisational structures, utilisation of specialists and temporary teams which increases the innovative potential of such organisations (Mathenge, 2013).

2.2.2 The Market Risk of Product Innovation

Product innovations are new products, but not all new products are product innovations (Davinder & Khamba, 2017). Product innovation is an important factor in increasing performance of firms. On the other hand, innovative products are characterized by many

technical and market uncertainties (Fernandes & Luiz, 2016). The increase in competitiveness through the development of innovative products is associated with high risks and management challenges due to their importance to the economic and financial development of enterprises and the uncertainties surrounding the development stages and the launch of the products. Firms may choose to abandon a product during the development stage due to the risks and the fact that they cannot determine in advance the relationship between innovation and market return (Kash & Rycroft, 2000).

Marketing strategies are a useful tool for reducing uncertainties of innovative products developed for specific audiences and new markets (McDermott & O'Connor, 2013). Competitive priorities are directed at consumers with different demands for the same product, without an alignment between the creative processes and marketing, firms may operate in the short term in conflict with their long-term interests (Fenny & Rodgers, 2013). Many product innovations have become impossible due the high degree of uncertainty in the early stages of the product development, given the high number of resources that are immobilized. In such instances it is common for the product to be redesigned many times to adjust and correct problems and concepts that could have been assessed and dealt with in the earliest stages of the project, and not during production (Cheng & Liu, 2012).

Product innovation deals with the establishment and development of a product with improved performance characteristics (David, 2006). In this context, it is expected that this project presents numerous risk factors, as well as uncertainties involved in innovative products. These uncertainties range from the design of the product to market insertion, changing expectations regarding the viability of the new product and causing sometimes the abandonment of the product during the development stage (Pennings & Lint, 2014). These risks are associated with high costs for research and development and high failure rates (Carbonell, Escudero, & Aleman, 2014).

There are many uncertainties involving new product innovations. The technical uncertainty, which occurs during the development stage, has more impact on the result of the product (Weisz, 2009). Pugh (1991) developed a model which “presents a focused approach to the development of technical uncertainties and focused on complex structured products” (1991, p.20). The development ranges through different levels of detail in the process. It begins with general specifications; then it seeks concepts that best

adhere to these specifications. It also looks into the system design and finally it goes into the detailed design of subsystems and components. The results are reassembled into a complete product, which is compared with the initial target (Bolo, 2011).

Consumers have a growing range of product options and are able to specify their desirable characteristics, it is important that the firms analyze consumer preferences before developing a new product (Fernandes & Luiz, 2016). The marketing plan is a resource available to businesses, which can contribute to the reduction of product development market uncertainty levels if there is an interaction between the areas of innovation and marketing (Aduda & Kingoo, 2012). Particularly, innovative companies that develop new products, technologies and research and development can make the use of marketing strategies to monitor the product from the beginning of the process, in order to attract customers and therefore reduce the risk associated with the new product.

2.2.3 Effect of Product Innovation on Firm Performance

Product innovation is central to the success of most companies. The rewards of a successful innovation programme are highly visible in terms of sales, profits and growth (Cooper, 1984). In spite of the growing emphasis on product innovation, most firms lack much in the way of an explicit new product strategy. Moreover, management find little help from the traditional literature in the formulation of an innovation strategy. New product innovations are critical to the growth and prosperity of the modern corporation. Facing slow growth markets, heightened competition from home and abroad, and maturing products, firms are increasingly looking to new products as the route to achieve their sales and profit objectives thus improved performance. The importance of new products to most corporations has been the topic of a number of studies in relation to firm performance (Mathenge, 2013).

Increasingly, progressive management recognise that a new product or technology strategy should be an explicit and central element of corporate strategy (Freeman, 2009). This is especially true for technologically intensive industries, such as industrial goods manufacturers in electronics, electrical, chemical and mechanical equipment fields. New product development and technology bear an integral relationship to a company's strategic thinking by helping to define the range of its choices (Afuah, 2016). For many companies, new products and technologies have become the leading edge of corporate strategy, opening new market and new business opportunities. The rapid growth of

countless firms in food processing, bio-engineering, micro-electronics and robotics is evidence of the growth potential of a well-conceived product innovative strategy (Lin, 2013).

Recognizing the strategic importance of product innovations, certain firms consciously develop new product strategies as part of their overall corporate plan (Norskov, Polymeros, Marina, 2015). Product innovation charters were described by Crawford (2012) in his study of 125 firms. He notes that firms are now beginning to pull all the multi-functional elements of a product innovation strategy together in one document, which specifies the types of markets, products, technologies and orientation the firm will pursue with its product innovation programme. A number of strategic advantages can be achieved through product innovation, such as competitive advantages, which are usually followed by greater profitability, the ability to enter new markets and the ability to revive mature businesses (Kim & Pennings, 2009).

One of the problems faced by new product strategists is that there exist few conceptual frameworks or proven methodologies for formulating a new product strategy (Cooper, 1984). Most strategic planning concepts deal with existing products and existing businesses (Burgelman, 2009). Concepts such as the strategic business unit, resource allocation models and portfolio analysis are familiar planning tools for determining strategies and resource allocation for the firm's products or strategic business units. The lacking factor in these planning processes is a systematic procedure for generating and choosing new strategic options, including new products and businesses. New product strategies can thus find little help in the traditional planning approaches (Alegre & Chiva, 2013).

2.3 Service Innovation and Firm Performance

2.3.1 Relationship between Service Innovation and Firm Performance

Services are fast overtaking manufacturing to form a dominant proportion of the world economy (Randhawa and Scerri, 2015). Service innovation is increasingly seen as a vector of sustainable growth and competitive advantage at the firm, industry and economy level. Services are increasingly dominating the world economy, contributing over 70% of employment in OECD countries and 58% of worldwide gross national product. Value in service-based organizations is created through the integration of intangible resources and capabilities such as knowledge, competences, cognitive-centric

workforce, and customer collaboration (Vargo & Lusch, 2008). This process of value creation provides organizations with an enhanced opportunity and ability to deliver elevated service offerings resulting in service innovation (Agarwal & Selen, 2014).

Service innovation is seen as a persuasive venue for organizations to create value and competitive advantage (Pitelis, 2009). With the growth of services in organizations and economy, attention has been focussed on innovation in the context of services over the last two decades. According to Noorami (2014), to be more competitive, companies constantly explore the methods, tools and services which can help them in getting competitive edge. To attain the competitive advantage companies, prefer to introduce more innovative services. Service innovation suggests how the concept of service can be improved which is already in practice. This can be either refined competence in customer relations, channel of distribution or innovation in technology (Berry, 2006).

Researchers have discussed competitive advantage under different contexts (Robert & Amit, 2003). For example, discussed that Porter (1985) said firm can achieve competitive advantage on the basis of cost, product differentiation guided by five force model and support by value chain activities of an organization that includes managerial activities like human resource, procurement, IT development that support marketing, inbound and outbound logistics. This competitive advantage is related to external environment and position the company accordingly to achieve it. Service innovation brings new products, and services that fulfill the rapidly changing customer requirements (Piana, 2004).

Customer satisfaction surveys is an effective tool used to measure service process innovation elements like to measure service process innovation element like quality, delivery time, assistance and after sales service (Day, 1994). Operational efficiency and effectiveness is also a result of process innovation. Brand image improvement, sales growth, market ranking improvement are the outcomes of process innovation as it enables firms to launch technically enhanced and innovative services with low cost and more value to meet customer needs of reliability, quality and less expensive. Barney (1991) stressed on internal dimension which include firms resource and their role in competitive advantage and its sustainability. Barney (1991) suggests that resources of firms are key players in providing sustainable competitive advantage.

Valuable, rare, imperfectly imitable, and imperfectly substitutable resources could generate sustainable competitive advantage for the firm with the pre-requisite of heterogeneity and imperfectly mobile of resources among competing firms (Nyawembe, 2011). Understanding resources of sustained competitive advantage for firms has become a major area of research (Porter, 1985). Continuous improvement in technology will provide sustainable competitive advantage. For example, the use of customer relationship management software gives comprehensive information about customer choice and preference and provides market intelligence (Kariuki, 2005).

2.3.2 Service Innovation and its Characteristics

The service sector encompasses a wide variety of activities and markets ranging from consumer services such as hotels and banks to business services such as IT and legal and large-scale public-sector services such as health and education (Afuah, 2016). The usage of technology is equally diverse such as financial services are more knowledge-intensive and use advanced information technologies (Christensen, 2010). As a result of this diversity, innovation in services involves transformation in a variety of aspects ranging from how the service is designed and developed to how it is delivered and managed. Innovation in services is interplay of service concepts, service delivery systems, client interfaces, and technologies and “often entails new ways in which customers view and use the service” (Agarwal & Selen, 2011).

Conceptualization service innovation as an elevated service offering that is made up of new client interface or customer encounter, new service delivery system or new organizational architecture or marketing proposition or improvements in productivity and performance through human resource management (Greenhalgh & Rogers, 2007). Innovation in services is different from innovation in products essentially because services are characterized by intangibility, heterogeneity, perishability, increased customer interactivity, and simultaneity between production and consumption (Sampson & Spring, 2012). The intangibility of services makes service innovation relatively more difficult to make imitate through patent protection (Trott, 2012) and to measure as its performance is mostly evaluated on the basis of user perception.

The heterogeneity in services means that innovative activities need to be tailored to different service contexts calling for a more dynamic approach to organizing innovation in services as compared to products (Autant-Bernard, 2013). Some service firms such as

fast food restaurants have used innovations around application of technology at the customer interface to reduce heterogeneity and achieve standardization of processes. As services are perishable they cannot be stored and resold as tangible products can. Service innovation also entails technology and processes to better manage demand and plan capacity (Trott, 2012). Research has shown that both heterogeneity and perishability of services have a positive impact on service innovation (Kash & Rycoft, 2000).

Services are produced, delivered, and consumed simultaneously making it harder to distinguish between product innovation and service innovation. The service innovation process involves a high degree of interactivity between the service supplier and customer (Zeithaml & Bitner, 2013). This implies that service innovations can focus as much on interactions as on the actual service product or process (Berry, 2006). There is a scope to innovate across a variety of service interactions ranging from those that involve the exchange of intangibles like information as in education and consultancy services, to tangible elements as in transportation and logistics services. The customer inputs into the simultaneous creation of services, referred to as customer supplier duality which make service innovation complex and multidimensional in nature (Froehle & White, 2014).

2.3.3 Effect of Service Innovation on Firm Performance

The importance of technological innovation, both in the service industry is widely recognized (Goktan & Miles, 2011). The service sector for a long time has been seen as technologically backward, with innovation playing a marginal role in explaining the aggregate performance of this sector and the competitive strategies of firms. In recent years, innovation in the service sector has been a topic of growing interest among researchers and policy-makers. According to Lin (2013), service innovation is still a new-emerging research field, where the approaches applying traditional manufacturing logic to service innovation exists alongside approaches that view service as distinctive activities (Drejer, 2004). The need to uncover sources of competitive advantage in service sector, especially innovation as a source to gain competitive advantage and its performance implication, has increasingly drawn the attention of researchers.

There are several aspects that make it challenging to measure the impact of service innovation on firm performance. The relationship between service innovation and firm performance can be direct or indirect (Aas & Pedersen, 2011). The intangible effects of

service innovation and the innovation- based service quality will have an impact on the financial results of the innovating firm in a more long-term perspective. Service innovation affects firm performance through reducing operational cost, increasing sales revenues or increasing the profitability of the firm. Baldwin and Sabourin (2012) found that innovation is positively related to organizational performance on a wide variety of performance measures, including relative profitability, size, market share gain, return on investment and growth rate.

Services are mainly intangible or knowledge products, a discussion on service innovation can benefit from conceptualizations of innovations stepping back from product-based definitions (Durst, Mention, & Poutanen, 2015). One of the reasons behind the underdeveloped understanding of service innovation may still be assigned to the dominance of the industrial and technological approach to innovation (Djellal, Gallouj, & Milles, 2013). As a result, service innovations will have relatively lower impact on performance. Service innovation allows the firm to build up monopolistic power which tends to be progressively eroded alongside the imitative diffusion of new products and processes (Bolo, 2011).

The performance effects on service innovations are either indirect or direct effects (Ahmed & Shepherd, 2010). The indirect effects entails that service innovation affects performance through service quality. The direct effects entail that service innovation affects business directly. The performance in this aspect refers to the objective performance (Burgelman, 2009). The direct or indirect effects depends on if the service quality was included in the influential paths. Besides service quality, service innovation would certainly affect performance through other intermediate variables, for example, through the change of the internal business process (Crespi & Zuniga, 2012).

The linkage between service quality and firm performance has been recognized for years (Guan & Ma, 2008). Scholars have suggested that the intangible effects of service innovation and the innovation- based service quality will have an impact on the financial results of the innovating firm in a more long-term perspective. For example, it is argued that increased customer loyalty most likely will result in repeat purchases by the customer and in recommendations to other potential customers. This will increase sales and consequently, improve the financial results of the firm. Lin (2015) based on the return on quality model (ROQ) also suggested that improvement of service quality would increase

customer-based perceived quality and satisfaction, which would lead to high-level customer retention, improvement of firm profitability and market share.

As for the output and employment impact of service innovation, Evangelista and Savona, (2003) found that the ‘direct’ impact of innovation on employment varies greatly according to the type of innovation strategy pursued by firms, across industries and according to the level of qualification of the labour force. Prajogo (2006) explored the relationship between innovation performance (in terms of product and process) and business performance (in terms of sales growth, market share and profitability) and compared this relationship between manufacturing and service firms, finding that a stronger correlation existed for manufacturing firms than for service firms between innovation and performance, particularly in relation to process innovation. Chen, Tsou, and Huang (2009) examined the innovation in service delivery and its antecedents and consequences (firm performance), finding that service delivery innovation had a positive and significant influence on firm performance.

2.4 Process Innovation and Firm Performance

2.4.1 Relationship between Process Innovation and Firm Performance

A growing number of studies have recently analysed the entire link between process innovation and firm performance (David, 2006). Analysing and quantifying the performance effects of process innovation activities has been one of the most challenging tasks in empirical economics for several decades (Crawford, 2012). Empirical process innovation research has focused on input-oriented innovation indicators when analysing the impact of innovation on productivity. The majority of these studies have used the process-function approach including Research and Design based measures as additional input factors. However, it is well known that R&D does not capture all aspects pertinent to innovation. Process innovation activities close to the market are not captured by the concept of R&D (Baldwin & Sabourin, 2012).

The focus of empirical process innovation studies has changed in favour of output-oriented innovation indicators when measuring aspects of innovative activities like productivity or employment effects (Aas & Pedersen, 2011). The economic explanation for this is that the process of learning involves successful implementation rather than just the resources devoted to the innovation projects. Process innovation can and should happen at various levels within the firm as no organization can depend solely upon

innovation occurring at one level only. It should also be noted that firms and countries that continuously innovate processes contribute significantly to experience firm performance. Firms which demonstrate the highest patent activity or R&D investment intensity are the leaders of the ladder of economic development (Ahmed & Shepherd, 2010).

Process innovation is complex and related to changes in production functions and processes whereby firms seek to acquire and build upon their distinctive technological competence, understood as the set of resources a firm possesses and the way in which these are transformed by innovative capabilities (Therrien, Doloreux, & Chamberlin, 2011). Process innovation involves the execution of a novel or considerably enhanced creation or delivery method. This includes significant changes in techniques, equipment or software such as installation of new or improved manufacturing technology, such as automation equipment or real-time sensors that can adjust processes, computer-aided product development.

In the study of Geroski (2013) on 721 manufacturing firms in U.K. it was found that the number of process innovations achieved by firms had a positive effect on their operating profit margin. She also found that although the effect of specific process innovations on firm profits was only modest in size, innovative firms in general were more profitable than non-innovative firms. Hani (2010) empirically tested the relationship between market orientation, process innovation and technical innovativeness and found a positive impact on firm performance. Mathenge (2013) examined the effects of product innovativeness on the sustainable profitability of firms with a longitudinal research in Kenya's banking industry. He found support for the expected relationship between high product innovation propensity and sustained superior profitability.

The ultimate reason for firms to engage in process innovation activities is to improve firm performance and success (Varis & Littunen, 2010). The best process innovation strategy can help firms to overcome the problems they encounter concerning striving for a sustainable competitive advantage (Bolo, 2011). The firm's process innovation is guided by an explicit or implicit innovation strategy, which provides direction toward specific resources, and help focus the efforts of the entire organization on common innovation goals. Recent evidence shows that a good portion of process innovative firms chooses to

combine various types of innovation at the same time for example complex process innovation strategy (Tavasolli & Karlsson, 2015).

2.4.2 Effect of Process Innovation on Firm Performance

Productivity gains are related to production efficiency and factor saving, it is argued that an analysis of the effects of innovation on productivity that focuses exclusively on product innovation is indeed too restrictive (Podler, Leeuwen , Pierre, & Wladiimir, 2010). Thus, expanding the scope of analysis of innovation strategies beyond the field of technological innovation is crucial. This will provide a much richer understanding of firms' choices of process innovation strategies as well as of the effects of different simple and complex process innovation strategies on firm performance (Le-Bas, Mothe , & Nguyen-Thi, 2015). More complex process innovation strategies are more demanding in terms of firm capabilities and the argument that firms can implement complex innovation strategies also will achieve a better performance.

Understanding how firms' choices of process innovation strategy affect firm performance is important from a management and owner perspective. With increased levels of competition and shortened product cycles the ability of firms to generate process innovations may be more important for firms' competitive advantage and performance (Artz, 2010). Thus, process innovation can be seen as a requisite objective for all firms that want to improve firm success and performance (Varis & Littunen, 2010). Studies of the relationship between process innovation strategies and firm performance has focused on simple innovation strategies involving product and process innovations. The effects of complex process innovation strategies have seldom been analysed on firm performance.

An understanding of the relationship between process innovation and firm performance is important from the perspective of innovation policies (Tavasolli & Karlsson, 2015). Most such policies mainly focus product and possibly process innovations. Process innovation is an important part of firms' innovation activities and supposed to significantly contribute to positive returns from innovation. Results of the Community Innovation Surveys (CIS) of the European Commission reveal that the number of process innovations is similar to that of product innovations. According to Rammer (2016) thousand enterprises in Europe introduced one or more product innovation during the years 2015 and 2017 while one hundred and eighty thousand enterprises introduced one or more process innovations.

In Kenya, it has often been pointed out that process innovation may be particularly helpful or suitable for small firms, since by this means they can share in advanced technology developed by larger firms (Bolo, 2011). The adoption of process innovation may also have the advantages of low risk and short-term payback. The limitation of depending upon investments in process innovation, however, is that any competitor can easily follow suit, removing the initial advantage gained from the investment. Whereas new products tend to put a firm ahead of its competitors, investment in available process technology merely brings a firm up to standard (Mathenge, 2013). From the viewpoint of regional development, it is important that the process technology used by local industry should be up to an adequate standard, since otherwise the region will cease to be competitive with other regions where investment in up-to-date technology is higher.

2.4.3 Measuring Process Innovation Output

The economics of innovation, process innovation is usually seen as a type of innovation that leaves product characteristics unchanged while lowering the cost of production of one unit of a product (Adner & Levinthal, 2001). Lower unit costs either allow for reducing the price and increasing the demand of the product. But Adner and Levinthal (2001) also pointed to the fact that separating between quality improving product innovation and cost reducing process innovation is not inherent. According to Varis and Littunen (2010), process innovation can also increase flexibility of production for example, the ability to adjust products to changing demand requirements which rather changes product characteristics than unit costs. In services, process innovation is often associated with improving the quality of the service and not just only or necessarily reducing costs.

The different dimensions of output potentially produced by process innovation complicate output measurement (Afuah, 2016). Cost reduction effects can be measured quite directly as the change in the costs of one unit of output or in the costs of providing a certain type of service. Quality improving effects of process innovation are more difficult to quantify. Studies using quantitative measures of process innovation output are rare. Kraft (2008) used data from the German innovation survey to analyse the impacts of employment incentive systems on process innovation results, employing the quantitative measures on both cost reduction and sales increase due to quality improvement. They found that

employee suggestion schemes are positively related to both cost reduction and quality improvement.

Various studies have been done Salge and Piening (2015) investigated the impacts of different types of process innovation activities on the extent of cost reduction through process innovation and found that a broad range of activities increases the amount of cost reduction until a certain number of different activities. Another driver of process innovation success is market turbulence (uncertain demand, competitors' action difficult to predict). They also found a positive impact of the process innovation on profit margins. The effects on cost reduction and quality improvement continuously have to be evaluated for each process innovation (Aduda & Kingoo, 2012). As the nature of individual process innovations often differs a lot, firms usually do not have a single process innovation reporting system in place from which output data could be derived.

2.5 Management Innovation and Firm Performance

2.5.1 Relationship between Management Innovation and Firm Performance

Management innovation concerns the creation or adoption of new organisational structures, management processes, and management activities and practices that are intended to improve organisational performance. Management innovations involve new ways of managing and organising. Some authors refer to it as organisational or administrative innovation (Damanpour & Aravind, 2012). Camison and Villar-Lopez (2014) argue that these definitions are not interchangeable. Management innovation can be seen "as one of the non-technological innovation types" (Cerne, Kase, & Skerlavaj, 2016). Since the concepts related to management innovation are often misunderstood and research gaps exist, it is important to clarify the main theoretical frameworks and definitions, and to differentiate generation and diffusion processes and their consequences.

Organizations with strong innovative processes among its managers have a potential to increase a sustainable competitive advantage (Urgal, Quintas, & Arvalo-Tome, 2013). Management innovation relies on critical thinking within an organization. An innovative organizational management culture supports critical thinking throughout an organization (Musa & Ismail, 2011). More importantly, employees carry knowledge across organizational lines, which can support the transfer of innovative ideas. It is important to

allow employees to put these creative ideas into practice in hopes of encouraging employee retention, employee professional growth, and knowledge sharing (Fernandez & Moldogaziev, 2013). Damanpour and Aravind (2012) explored managerial innovations noting business innovation is gaining popularity over research and development while facilitating organizational culture changes and reinforcing the need for performance sustainment.

Management innovation helps in creating value through more effective processes, products, or pricing to create a competitive advantage for an organization (Hinterhuber & Liozu, 2014). Alegre and Chiva (2013) defined management innovation performance as three different dimensions involving product and process effectiveness and innovation efficiency. Crespi and Zuniga (2012) found through a study of the relationship between innovation and firm performance and that knowledge was important in management innovation with strong associations between innovation and productivity. Hogan and Coote (2014) found evidence supporting management innovative behaviours and firm performance when examining the organizational culture of approximately 100 law firm principals. Organizational reinforcement of products and associated processes help prevent knowledge and innovation loss due to employee departures.

When key employees depart an organization, organizational processes are disrupted. Changing the organizational processes opens the possibility of sharing ideas that lead to innovative practices and discovery. Management innovation has been positively associated with the reduction of employee turnover (Mohr, Young, and Burgess (2012) and significant effective on organizational performance (Camison & Villar-Lopez, 2014). Enkel and Heil (2014) proposed that cross-industry innovation, internal to an organization and external with their teaming partners, suggests exploitive and exploratory innovation negates employee turnover. Organizations that retain knowledge while encouraging growth of innovative practices through knowledge sharing decrease chances of employee departures. The personalization of how an organizational knowledge management strategy enhances innovation. The findings supported corporate knowledge strategies concluding that strategies of knowledge were vital for organizational efficiency, effectiveness, and innovativeness.

2.5.2 Sources of Management Innovation

According to Hamel, Birkinshaw and Mol (2008), management innovation is the invention and implementation of a management practice, process, structure or technique that is new to the state of the art and is further intended to further organizational goals. Internal knowledge is one of the sources of management innovation in firms today (Afuah, 2016). Internal knowledge contains capacities and rules which cannot be expressed. It is generated by the learning process through practice and use and defined as the body of knowledge that the company creates within its borders. This definition incorporates explicit and tacit knowledge as well as organizational learning stored in the routines of the organization, culture and strategy.

Many researchers are interested in the study of organizational innovation. The organizational innovation is the introduction of new organizational business management methods in the workplace or the relationship between a company and external agents. According to Gunday (2011), the management inventions are strongly linked with all administrative efforts to renew organizational practices, processes, tools, structures in order to renew teamwork, sharing of information, harmonisation, teamwork, education and innovation. The organizational innovation is considered a source of sustainable competitive advantage. Management inventions are strongly related with all administrative efforts to renovate organizational practices, processes, tools, systems, etc. and in order to promote teamwork, sharing of information, coordination, learning and general innovation.

Knowledge and management innovation are closely linked. To innovate, management has to rely on its internal information bases, to both benefit from them and integrate the information and the external information (Urgal *et.al.*, 2013). Knowledge as an essential element of the capacity of the firm's management to innovate. According to Nonaka and Toyama (2001) understanding how organizations create new products, new methods and new organizational forms is important. There is still a basic need to understand how organizations create new knowledge that makes these designs possible. Internal knowledge is important for innovation-generating organizations and is considered as a basis for the learning process leading to innovation (Fernandez & Moldogaziev, 2013).

The internal sources of knowledge consist of production and knowledge sharing within the firm. According to Zaiied, Louati and Affes (2015) professional service organizations

revealed that employees largely depend on their personal networks for information and knowledge. Indeed, the interaction between internal and external business and is important in the process of management innovation. Management innovation significantly contributes to the performance, productivity and improvement of new goods and services and hence competitiveness and growth.

2.5.3 Effect of Management Innovation on Firm Performance

While the effect of technology in service, process and product innovations on firm performance is established, the performance contributions of management innovations are as yet undetermined. Although it is generally accepted that management innovation has contributed to the business performance, companies must adopt some types of innovation over time that enable them to achieve a competitive advantage and enhance their performance (Fernandez & Moldogaziev, 2013). The organizations that have greater innovation will achieve a better response from the environment, find it easier to improve organizational performance capabilities and consolidate a sustainable competitive advantage. Management innovation has a direct impact on organizational performance. Some empirical studies indicate that innovation has no influence on business performance (Jansen, Curseu, & Geurts, 2011).

Management innovation is widely regarded as one of the most important sources of sustainable competitive advantage in an increasingly changing environment, because it leads to product and process improvements, makes continuous advances that helps firms to survive, allows firms to grow more quickly, be more efficient, and ultimately be more profitable than non-innovative firms (Jansen et.al., 2011). Management innovation accompanied by strategic management is a process that has different components and, at the same time, requires the management of these different components as a whole (Igartua, Garrigos & Hervas-Oliver, 2010). Terece, Pisano and Shuan (2014) point out that firms aim to support innovations, they need to re-structure their organizational and managerial processes, so that it can promote new technologies. Researchers point out that individual management practices, such as inputs management, knowledge management, strategic management, organizational culture, and others are essential for management innovative firms.

A study by Grawe, Chen and Daugherty (2009) detected the relationship between strategic orientation, management innovation and performance, concluding with the positive relationships between customer orientation and competitor orientation and management innovation, as well as the positive relationship between management innovation and market performance. Eisingerich, Rubera and Seifert, (2009) found that inter-organizational relationship commitment increased management innovation focus and strengthened the innovation focus – firm performance relationship. Ordanini and Rubera (2010) analysed the influence of IT management innovation on firm performance based on resource-based view (RBV), finding that the model explained more than half of the variance in the performance of IT management innovators.

For managers, the examination of impact of innovation on operational process and performance would be of particular importance for firm's innovation strategy formulation and implementation, as well as for the managerial diagnosis of the innovation-related operation process (Cambra-Fierro, Florin, Perez, & Whitelock, 2011). More specifically, executives of firms need to know if the innovation-related resource inputs would contribute to firm performance positively as initially expected, as well as to find out the path and intensity of innovation on firm performance to make right decisions. However, the distinct peculiarities of service such as intangibility, perishability, inseparability, and variability, particularly with respect to the intangibility of service outputs, make it difficult for managers to identify the existence of innovation, and thereby, to make sure that the conclusion drawn from manufacturing also can be found in service sectors (Fernandez & Moldogaziev, 2013).

Furthermore, while this does not necessarily mean that service firms lag behind manufacturing firms in innovation, it could be expected that the impact of innovation on performance in services would be different than that in manufacturing sectors (Nyawembe, 2011). Managers who consider alternative uses of their financial and managerial resources need to know the performance effects of using their resources on service innovation. Thus, from a managerial point of view, the lack of empirical studies on the relationship between service innovation and performance is worrying (Bolo, 2011).

2.6 Chapter Summary

The chapter has reviewed literature based on the research objectives. The literature reviewed is based on the previous studies done in the field of study which each objective

discussed in detailed. The next chapter introduces the research methodology which includes the research design, the research procedure, data collection and methods of data analysis which will be analysed and reported in the subsequent chapter four and five.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlined the overall research methodology that was used in carrying out this study. It covered the research design, population and sampling design, data collection methods, research procedures and data analysis methods.

3.2 Research Design

A research design constitutes the outline for collection, measurement and analysis of data (Cooper & Schindler, 2014). It is a blue print for answering research questions and fulfilling research objectives. The study used descriptive research design approach which is defined as a study that describes phenomena or characteristics associated with a subject population, it is undertaken to answer questions of the who, what, when, where, and how. Descriptive studies attempt to describe or explain a subject, often by creating a summary of a group of problems, people or events, through group of data and the tabulation of the frequencies on research variables or their interaction (Cooper & Schindler, 2014). This research design is deemed appropriate as this study seeks to examine the effect of cutting-edge technology on firm performance.

3.3 Population and Sampling Design

3.3.1 Population

A population refers to the total group of elements about which we wish to make some conclusions (Cooper & Schindler, 2014). Sampling begins precisely with defining the target population. Population in any research consists of the study objects, which are individuals, groups or organizations. Population can also be defined as the group of people, events, or things of interest for which the researcher wants to make inferences. The study of population refers to the total group of elements which one would like to study or make conclusions (Cooper & Schindler, 2001). The target population for this study was 200 employees of Seven Seas Technologies Group.

3.3.2 Sampling Design

The sampling design represents the technique applied in arriving at the sample size (Saunders, Lewis & Thornhill, 2016). The study used a population of known parameters

which together with time and financial constraints necessitated the selection of a sampling procedure that is easy to use.

3.3.2.1 Sampling Frame

A sampling frame is a list of all population elements from which the sample of a study is drawn. This refers to the list of elements from which the sample is actually drawn and is closely related to the population (Cooper & Schindler, 2014). The sample frame of the study was obtained from Seven Seas Technologies Group human resources department. The list consisted all the employees of Seven Seas Technologies Group.

3.3.2.2 Sampling Technique

Mugenda and Mugenda (2003) define sampling as the process of selecting or drawing a sample of individuals from the total population. Stratified random sampling technique was used in the selection of sample elements from the sampling frame. The researcher used stratified sampling because of the ease in classifying the population into strata's. The population was segregated into several mutually exclusive sub populations, or strata, the process by which the sample is constrained to include elements from each of the segments is referred to as stratified random sampling. The study population was segmented on the basis of various departments within Seven Seas Technologies Group.

3.3.2.3 Sample Size

A sample is a subset of the population. It comprises some members selected from it. Generally, elements of the population form the sample (McBurney & White, 2010). By studying the sample, the researcher was able to draw conclusions that generalize the population of interest in the study. With the target population limited to Seven Seas, the choice of the sample size was governed by the dependability the researcher has in the data, the level of certainty and the accuracy one requires in the estimation of the sample size, the analysis of the population and the total population in which the analysis is drawn. The sample of the study was 100 employees drawn from various departments at Seven Seas Technologies Group.

Table 3.1 Sample Size Distribution

Department	Population Distribution	Sample Population	Percentage Distribution
Human Resources	30	20	20%
Finance	30	20	20%
Marketing	40	10	10%
Technical	60	30	30%
Procurement	40	20	20%
Total	200	100	100%

3.4 Data Collection Methods

Data collection methods are an integral part of research design with data being obtained from either primary data sources or secondary data sources. The choice of data collection method depends on the facilities available, the degree of accuracy required, the expertise of the researcher, the time span on the study and other costs and resources associated with and available for data gathering (McBurney & White, 2010). For the study, the researcher used questionnaires to collect data from the target population as a source of primary data. The researcher came up with a detailed questionnaire that is divided into different sections that also include demographic components where the respondents describe their personal profile while other sections of the questionnaire are guided by the objectives of the study.

3.5 Research Procedures

Research procedure is critical to any research procedure. The questionnaires were personally administered to the respondents as it offered the researcher to collect all the completed responses within a short period of time. This was only after the research proposal has been approved by the supervisor and a letter issued from the research office allowing the researcher to collect data based on the questionnaires designed. The researcher conducted a validity and reliability test to test the validity of the questionnaire through pilot test.

3.6 Data Analysis Methods

Data analysis is a process of editing, coding, classifying and tabulating the collected data .According to Cooper and Schindler (2014), the purpose of data analysis is to ease

accumulated data to a manageable size, developing summaries, looking for outlines, and applying statistical practices. Once data was collected, it was edited, coded, recorded, and then cleaned. Data was edited to check for missing sections. The data was coded by attaching numerical value to every qualitative data. With the help of a data analyst, quantitative data was entered in a computer using Statistical Packages for Social Sciences (SPSS Ver.24) and developed a database structure that integrated the various issues under investigation. The study applied the use of descriptive where frequency distribution tables were used. Correlational analysis was done to test the relationship between variables.

The analysis were also completed using regression models to determine the effect of cutting-edge technology on the firm performance, as concerning product innovation, service innovation, process innovation and management innovation in the firm. The coefficients determination which is the R-square was reported alongside their ANOVA, and coefficients of variations. The dependent variable was firm performance while the independent variables were; product innovation, service innovation, process innovation, and management innovation which is given in the regression model below;

$$Y = a + bX_1 + bX_2 + bX_3 + bX_4 + e$$

Where Y= Firm Performance

a = Constant (Regression coefficient)

bX₁ = Product Innovation,

bX₂ = Service Innovation,

bX₃ = Process Innovation,

bX₄ = Management Innovation,

e = Standard error

3.7 Chapter Summary

This chapter focused on the methodology that was used to carry out the study. The study adopted a descriptive research design. The population, the sample frame, the sample size and the sampling technique used was specified. Data collection methods used include structured questionnaires which was given to the respondents to complete. Data was analyzed by use of descriptive statistics and presented in the form of tables and figures. The next chapter discussed the research findings based on the responses obtained from the questionnaires.

CHAPTER FOUR

4.0 RESULTS AND FINDINGS

4.1 Introduction

This chapter presented the analysis and findings of the study as set out in the research methodology. The results were presented on the effect of cutting- edge technology on firm performance at Seven Seas Technologies Group in Kenya. The data was gathered exclusively from questionnaire as the research instrument. The questionnaire was designed in line with the specific objectives of the study which are; effect of product innovation on firm performance, influence of service innovation on firm performance, effect of process innovation on firm performance, and effect of management innovation on firm performance.

4.1.1 Response Rate

The Table 4.1 shows the percentage response rate realized for the employees of Seven Seas Technologies Group. The percentage response rate is conclusively fit for the study. From the study, 60 out of 100 sample respondents filled in and returned the questionnaire contributing to 60%. This commendable response rate was made a reality after the researcher made personal calls and visits to remind the respondent to fill-in and return the questionnaires. This response rate is a representative and therefore conclusions drawn from the results have a relatively high validity in relation to the target population.

Table 4.1 Response Rate

Category	Target Respondents	Response	Response Rate (%)
Employees	100	60	60%

4.2 Background Information

This sub-section investigates the respondent's background information. Mainly the section assesses on respondent's gender, age, highest education level, working experience, the age group and the marital status of the respondents.

4.2.1 Gender of Respondents

The study sought to establish the gender distribution of the employees. Figure 4.1 shows that a majority 55% of the respondents were Male and 45% were Female. The findings

imply that the firm is dominated by male employees who were able to fill in the questionnaire.

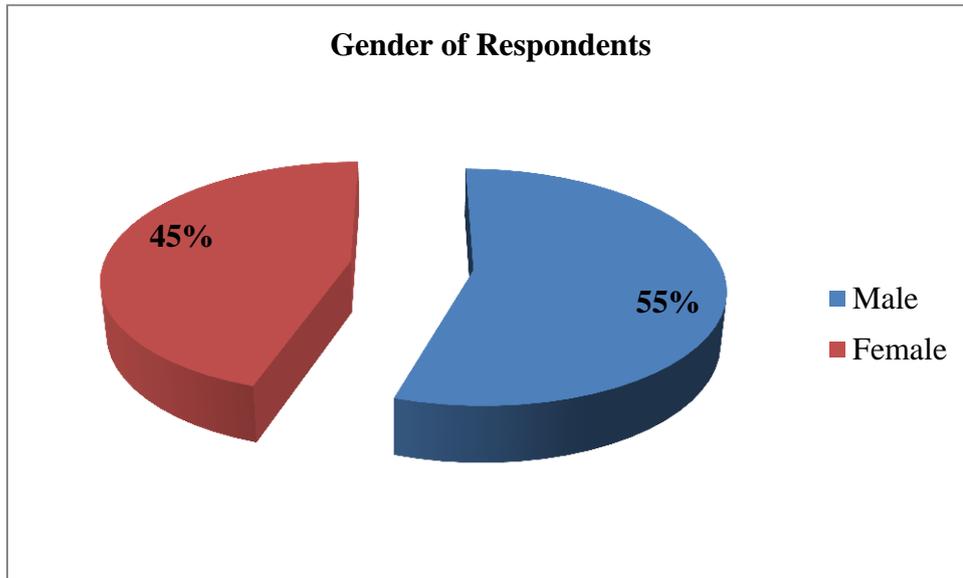


Figure 4.1 Gender of Respondents

4.2.2 Level of Education

The highest level of Education of the respondents was requested for and the results obtained show that respondents attained different level of Education which included undergraduate level and graduate studies. This implies that respondents holding various academic qualifications were well involved in this study. The Figure 4.2 indicates the Education qualification for employees who attained Undergraduate degree is 83% of the total sample size, and Graduate were 17% of the total sample who participated in the study.

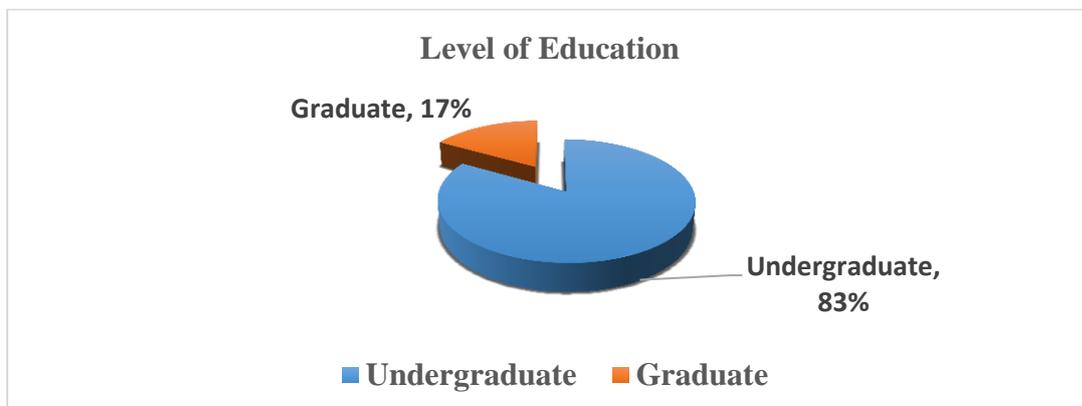


Figure 4.2 Level of Education

4.2.3 Working Experience

The findings in Figure 4.3 established that most of the respondents have worked for Seven Seas Technologies Group for a period between 6 to 10 years, followed by less than 5 years which is represented by 27%, and the remaining 3% have worked for the company between 11 to 15 years.

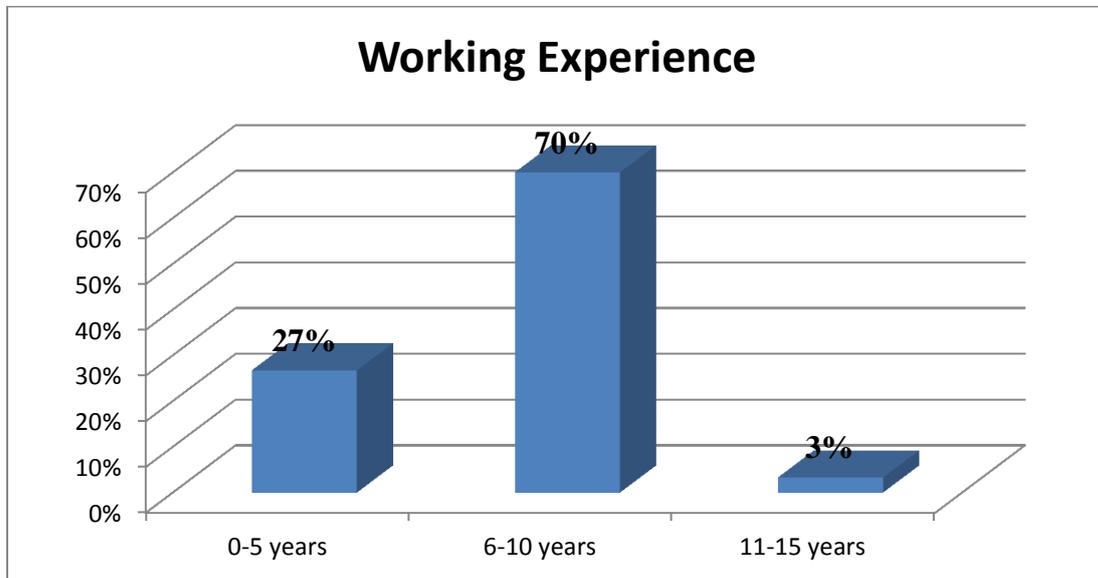


Figure 4.3 Working Experience of Employees

4.2.4 Age Group of Respondents

The findings in Figure 4.4 established that most of the respondents were between 31 to 40 years of age which is represented by 63%. It was followed by 18 to 30 years with a percentage of 33%. Between 41-50 was represented only by 3%. This shows a normal distribution of the responses given and it tells us that those who are involved in the survey are those between the age group of between 31-40 years.

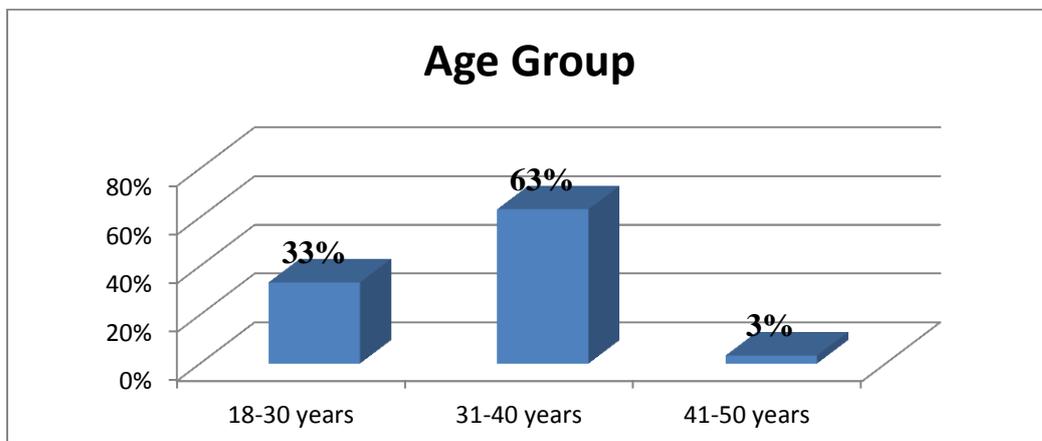


Figure 4.4 Age Group of Employee

4.2.5 Marital Status of Respondents

The last section on the background information was Marital status of the employees of the Seven Seas Technologies Group, and most of the employees in the organization were married with a representation of 63% and the remaining were single with a representation of 37%. The Figure 4.5 shows the summary of the outcome from the data collected in the field.

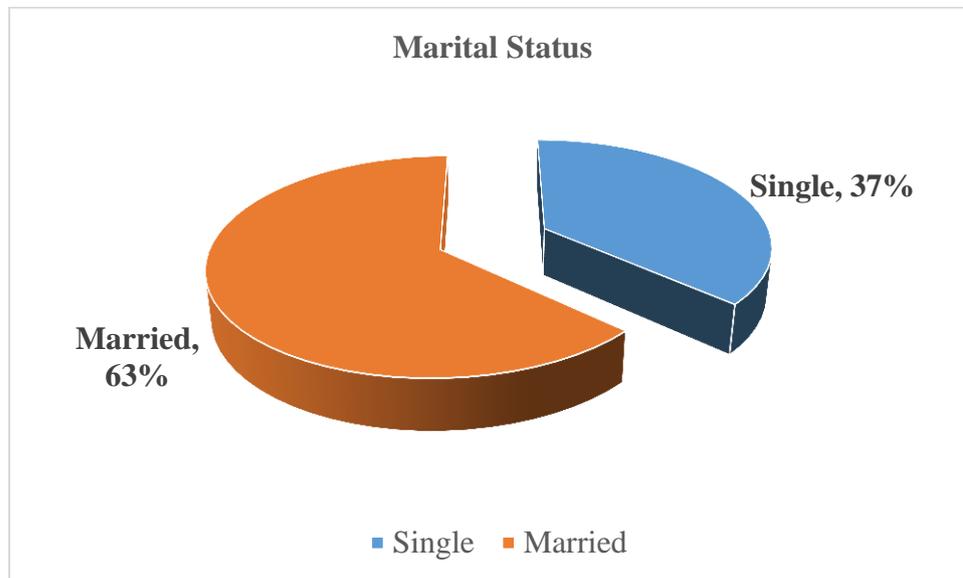


Figure 4.5 Marital Status of Employees

4.3 Product Innovation on Firm Performance

The Tables 4.2 indicates the findings on the first objective of the study which was to determine the effect of product innovation on firm performance. The questions were rated using a five-Likert scale, the first one was product innovation was considered as one of the success features at Seven Seas Technologies where it was rated as 43% Agreed, and 53% as Strongly Agreed, on whether the firm uses product innovation as a tool for achieving a competitive advantage it was rated as 60% agreeing and 30% strongly agreed. The competitive advantage created by product innovation manifests itself in the speed and magnitude of market acceptance was rated as 53% agreeing and 10% strongly agreed and the internal environment of firm has a suitable product innovative culture where it was rated as 20% agreeing and 80% strongly agreed and the firm choose to abandon a product during the development stage due to the product development and market risks was rated as 50% agreeing and 7% strongly agreed.

The firm uses marketing strategies to reduce uncertainties of innovative products developed for new markets where it was rated as 43% agreeing and 27% as strongly agreed and the rewards of a successful innovation program are highly visible in terms of sales, profits and growth where it was rated as 27% agreed and 70% of respondents strongly agreed, on the last question which was product innovation in the firm has become impossible due the high degree of uncertainty in the early stages of the product development where 17% agreed and 40% strongly agreed.

Table 4.2 Product Innovation on Firm Performance

		SD	D	SWA	A	SA
PI1	Product innovation is considered as one of the success features at Seven Seas Technologies.	0%	0%	3%	43%	53%
PI2	Seven Seas technologies uses product innovation as a tool for achieving a competitive advantage.	0%	0%	10%	60%	30%
PI3	Competitive advantage created by product innovation manifests itself in the speed and magnitude of market	0%	0%	37%	53%	10%
PI4	Internal environment of Seven Seas Technologies has a suitable product innovative culture.	0%	0%	0%	20%	80%
PI5	Seven Seas Technology may choose to abandon a product in development stage due to the product development	0%	13%	30%	50%	7%
PI6	Seven Seas uses marketing strategies to reduce uncertainties of innovative products developed for new markets.	0%	3%	27%	43%	27%
PI7	Rewards of a successful innovation programme are highly visible in terms of sales, profits and growth.	0%	0%	3%	27%	70%
PI8	Product innovation at Seven Seas has become impossible due the high degree of uncertainty in the early stages of the product development.	0%	20%	23%	17%	40%

4.3.2 Correlational Analysis on Product Innovation

Correlation coefficient is a measure of the degree of linear association between two continuous variables. The Correlation between product innovation and firm performance shows that there is a strong positive correlation between product innovation and the performance of the firm as indicated in the Table 4.3 where the correlation coefficient (r) equals 0.714, indicating a strong relationship, and the $p < 0.001$ which indicates that the coefficient is significant.

Table 4.3 Correlational Analysis on Product Innovation

Correlations			
		Firm Performance	Product Innovation
Firm Performance	Pearson Correlation	1	.714**
	Sig. (2-tailed)		.000
	N	60	60
Product Innovation	Pearson Correlation	.714**	1
	Sig. (2-tailed)	.000	
	N	60	60

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

4.3.3 Regression Analysis

4.3.3.1 Model Summary

To establish the statistical significance of the independent variables on the dependent variable (firm performance) regression analysis was employed. Table 4.4 shows that the coefficient of determination also called the R square is 0.510. This means that the change in firm performance is explained by 51.0% of the variations in product innovation.

Table 4.4 Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.714 ^a	.510	.502	2.82215

a. Predictors: (Constant), Product Innovation

4.3.3.2 Analysis of Variance

This Table 4.5 indicates that the analysis of Variance where regression model predicts the dependent variable significantly well. This indicates the statistical significance of the regression model that was run. Here, the $p < 0.001$, which is less than 0.05, the F (1,58) is 60.366 and indicates that, overall, the regression model statistically significantly predicts the outcome variable which is the product innovation (i.e., it is a good fit for the data).

Table 4.5 ANOVA Table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	480.789	1	480.789	60.366	.000 ^b
	Residual	461.944	58	7.965		
	Total	942.733	59			

a. Dependent Variable: Firm Performance

b. Predictors: (Constant), Product Innovation

4.3.3.3 Coefficients Analysis

The coefficients analysis below provides the necessary information to predict firm performance from product innovation, as well as determine whether product innovation contributes statistically significantly to the model. The analysis shows that one-unit change in firm performance results in 0.957 units increase in product innovation. The regression model below explains the results in the given Table 4.6 is shown as;
 $Y=12.903+ 0.957 \text{ Product Innovation}$

Table 4.6 Coefficients Analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
		1	(Constant)	12.903		
	Product Innovation	.957	.123	.714	7.770	.000

a. Dependent Variable: Firm Performance

4.4 Service Innovation on Firm Performance

The Table 4.7 shows the analysis of the second objective which was to determine the effect of service on firm performance. The first question in the section was service innovation is seen as a vector of sustainable growth and competitive advantage in the firm which was rated as 73% agreed and 17% strongly agreed and service innovation brings new products, and services that fulfill the rapidly changing customer requirements in the company and was rated as 53% agreed and 33% as strongly agreed.

The intangibility of services makes service innovation relatively more difficult to make imitate through patent protection was rated as 37% as agreed and 13% strongly agreed and the intangible effects of service innovation and the innovation- based service quality

have an impact on the financial results of the company was rated as 37% agreeing and 23% as strongly agreed. The next question was service innovation allows the firm to build up monopolistic power and was rated 50% as agreeing, 43% as strongly agreed and service delivery innovation has a positive and significant influence on the financial performance of the firm where it was rated as 60% agreed and 13% strongly agreed. The Improvement of service quality in the firm increases customer-based perceived quality and satisfaction was rated as 33% agreed and 30% strongly agreed and lastly service innovation affects firm performance through reducing operational cost, increasing sales revenues which was rated as 60% agreed and 33% strongly agreed.

Table 4.7 Service Innovation on Firm Performance

	SD	D	SWA	A	SA
SI1	0%	0%	10%	73%	17%
SI2	0%	3%	10%	53%	33%
SI3	0%	10%	40%	37%	13%
SI4	0%	3%	37%	37%	23%
SI5	0%	0%	7%	50%	43%
SI6	0%	3%	23%	60%	13%
SI7	0%	0%	37%	33%	30%
SI8	0%	0%	7%	60%	33%

4.4.2 Correlational Analysis on Service Innovation

Correlation coefficient is a measure of the degree of relationship between two continuous variables. From the analysis of correlations in the Table 4.8 correlation coefficient is (r) which is equals to 0.796, indicating a strong relationship, and the $p < 0.001$ which indicates that the coefficient is significant. Therefore, there is a strong correlation between firm performance and service innovation as shown below;

Table 4.8 Correlation Analysis on Service Innovation

Correlations			
		Firm Performance	Service Innovation
Firm Performance	Pearson Correlation	1	.796**
	Sig. (2-tailed)		.000
	N	60	60
Service Innovation	Pearson Correlation	.796**	1
	Sig. (2-tailed)	.000	
	N	60	60

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

4.4.3 Regression Analysis

4.4.3.1 Model Summary

The Table 4.9 shows that the coefficient of determination also called the R square is 0.634. This means that the change in the firm performance is explained by 63.4% of the variations in service innovation.

Table 4.9 Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.796 ^a	.634	.628	2.43955

a. Predictors: (Constant), Service Innovation

4.4.3.1 Analysis of Variance

This Table 4.10 indicates that the analysis of Variance where regression model predicts the dependent variable significantly well. This indicates the statistical significance of the regression model that was run. Here, the $p < 0.001$, which is less than 0.05, the F (1,58) is 100.405 and indicates that, overall, the regression model statistically significantly predicts the outcome variable which is the service innovation (i.e., it is a good fit for the data).

Table 4.10 ANOVA Table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	597.552	1	597.552	100.405	.000 ^b
	Residual	345.182	58	5.951		
	Total	942.733	59			

a. Dependent Variable: Firm Performance

b. Predictors: (Constant), Service Innovation

4.4.3.1 Coefficients

The coefficients analysis below provides the necessary information on the firm performance and service innovation. The analysis shows that one-unit change in firm performance results in 1.098 units increase in service innovation. The regression model below explains the results in the given Table 4.11 is shown as; $Y=10.605+ 1.098 \text{ Service Innovation}$

Table 4.11 Coefficients Analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	10.605	3.404		3.115	.003
	Service Innovation	1.098	.110	.796	10.020	.000

a. Dependent Variable: Firm Performance

4.5 Process Innovation on Firm Performance

The third objective of the study was to determine the effect of process innovation on firm performance. Table 4.12 shows the findings of the study where the first variable was if process innovation happens at various levels within the firm and the response was 67% agreed and 33% strongly agreed and the firms continuously innovate processes to contribute significantly and to experience firm performance where it was rated as 40% agreed and 60% strongly agreed. The process innovations achieved by firm has a positive effect on operating profit margin where it was rated as 20% agreed and 70% strongly agreed and the best process innovation strategy helps firm to strive for a sustainable competitive advantage where it was rated as 50% agreed and 47% strongly agreed.

The next question was if understanding of the relationship between process innovation and firm performance is important from the perspective of innovation policies was rated as 37% agreeing and 43% strongly agreed and the adoption of process innovation has the advantages of low risk and short-term payback was rated as 50% agreed and 17% strongly agreed and the process innovation at firm is often associated with improving the quality of a service or product where it was rated as 33% agreed and 63% strongly agreed.

Table 4.12 Process Innovation on Firm Performance

		SD	D	SWA	A	SA
PRI1	Process innovation happens at various levels within Seven Seas Technologies.	0%	0%	0%	67%	33%
PRI2	Firms continuously innovate processes to contribute significantly and to experience firm performance.	0%	0%	0%	40%	60%
PRI3	Process innovations achieved by Seven Seas Technologies had a positive effect on operating profit margin.	0%	0%	10%	20%	70%
PRI4	The best process innovation strategy helps Seven Seas Technologies to strive for a sustainable competitive advantage.	0%	0%	3%	50%	47%
PRI5	Understanding of the relationship between process innovation and firm performance is important from the perspective of innovation policies.	0%	0%	20%	37%	43%
PRI6	The adoption of process innovation has the advantages of low risk and short-term payback.	0%	0%	33%	50%	17%
PRI7	Process innovation at Seven Seas Technologies is often associated with improving the quality of a service or product.	0%	0%	3%	33%	63%

4.5.2 Correlation Analysis on Process Innovation

Correlation coefficient is a measure of the degree of correlation between two continuous variables. From the analysis of correlations in the Table 4.13 the correlation between process innovation and firm performance is highly correlated where the correlation coefficient is (r) which is equals to 0.625, indicating a strong relationship, and the $p < 0.001$ which indicates that the coefficient is significant.

Table 4.13 Correlation Analysis on Process Innovation

Correlations			
		Firm Performance	Process Innovation
Firm Performance	Pearson Correlation	1	.625**
	Sig. (2-tailed)		.000
	N	60	60
Process Innovation	Pearson Correlation	.625**	1
	Sig. (2-tailed)	.000	
	N	60	60

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

4.5.3 Regression Analysis

4.5.3.1 Model Summary

The Table 4.14 shows that the coefficient of determination also called the R square is 0.391. This means that the change in the firm performance is explained by 39.1% of the variations in process innovation.

Table 4.14 Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.625 ^a	.391	.381	3.14573

a. Predictors: (Constant), Process Innovation

4.5.3.2 Analysis of Variance

This Table 4.15 indicates that the analysis of Variance where regression model predicts the dependent variable significantly well. This indicates the statistical significance of the regression model that was run. Here, the $p < 0.001$, which is less than 0.05, the F (1,58) is 37.268 and indicates that, overall, the regression model statistically significantly predicts the outcome variable which is the process innovation (i.e., it is a good fit for the data).

Table 4.15 ANOVA Table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	368.788	1	368.788	37.268	.000 ^b
	Residual	573.945	58	9.896		
	Total	942.733	59			

a. Dependent Variable: Firm Performance

b. Predictors: (Constant), Process Innovation

4.5.3.3 Coefficients

The coefficients analysis below provides the necessary information on the firm performance and process innovation. The analysis shows that one-unit change in firm performance results in 0.935 units increase in process innovation. The regression model below explains the results in the given Table 4.16 is shown as; $Y=15.927+ 0.935 \text{ Process Innovation}$

Table 4.16 Coefficients Analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	15.927	4.709		3.382	.001
	Process Innovation	.935	.153	.625	6.105	.000

a. Dependent Variable: Firm Performance

4.6 Management Innovation on Firm Performance

The Table 4.17 shows the last objective of the study was to determine the effect of management innovation on the firm performance. The first question was if an innovative organizational management culture supports critical thinking among Employees in the firm where it was rated as 60% agreed and 33% strongly agreed and the management innovation helps in creating value through more effective processes in the firm where it was rated as 60% agreed and 27% strongly agreed. the next question was if the firm encourages knowledge innovation while encouraging growth of innovative practices through knowledge sharing where it was rated as 33% agreed and 63% strongly agreed

and the management innovation in the company positively associate with the reduction of employee turnover where it was rate as 30% agreed and 7% strongly agreed.

The next question was if management innovations in the firm is strongly linked with all administrative efforts to renew organizational routines and was rated as 37% agreed and 57% strongly agreed and the internal knowledge is important for innovation-generation among employees at in the firm where it was rated as 43% agreed and 47% strongly agreed. The next was if management innovation has a direct impact on the performance of the firm where it was rated as 47% agreed and 23% strongly agreed and the last question was if management innovation is widely regarded as one of the most important sources of sustainable competitive advantage in the firm where it was rated as 40% agreed and 27% strongly agreed.

Table 4.17 Management Innovation on Firm Performance

		SD	D	SWA	A	SA
MI1	An innovative organizational management culture supports critical thinking among Employees at Seven Seas Technologies.	0%	0%	7%	60%	33%
MI2	Management innovation helps in creating value through more effective processes at Seven Seas Technologies.	0%	0%	13%	60%	27%
MI3	Seven Seas encourages knowledge innovation while encouraging growth of innovative practices through knowledge sharing.	0%	3%	0%	33%	63%
MI4	Management innovation at Seven Seas has been positively associated with the reduction of employee turnover.	0%	17%	47%	30%	7%
MI5	Management innovations at Seven Seas Technologies are strongly linked with all administrative efforts to renew organizational routines.	0%	0%	7%	37%	57%
MI6	Internal knowledge is important for innovation-generation among employees at Seven Seas Technologies.	0%	0%	10%	43%	47%
MI7	Management innovation has a direct impact on the performance of Seven Seas Technologies.	0%	10%	20%	47%	23%
MI8	Management innovation is widely regarded as one of the most important sources of sustainable competitive advantage at Seven Seas Technologies.	3%	7%	23%	40%	27%

4.6.2 Correlational Analysis on Management Innovation

The correlation coefficient is a measure of the degree of relationship between two variables. From the analysis of correlations in the Table 4.18 the correlation between management innovation and firm performance is highly correlated where the correlation coefficient is (r) which is equals to 0.528, indicating a strong relationship, and the $p < 0.001$ which indicates that the coefficient is significant.

Table 4.18 Correlation Analysis on Management Innovation

Correlations			
		Firm Performance	Management Innovation
Firm Performance	Pearson Correlation	1	.528**
	Sig. (2-tailed)		.000
	N	60	58
Management Innovation	Pearson Correlation	.528**	1
	Sig. (2-tailed)	.000	
	N	58	58

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

4.6.3 Regression Analysis

4.6.3.1 Model Summary

The Table 4.19 shows that the coefficient of determination also called the R square is 0.279. This means that the change in the firm performance is explained by 27.9% of the variations in management innovation.

Table 4.19 Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.528 ^a	.279	.266	3.47505

a. Predictors: (Constant), Management Innovation

4.6.3.2 Analysis of Variance

This Table 4.20 indicates that the analysis of Variance where regression model predicts the dependent variable significantly well. This indicates the statistical significance of the regression model that was run. Here, the $p < 0.001$, which is less than 0.05, the F (1,58) is 21.646 and indicates that, overall, the regression model statistically significantly predicts the outcome variable which is the management innovation (i.e., it is a good fit for the data).

Table 4.20 ANOVA Table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	261.399	1	261.399	21.646	.000 ^b
	Residual	676.256	56	12.076		
	Total	937.655	57			

a. Dependent Variable: Firm Performance

b. Predictors: (Constant), Management Innovation

4.6.3.3 Coefficients

The coefficients analysis below provides the necessary information on the firm performance and management innovation. The analysis shows that one-unit change in firm performance results in 0.651 units increase in management innovation. The regression model below explains the results in the given Table 4.21 is shown as;

$$Y = 23.866 + 0.651 \text{ Management Innovation}$$

Table 4.21 Coefficients Analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	23.866	4.484		5.322	.000
	Management Innovation	.651	.140	.528	4.653	.000

a. Dependent Variable: Firm Performance

4.7 Chapter Summary

The chapter has presented the analysis of the findings from the study, which include the background information, descriptive and inferential statistics for each specific objective have been done.

From the Analysis the relationship between product innovation and performance shows that there was strong positive correlation between product innovation and the performance of the firm. The coefficient of determination R square is 0.510. This means that the changes in the firm performance is explained by 51.0% of the variations in product innovation. On the service innovation and firm performance, the correlation coefficient was 0.796, indicating a strong relationship, and the $p < 0.001$ which indicates that the coefficient is significant. Therefore, there was a strong correlation between firm

performance and service innovation. The coefficient of determination R square was 0.634. Which indicated the changes in the firm performance is explained by 63.4% of the variations in service innovation.

The relationship between process innovation and firm performance is highly correlated where the correlation coefficient was 0.625 indicating a strong relationship, and the $p < 0.001$ which indicates that the coefficient is significant. Coefficient of determination the R square was 0.391 which indicated the change in the firm performance is explained by 39.1% of the variations in process innovation. The relationship between management innovation and firm performance is highly correlated where the correlation coefficient was 0.528, indicating a strong relationship, and the $p < 0.001$ which indicates that the coefficient is significant. The coefficient of determination was 0.279. This means that the changes in the firm performance is explained by 27.9% of the variations in management innovation. The next chapter which is chapter five will discuss more on the findings, by drawing summary of key findings, discussions, conclusions, and recommendation of the study.

CHAPTER FIVE

5.0 SUMMARY, DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provided the summary of the findings from chapter four, and it also gives the conclusions and recommendations of the study based on the objectives of the study. The recommendations made are directly inferred from the conclusions on the effect of cutting-edge technology on firm performance. The conclusions and the recommendations presented are categorized based on the key objectives which form the basis of the study. Also highlighted in this chapter are possible suggestions for further research.

5.2 Summary of the Study

The general objective study was to determine the effect of cutting- edge technology on firm performance in Kenya. To achieve the aim of the research, the research explored four objectives; to determine the effect of product innovation on firm performance, the influence of service innovation on firm performance, the effect of process innovation on firm performance, and to establish the effect of management innovation on firm performance. The study used descriptive research design. The data collected from the field was coded, tabulated, and analyzed using statistical packages for social sciences (SPSS ver.22) and through descriptive statistics, frequency tables, and inferential statistics was also performed to test the relationships between variables and the fitness of the model were prepared to describe all the specific objectives of the study. A total population of 100 employees in the Seven Seas Technologies Group were targeted to respond to the questionnaire. From the 100 respondents only 60 managed to fill in the questionnaire which created a percentage response rate of 60% for the employees.

The results of the gender of the employees indicated that 55% of the respondents were male and 45% were female. Most of the respondents who have been working at Seven Seas Technologies Group for a period between 6 to 10 years, followed by less than 5 years was 27%, and 3% have worked for the company between 11 to 15 years. This implied that majority of the respondents had interacted with firm for a considerable period time in which they could give credible information relating to the cutting-edge technology and firm performance. On the age group of the employees most of the respondents were between 31 to 40 years of age which is represented by 63%. It was

followed by 18 to 30 years with a percentage of 33% and between 41-50 was represented only by 3%.

From the analysis, the relationship between product innovation and firm performance shows that there was strong positive correlation between product innovation and firm performance. The coefficient of determination R square was 0.510. This means that the changes in the firm performance is explained by 51.0% of the variations in product innovation. Product innovation within a firm, is considered as one of essential component for surviving and growing. These innovation activities create value and competitive advantages for successful organizations; therefore, understanding the organization's overall innovation is the first and foremost to understand the role of innovation on firm performance.

The correlation coefficient between service innovation and firm performance was 0.796, indicating a strong relationship, and the $p < 0.001$ which indicates that the coefficient is significant. Therefore, there was a strong correlation between firm performance and service innovation. The coefficient of determination R square was 0.634. Which indicated the changes in the firm performance is explained by 63.4% of the variations in service innovation. Service innovation is important factors affecting firm performance than product and marketing innovation. Therefore, enterprises should focus and mobilize resources to create improvement in organizational structure and manufacturing processes. Enterprises should update information on technology changes in the advanced firms, especially firms with high technology background related to supporting industries; seeking opportunities for long term cooperation with foreign enterprises and domestic ones in the same industry. Companies should focus on enhancing organizational innovation and service innovation. Enterprises should also create a creative environment inside themselves to encourage innovation through programs, awarding feasible creativities.

The relationship between process innovation and firm performance is highly correlated where the correlation coefficient was 0.625 indicating a strong relationship, and the $p < 0.001$ which indicates that the coefficient was significant. Coefficient of determination the R square was 0.391 which indicated the changes in the firm performance is explained by 39.1% of the variations in process innovation.

The relationship between management innovation and firm performance is highly correlated where the correlation coefficient was 0.528, indicating a strong relationship, and the $p < 0.001$ which indicates that the coefficient was significant. The coefficient of determination was 0.279. This meant that the changes in firm performance is explained by 27.9% of the variations in management innovation.

5.3 Discussion

5.3.1 Effect of Product Innovation on Firm Performance

The findings on the effect of product innovation on firm performance were product innovation was considered as one of the success features at Seven Seas Technologies where it was rated as 43% agreed, and 53% as strongly agreed, based on the Rainey (2006), asserts that product reflects the company's image its whole success depends also on the product success through realizing consumers desires and needs, and developing new products. The firm uses product innovation as a tool for achieving a competitive advantage which was rated as 60% agreed and 30% strongly agreed this agrees with Artz, (2010) where he asserts that the sustainability of the competitive advantage is reflected by the market share where the innovative product is able to maintain against follower products launched by competitors.

The competitive advantage created by product innovation manifests itself in the speed and magnitude of market acceptance was rated as 53% of the employees agreed and 10% strongly agreed and the internal environment of firm has a suitable product innovative culture was rated as 20% agreed and 80% strongly agreed and the firm choose to abandon a product during the development stage due to the product development and market risks was rated as 50% as agreed and 7% strongly agreed. Product innovation is an important factor in increasing performance of firms. The innovative products are characterized by technical and market uncertainties in the industry.

The firm uses marketing strategies to reduce uncertainties of innovative products developed for new markets where it was rated as 43% agreeing and 27% as strongly agreed and the rewards of a successful innovation program are highly visible in terms of sales, profits and growth where it was rated as 27% agreeing and 70% strongly agreed. According to McDermott and O'Connor (2013), marketing strategies are a useful tool for reducing uncertainties of innovative products developed for specific audiences and new

markets. Competitive priorities are directed on consumers with different demands for the same product, without an alignment between the creative processes and marketing, firms may operate in the short term in conflict with their long-term interests (Fenny & Rodgers, 2013).

Product innovation in the firm has become impossible due the high degree of uncertainty in the early stages of the product development where 17% agreed and 40% strongly agreed. Cheng and Liu (2012), where they agree that many product innovations have become impossible due the high degree of uncertainty in the early stages of the product development, given the high number of resources that is immobilized. In such instances it is common for the product to be redesigned many times to adjust and correct problems and concepts that could have been assessed and dealt with in the earliest stages of the project, and not during production. The relationship between product innovation and firm performance shows that there was strong positive correlation between product innovation and firm performance. The coefficient of determination R square is 0.510. This means that the changes in firm performance is explained by 51.0% of the variations in product innovation.

Product innovation is one of the important sources of competitive advantage to the firm (Camison & Lopez, 2010). With innovation, quality of products could be enhanced, which in turn it contributes to firm performance and ultimately to a firm's competitive advantage. Product innovation offers a potential protection to a firm from market threats and competitors. Bayus, Subin and Mason, (2003) proved that product innovation had positive and significant link with organizational performance. Similarly, Alegre, Lapiedra and Chiya, (2006), found that both product innovation dimensions were strongly and positively related to firm performance.

5.3.2 Effect of Service Innovation on Firm Performance

The analysis on service innovation on the firm performance where service innovation is seen as a vector of sustainable growth and competitive advantage in the firm which was rated as 73% agreed and 17% strongly agreed. Services have increasingly dominated the world economy, by contributing over 70% of employment in OECD countries and 58% of worldwide gross national product. and service innovation brings new products, and services that fulfill the rapidly changing customer requirements in the company and was

rated as 53% agreed and 33% as strongly agreed. Services in organizations and economy, focus more on innovation. According to Nooranm (2014), to be more competitive, firms explore the methods, tools and services which help them in getting competitive edge. To attain the competitive advantage companies, prefer to introduce more innovative services. Service innovation suggests that the concept of service can be improved practiced. This can be either refined competence in customer relations, channel of distribution or innovation in technology.

The intangibility of services makes service innovation relatively more difficult to make imitate through patent protection and which was rated as 37% as agreed and 13% strongly agreed and the intangible effects of service innovation and the innovation-based service quality have an impact on the financial results of the company and was rated as 37% of the respondents agreed and 23% as strongly agreed. Many scholars have suggested that the intangible effects of service innovation and the innovation- based service quality will have an impact on the financial results of the innovating firm in a more long-term perspective. It is argued that increased customer loyalty most likely will result in repeat purchases by the customer and in recommendations to other potential customers. This increases sales and consequently, improve the financial results of the firm. According to Lin (2015) based on the return on quality model also suggested that improvement of service quality increases customer-based perceived quality and satisfaction, which lead to high-level customer retention, improvement of firm profitability and market share (Artz, 2010).

Service innovation allows the firm to build up monopolistic power and was rated 50% of the employees agreed, 43% as strongly agreed Bolo, (2011), argues that service innovation allows the firm to build up monopolistic power which tends to be progressively eroded alongside the imitative diffusion of new products and processes. and service delivery innovation have positive and significant influence on the financial performance of the firm where which was rated as 60% agreed and 13% strongly agreed. According to Ahmed and Shepherd, (2010) performance effects on service innovations are either indirect or direct effect. The indirect effects entail that service innovation affects performance through service quality. The direct effects entail that service innovation affects business directly. The direct or indirect effects depends on if the service quality was included in the influential paths. Besides service quality, service

innovation would certainly affect performance through other intermediate variables, for example, through the change of the internal business process (Crespi & Zuniga, 2012). The improvement of service quality in the firm increases customer-based perceived quality and satisfaction was rated as 33% of the respondents agreed and 30% strongly agreed and service innovation affects firm performance through reducing operational cost, increasing sales revenues which was rated as 60% agreed and 33% strongly agreed. There was a strong correlation between firm performance and service innovation. The coefficient of determination R square was 0.634 which indicated the changes in the firm performance is explained by 63.4% of the variations in service innovation. This is in line with Prajogo (2006) who explored the relationship between service innovation and business performance and compared this relationship between manufacturing and service firms, and the findings showed that there exists a stronger correlation existed for manufacturing firms than for service firms between innovation and performance, particularly in relation to process innovation. Chen, Tsou, and Huang (2009) examined the innovation in service delivery and its antecedents and consequences and the outcomes was service delivery innovation had a positive and significant influence on firm performance.

5.3.3 Effect of Process Innovation on Firm Performance

The third objective was to determine the effect of process innovation on firm performance. Process innovation happens at various levels within the firm and the response was 67% agreed and 33% strongly agreed and according to Ahmed & Shepherd, (2010) firms that continuously innovate processes contribute significantly to experience firm performance. Firms which demonstrate the highest patent activity or research and development investment intensity are the leaders of the ladder of economic development. The firms continuously innovate processes to contribute significantly and to experience firm performance where it was rated as 40% agreed and 60% strongly agreed. Process innovations which is achieved by firm and has a positive effect on operating profit margin where it was rated as 20% agreed and 70% strongly agreed by the employees of the Seven Seas Technologies Group this is in agreement with Geroski (2013) on 721 manufacturing firms in U.K where it was found that the number of process innovations achieved by firms had a positive effect on their operating profit margin. She also found that although

the effect of specific process innovations on firm profits was only modest in size, innovative firms in general were more profitable than non-innovative firms.

The best process innovation strategy helps firm to strive for a sustainable competitive advantage where it was rated as 50% agreed and 47% strongly agreed. According to Tavasolli and Karlsson, (2015) argues that the firm's process innovation is guided by an explicit or implicit innovation strategy, which provides direction toward specific resources, and help focus the efforts of the entire organization on common innovation goals. The evidence shows that a good portion of process innovative firms chooses to combine various types of innovation at the same time for example complex process innovation strategy. The relationship between process innovation and firm performance is important from the perspective of innovation policies where it was rated as 37% of employees agreed and 43% strongly agreed. The policies mainly focus product and possibly process innovations. Process innovation is important part of firms' innovation activities and supposed to significantly contribute to positive returns from innovation. According to Rammer (2016) thousand enterprises in Europe introduced one or more product innovation during the years 2015 and 2017 while one hundred and eighty thousand enterprises introduced one or more process innovations.

The adoption of process innovation has the advantages of low risk and short-term payback was rated as 50% agreed and 17% strongly agreed. According to Mathenge, (2013), new products tend to put a firm ahead of its competitors, investment in available process technology merely brings a firm up to standard. Process innovation in the firm is often associated with improving the quality of a service or product where it was rated as 33% agreed and 63% strongly agreed. Based on Kraft (2008) assertions the impacts of employment incentive systems on process innovation results, employing the quantitative measures on both cost reduction and sales increase due to quality improvement. They found that employee suggestion schemes are positively related to both cost reduction and quality improvement. Significant changes in techniques, equipment or software such as installation of new or improved manufacturing technology, such as automation equipment or real-time sensors that can adjust processes, computer-aided product development.

The relationship between process innovation and firm performance is highly correlated where the correlation coefficient was 0.625, indicating a strong relationship, and the $p < 0.001$ which indicates that the coefficient is significant. Coefficient of determination the

R square was 0.391. which indicated the changes in the firm performance is explained by 39.1% of the variations in process innovation. Aduda & Kingoo, (2012), They found a positive impact of the process innovation on profit margins. The effects on cost reduction and quality improvement continuously must be evaluated for each process innovation.

5.3.4 Effect of Management Innovation on Firm performance

The analyzed results of management innovation on the firm performance indicate that an innovative organizational management culture supports critical thinking among employees in the firm where it was rated as 60% agreed and 33% strongly agreed by the respondents the employees carry knowledge across organizational lines, which can support the transfer of innovative ideas. It is important to allow employees to put these creative ideas into practice in hopes of encouraging employee retention, employee professional growth, and knowledge sharing (Fernandez & Moldogaziev, 2013). Management innovation helps in creating value through more effective processes in the firm where it was rated as 60% agreed and 27% strongly agreed by the employees and pricing creates a competitive advantage for an organization (Hinterhuber & Liozu, 2014)

The firm encourages knowledge innovation while encouraging growth of innovative practices through knowledge sharing where it employees rated as 33% agreed and 63% strongly agreed and changing the organizational processes opens the possibility of sharing ideas that lead to innovative practices and discovery the management innovation in the company positively associate with the reduction of employee turnover where it was rate as 30% agreed and 7% strongly agreed. This is in the same with Enkel and Heil (2014) who asserts that organizations that retain knowledge while encouraging growth of innovative practices through knowledge sharing decrease chances of employee departures. The personalization of how an organizational knowledge management strategy enhances innovation.

Management innovation in the firm is strongly linked to all administrative efforts to renew organizational routines and was rated as 37% agreed and 57% strongly agreed and organizational innovation is considered a source of sustainable competitive advantage. Organizational innovation is associated with all administrative efforts to renew organizational routines, procedures, mechanisms, systems, etc. and to promote teamwork, sharing of information, coordination, learning and general innovation. The internal

knowledge is important for innovation-generation among employees at in the firm where it was rated as 43% agreed and 47% strongly agreed. internal sources of knowledge consist of production and knowledge sharing within the firm. The study focuses on the importance of management innovation and network resources as a source of innovation, knowledge and sustained performance for the companies. The internal network is potentially an equal important source of knowledge that personal networks within the company are often the first point of contact for the employees.

Management innovation has a direct impact on the performance of the firm where it was rated as 47% agreed and 23% strongly agreed and on management innovation is widely regarded as one of the most important sources of sustainable competitive advantage in the firm where it was rated as 40% agreed and 27% strongly agreed. According to Jansen et.al., (2011) management innovations leads to product and process improvements, makes continuous advances that helps firms to survive, allows firms to grow more quickly, be more efficient, and ultimately be more profitable than non-innovative firms. The organizations that have greater innovation achieve a better response from the environment, find it easier to improve organizational performance capabilities and consolidate a sustainable competitive advantage within the industry.

Management innovation is highly correlated with firm performance where the correlation coefficient was 0.528, indicating a strong relationship, and the $p < 0.001$ which indicated that the coefficient is significant. The coefficient of determination was 0.279. The changes in the firm performance is explained by 27.9% of the variations in management innovation. Which indicated that management innovation has a direct effect on organizational performance. A study by Grawe, Chen and Daugherty (2009) detected the relationship between strategic orientation, management innovation and performance, concluding with the positive relationships between customer orientation and competitor orientation and management innovation, as well as the positive relationship between management innovation and market performance.

Essential implementation of management innovations results in actual service innovations. It is by introducing new or improved services to the market that a firm can distinguish itself from competitors. The empirically confirmed absence of a direct relation between management innovation and performance implies that the ability to generate and implement management practices should not only be considered in relation to short-term

performance. Deploying management innovations can have the aim to improve the overall functioning of an organization, while being related to introducing specific (service) innovations or boosting firm performance. Both innovation and enhanced performance might follow from reorganized processes, even if they were not direct and exclusive targets. However, when deploying management innovations, one should consider the risks of failure, unnecessary or overly extensive change, mismanagement and lack of integration.

5.4 Conclusions

5.4.1 Effect of Product Innovation on Firm Performance

The relationship between product innovation and firm performance showed that there was strong positive relationship between product innovation and the performance of the firm. The coefficient of determination was reported to be high this meant that the changes in the firm performance was well explained in the variations of product innovation. The higher the level of product innovation the greater the innovative performance, which means the high level of product process the higher level of innovative performance is likely to be. Product innovation was found out to be one of the successful innovations in the firm which makes the organization to be very competitive in the market.

5.4.2 Effect of Service Innovation on Firm Performance

The relationship between service innovation and firm performance indicated a strong relationship. The coefficient of determination was reported to be very high, which indicated the changes in the firm performance is explained by the variations in service innovation. This indicates that service innovations in the organization have an impact in the overall competitiveness in the market and financial performance.

5.4.3 Effect of Process Innovation on Firm Performance

There was strong relationship between process innovation and firm and the correlation coefficient indicated a statistically significant relationship. Coefficient of determination indicated the changes in the firm performance is explained by the variations in process innovation. Firms need to conduct appropriate types of innovation to improve their firm performance. It can be concluded that the innovation type of firms leads them to improve their firm performance. Also, innovation strategy leads these firms to improve their internal business processes performance, financial performance, and learning and growth performance. Firms should choose the appropriate innovation types to reach high

performance. This study is expected to make contribution to academicians and firms in the field of innovation.

5.4.4 Effect of Management Innovation on the Firm performance

The relationship between management innovation and firm performance is highly correlated indicating a strong relationship which indicates that the coefficient was significant. Management innovation plays a central role in the process of changing organizations, facilitating organizational adaptation to the external environment and increasing the efficiency and effectiveness of internal processes. The adoption of management innovations such as the balanced score card and total quality management in firms seek to increase organizational performance, aligning the organization with the environmental demands of quality services at lower costs. Management innovations firms allows for a wide range of further research. For instance, it helps scholars to address the ‘innovation gap’ in services, which refers to the observation that emergence of innovations is hard to trace to organizational antecedents.

5.5 Recommendations

5.5.1 Recommendations for the Improvement

5.5.1.1 Effect of Product Innovation on Firm Performance

Managers of the firms should consider increasing product innovation budgets. Product innovation strengthen revenue growth for both innovations. With higher innovation intensity, firms can develop new market offerings more thoroughly, e.g. by intensive testing and prototyping with customers. The factors that traditionally have hindered the market success of their product innovations can be effective promoters of profit growth through their service innovations. Hence, managing product innovation requires a different managerial mindset and represents a fruitful area for scholarly innovation research

5.5.1.2 Effect of Service Innovation on Firm Performance

Since service innovation is aggressively and continuously adopted in Kenya, the government should provide incentives for research and development to researchers who would continue to invest their time and skills in discovering more service innovations in the firms. It is recommended that the government also should pursues a strategy to provide incentives for technology transfer from more developed economies in order to

promote the adoption of world class service innovations - this will boost prosperity in different industry in Kenya.

5.5.1.3 Effect of Process Innovation on Firm Performance

The study concludes that process innovation is critical to organizational performance in Seven Seas Technologies Group. It is thus, recommends that managers in the company should focus on improving innovation at firm process level to achieve superior performance over time.

The enterprises should emphasis and mobilize resources to create improvement in organizational structure. They should update information on technology changes in the advanced especially countries with high technology background related to supporting industries; seeking opportunities for long term cooperation with foreign enterprises and domestic ones in the same industry. Because innovative performances are strongly impacted from organizational innovation and process innovation activities, companies should focus on enhancing organizational innovation and process innovation.

5.5.1.4 Effect of Management Innovation on Firm performance

Management innovation is an undeniable issue for future development of each company, industry, and region, however for firms in Kenya, there are a limit number of researches related to management innovation activities, innovative performances, and firm performances. To broaden the topic, other researches should be encouraged to develop same topics about the external and internal factors of management impacting on innovation activities or the effect of management innovation activities on firm performances.

5.5.2 Recommendation for further Research

There is need to replicate the study using many other sectors and find out the effect of cutting- edge technology on firm performance in Kenya. There is need to conduct a similar study which will attempt to find out the effect of effective product, service, processes and management innovation and firm performance. This research study included only one company, but there are many more firms in Kenya. Future research studies should therefore be undertaken to incorporate a larger number of firms in the study so assess the impact on the firms which will give more insights for the different industries.

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APPENDICES

APPENDIX 1: LETTER OF INTRODUCTORY

Pauline Wanjiku Njaramba

P.O. Box 79406 -00200

Nairobi, Kenya.

Email: paulinenjaramba@gmail.com

Mobile No: 0726-125874

Dear Respondent,

RE: REQUEST FOR YOUR PARTICIPATION IN MY RESEARCH PROPOSAL

I am a graduate student at United States International University- Africa pursuing a Masters Degree in Business Administration. In partial fulfillment of the requirements of the award of the degree, I am conducting a research to establish the *EFFECT OF CUTTING-EDGE TECHNOLOGY ON FIRM PERFORMANCE: A CASE STUDY OF SEVENSEAS TECHNOLOGIES GROUP*.

You have been selected to participate in this survey. The questionnaire has been divided into Six sections which ask for your Bio information and corresponding sections are on effects of Product Innovation, Service Innovation, Process Innovation, Management Innovation on Firm Performance and cutting-edge technology and firm performance. You are required to rate with a tick in the spaces provided alongside the statements. The information provided will only be accessible to the researcher for analysis and will be treated with confidentiality.

Your participation in this study will be highly appreciated.

Yours Sincerely,

Pauline Wanjiku Njaramba

APPENDIX II: QUESTIONNAIRE

SECTION A: BIO DATA INFORMATION

Please tick where appropriate:

1. Your gender

Male	Female

2. Indicate your highest level of education.

Certificate	Diploma	Undergraduate	Graduate	Other

3. Duration of working at Seven Seas Technologies Group.

0-5 years	6-10 years	11-15 years	More than 15 years

4. What is your age group?

18–30 years	31 –40 years	41 – 50 years	Over 50 years

5. Please indicate your marital Status

Single	Married

SECTION B: PRODUCT INNOVATION AND FIRM PERFORMANCE

Please indicate with a tick (✓) the extent to which you agree with the following statements concerning how product innovation affects firm performance at Seven Seas Technologies Group. (1 = strongly disagree; 2 = disagree; 3 = somewhat agree; 4 = agree; 5 = strongly agree).

No.	STATEMENT	SCALE				
		1	2	3	4	5
6.	Product innovation is considered as one of the success features at Seven Seas Technologies.					
7.	Seven Seas Technologies uses product innovation as a tool for achieving a competitive advantage.					
8.	The competitive advantage created by product innovation manifests itself in the speed and magnitude of market acceptance.					
9.	The internal environment of Seven Seas Technologies has a suitable product innovative culture.					
10.	Seven Seas Technologies may choose to abandon a product during the development stage due to the product development and market risks.					
11.	Seven Seas uses marketing strategies to reduce uncertainties of innovative products developed for new markets.					
12.	The rewards of a successful innovation programme are highly visible in terms of sales, profits and growth.					
13.	Product innovation at Seven Seas has become impossible due the high degree of uncertainty in the early stages of the product development.					

SECTION C: SERVICE INNOVATION AND FIRM PERFORMANCE

Please indicate with a tick (✓) the extent to which you agree with the following statements concerning how service innovation affects firm performance at Seven Seas Technologies. (1 = strongly disagree; 2 = disagree; 3 = somewhat agree; 4 = agree; 5 = strongly agree).

No.	STATEMENT	SCALE				
		1	2	3	4	5
14.	Service innovation is seen as a vector of sustainable growth and competitive advantage at Seven Seas Technologies.					
15.	Service innovation brings new products, and services that fulfill the rapidly changing customer requirements at Seven Seas Technologies.					
16.	The intangibility of services makes service innovation relatively more difficult to make imitate through patent protection.					
17.	The intangible effects of service innovation and the innovation- based service quality have an impact on the financial results of Seven Seas Technologies.					
18.	Service innovation allows Seven Seas Technologies to build up monopolistic power.					
19.	Service delivery innovation has a positive and significant influence on the financial performance of Seven Seas Technologies.					
20.	Improvement of service quality at Seven Seas Technologies increases customer-based perceived quality and satisfaction.					
21.	Service innovation affects Seven Seas Technologies performance through reducing operational cost, increasing sales revenues.					

SECTION D: PROCESS INNOVATION AND FIRM PERFORMANCE

Please indicate with a tick (✓) the extent to which you agree with the following statements concerning how process innovation affects firm performance at Seven Seas Technologies.

(1 = strongly disagree; 2 = disagree; 3 = somewhat agree; 4 = agree; 5 = strongly agree).

No.	STATEMENT	SCALE				
		1	2	3	4	5
22.	Process innovation happens at various levels within Seven Seas Technologies.	1	2	3	4	5
23.	Firms continuously innovate processes to contribute significantly and to experience firm performance.	1	2	3	4	5
24.	Process innovations achieved by Seven Seas Technologies had a positive effect on operating profit margin.	1	2	3	4	5
25.	The best process innovation strategy helps Seven Seas Technologies to strive for a sustainable competitive advantage.	1	2	3	4	5
26.	Understanding of the relationship between process innovation and firm performance is important from the perspective of innovation policies.	1	2	3	4	5
27.	The adoption of process innovation has the advantages of low risk and short-term payback.	1	2	3	4	5
28.	Process innovation at Seven Seas Technologies is often associated with improving the quality of a service or product.	1	2	3	4	5

SECTION E: MANAGEMENT INNOVATION AND FIRM PERFORMANCE

Please indicate with a tick (√) the extent to which you agree with the following statements concerning how management innovation affects firm performance at Seven Seas Technologies. (1 = strongly disagree; 2 = disagree; 3 = somewhat agree; 4 = agree; 5 = strongly agree).

No.	STATEMENT	SCALE				
		1	2	3	4	5
29.	An innovative organizational management culture supports critical thinking among Employees at Seven Seas Technologies.					
30.	Management innovation helps in creating value through more effective processes at Seven Seas Technologies.					
31.	Seven Seas encourages knowledge innovation while encouraging growth of innovative practices through knowledge sharing.					
32.	Management innovation at Seven Seas has been positively associated with the reduction of employee turnover.					
33.	Management innovations at Seven Seas Technologies are strongly linked with all administrative efforts to renew organizational routines.					
34.	Internal knowledge is important for innovation-generation among employees at Seven Seas Technologies.					
35.	Management innovation has a direct impact on the performance of Seven Seas Technologies.					
36.	Management innovation is widely regarded as one of the most important sources of sustainable competitive advantage at Seven Seas Technologies.					

SECTION F: CUTTING EDGE TECHNOLOGY AND FIRM PERFORMANCE

Please indicate with a tick (√) the extent to which you agree with the following statements concerning cutting edge and firm performance at Seven Seas Technologies. (1 = strongly disagree; 2 = disagree; 3 = somewhat agree; 4 = agree; 5 = strongly agree).

No.	STATEMENT	SCALE				
		1	2	3	4	5
37.	Cutting-edge technology adoption represents the ability of the firm to combine efficiently resources to attain improved firm performance.					
38.	Product innovation has a positive significant influence on firm performance					
39.	Service innovation has a positive significant influence on firm performance					
40.	Process innovation has a positive significant influence on firm performance					
41.	Management innovation has a positive significant influence on firm performance					

Thank you for your response