EFFECT OF TECHNOLOGICAL INNOVATIONS ON ORGANIZATIONAL PERFORMANCE OF GOVERNMENT AGENCIES IN KENYA

ALEXANDER MUTIE

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DECLARATION

This research project is my original work and has not been submitted to any other institution for the purposes of examination.

Signature ………………………… Date……………………

ALEXANDER MUTIE

D61/79718/2015

This research project has been submitted for examination with my approval as University supervisor.

Signature: …………………….. Date………………………

MR JOB MWANYOTA

Department of Management Science

School of Business, University of Nairobi

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I take this opportunity to thank God for protecting me to the completion of this project. A work of this magnitude is never accomplished without reminiscence to our creator. To my family, friends and colleagues thank you for the tremendous support during my entire study period of this program. I would also like to express my deepest gratitude to my supervisors Mr. Job Mwanyota and Dr. Kingsford Rucha for their guidance and pieces of advice along all this period.

DEDICATION

I dedicate this work to my wife, Carolyne Mbinda and my children, Godwill Mutie and Redemptah Wairimu.

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ABREVIATIONS AND ACRONYMS

EDI	Electronic Data Interchange
GDP	Gross Domestic Product
GHRIS	Government Human Resource Information System
GPS	Global Positioning Systems
IBM	International Business Machines
ICT	Information, Communication and Technology
IFMIS	Integrated Financial Management Information Systems
IT	Information Technology
KRA	Kenya Revenue Authority
POS	Point of Sales
R&D	Research and Development
RBV	Resource Based View
RFID	Radio Frequency Identification Systems
TAM	Technology Acceptance Model

ABSTRACT

The study determined the effect of technological innovations on organizational performance of government agencies. The independent variables for the study were system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration. The study adopted descriptive cross-sectional survey design. Primary data was collected by use of questionnaires. The model summary revealed that the independent variables system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration explains 75.9% of changes in dependent variable as evidenced by R^2 value which implies other factors exist not factored in this model that account for 24.1% of changes in how government agencies perform in Kenya. The correlation analysis results revealed a statistically significant and a positive correlation between system development enhancement and organizational performance of government agencies in Kenya. The study also revealed the existence of significant positive correlation between digital tools and services and organizational performance of Government Agencies. Information technology based innovations was also found to have a positive and significant association with organizational performance of Government Agencies. Finally, interdepartmental process integration was found to have a positive and significant association with organizational performance of government agencies in Kenya. The model is fit at 95% confidence level since the F-value is 55.924. Regression results showed that system development enhancement showed a significant positive association with organisational performance of Government Agencies in Kenya, digital tools and services had positive and statistically significant link with organizational performance of government agencies in Kenya while information technology based innovations had positive and statistically significant association with organizational performance of government agencies in Kenya. Finally, the regression output revealed that Interdepartmental process integration had positive statistically significant relationship with organizational performance. Therefore, a conclusion from the findings that performance of government agencies in Kenya is significantly affected by system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration can be made. The study recommends more funds in digitization and technological advancement in order to improve service delivery.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

In a globally competitive environment that is constantly changing, the inability of established firms to come up with breakthrough technological innovations that will help them operate effectively is a truism today (Davila, 2014). Technological innovation is part of strategy implementation that enhances organization performance through increased expansion and reduced risks (Drucker, 2001). Advancement techniques are key in enhanced execution among numerous organizations and are reflected by expanded productivity and overall industry development (Palmer & Kaplan, 2007). Yilmaz, Alpkan and Ergun (2005) also recognize technological innovations as critical enablers for organization's performance by creating value in the undeniably unpredictable and quickly evolving environment.

This study's theoretical foundation leant on the Resource Based View (RBV) theory of the firm, Technology Acceptance model (TAM) and diffusion of innovation theory. According to the RBV theory of the firm, performance is centered on how the resources and capabilities controlled by a firm enable it to acquire competitive advantage edge. Hart contends that maintained upper hand and enhanced execution by a firm might be acknowledged by using profitable, uncommon, non-substitutable and incompletely imitable assets (Hart, 1995). The resources that are held by a government agency together with the technological innovations will have an extensive impact in the generation of improved performance. TAM clarifies the way clients embrace and make use of an innovative idea. It influences the perceived usefulness and the intention for adoption (Davis, 1989). TAM was applied in this study to establish how technology acceptance influences technological innovations in government agencies. Diffusion of Innovation refers to the communication of an idea which is considered to be novel to the members of a social system through certain preferred channels (Rogers, 2003). Innovations have to gain acceptability in a wide area in order to be sustainable. This theory has guided the study of the adoption of various technological innovations in businesses.

The Kenyan government was first involved in the technology world in mid 1970s with establishment of International Business Machine computer frameworks to process population census data (Bon & Mustafa, 2013). From that point forward, more effort has been made to modernize the public organizations through technological innovations so as to deliver their mandate and offer efficient services. Some of the recent Kenyan government information technology projects are; iTax by the Kenya Revenue Authority (KRA) which is an online system that enables citizens and corporates to access and do all their necessary tax returns, eCitizen, that enables citizens and foreigners to access government to citizen services, Intergrated Financial Management System (IFMIS) which is an online public financial management system. Government Human Resource Information System (GHRIS) and eVisa are other Government of Kenya systems being used (Government of Kenya (GOK), 2016).

1.1.1 Technological Innovations

Innovation is the process through which an invention or idea is translated into a service or good which creates value (Kantor, 2001). With regard to this study, the term innovation only implies to technological innovation and not any other innovation type. From the many definitions, technological innovation refers to the scientific and system based process. The process has several influencing factors that affect or are influenced by the internal strengths of the firm which are its technological learning ability and networking capabilities within the external environment. It would harness the existing resources and expand the firm's innovation prospects with the result being the production of advanced or much better goods and services or the process of production itself. (Goh, 2002).

According to Tushman and Nadler (2006), mechanical development is an innovative and novel process which empowers the formation of new techniques, products and ventures in an association. What's more Swanson (1994) watches that mechanical advancement includes computerized devices in its applications. As indicated by Lyytinen and Rose (2003) there are four classifications of mechanical advancements. These are: System improvement upgrade, this entails re-adjustments of the involved team in development; goods and services which are a result of the process of development that involve utilization of digital tools and services in the execution of the daily operational activities of the organization; information technology based innovations, which is a new capacity of computing and technology; interdepartmental process integration which involve integration of processes across all the departments.

1.1.2 Organizational Performance

Richard, Devinney, Johnson and Yip (2009) defined organizational performance as fulfillment of the intended mission of the organization which is obtained through good management, persistent efforts and superior governance in order to achieve goals. The multiple performance criteria for nonprofit organizations include responsiveness, flexibility, cost, productivity, asset efficiency utilization and reliability (Chang, Tsui, & Hsu, 2013). An organization's performance is centered on the kind of activities that it carries out in fulfillment of its mission. End results are the observable aspects that determine an organization's performance (Valmohammadi & Servati, 2011).

Some other frequent performance measures include productivity, market share, profitability, growth, competitive position and stakeholder satisfaction (Kantor, 2001). However, financial elements are not the only indicator for measuring firm performance (Chesbrough, 2010); business performance is split into four dimensions, rational goals, internal processes, human relations and open system, where each gets measured by whatever changes in its variables. There seem to be no agreement concerning the best or even the most sufficient measure of organization performance. This is because many views exist as to what are the desirable outcomes of organizational effectiveness and because performance is often based on the theory and purposes of the research that is being performed (Carton & Hofer, 2006). Some use financial measures as a criterion to judge the success or failure of a decision or action. Performance measurement focuses on the internal processes to quantify how effective and efficient an act is, by use of a number of metrics.

According to Richard et al., (2009) how an organization performs is centered on three outcome areas; financial performance in terms of profits, Return on Investment (ROI) and Return on Assets (ROA); performance of the product measured by market share, sales volume; and returns made on investments by the shareholders that includes total shareholder return and economic value added. There are, however, challenges in using these measures; for starters most managers are unwilling to allow researchers access their financial records, savings are inconsistent from year to year, environments are constantly changing which makes it difficult to compare the savings made years after(Richard et al., 2009).

1.1.3 Technological Innovations and Organizational Performance

The association between performance and technological innovation has been a subject of interest to many researchers and policy makers. Positive relationships between performance and technological innovation have been reported in recent studies (Loof & Heshmatt, 2013). Performance was measured using sales and export revenues, return of assets and productivity. These were measured in relation to sell of new products by their employees, employee growth and operating profit. A positive link between innovation output and growth in sales was found but no evidence that relates technological innovation output and employee growth (Klomp & Leeuwen 2011).

McAdam and Keogh (2004) in their research found out that firms which are more inclined to technological innovation enjoy a competitive advantage despite the competitive environments they operate in but others looked at proper timing and product acceptance as a proper way to measure the contribution of innovation to performance. For instance, Mamoghli and Mabrouk (2010) asserts that as the innovation process continues overtime, banks considered to be innovative will be able to continue enjoying attractive returns on the newer or improved products. However, supernormal profits will decrease following widespread adoption of the new technologies.

Kantor (2001) is of the opinion that technological innovation is key factor in economic progress of any country as well as in gaining competitive advantage for different industries. A crucial role for both large firms, medium, small and micro is played by innovation (WladawskyBerger, 2008). Kemp (2003) maintains that innovation remains to be one of the main competitive weapons in a firm and is distinguished as a business core. It is also considered by Ruttan (1984) as a very effective means to progress business' productivity should there be resource limitations

1.1.4 Government Agencies in Kenya

According to the State Corporation Act Cap 446 (1987) a government agency is defined as a state corporation formed under the orders of the president or under an Act of parliament to perform the functions specified in that order; and whose a bigger percentage of the shares are owned by the government. The corporations may be in form of a bank, a financial institution or any organization formed under the Act (GOK, 1987).

Government agencies are formed for many reasons including; promoting socioeconomic development, to enable more people to get involved in the economy and to bring equal economic development in all the regions of the country (Njiru, 2008). The number of government agencies had risen to 240 by 1995 but as at 31st December, 2016, there are 94 government agencies in the country after a series of restructuring them to place them in line with the countries developments. The restructuring has also been as result of the restrained government coffers and in a bid to cut on government expenditure.

Effective and functioning technological innovations are at key in ensuring this is attained since it will be beneficial to the entire country as it moves towards the achievement of Vision 2030 (GOK, 2016). These technological innovations contribute heavily in meeting their mandate as well as enhancing their efficiency and effectiveness which results to influence on their overall performance (Ochieng, 2009). Improved service delivery has been a major objective in government agencies and technological innovations have been presumed to aid in attainment of the same.

1.2 Research Problem

A key assumption of most research work done on the improvement of operations has been technological innovations are directly proportional to improvements in performance (Upton & Kim, 1999). The process of technological innovation and implementation forms a critical part in the growth of many nations. A change of past techniques and adoption of local technology similar to that of more advanced industrialized nations lead to indigenous technological innovations (Roehm & Sternthal, 2001). The current study sought to determine if indeed adoption of technological innovations among government agencies in Kenya which is a developing country has a significant influence on performance.

Government agencies in Kenya have undertaken massive reforms through session papers and government task forces to make them more effective, efficient in the performance of their mandate and to limit the financial burden of the agencies on the public coffers. Forces of change that have had an immense impact on the performance of government agencies include mainly technological advancement (Oyeyinka, 2006). Research demonstrates that a significant number of government agencies need appropriate advancements in technologies, however, efforts to enhance technology use in public organizations is not successful (Lytra et al., 2008). Fundamentally, to thrive in competitive global environment, government agencies must be innovative by regularly streaming innovations so as to gain competitive advantage (Robbins & Coulter, 2009).

Despite the potential benefits of technological innovations, there is debate about whether and how their adoption improves organizational performance (Mabrouk & Mamoghli, 2010). Worch and Truffer (2012) found that the firm's general productive capacity and ability to maximize its value is enhanced by operations innovation. A study by Hafeez (2013) found that there was positive relationship between companies' profitability and value added innovativeness. Another study by Kiraka, Kobia and Katwalo (2013) established that process, product, positioning and paradigm types of innovation had a positive performance relationship in some business types of the micro and small enterprises. Odhiambo (2008) established that Standard Chartered Firm (Kenya) Limited bank has been able to successfully introduce various innovative strategies ranging from product, technological to customer care thus contributing enormously to its profitability over the years. Kiiyuru (2014) established that the commercial banks in Kenya had employed value creation through resource availability, customer satisfaction, retention and pricing in form of market innovation strategies.

Most previous studies conducted on technological innovations have concentrated on developed nations (Worch & Truffer, 2012; Hafeez, 2013). The few studies conducted locally have not been exhaustive as they have dealt with some aspects of innovations and different contexts (Kiraka, Kobia, & Katwalo, 2013; Odhiambo, 2008; Kiiyuru, 2014). This study sought to close this literature gap by providing answers to these questions; What is the level of adoption of technological innovations by government agencies in Kenya? And what is the effect of technological innovations on organizational performance of Kenya's government agencies?

1.3 Research Objectives

The objectives of this study were:

i) To determine the level of technological innovations adoption among government agencies in Kenya.

ii) To establish the result of technological innovations on organizational performance of Kenya's government agencies.

1.4 Value of the Study

This study will be significant in terms of future references to future academicians. The study can also be used to identify further areas of research by highlighting related topics and critiquing to identify research gaps. The study contributes significantly to technological innovations in the public sector.

The findings of this study will add knowledge by showing how technological innovations influence organizational performance of public institutions and thereby identify mechanisms to be utilized by the regulators to improve performance of such firms which form the framework for achievement of economic growth and development goals of vision 2030. The study was also geared towards helping firms which are yet to adopt technological innovations. The management of these firms will be able to determine the technological innovations suitable for them to enhance organizational growth and performance.

Findings from the study also form a foundation for implementing an effective technological innovation practice. The study would help the Government of Kenya in formulation and implementation of policies for operational efficiency. Through the results of this study, the government agencies would find the benefits realized and how more benefits can be realized for optimal operational efficiency.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter entails theoretical literature review, technological innovations and its relationship with organizational performance. The empirical review of literature consisting of studies done both locally and internationally and lastly the conceptual framework are also presented.

2.2 Theoretical Review

Three theories have been used to guide this study. These are; the RBV theory of the firm, the diffusion of innovation theory and TAM.

2.2.1 Resource Based View Theory (RBV).

According to Hart, maintained upper hand and enhanced execution by a firm might be acknowledged by using profitable, uncommon, non-substitutable and incompletely imitable assets (Hart, 1995). A significant asset or heap of assets enables a venture to bridle openings and diminish dangers in its condition. An uncommon asset or heap of assets is one that is not controlled by many. A non-substitutable asset or heap of assets is one for which a proportional asset can't undoubtedly be made by contending organization(s). Incompletely copyable asset or heap of assets is hard to imitate or is repeated after critical expense (Hart, 1995). Ignorant (1983) records these assets to incorporate all abilities, resources, hierarchical procedures, learning and data controlled by a firm.

Assets can just extend the firm’s esteem in the event that their utilization is in a manner that thinks about the constant changes outside firm condition (Ireland, Sirmon and Hitt, 2007). Assets could also be sorted as substantial or elusive (Bobbitt, Mentzer and Min, 2004). Wagner (2006) defined technological innovations as the desirable practices acquired from efficient technologies. Desirable practices will support the technological functions in the delivery of services of high quality and sustain superior performance therefore technological innovation frameworks are resources that fall well within RBV theory because they lead to improved service delivery and performance.

This study was of the view that higher level of bonding between technological innovations and sustainability is directly associated with an organization’s performance and profitability. Under RBV, by exploiting technological innovation practices, government agencies build capabilities for improved organizational performances. This theory is important because it recognizes organizational processes, close working relationships and knowledge sharing as resources that improve organizational performance.

2.2.2 Diffusion of Innovation Theory

Diffusion of innovation refers to the communication of an idea which is considered to be novel to the members of a social system through certain preferred channels (Rogers, 2003). The spread of new ideas is impacted by four variables which are: the actual innovation, social systems, communication channels and time. Of utmost importance is innovations have to gain acceptability in a wide area in order to be sustainable. According to Fisher (1971), adoption of innovation when mapped in the long run forms an S shaped curve.

How successful an innovation will be stems from the resolutions put forward by the social systems through five defined steps which are; knowledge: such as innovation awareness and continuous learning regarding it; persuasion which means willingness to have detailed knowledge concerning the innovation; resolution, that is, consideration of pros and cons of innovating together with the choice of whether to adopt the innovation or not; application which is an examination of how useful the innovation will be and finally confirmation, which is eventual decision on the continual use of the innovation (Rogers, 2003). The diffusion of innovation model though falls short of explaining the importance of the capability and the dynamics of different inter-connected trading partners and the influence of power between trading partners (Hart & Saunders, 1997).

Rogers (1995) describes communication channel as a critical contributor to the success of adoption of new innovation in the organization. As an effective communication channel creates prior awareness of the new technology, the trading partners need to work together to ensure the success of technological innovations. This will be determined by the inter-connected industry the organization is in and how influential that organization is to its trading partners (Lundblad, 2003). This theory has guided studies on the adoption of technological innovations in businesses.

2.2.3 The Technology Acceptance Model (TAM)

This model clarifies how clients embrace/acknowledge and utilize an innovation. TAM was found Davis in 1989. This model asserts that once a client is given an alternative innovation, some aspects influence their choices on the means and time of utilization. This incorporates its apparent convenience and seen helpfulness. TAM embraces settled causal chain of genuine conduct convictions, goal and disposition. This was produced by social clinicians from the contemplated activity hypothesis. In Davis' study, two vital parts are recognized; feasible convenience and seen helpfulness (Davis, Pallister & Foxall, 2002).

In other studies regarding technology, TAM is widely adopted and greatly contributes to the development of a person's predictability on technology use (Fishbein and Ajzen, 2010). It is effortless to utilize and this influences the perceived usefulness and the intention for adoption (Davis, 1989). Despite TAM being an important source for framework in the study of adoption and use of technology it has many limitations which include the initial purpose designing the model which is extreme unwillingness to spent resourses and generality (Strong & Dishaw, 1999), not taking into consideration non organizational setting of the organization (Davis & Venkatesh 2000), and ignoring the factors which moderate the adoption of ICT (Sun & Zhang, 2006).

This theory has affected research in acceptance of technological innovations. In this exploration, TAM will be utilized as a part of three distinctive routes, specifically to discover how the utilization of technology enhances hierarchical administration conveyance to natives, how staff technology preparation impacts the utilization of technology in government agencies and how the accessibility of technology offices impacts the utilization of technological innovations in government agencies.

2.3 Technological Innovations Practices

According to Lyytinen and Rose (2003) there are four measures of technological innovations. These are: System development enhancement, utilization of digital tools and services in the execution of the daily operational activities of the organization; information technology based innovations and interdepartmental process integration which involve integration of processes across all the departments. The measures are discussed in detail below.

2.3.1 System Development Enhancement

System development enhancement involves adding new capabilities to an existing system. Enhancement might also involve adding new features, correcting identified defects and modifying functionality to enhance efficiency. An enhanced system can replace an existing system in any of these three ways: a commercial off-the-shelf system, a new custom-built system or a hybrid of the two. System development enhancement is most commonly implemented to cut costs, improve performance, meet regulatory requirements or to take advantage of modern technologies (Kash & Rycroft, 2011).

An effective way for systems development managers to determine if a system needs an overhaul is to perform an operational analysis. By investing a small amount of time and money, the operational analysis process can resolve the problems and extend the life of the system. Enhancement requests address some minor modification for an existing system. One rule for systems development managers to follow is to define enhancements as projects that require less than ten days of labor and that can be completed within one calendar month (Wu & Lin, 2009).

2.3.2 Digital Tools and Services

Digital tools and services are used to support business operations, from electronic commerce, to firm communications and to internal business systems. While digital tools and services require an initial resource investments, this kind of investment can bring long run efficiency by streamlining processes and saving time. Digital tools can also open up new avenues for exchange of data and collaboration all of which creates more venues (Kash & Rycroft, 2011). Various tools can be used to help manage documents, customer relationships, human resources and other internal processes (Alstrup, 2010).

The three main digital tools and services applied by organizations include extranet/ intranet, human resource management and customer association management. An intranet is like an internal internet. It can link employees who working in different locations enable them to effectively communicate and collaborate. Customer relationship management tools help organizations manage relationships with customers systematically, efficiently and profitably (Alstrup, 2010). Human resource management tool assists an organization to manage its most important resource (the employees) so as to achieve the best from them as well as evaluation of the same.

2.3.3 Information Technology Based Innovations

Information technology based innovations are continually becoming prominent in improving competitiveness in service operations. Being the action of converting opportunities to become contemporary ideas (Lin & Ho, 2007), information technology based innovations are significant to enable a firm(s) survive severe and tough universal circumstances but maintaining sustainable competitiveness (Wu & Lin, 2009). Several information technology based innovations are used in service science and firm operations. Lin & Ho (2007) came up with an important way to classify information technology based innovation as Radio Frequency Identification Systems (RFID); automated storage and retrieval systems; global positioning systems (GPS); Electronic Data Interchange (EDI) and Point of Sales (POS) IT based innovations.

Information technology based innovations are vital to help firms in surviving antagonistic worldwide money related conditions while likewise getting to be plainly instrumental for producing supportable intensity. This is confirmed by the race towards development and interest in environmentally friendly power vitality (e.g. sun oriented vitality and bioenergy), which is attractive for associations to flourish into what's to come. Governments in numerous nations have distinguished advancement as a center component of their dynamic strategies. For example, advancement is a critical part in strategies and vital research need for both developing and developed nations (Lin and Ho, 2007).

2.3.4 Interdepartmental Process Integration

In multi-functional firms where separate departments collaborate to produce a perfect coordination in design, assembled product, technical and production capabilities are critical in ensuring that final product meets the standards. Thus, proper integration is a vital management obligation which balances decentralization and centralization of operational efficiency within the entire group. This enables different participants to homogeneously function and coordinate energies to attain the goals of an organization. Interdepartmental process integration defines general goals and departmental sub-goals so that everyone articulates their roles and how these results in realizing overall objectives (Tushman & Nadler, 2006).

2.4 Empirical Literature Review

The significance of innovation and how influential it is to the performance of an organization was depicted by the study conducted by Furst, Lang, and Nolle (2012) who considered several companies from five countries. From the findings of this study the differences in performance of firms in the different countries was determined by their innovative capacity: France, England, Germany, United States and Japan. This study was however conducted in developed countries and so the findings cannot be generalized in the local context. Kotler (2003) in his study of the association between innovation and performance, by examining Sony Company, showed that the market share for a front runner in innovation expanded significantly by way of offering many new products to clients. This study was a case study as it only focused on Sony Company. In addition, the focus was effect of innovation on market share and not overall firm performance which is the focus of the current study.

Gerstenfield and Wortzel (2007) did an analysis of the link between the use of innovation technologies that are internet-based, various types of innovation and the financial performance on firm level. The data used was selected from European enterprises totaling 7,302. The findings from the empirical investigation showed that internet-based innovation technologies were significant in enabling innovation in the year 2003. The results also showed that all the technological innovations whether internet-enabled or non-internet-enabled product contributed to positive turnover and growth in employment. Additionally, it showed that higher profitability is mostly the result of the innovative activity of the firm. Although this study focused on innovation technologies and performance, it had two weaknesses that the current study sought to overcome. First, the study was carried on firms in a developed context which is different from the current study. Secondly, the study focused on financial measures of performance while the current study focused on both financial and non-financial measures of performance.

The study by Mamoghli and Mabrouk (2010) asserts that as the innovation process continues overtime, banks considered to be innovative will be able to continue enjoying attractive returns on the newer or improved products. However, supernormal profits will decrease following widespread adoption of the new technologies. Grndiche (2004) opinion is that, for a firm to ensure it remains competitive in a dynamic environment and achieve its set objectives of profitability, sales volume and market share, it must make efforts to continually improve products to satisfy customer desires and needs that keep changing. Mabrouk and Mamoghli (2010) state the reasons that drive new product development as mentioned by most business persons include growth in the corporation, diversification, and the search for increased competitiveness. They also add that the main goal for developing new products is to explore other new opportunities since new products enhance the firms' survival in the long run growth. These three studies focused on one aspect of innovation (product) and this is different from the current study that focuses on technological innovations.

Nwokah, Ofoegbu and Elizabeth (2009) did a study on the variables of product development such as the quality of the product mix which showed a positive correlation to corporate performance variables of sales volume, customer loyalty and profitability. Neely (2002) turnover in terms of sales for firms embracing innovation was faster than firms that do not embrace innovation. They found that there exists a significant association between the innovative sales share and the firm's change in sales turnover. Chesbrough (2010) found that the effects of innovation were reflected in higher levels of products, better standards of products as well as process-oriented outcomes such as improved production flexibility and increased production capacity. Nwokah et al., (2009) and Chesbrough (2010) focused on one aspect of product innovation while the current study focuses on four different aspects of technological innovations. Although Neely (2002) focused on innovation, the dependent variable in that study was sales volume while the current study focuses on different measures of firm performance.

Firm performance is said to be the outcome that is achieved when a firm meets its goals (Wladawsky-Berger, 2008). Conventionally, the variation in firm's performance is linked to business structure (Ruttan, 1984). The neo-classical economic theory however sees business growth as the process of achieving the minimum point of the average cost. Ruttan (1984) came up with a theory that was resource-based where a business's performance is reliant on the firm resources and abilities the business has to source sustainable market competitive advantages and argues that for firms to grow, they must be able to mobilize, access and position resources.

Hill and Utterback (2009) mentioned that the driver of change and development in societies that are associated with increasing levels of employment growth had a strong export market position, productivity, trade and improvement in the quality of life and trade. The technological innovation process however comes with some complexities in the process of interacting with industrial factors; studies on the concept have proven to be difficult. However, Lall (1980) stressed that technological innovation is mostly being undertaken in the developing country's modern sectors especially those that have been in the manufacturing industry for long and with broad -based capital good sectors. These innovations bring change in a variety of ways including increased efficiency and productivity from the simplicity of learning through practicing, advancements in design, construction and management of advanced industrial processes.

Additionally Worch and Truffer (2012) studied how IT innovations impacts service environments and found that the adoption of technology is associated with a given degree of suspicion but with expectations that it will lead to the improvement of performance and service delivery. It was also noted that the decision to outsource technological services capabilities is considered as passing the blame for failure of service under public domain. Based on the above, the researcher posits the following:

Proposition: Technological innovations have significant positive effect on organizational performance.

2.5 Summary of Literature Review

The theoretical review has explained in detail three theories which include the RBV theory of the firm, diffusion of innovation theory as well as TAM This study is of the view that higher level of bonding between technological innovations and sustainability is directly associated with an organization's performance and profitability. Under RBV by exploiting technological innovation practices, government agencies build capabilities for improved organizational performance. This theory recognizes organizational processes, close working relationships and knowledge sharing as resources of improving organizational performance while TAM along with diffusion of innovation theory explains how innovations spread throughout organizations. This study sought to determine whether organization performance is in anyway associated with technological innovations as explained in RBV.

Numerous international and local empirical studies have been carried out on technological innovations as well as organization performance and discussed in this chapter. The above review indicates that few studies have been undertaken in the establishment of the relationship between technological innovations and organization performance thus more studies need to be done. This study sought to clearly demonstrate the association between technological innovations and organization performance among government agencies in Kenya after which the conclusions will be dispelled after obtaining empirical evidence from the research. Local studies done (Kiraka, Kobia, & Katwalo, 2013; Odhiambo, 2008; Kiiyuru, 2014) are not conclusive in their findings and thus the conceptual gap is intended to be filled by the current study.

2.6 Conceptual Framework

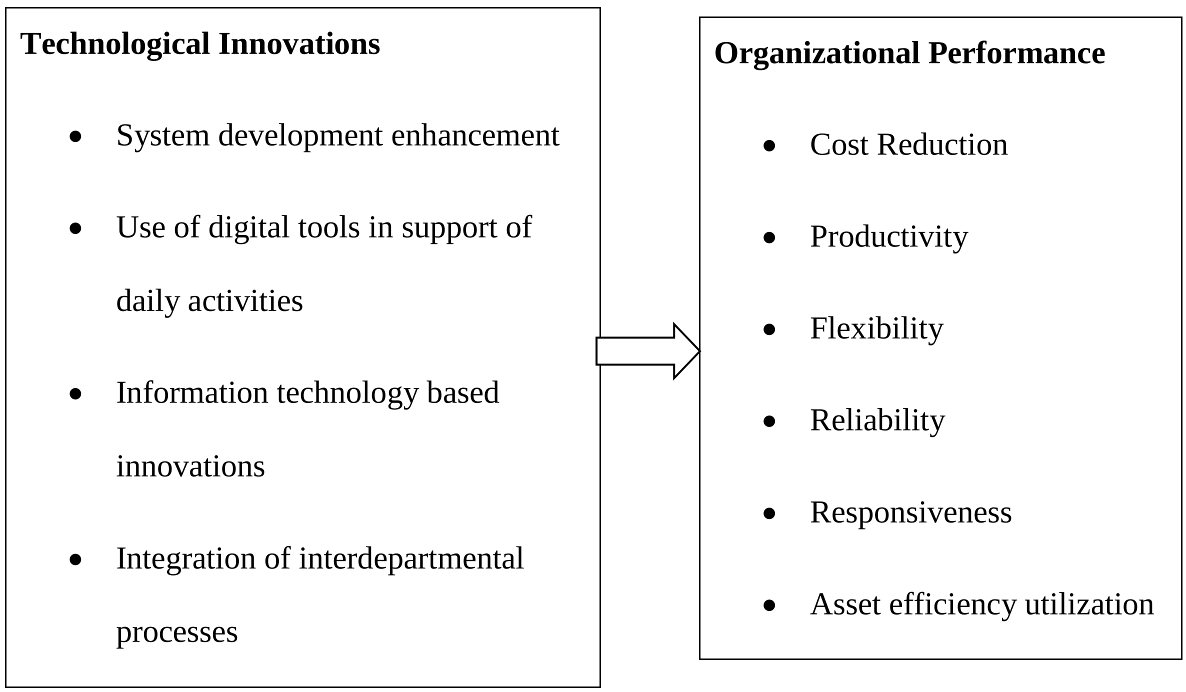


Figure 2.1: The Conceptual Framework

Source: Researcher (2017)

Conceptual framework in figure 2.1 shows how system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration influence organizational performance of government agencies in Kenya.

H_1: Technological innovations have significant positive effect on organizational performance of Kenya's government agencies.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This section has the description of the methods of research applied to determine effect of technological innovations on organization performance among government agencies in Kenya in an objective manner. The research design, population of the study, sampling design, data collection technique as well as the sampling criteria are all discussed in this chapter.

3.2 Research Design

Khumar (2005) described research design as a method that is procedurally acquired by the researcher and that which enables the researcher to be able to answer research questions accurately, validly, objectively, and economically. According to Wanyama and Olweny (2013), a research design aims at improving the ability of the research in conceptualizing an operational plan in order to be able to embark on the various techniques available and required tasks for the completion of the study while at the same time ensuring that the procedures used are sufficient enough to acquire valid, objective and precise responses to the research questions.

Descriptive cross-sectional survey design was used for the study. A descriptive study aims at finding out the what, where and how of a phenomenon. The appropriateness of this design is that it allows the researcher to utilize both qualitative and quantitative data in order to ascertain the effect of technological innovations on Kenya's government agencies performance. Descriptive cross sectional design was used by the researcher to obtain data, make summarizations, presentations and interpretations in order to obtain more clarification on issues. The researcher chose descriptive survey research design because his interest was primarily with the current field's conditions rather than manipulating variables. Cross-sectional study methods are done once and they represent summary at a given timeframe (Khumar, 2005).

3.3 Population of the Study

Population is a collection of units of study (Burns & Burns, 2008). The study's population comprised of the 94 government agencies operating in Kenya (see appendix II). Since the population is relatively small, a census of the 94 firms was undertaken for the study.

3.4 Data Collection

Structured questionnaires were employed to collect primary data in this study. This study's target respondents were senior level managers of the government agencies. This is because they are involved in the management of the organizations and have a broad understanding of the affairs of their organizations.

In-order to address objective one – 'determine the level of technological innovations adoption among government agencies in Kenya, primary data was acquired through closed ended questionnaires regarding the level of technological innovations (see appendix 1 section b). For objective two – 'determine the impact of technological innovations on how organizations of Kenya's government agencies perform', this study utilized primary data. The questionnaire had both closed-ended questions and captured how the respondent perceived the impact of technological innovations on how the firm performed (see appendix 1 section c).

The researcher administered the questionnaire to one respondent in each organization. Closed and open-ended questions were structured in the questionnaire. The research instrument was availed through drop and pick technique by the researcher in order to reach out to various respondents. Care and control was achieved by keeping a register of all the questionnaires sent to the field.

3.5 Operationalization of Research Variables

The variables were operationalized as depicted in table 3.2

Table 3.2: Operationalization of Research Variables

Construct	Sub construct	Indicators	Measurement Scale	Informing Literature
Technological innovations (Independent)	System development Enhancement	• The organization frequently adds new capabilities to an existing system • New features are often added to the existing system • Identified defects are corrected on a continuous basis • The organization continuously modify systems to enhance efficiency	5 point Likert Scale where; 1 -Strongly Disagree 2 - Disagree 3 – Neutral 4 - Agree 5 - Strongly Agree	(Kash & Rycroft, 2011); (Bon & Mustafa 2013).
	Digital tools and services	• The organization is connected with an intranet • The organization is connected with an extranet • The organization has an efficient human resource management system • The organization has an efficient customer relationships management system	5 point Likert Scale where; 1 -Strongly Disagree 2 - Disagree 3 – Neutral 4 - Agree 5 - Strongly Agree	(Alstrup, 2010); (Bon & Mustafa 2013).
	Information technology	• Organization makes use of radio frequency	5 point Likert Scale where;	(Wu & Lin,

	based innovations	identification systems (RFID) • The organization has automated storage and retrieval system • The organization makes use of global positioning systems • Electronic data interchange is widely practiced in the organization • The organization has a functional point of sale	1 -Strongly Disagree 2 - Disagree 3 – Neutral 4 - Agree 5 - Strongly Agree	2009); (Kash & Rycroft, 2011); (Bon & Mustafa 2013).
	Interdepartmental Process Integration	• There is continuous interaction between departments • There is efficient flow of information between functions and departments • Collaboration between departments is encouraged in the organization • All departments understand their roles and how these affect the overall objective	5 point Likert Scale where; 1 -Strongly Disagree 2 - Disagree 3 – Neutral 4 - Agree 5 - Strongly Agree	Lin and Ho (2007); Bon and Mustafa (2013);

3.6 Data Analysis

Quantitative data was analyzed by use of the multiple regression analysis since it entails multiple independent variables against one dependent variable. This was utilized to analyze if an association exists between one dependent variable and one or more independent variables. Organization performance was the dependent variable while the independent variables were: System development enhancements, use of digital tools in support of daily activities, new computing and technology capacity and integration of interdepartmental processes. The multiple regression model used was represented as:

$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$

Where;

Y= Organization performance

α = Constant Term; it is the Y value when all the predictor values are zero

β_1, β_2, β_3 and β_4 = beta coefficient of variable i that measures whether there is responsiveness of Y to changes in i

X_1 =System development enhancements

X_2= Use of digital tools in support of daily activities

X_3= Information technology based innovations

X_4= Integration of interdepartmental processes

ε=Error term

3.7 Diagnostic Tests

To test the statistical significance the F- test and the t – test were used at 95% level of confidence. F statistic was used to determine statistical significance of regression equation whereas t statistic was utilized to test statistical significance of study coefficients.

Reliability test shows the degree to which the research instrument determines what it purports to measure. The test was obtained using Cronbach alpha. Normality is a test for the assumption that the residual of the response variable are normally distributed around the mean. This was determined by use of graphical method representation of normality.

Homoskedasticity of variance is required for multiple linear regressions. The non-existence of a constant variance of the variance of error term posits heteroskedasticity. Modified wald test was used to test for heteroskedasticity. Multicollinearity is said to occur when there is a nearly exact or exact linear relation among two or more independent variables. Variance Inflation Factors (VIF) was carried out to show the degree of multicollinearity (Burns & Burns, 2008).

CHAPTER FOUR: PRESENTATION AND DISCUSSION OF RESULTS

4.1 Introduction

Findings and discussions of this study are presented in this section. The findings address each objective of the study. The study analyzed both inferential and descriptive statistics and tables and figures have been used to present the findings.

Ninety four questionnaires were distributed to the respondents but only seventy six were returned back as indicated in Table 4.1 below;

Table 4.1: Response Rate

Item	Frequency	Percent
Returned	76	80.9
Unreturned	18	19.1
Total	**94**	**100%**

Source: Survey Data (2017)

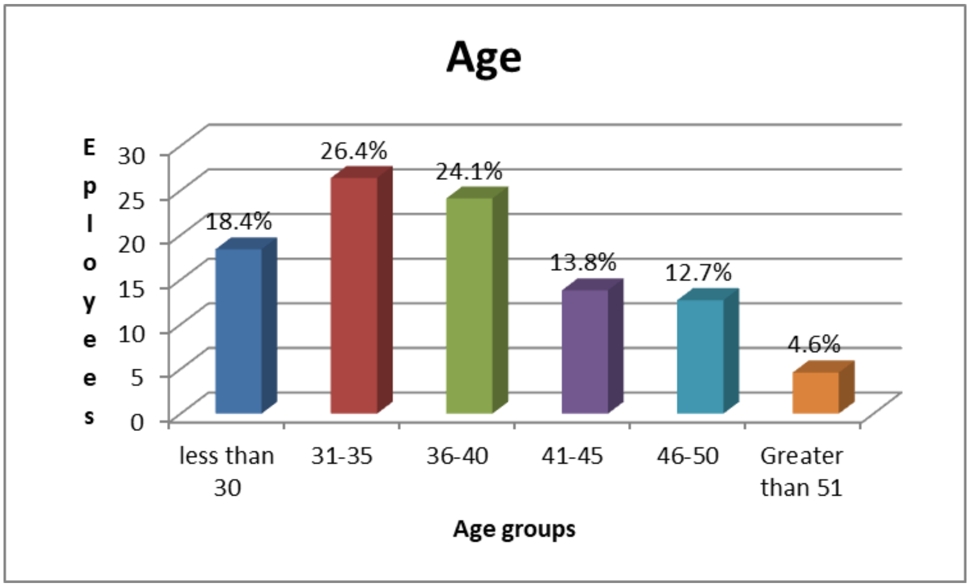
Results in Table 4.1 shows an 80.9% return rate. According to Babbie (2004), a response rates of 50% and above is allowed for analysis, a 60% response is good, and one exceeding 70% is very good whereas any response rate over 80% is perceived excellent.

4.2 Biographic Data

The demographic data of the employees including age, position, period of service and educational qualification is captured in this section.

4.2.1 Age of respondents

Employees indicated their age. Studies depict that there is an association between age and how one is committed to his or her career.



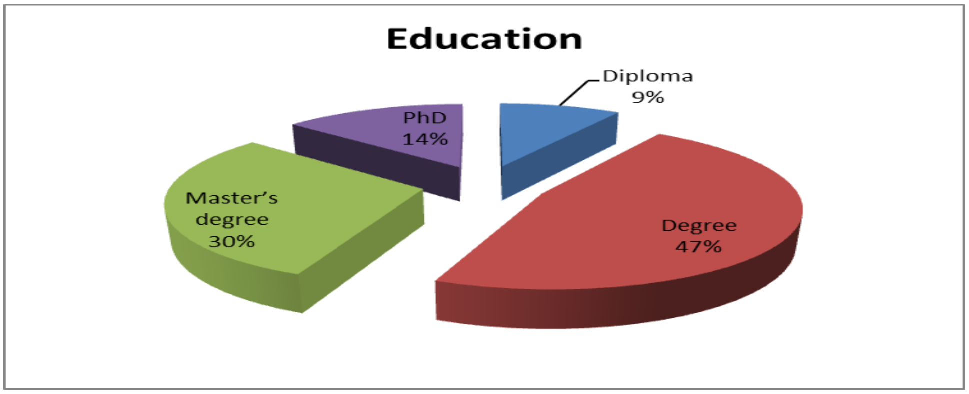
Source: Research data (2017)

Figure 4.1 Age

Figure 4.1 shows more employees aged 31-45 years. This is an implication that most of the workers are still youthful.

4.2.2 Education level of the respondents

Employees revealed their education. Presentation is done in Figure 4.2. Education is directly related to the advancement of technological innovations.



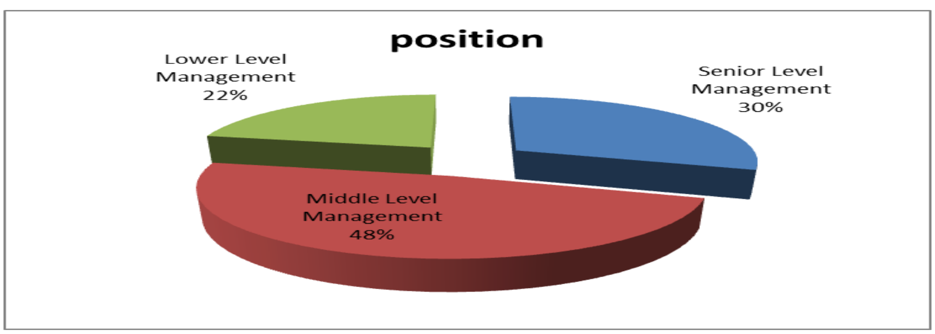
Source: Research data (2017)

Figure 4.2 Education level

The results revealed that most of the employees possess degree level of education. Thirty percent of the employees had masters level of education. This implies that the workers understand technology innovations and can implement them to the benefit of the organization.

4.2.3 Position held in the Organisation

The employees indicated the position they are holding at Government Agencies in Kenya. The findings are illustrated in Figure 4.3. Most of the respondents were in the middle level management.

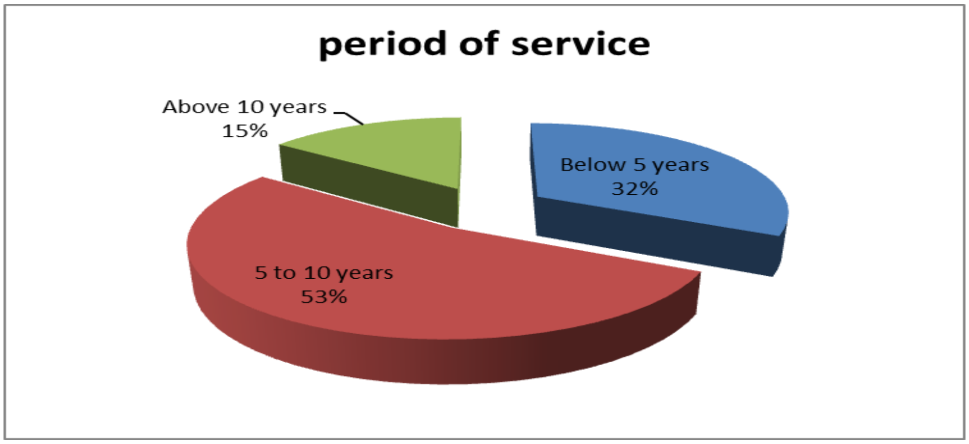


Source: Research data (2017)

Figure 4.3 positions

4.2.4 Period of service of the respondents

The employee indicated the duration worked at Government Agencies in Kenya. The findings are shown in Figure 4.4. Adequate experience is fundamental for successful organizational performance. Employees that are more experienced possess more management skills and innovative skills necessary for the growth of an organization.



Source: Research data (2017)

Figure 4.4 Duration Worked

Most employees labeled that they have worked for a period of 5-10years. This implies that the workers are experienced enough at their respective fields.

4.2.5 Department Employee Worked

Further respondents indicated the department they were working in the organisation. They indicated their respective departments. Majority of the respondents 78% were in the Information Technology (IT) and Research and Development (RD) departments while 22% of the respondents were in other departments.

4.3 Descriptive results

Descriptive results were used to describe items in the study. Tabulation is conducted and presentation done in form of means and standard deviations.

4.3.1 System Development Enhancement

The study established the impact of system development enhancement on organizational performance of government agencies in Kenya. Employees responded on indicators related to system development enhancement. The responses as per the five point likert scale are as shown in table 4.2 below;

Table 4.2: System Development Enhancement

Indicator	Mean	SD
The organization frequently adds new capabilities to an existing system	2.45	1.45
The organization modifies systems on a continuous basis to enhance efficiency	2.34	1.37
Identified defects are corrected on a continuous basis	2.26	1.44
New features are often added to the existing system	2.24	1.38
Average	**2.32**	**1.41**

Source: Research data (2017)

Table 4.2 depicts the mean and standard deviation of various indicators of system development enhancement. The overall mean and standard deviation for all the indicators are also shown. The results on the indicator that the organization frequently adds new capabilities to an existing system had a 2.45 mean and 1.45 SD an indication that most of the respondents were disagreeing with the statement. Nevertheless, this was the indicator with the highest mean and hence the highly adopted under system development enhancement. Secondly, the results on the indicator that organization modifies systems on a continuous basis to enhance efficiency had a 2.34 mean and a 1.37 SD. This signaled that majority of the respondents were disagreeing with the statement. Thirdly, the results on the indicator that identified defects are corrected on a continuous basis had a 2.26 mean and 1.44 SD. Finally, the least in adoption was the construct that new features are often added to the existing system with a 2.24 mean and 1.38 SD. An overall mean of 2.32 was obtained meaning that most respondents failed to agree with these statements. The overall SD was 1.41, an illustration there was clustering of responses around the mean.

4.3.2 Digital Tools and Services

The study established the effect of digital tools and services on organizational performance of government agencies. The employees' responded on digital tools and services. The responses are rated on 5 point likert scale of 5- Strongly agree, 4- Agree, 3- Neutral, 2- Disagree and 1- Strongly disagree. The outcome was indicated in table 4.3.

Table 4.3: Digital Tools and Services

Indicator	Mean	SD
The organization has an efficient customer relationships management system	2.34	1.39
The organization has an efficient human resource management system	2.28	1.38
The organization is connected with an extranet	2.16	1.27
The organization is connected with an intranet	2.14	1.34
Average	**2.23**	**1.35**

Source: Research data (2017)

Table 4.3 depicts the average and SDs of various indicators of digital tools and services. The overall mean and standard deviation for all the indicators are also shown. The results on the indicator that the organization has an efficient customer relationships management system had a 2.34 mean and 1.39 SD a sign that most respondents were disagreeing with the statement. This was the indicator with the greatest mean and hence the highest determinant under digital tools and services on organizational performance of government agencies. Secondly, this was followed by the indicator that the organization has an efficient human resource management system. The results on this had a 2.28 mean and a 1.38 SD meaning most respondents were disagreeing with the statement.

Further, the results on the indicator that organization is connected with an extranet was the third in influencing the contribution digital tools and services on organizational performance of government agencies at a 2.16 mean and a 1.27 SD but which was still a sign that most respondents were not agreeing to the statement. The results on the indicator that the organization is connected with an intranet were the last and had a 2.14 mean and a 1.34 SD. This was still an indication that most respondents were not agreeing to the statement. The overall mean was 2.23 a signal that most respondents failed to agree with the statement. The overall standard deviation was 1.35, an illustration that the responses were concentrated around the mean.

4.3.3 Information Technology Based Innovations

The study determined the impact of information technology based innovations on organizational performance of Kenya's government agencies. The respondents were required to respond on statements associated with information technology based innovations.

Table 4.4: Information Technology Based Innovations

Indicator	Mean	SD
Organization makes use of radio frequency identification systems	2.39	1.43
Electronic data interchange is widely practiced in the organization	2.22	1.39
The organization has automated storage and retrieval system	2.18	1.31

The organization makes use of global positioning systems	2.07	1.30
Average	**2.22**	**1.36**

Source: Research data (2017)

Table 4.4 depicts mean and standard deviations of various indicators of system development enhancement. The overall mean and standard deviation for all the indicators are also shown starting with the highest to the least. The study findings showed that the indicator that the organization makes use of radio frequency identification systems (RFID) with a 2.39 mean and 1.43 SD was the highest in adoption under information technology based innovations. Nevertheless, it was still an indication that most of the respondents were disagreeing with the statement. This was followed by the indicator that the electronic data interchange is widely practiced in the organization with a 2.22 mean and 1.39 SD. Thirdly, the results on the indicator that the organization has automated storage and retrieval system had a 2.18 mean and 1.31 SD. The findings on the indicator that the organization makes use of global positioning systems was the least in influencing information technology based innovations on organizational performance of government agencies with a 2.07 mean and a 1.30 SD. An overall mean of 2.22 was obtained meaning that most respondents failed to agree with the statement. The overall SD was 1.36, an illustration that the responses were concentrated around the mean.

4.3.4 Interdepartmental Process Integration

The study’s aim was to determine the impact of interdepartmental process integration on organizational performance of Kenya's government agencies. The respondents were asked to respond on statements related to interdepartmental process integration. The responses are rated on 5 point likert scale of 5- Strongly agree, 4- Agree, 3- Neutral, 2- Disagree and 1- Strongly disagree. The results are shown in table 4.5.

Table 4.5: Interdepartmental Process Integration

Indicator	**Mean**	**SD**
Collaboration between departments is encouraged in the organization	2.22	1.42
There is efficient flow of information between functions and departments	2.20	1.25
There is continuous interaction between departments	2.12	1.33
All departments understand their roles and how these affect the overall objective	2.09	1.33
Average	**2.16**	**1.33**

Source: Research data (2017)

The overall mean and standard deviation for all the indicators are also shown. The indicators are arranged according to the weight they had on the entire variable as reflected by the mean and the standard deviation. The results on the indicator that collaboration between departments is encouraged in the organization had the greatest mean of 2.22 and a 1.42 SD and therefore had the greatest impact on the variable of interdepartmental process integration. Nevertheless it still signaled that most respondents disagreed with the statement. Secondly, the results on the indicator that there is efficient flow of information between functions and departments had a 2.20 mean and a 1.25 SD, once again a sign that most respondents failed to agree with the statement. The results on the indicator that there is continuous interaction between departments had a 2.12 mean and a 1.33 SD a signal that most respondents failed to agree with the statement. Finally, the results on the indicator that all departments understand their roles and how these affect the overall objective had 2.09 mean and a 1.33 SD a sign that most respondents failed to concur with the statement. The average mean was 2.16 meaning most respondents disagreed with the statement. The overall SD was 1.33, an illustration that the responses were concentrated around the mean.

4.4 Summary of Level of Adoption of Technological Innovations

The study further aimed at determining the effect of technological innovations on organizational performance of Kenya's government agencies. The independent variables for the study were system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration. The study adopted descriptive cross-sectional survey design. Questionnaires were used to collect primary data which was analyzed using SPSS software version 20. From the descriptive statistics, the level of adoption of the study variables among government agencies is averagely low as overall mean for each variable was below 2.32. The means of these variables are depicted in table 4.6 below.

Table 4.6: Summary of Means of Level of Adoption of Technological Innovations

Independent Variable	Means	Standard deviations
System Development Enhancement	2.32	1.41

Digital Tools and Services	2.23	1.35
Information Technology Based Innovations	2.22	1.36
Interdepartmental Process Integration	2.16	1.33

The variable that had the highest mean was that of system development (mean=2.32, standard deviation=1.41). This meant that it had the highest level of adoption. Secondly, digital tools and services was the next at a 2.23 mean and 1.35 SD followed by information technology based innovations at a 2.22 mean and SD of 1.38. Finally, interdepartmental process integration was the last at a 2.16 mean and 1.33 SD. This therefore meant that interdepartmental process integration had the least level of adoption as compared to others. The overall mean for system development enhancement was 2.32 meaning most respondents were not agreeing to the statement. The overall SD was 1.41, an illustration of responses being concentrated around the mean response. The level of adoption of system development enhancement is therefore at low levels in government agencies in Kenya.

The overall mean for digital tools and services was 2.23 a sign that most respondents failed to agree with the statements. The overall SD was 1.35, an illustration that the responses were concentrated around the mean. This therefore meant that digital tools and services had a low adoption in the government agencies in Kenya. The overall mean for information technology based innovations on organizational performance of government agencies in Kenya was 2.22 signaling that most respondents were not concurring with the statements. The overall SD was 1.36, an illustration the responses were concentrated within the mean response. This meant that government agencies in Kenya have utilized information technology based innovations to a small extent.

The overall mean for interdepartmental process integration on organizational performance of government agencies in Kenya was 2.16 showing that most respondents were not concurring with most statements. The overall SD was 1.33, an illustration that the responses were concentrated around the mean. This therefore meant that government agencies in Kenya have adopted interdepartmental process integration only to a small extent.

4.5 Organizational performance

The study also established the level of organizational performance of government agencies in Kenya in relation to implementation of technological innovations. The respondents were asked to respond on aspects related to organizational performance. The responses are rated on 5 point likert scale of 1- Greatly reduced, 2-Reduced, 3-Constant, 4- Improved and 5- Greatly improved. The responses were rated on a five likert scale in table 4.7. The findings were as demonstrated below;

Table 4.7: Organizational performance

Statement	Mean	SD
Cost reduction	3.50	1.42
Productivity	3.53	1.25
Flexibility	3.62	1.14
Reliability	3.72	1.16
Responsiveness	3.76	1.33

Asset efficiency utilization	3.74	1.36
Average	**3.64**	**1.28**

Table 4.7 depicts mean and SD of various indicators of organizational performance. The overall mean and standard deviation for all the indicators are also shown. The results on cost reduction had a 3.50 mean and 1.42 SD an indication that most respondents were agreeing to the indicator. Further, the results on productivity had a 3.53 mean and 1.25 SD signaling that most respondents were agreeing to the statement.

The results on flexibility had a 3.62 mean and 1.14 SD an indication that most respondents were agreeing to the statement. The findings of this study were in agreement with those of Chesbrough (2010) who found out that the effects of innovation were reflected in a wider variety of goods and services, increased quality of services, and process-oriented outcomes such as improved production flexibility and increased production capacity.

The results on reliability had a 3.72 mean and 1.16 SD an indication that most of the individuals who responded were in agreement with the indicator. Further, results on responsiveness had a 3.76 mean and a 1.33 SD meaning most respondents were agreeing to the indicator. Finally, the results on asset efficiency utilization had a 3.74 mean and a 1.36 SD meaning most respondents were agreeing to the statement. The overall mean was 3.64 an indication that most of the people who responded were in agreement with the statements. Overall standard deviation was 1.28, an illustration the responses were concentrated within the mean response.

4.6 Diagnostic tests

Both pre-estimation and post estimation tests were executed before running the regression model. Multicollinearity test was the pre-estimation test for this study whereas heteroskedasticity and normality tests were the post- estimation tests. These tests are undertaken to moderate the results of the regression output.

4.6.1 Reliability Test Results

The Cronbach Alpha was utilized to test this instrument's reliability. This was in a bid to ascertain the internal consistency. The findings are shown in Table 4.8.

Table 4.8: Test Results

Item	Respondents	α=Alpha	Comment
System development enhancement	8	0.882	Reliable
Digital tools and services	6	0.739	Reliable
Information technology based innovations	7	0.974	Reliable
Interdepartmental process integration	5	0.776	Reliable
Organizational performance	6	0.841	Reliable

Source: Research data (2017)

The results on Table 4.8 revealed that system development enhancement had a 0.882 Cronbach alpha coefficient, digital tools and services had a 0.739 Cronbach alpha coefficient. The results of the reliability tests revealed that information technology based innovations had a 0.974 Cronbach alpha coefficient, interdepartmental process integration had a 0.776 Cronbach alpha while organizational performance had a 0.841 Cronbach alpha coefficient. An alpha coefficient above 0.7 is regarded as reliable.

4.6.2 Test for Normality

The graphical method approach was used in the study to test normality and the findings are as presented in figure 4.5. It can therefore be concluded that the distribution of residuals was normal.

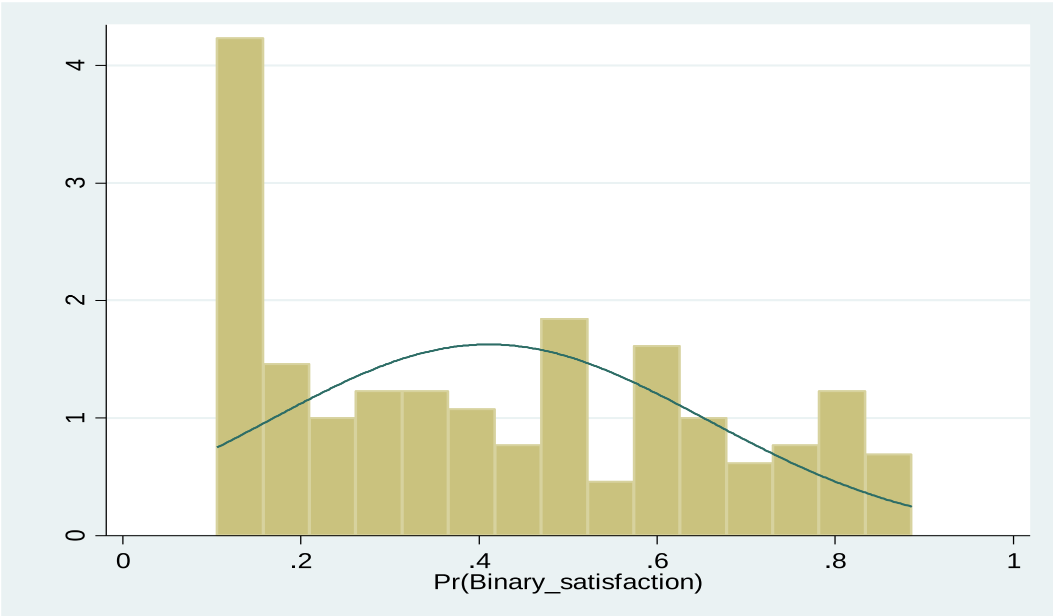


Figure 4.5: Test for Normality

Source: Research data (2017)

4.6.3 Test for Multicollinearity

William, (2013) describes multicollinearity as the existence of correlations among the predictor variables. In extreme instances of perfect correlations between predictor variables, multicollinearity could mean it will be hard to compute a unique least squares solution to a regression analysis (Field, 2009). According to Belsley *et al*., (1980), multicollinearity inflates confidence intervals and the standard errors resulting to unstable coefficient estimates for individual predictors. The variance inflation factors (VIF) was used to assess multicollinearity in this case. VIF values exceeding 10 shows the existence of multicollinearity (Field, 2009). The findings in Table 4.9 present VIF results and its value was 1.08 which is <10 and no multicollinearity existed (Field, 2009).

Table 4.9: Table Multicollinearity results using VIF

Variable	**VIF**	**1/VIF**
System Development Enhancement	1.1	0.908196
Digital Tools and Services	1.1	0.908525
Information Technology Based Innovations	1.09	0.917836
Interdepartmental Process Integration	1.08	0.924977
Organizational performance	1.05	0.954688
Mean VIF	**1.08**	

Source: Research data (2017)

4.6.4 Heteroskedasticity test

Breusch-Pegan test was employed to ascertain heteroskedasticity. The tests' null hypothesis was that that error terms have a constant variance. The findings in Table 4.10 reveal that the error terms are homoskedastic because the p-value is bigger as compared to the 5% (0.1001).

Table 4.10: Heteroskedasticity Test Result

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of satisfaction
chi2(1) = 15.33
Prob > chi2 = 0.1001

Source: Research data (2017)

4.7 Inferential analysis

Inferential statistics was used to make predictions and inferences regarding the study population. Pearson correlation and regression model was used.

4.7.1 Correlation analysis

The study's other goal was to determine the relationship between the variables in the study. The results are shown in Table 4.11. Correlation analysis shows whether an association exists between two variables. R value of -1 indicates strong negative correlation and an R value of +1 indicates perfect positive correlation. Pearson correlation was employed to establish the impact of technological innovations on how organizations of Kenya's government agencies perform. The elements of technological innovations were system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration.

Table 4.11: Correlation matrix of variables

Variable		Organization performance	System Development Enhance	Digital Tools and Services	Information Technology Based Innovations	Interdepartmental Process Integration
Organization performance	Pearson Correlation	1	.602**	.599**	.554**	.726**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000
System Development Enhancement	Pearson Correlation	.602**	1	.366**	.469**	.377**
	Sig. (2-tailed)	0.000		0.001	0.000	0.001
Digital Tools and Services	Pearson Correlation	.599**	.366**	1	0.19	.435**
	Sig. (2-tailed)	0.000	0.001		0.1	0.000
Information Technology Based Innovations	Pearson Correlation	.554**	.469**	0.19	1	.321**
	Sig. (2-tailed)	0.000	0.000	0.1		0.005
Interdepartmental Process Integration	Pearson Correlation	.726**	.377**	.435**	.321**	1
	Sig. (2-tailed)	0.000	0.001	0.000	0.005	

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

Source: Research data (2017)

The outcome revealed a positive and statistically significant correlation ($r=.602$, $p = .000$) exists between system development enhancement and organizational performance of government agencies in Kenya. This study's findings were in agreement with those of Kash and Rycroft (2011) who stipulated that system development enhancement is most commonly implemented to cut costs, improve performance, meet regulatory requirements or to take advantage of modern technologies and therefore a positive significant relationship between them.

The study also established a significantly positive correlation existed between digital tools and services and how organizations of government agencies perform ($r = .599$, $p = .000$). Technology based innovations was had a positive and significant association with performance of government agencies in Kenya ($r = .554$, $p = .000$). Further, this study established that that there is a positive as well as significant correlation between interdepartmental process integration and performance of government agencies in Kenya ($r = .726$, $p = .000$). The findings of this study were in agreement with those of Nadler and Tushman, (2006) who stipulated that interdepartmental process integration defines overall goals and departmental sub-goals so that each employee understands their roles and how they contribute to realization of overall objectives and consecutively affecting the next step in the processes chain. Moreover, the findings of this study were in agreement with those of Lin and Ho (2007) who argued that joint effort has a solid, beneficial outcome on execution.

4.7.2 Regression Analysis

Organizational performance of government agencies was regressed against system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration. The regression analysis was executed at 5% level of significance. The study obtained the model summary statistics as depicted in table 4.12.

Table 4.12: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.871	.759	.746	.30115

Source: Research Findings (2017)

The coefficient of determination R squared indicates response variations brought about by changes in the predictor variables. From the outcome in table 4.12, the value of R square was .759, an indication that 75.9 percent of the deviations in the organizational performance of government agencies are caused by changes in system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration. Other variables not included in the model justify for 24.1 percent of the variations in the organizational performance of government agencies. Also, the results reveal that there exists a significant association among the selected independent variables and organizational performance of government agencies as indicated by the correlation coefficient of 75.9 %. Table 4.13 shows the ANOVA results of the study.

Table 4.13: Analysis of Variance

Indicator	Sum of Squares	Df	Mean Square	F	Sig.
Regression	20.287	4	5.072	55.924	.000
Residual	6.439	71	0.091		
Total	26.726	75			

Source: Research findings (2017)

The significance value of 0.000 was obtained which is less than p=0.05. The meaning of this is that the model was statistically significant in predicting how system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration affect the organizational performance of government agencies in Kenya. The F value derived indicates that the data used was linear and therefore can be used for regression analysis.

The researcher used t-test to determine the significance of each individual variable used in this study as a predictor of the organizational performance of government agencies in Kenya. The p-value under sig. column was used as an indicator of the significance of the relationship between the independent variable and dependent variable. The p-value was less than < 0.05 at 95% confidence level which was interpreted as a measure of statistical significance. As such, a p-value above 0.05 indicates a statistically insignificant association between the dependent and independent variable. The regression results of the model are as shown in table 4.14.

Table 4.14: Regressions of coefficients

Variable	B	Std. Error	Beta	t	Sig.
(Constant)	-0.208	0.215		-0.969	0.336
System Development Enhancement	0.202	0.068	0.211	2.99	0.004
Digital Tools and Services	0.237	0.057	0.28	4.194	0.000
Information Technology Based Innovations	0.214	0.055	0.26	3.872	0.005
Interdepartmental Process Integration	0.384	0.059	0.441	6.48	0.000

Source: Research Findings (2017)

The findings reveal that system development enhancement had a positive and statistically significant relationship with how organizations of government agencies perform in kenya ($r = .202$, $p = .004$), digital tools and services had positive and statistically significant relationship with organizational performance of government agencies in Kenya ($r = .237$, $p = .000$), information technology based innovations had positive and statistically significant relationship with organizational performance of government agencies in Kenya ($r = .214$, $p = .005$) interdepartmental process integration had positive and statistically significant relationship with organizational performance of government agencies in Kenya ($r = .384$, $p = .000$). The following regression equation was estimated:

$$Y = -0.208 + 0.202X_1 + 0.237X_2 + 0.214X_3 + 0.384X_4$$

Where,

Y = Organizational performance of government agencies in Kenya

X_1 = System development enhancement

X_2 = Digital tools and services

X_3 = Information technology based innovations

X_4 = Interdepartmental process integration

On the estimated regression model above, the constant = -0.208 shows organizational performance of government agencies if the independent variables (system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration) were put at zero. An increase in system development enhancement by one unit would result to increase in organizational performance of government agencies by 0.202. An increase in digital tools and services by one unit results in increased organizational performance of government agencies by 0.237; a unit increase in information technology based innovations would lead to an increase in organizational performance of government agencies by 0.214 units. Further, a unit increase in interdepartmental process integration would lead to an increase in organizational performance of government agencies in Kenya by .384.

4.8 Discussion of Research Findings

The study's aim was to ascertain the consequence of technological innovations on organizational performance of Kenya's government agencies. Independent variables for this study were system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration. The dependent variable of this study was organizational performance of government agencies in Kenya. The individual effect of each independent variable on the dependent variable was analyzed in terms of strength and direction.

The Pearson correlation coefficients between the variables revealed that a positive and statistically significant correlation exists between system development enhancement and organizational performance of government agencies in Kenya. The study also showed that there exist a positive association between digital tools and services, information technology based innovations and interdepartmental process integration, and organizational performance of government agencies in Kenya.

The model summary revealed that the independent variables: system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration explains 75.9% of change in dependent variable as demonstrated by R^2 value which mean that other factors not factored in this model exist that account for 24.1% of changes in the performance of government agencies in Kenya. The model is fit at 95% level of confidence since the F-value is 55.924. Therefore, the overall multiple regression model can be said to be statistically significant i.e. it is suitable for explaining how the selected independent variables affects performance of government agencies in Kenya.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section gives a summary of all the findings discussed in the previous chapter, draws conclusions and states the limitations encountered while executing the study. The study also presents policy recommendations that could be implemented by different stakeholders with respect to this subject.

5.2 Summary of Findings

This study established effect of technological innovations to how organizations of government agencies in Kenya perform. Independent variables for the study were system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration. From the descriptive statistics, the level of adoption of the study variables among government agencies is averagely low as overall mean for each variable was below 2.32.

From the correlation analysis findings, a significant and a positive correlation exists between system development enhancement and organizational performance of government agencies in Kenya. There also existed a significant and a positive correlation between digital tools and services and the organization's performance of government agencies. Information technology based innovations was also exhibited positive and significant relationship with how government agencies perform as organizations. Finally, interdepartmental process integration showed a positive as well as significant association with organizational performance of government agencies in Kenya.

The findings of this study were compatible with those of Grundiche (2004) who argued that for the company to ensure that it remains competitive in a dynamic environment and achieve its set objectives of profitability, sales volume and market share, it must make efforts to continually improve products and product lines to satisfy customer needs that keep changing through adoption of innovations and technology. Moreover, the findings of this study were in agreement with those of Lall (1980) who stressed that technological innovation is mostly being undertaken in the developing country's modern sectors especially those that have been in the manufacturing industry for long and with broad - based capital good sectors. These innovations bring change in a variety of ways including increased efficiency and productivity from the simplicity of learning through practicing, advancements in design, construction and management of advanced industrial processes.

The findings of this study were in agreement with those Alstrup, (2010) who posited that Customer relationship management tools help organizations manage relationships with customers systematically, efficiently and profitably therefore boosting on performance of the organization. Moreover, this study's findings were in agreement with those of Kash and Rycroft (2011) who argued that while digital tools and services require a prior resource investment, this kind of investment can create long run efficiency by saving time and aligning the processes. In addition, the findings of this study were in agreement with those of Alstrup (2010) who stipulated that digital tools can also open up new opportunities for exchange of data and collaboration which ultimately contributes to more revenue, manage documents, customer relationships, human resources and other internal processes.

The study findings were also in agreement with those of Lin and Ho (2007) who posited that information technology based innovations are significant to enable companies survive severe universal tough circumstances but maintaining sustainable competitiveness In addition, the findings of this study were in agreement with those of Wu and Lin (2009) who stipulated that several information technology based innovations are used in service science and firm operations and that the information technology based innovations are vital to help firms in surviving antagonistic worldwide money related conditions while likewise getting to be plainly instrumental for producing supportable intensity.

This study's model summary revealed that the independent variables: system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration explains 75.9% of change in dependent variable as demonstrated by R^2 value which mean that other factors not factored in this model exist that account for 24.1% of changes in the performance of government agencies in Kenya. The model is fit at 95% level of confidence since the F-value is 55.924. Therefore, the overall the multiple regression model can be said to be statistically significant i.e. it is suitable for explaining how the selected independent variables affects performance of government agencies in Kenya.

Regression results showed that system development enhancement had a significant and positive relationship with how government agencies in Kenya perform, digital tools and services had positive and statistically significant association with organizational performance of government agencies in Kenya while information technology based innovations had positive and significant link with firm performance of government agencies in Kenya. Finally, regression output showed that interdepartmental process integration had positive and statistically significant link with organizational performance of government agencies in Kenya. The study's findings were in agreement with those of Lyytinen and Rose (2003) who posited that there are four measures of technological innovations: System development enhancement, utilization of digital tools and services in the execution of the daily operational activities of the organization, information technology based innovations and interdepartmental process integration which involve integration of processes across all the departments.

5.3 Conclusion

It can be concluded from the findings that performance of government agencies in Kenya is significantly influenced by system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration. The study established that system development enhancement had positive and significant association with organizational performance of government agencies in Kenya. The study therefore concludes that a higher unit in system development enhancement cause 0.202 units to go up in how government agencies in Kenya perform as organizations.

The study found that digital tools and services has positive and statistically significant relationship with organizational performance of government agencies in Kenya and therefore it is concluded that a unit rise in digital tools and services causes 0.237 units increase in the organizational performance of government agencies. Information technology based innovations shown a positive and significant relationship with how government agencies perform and therefore means that a unit in increase in information technology based innovations leads to a 0.214 units increase in the organizational performance of government agencies in Kenya. It was also found that interdepartmental process integration had a significant and positive relationship with how government agencies in Kenya perform as organizations implying that a unit in increase in interdepartmental process integration leads to a 0.387 units increase in the organizational performance of government agencies in Kenya.

The study further concludes that, the independent variables which are system development enhancement, digital tools and services, information technology based innovations and interdepartmental process integration influences organizational performance of government agencies in Kenya. It is thus partially reasonable to conclude that these variables significantly affect organizational performance of government agencies in Kenya as demonstrated by the p value in ANOVA table. Since the predictor variables are responsible for 75.9% of changes in government agencies' performance in Kenya implies that there exists other factors influencing performance of government agencies in Kenya that were not factored into the model.

5.4 Recommendations

The study established that system development enhancement had a significant and positive relationship with how organizations of government agencies in Kenya perform. This study recommends expert training to enhance the systems. The study found that digital tools and services have positive and statistically significant relationship with organizational performance of government agencies in Kenya. Digital tools and services are important when digitizing government services. Digital tools and services are used to support business operations, from electronic commerce, to firm communications and to internal business systems. This study recommends more funding to search departments.

Information technology based innovations too exhibited statistically significant and positive association with organizational performance of government agencies in Kenya. Information technology based innovations are significant in helping organizations survive severe universal financial circumstances and at the same time become a tool of coming up with competitiveness that is sustainable. This study recommends more funding to research and development. Finally, interdepartmental process integration had positive and statistically significant relationship with organizational performance of government agencies in Kenya. Interdepartmental process integration defines the general goals and departmental sub-goals so that everyone clearly understands their roles and how they contribute to realization of overall objectives. This study recommends integration of key government entities through technology adoption.

5.5 Limitations of the Study

A number of the respondents were unwilling to participate in the study. However, this was mitigated by assuring them of confidentiality and that the collection of data was for the purposes of academic research only.

There was also the challenge of time constraint. This was also addressed by dropping the questionnaire and picking it at a later date and also sending it via email and booking an appointment to collect it physically. The study relied much on primary data which is prone to bias. However, the study requested the respondents to be truthful as much as possible.

5.6 Suggestions for Further Research

It's recommended that a similar research ought to be carried out but focus on government ministries for comparison purposes. This would help to establish whether government ministries have similar operational experiences with regard to adoption of technological innovation. However, this is expected to be different due to difference in business environment.

The study also suggested that a similar study be conducted but focusing on the private sector. This would help to establish the differences that exist between public and private sector with regard to adoption of technological innovation. Though a very thin line exists between the two, the study would help to elucidate on how they differ.

Further, the study suggest that a more extensive study be conducted to establish the influence of the specific aspects of the different types of technological innovations and this would help the government agencies to identify the aspects that have more weight than other and thus have clarity with regard to what to adopt and what not to adopt.

The study recommends for a study on the factors that affect implementation of technological innovations among government agencies. This study found that the adoption level of technological innovations is low and thus establishment of the factors leading to this is recommended.

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Appendix I: Questionnaire

This questionnaire has been designed to collect information on the effect of technological innovations on organization performance of government agencies in Kenya. Please read carefully and answer the questions as honestly as possible. The information gathered will be used purely for the purpose of academic research and will be treated with utmost confidence.

Instructions

1. Tick appropriately in the box or fill in the space provided.

2. Feel free to give further relevant information to the research.

PART A: BIOGRAPHIC INFORMATION

1. Your age bracket in years?

Less than 30☐ 31-35☐ 36-40☐ 41-45 ☐ 46-50☐ greater than 51☐

2. Your highest level of professional training and education?

Diploma ☐ Degree☐ Master's degree ☐ PhD ☐

Any other Specify…………………………………………………………………………

3. Your management level in the organization

Senior Level Management ☐

Middle Level Management ☐

Lower Level Management ☐

4. How long have you worked with the organization?

Below 5 years ☐

5 to 10 years ☐

Above 10 years ☐

5. Which department do you work in the organization? ………………………..

PART B: LEVEL OF TECHNOLOGICAL INNOVATIONS ADOPTION AMONG GOVERNMENT AGENCIES

a) Use 1- Strongly disagree, 2-Disagree, 3- Neutral, 4- Agree, 5- Strongly agree

System Development Enhancement

Indicator	**1**	**2**	**3**	**4**	**5**
The organization frequently adds new capabilities to an existing system					
New features are often added to the existing system					
Identified defects are corrected on a continuous basis					
The organization modifies systems on a continuous basis to enhance efficiency					
The organization frequently adds new capabilities to an existing system					

Digital Tools and Services

Component	1	2	3	4	5
The organization is connected with an intranet					
The organization is connected with an extranet					
The organization has an efficient human resource management system					
The organization has an efficient customer relationships management system					

Information Technology Based Innovations

Component	1	2	3	4	5
Organization makes use of radio frequency identification systems (RFID)					
The organization has automated storage and retrieval system					
The organization makes use of global positioning systems					

Electronic data interchange is widely practiced in the organization					

Interdepartmental Process Integration

Component	**1**	**2**	**3**	**4**	**5**
There is continuous interaction between departments					
There is efficient flow of information between functions and departments					
Collaboration between departments is encouraged in the organization					
All departments understand their roles and how these affect the overall objective					

PART C: TECHNOLOGICAL INNOVATIONS AND ORGANIZATION PERFORMANCE

a) In your own opinion how would you rate the organization performance indicators below before and after implementing some technological innovation practices in the firm?

Performance Indicator	**Greatly reduced**	**Reduced**	**Constant**	**Improved**	**Greatly improved**
	1	**2**	**3**	**4**	**5**
Cost reduction					
Productivity					
Flexibility					
Reliability					
Responsiveness					
Asset efficiency utilization					

Thank you for your co-operation

Appendix II: List of Government Agencies in Kenya

1. Agricultural Development Corporation (ADC) in Kenya
2. Betting Control And Licensing Board in Kenya
3. Brand Kenya Board in Kenya
4. Bomas of Kenya Limited
5. Capital Markets Authority (CMA) in Kenya
6. Central Bank Of Kenya
7. Coffee Board of Kenya
8. Coffee Research Foundation in Kenya
9. Commission on Revenue Allocation in Kenya
10. Communications Commissions of Kenya (CCK)
11. Constituencies Development Fund Board in Kenya
12. Economic Stimulus Program in Kenya
13. eGovernment Kenya
14. Energy Regulatory Commission (ERC) in Kenya
15. Ethics and Anti-Corruption Commission (EACC) in Kenya
16. Export Promotion Council in Kenya
17. Higher Education Loans Board (HELB) in Kenya
18. Huduma Kenya Secretariat
19. Independent Boundaries And Electoral Commission (IEBC) in Kenya
20. Judges and Magistrates Vetting Board in Kenya
21. Judiciary Training Institute in Kenya
22. Kenya Airports Authority
23. Kenya Broadcasting Corporation
24. Kenya Bureau of Standards (KBS)
25. Kenya Civil Aviation Authority
26. Kenya Coconut Development Authority
27. Kenya Ferry Services Limited
28. Kenya Film Commission
29. Kenya Flower Council
30. Kenya Forest Service
31. Kenya ICT Board
32. Kenya Law Reform Commission (KLRC)
33. Kenya Maritime Authority
34. Kenya Medical Supplies Agency (KEMSA)
35. Kenya National Audit Office (KENAO)
36. Kenya National Bureau of Statistics (KNBS)
37. Kenya National Commission for UNESCO
38. Kenya National Commission of Human Rights (KNCHR)
39. Kenya National Examinations Council (KNEC)
40. Kenya National Highways Authority (KENHA)
41. Kenya National Trading Corporation Limited
42. Kenya Plant Health Inspectorate Services (KEPHIS)
43. Kenya Ports Authority (KPA)
44. Kenya Revenue Authority (KRA)
45. Kenya Roads Board

46. Kenya Sugar Board
47. Kenya Tourist Board
48. Kenya Urban Roads Authority (KURA)
49. Kenya Valley Development Authority (KVDA)
50. Kenya National Disaster Operation Centre (NDOC)
51. Kenya Wildlife Service (KWS)
52. Kenya Yearbook Editorial Board
53. LAPFUND in Kenya
54. Media Council of Kenya
55. Medical Practitioners and Dentists Board in Kenya
56. National Aids Control Council in Kenya
57. National Cereals and Produce Board (NCPB) in Kenya
58. National Council for Law Reporting in Kenya
59. National Council for Persons With Disabilities in Kenya
60. National Council for Population and Development in Kenya
61. National Crime Research Centre in Kenya
62. National Environment Management Authority (NEMA)
63. National Gender and Equality Commission (NGEC) in Kenya
64. National Hospital Insurance Fund (NHIF) in Kenya
65. National Intelligence Service (NIS) in Kenya
66. National Irrigations Board in Kenya
67. National Land Commission in Kenya
68. National Museums of Kenya
69. National Police Service Commission in Kenya
70. National Social Security Service (NSSF) in Kenya
71. National Transport and Safety Authority in Kenya
72. Non-Governmental Organization Coordination Board in Kenya
73. Nyayo Tea Zones Development Corporation in Kenya
74. Office of Attorney General and Department of Justice in Kenya
75. Office of The Controller of Budget in Kenya
76. Office of The Director of Public Prosecution in Kenya
77. Parliamentary Service Commission in Kenya
78. Pest Control Products Board in Kenya
79. Postal Corporation of Kenya
80. Privatization Commission in Kenya
81. Public Service Commission of Kenya
82. Retirement Benefits Authority in Kenya
83. Salaries and Remuneration Commission in Kenya
84. Tana and Athi River Development Authority (TARDA) in Kenya
85. Tea Board of Kenya
86. Teachers Service Commission in Kenya
87. The Commission on Administrative Justice (Office of The Ombudsman) in Kenya
88. The Judiciary in Kenya
89. The Kenya National Disaster Operation Centre (NDOC)
90. The Sacco Societies Regulatory Authority (SASRA) in Kenya
91. Tourism Fund in Kenya

92. Transition Authority (TA) in Kenya
93. Vision 2030 Delivery Secretariat in Kenya
94. Youth Enterprise Development Fund in Kenya

Source: Yellow pages (2017)

Appendix III: Data Collection Letter