A SURVEY ON THE IMPACT OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) INDUCED INNOVATION ON OPERATIONAL PERFORMANCE OF COMMERCIAL BANKS IN KENYA

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ABSTRACT
Information Communication Technology (ICT) is one of the most relevant types of technology that an organization can employ today to create a sustainable competitive edge. Taking advantage of ICT can only make a difference through innovation. Technology-led innovations consistently provide positive results to organization’s overall performance.

The objective of the study was to establish the impact of ICT-induced innovation on operational performance in commercial banks in Kenya. The study was a descriptive survey. The population of interest comprised commercial banks in Kenya. There were 43 commercial banks in Kenya as of December 2010. Primary data was collected using a questionnaire with close-ended and open-ended questions administered to senior management staff of various commercial banks. The respondents were requested to fill-in the questionnaires. The data collected was then coded for analysis. Microsoft Excel was used by the researcher to analyze the data.

The study concludes that ICT led innovations have enabled banks to offer a wider array of savings, term deposit and loan products. ICT innovations have also facilitated banks to offer differentiated delivery channels through which customers can access banking services like through mobile phones, agents, debit cards, credit cards and through ATMs. Technology innovations improved service delivery thereby attracting more customers. ICT innovation has enabled banks to deepen customer loyalty and increase customer retention. For back office activities, banks have invested in software applications to simplify work and to manage internal controls leading to better organizational performance. ICT has facilitated banks to expand their operations by opening new branches in rural and remote areas.

The study concludes that ICT induced innovations have positively impacted on operational performance. The study recommends banks to invest in technology if they desire to increase their revenues and reduce their operational costs thereby delivering better operational performance.

Key Terms: Information Communication Technology, Induced Innovation and Operational Performance

1.1. Introduction
According to Collins English Dictionary (2003), technology is a body of knowledge used to create tools, develop skills, and extract or collect materials. According to Laudon and Laudon (2000); technology is the application of science to meet an objective or solve a problem. The modern day enterprises are facing most challenging environment due to stiff competition from local and international peers that are constantly changing tactics to become the best in the market. The customers have also become wiser and are more demanding while the regulators are stricter than ever before. The market has shrunk considerably with the opening up of the international markets and creation of trading blocs like the East African Community or the European Union.

Globalization has eased the movement of goods and services from one corner of the globe to the other. The discovery and evolution of communication channels like mobile telephony, internet, the World Wide Web and social networking among other media, has made the flow of information so free that it is ubiquitous. The hitherto undue advantage arising from possession of important ideas or information is no longer existent.

Throughout history, the business environment has been on constant evolution starting with the pre-agrarian and agrarian ages, industrial era and the modern day technological age. Technology has become the most critical resource with which any organization can harness to overcome its challenges. However, the acquisition of technology is not sufficient enough to set any firm
above the rest because technology has become easily accessible to all. The answer lies in how an organization exploits this technology to its advantage. Information Communication Technology (ICT) is one of the most relevant forms of technology that an organization can employ today to create a sustainable competitive edge. Taking advantage of ICT can only make a difference through innovation. Any organisation that endeavors to survive must keep pace with fast changing technology and must innovate because failure to innovate is planning to fail (Mayo, 2011). The ability to innovate is increasingly viewed as the single most important factor in developing and sustaining competitive advantage (Tidd, 2001). It is no longer adequate to do things better, but it is about doing new and better things (Slater and Narver, 1995).

1.1 Concept of ICT
Information Communication Technology (ICT) is an umbrella term used to define a collection of telecommunication devices, computer hardware and software. According to Chaffey and Wood (2005), ICT refers to software applications that captures, manipulates and allows access to information, hardware that helps run installed applications and telecommunication devices and networks that facilitate transfer of information within an organization and beyond. ICT has transformed the way businesses are conducted by impacting on almost all aspects of business operations including product development, automation of processes, storage of customer data, communication and interaction with customers and suppliers. In today's global and dynamic competitive environment, organizations are leveraging on technology to innovate. ICT innovation is becoming more and more relevant, mainly as a result of three major trends; intense international competition, fragmented and demanding markets and diverse and rapidly changing technologies (Wheelwright and Clark, 1992). Firms that offer innovative products adapted to the needs of target customers or firms that are quick market new products and are more efficient than their competitors are in a better position to create a sustainable competitive advantage (Prahalad and Hamel, 1990; Amit and Schoemaker, 1993; Nonaka and Takeuchi, 1995; Calantone, 1995). Competitive advantage is increasingly being derived from technological skills and experience in the creation of new products (Teece, 1997; Tidd, 1997).

1.1.2 Concept of Innovation
Innovation is derived from the Latin word novus, meaning new. Innovation is defined as the introduction of something new or a new idea, method or device (Tornatzky and Fleischer, 1990). Innovation can also be defined as the change in the thought process for doing something. Innovation can be viewed in three dimensions as manifested in an organization. First, there is the technological knowledge manifested in the creative mind of an individual working within an organization. This type of knowledge can either be tacit or implicit. This knowledge and expertise is evidenced by the continuous improvement of routine operations, processes and development of new products and services. The second one can be viewed as ever dynamic and changes over time as new challenges arise and individuals gain more experience in what they do. This enables persons to become creative over time through gathering of new techniques from within and without their environment (Burns, 2008). While the third, thrives best in unstable and highly unpredictable environment. In such environments there is unequal and limited access to new information. Where information is readily available, different organizations interpret the same information differently leading to diverse approaches on how to use the said information.

The ultimate goal of innovation is to create competitive advantage for an organization which translates to better product offerings, ability to attract more loyal customers and the ability to reach out to a bigger market. In banking, innovation is assumed to have been achieved if a bank is able to deliver the desired advantage with relatively minimal investment. The best yardstick to measure successful innovation is evaluating the operational performance of that bank.

Some of the technological innovations in banking include; automated teller machine, mobile commerce, electronic banking and electronic publishing. Therefore the study will seek to assess
the impact of these novel innovations mainly on the expansion of new products and services, access to erstwhile difficult market segments or regions, timeliness in delivery of service, profitability, prevention of fraud and break down of controls.

1.1.3 Concept of Operational Performance
Operational performance can be defined as the accomplishment of expected outcomes relative to investments employed. It is the progress towards a set of objectives like number of customers, market share, and level of profits or expected returns to shareholders. The Performance Reference Model, PRM (Figure 1.1) illustrates the cause and effect of inputs and outputs. Inputs are basically the raw materials like human labour, fixed assets and base technology. Outputs are the products and services availed to the ultimate consumers. Output can also be viewed as the returns accruing to the investors or shareholders or the achievement of the firm’s strategic mission and vision.

![Figure 1.1: The Performance Reference Model](image)
(Source: U.S. Federal Enterprise Architecture, FEA)

In the study, operational performance was anchored on four key indicators; Product efficiency, process efficiency, market share and profitability

1.2 Kenya Banking Industry
The banking industry in Kenya is governed by various acts: the Companies Act Cap 486, the Banking Act Cap 488, the Central Bank of Kenya Act and various prudential guidelines issued by the Central Bank of Kenya (CBK). According to the half year CBK Report (June 2011), there are 43 commercial banks and one mortgage finance company. The banking industry has continued to experience improved performance. The aggregate industry balance sheet grew by 26.7% from Ksh. 1.5 trillion in June 2010 to Ksh. 1.9 trillion in June 2011 with all other parameters indicating the same positive results. Loans and advances
registered a 32.7% growth from Ksh. 828.9 billion to Ksh. 1.1 trillion (June, 2011). The deposits grew from Ksh. 1.2 trillion in June 2010 to Ksh.1.4 trillion by June 2011. The number of branches grew by 85, moving from 1,017 in 2010 to 1,102 in June 2011 with the bank deposit accounts increasing by 27% from 10.1 million to 12.8 million. Within the same period the non-performing loans reduced by 5.2% from a high of Ksh. 61.5 Billion to Ksh. 58.3Billion. The industry registered a 16.9% jump in profit before tax from 34.9 Billion to 40.8 billion. The CBK attributes this positive performance to several factors which include expansion of branch outreach, introduction of new products and services to meet changing customer demands, the roll out of the agency banking model, sustained opportunities in the regional markets, and enhanced outreach through innovative delivery channels and embracing of innovative use of technology (CBK Reports; June 2011, December 2010).

1.3 Statement of the Problem
Technology-led innovations have frequently provided consistent results as to the real impact of technology innovation on performance. In a study conducted by Byrd and Davidson (2003) on the relationship between technology-led innovations to performance, they noted that there was indeed a positive relationship between technology innovation and performance. Yam et al (2010) in a study titled 'Technological innovation capability and firm performance", and covering 1,200 firms in Hong Kong noted that, technological innovation has a positive impact on sales performance and resource allocation. Li and Ye (1999) noted that factors, such as environmental dynamism, external orientation, and technology-led innovation if integrated into a firm’s strategic management, can moderate the performance effect of technology. Andersen and Segars (2001) concluded that technology driven innovation enhances communication capabilities and supports the effectiveness of decentralized decision structure, which in turn increases performance of the firm. Weill (2000) found those contextual firm characteristics, such as top management commitment to technology, previous firm experience with technology, user satisfaction with systems, and the turbulence of the political environment within the firm, to be a significant moderator between strategic technology investment and firm performance. Locally, Letting (2003) studied the relationship between technology and competitive advantage by focusing on vegetables, animal oils and fats manufacturers in Kenya. From the study findings, it was clear that technology created competitive advantage. The study found that technology does indeed create competitive advantage albeit over the long term; Maina (2004) noted in a research, the positive relationship between technology strategy and competitive performance in the telephony industry in Kenya;

From the available literature none of the researchers studied on the effect of technology innovation on operational performance of commercial banks in Kenya. Most have either attempted to study the impact of innovation on a specific area within a business or focused on businesses in different industries all together. Commercial banks have been at the forefront of carrying out huge investments in ICT technology as a key driver of their operations. The CBK notes in it recent report (CBK, 2011), the huge capital outlay that has been put in ICT to support innovative products and services like ATMs, Cheque handling, Customer Relationship Management, Enterprise Resource Planning and mobile money transfers. The challenge has been how to demonstrate that despite the huge cost arising from ICT investments, the returns are worth the consideration. The study was about performance of commercial banks and was to specifically examine the effects of technology innovations on the performance of commercial banks in Kenya.

1.3.1 Research Questions
The key questions for the research were:
1. Has ICT-induced innovation affected product efficiency of commercial banks in Kenya?
2. What has been the impact of ICT innovations on process efficiency in commercial banks in Kenya?
3. What has been the impact of ICT-induced innovation on new markets for commercial banks in Kenya?

4. How has ICT innovation impacted on the profitability of commercial banks in Kenya?

1.4 Objective of the Study
The main objective of the study was to establish the impact of ICT-induced innovation on operation performance in commercial banks in Kenya. The specific objectives of the study were therefore to:

i. Determine whether ICT-induced innovation had impact on product efficiency of commercial banks in Kenya.

ii. Determine whether ICT-induced innovation had impact on the process efficiency of commercial banks in Kenya.

1.5 Value of the Study
The study will be important to commercial banks in Kenya as it explains the impact of ICT innovation on operational performance. By clearly exposing the positive relationship between technology innovation and improved performance, the study will serve as a reference for justifying investment in technology innovation and to dispel the fear that banks were suffering from productivity paradox experienced in other industries. The results of the study will also be invaluable to researchers and scholars, as it will form a basis for further research. The students and academics can use this study as a basis for discussions on the technological innovation strategies adopted by the banking industry in Kenya and their effect on performance. The Central Bank of Kenya will also find the results of this study very invaluable, as it can be used to explain organizational performance and technological trends within the banking industry.

2.1 Literature Review
This section reviews studies that have been done in the area of technological innovation and firm efficiency. The specific areas covered were theoretical orientation, innovation, technological innovation, adoption of technological innovation, technological innovation process, factors affecting the adoption of technological innovation (firm's external potential sourcing and networking, firm-specific characteristics and firm's environmental condition), and technological innovation and firm's operational performance.

2.1.1 Background on ICT and Operational performance
The Information and Communication Technologies (ICT) sector has seen a revolution since the last ICT sector strategy of the World Bank Group (WBG) was prepared in 2000. The impact of ICT as an enabler has become ever more noticeable in the banking sector. According to Laudon and Laudon (2004), ICT can give an organization competitive advantages by producing finely tuned sales and marketing techniques. Such an ICT platform they contend is a strategic resource that can be mined and be used to increase profitability and market penetration. Banks can use ICT to analyze customer buying patterns, their preferences and tastes. With such insights, the banks can develop more relevant and profitable products, improve their processes and develop more intimate and profitable relationships with their customers.

2.2 Review of Empirical Studies
According to Rycroft and Kash (1999) innovation requires a process of co-evolution between technology and cultural perspectives. Technology exerts a significant influence on the ability to innovate and is viewed both as a major source of competitive advantage and of new product innovation (Gunasegaram et al., 1996). For technology to be effective, the social-cultural aspects of its impact must also be taken into account. Often, banks experience problems in achieving this balance, which is caused by either lack of capital expenditure on technology or insufficient expertise to use the technology to its maximum effectiveness (Alstrup, 2000). According to Hammer (1990) organizations should “obliterate rather than automate” believing that technology is often introduced for technology's sake without contributing to the overall...
effectiveness of the operation. It is important to link technology to innovation in sustaining competitiveness. Organizations that can combine customer value innovation (Kim and Mauborgne, 1999) with technology innovation have an increased chance of enjoying sustainable growth, greater customer retention and profit.

Despite innovation absorbing real and substantial costs, and considering Culkin and Smith (2000) conclusion that the clarity of organizational objectives in terms of innovation has led to an increased emphasis on the evaluation of return on investment, Ekvall (1999) observes that systematic evaluation rarely occurs within organizations. Making causal connections between investment in innovation, and future management performance and organization success is externally difficult. Francis (2000) highlights the difficulty in establishing a statistical link between the incidence of innovation and company performance. Similarly, Tidd, Bessant and Pavitt (2001), found that the literature tends to focus heavily on training and education, and is primarily concerned with measuring the inputs, process and immediate outcomes rather than the longer-term impact of innovation.

The more important limitations for IS research, though, are the conceptual assumptions imposed by the theories themselves. One extremely important assumption of this kind is the pro-innovation bias of adoption and diffusion research (Rogers, 1995). The adoption and diffusion approach has a strong bias towards assuming that a technological innovation is positive, and will easily be adopted by a target population over time. This bias tends to lay the “blame” of poor adoption on individuals and organizations, rather than on systems or situations, and does little to help IS research understand the crucial problem of trying to learn which innovations will be beneficial, and which will not. The adoption and diffusion approach is poorly equipped to understand how different groups interact in the production and provision of innovation, including the influence of consumers on producers. Other limitations have been identified with respect to the lack of attention to the adaptation and reinvention of innovations by users; users often create new innovations on top of baseline innovations forcing innovators to re-invent their products or services. There is also the challenge of neglect of the consequences of adoption and diffusion that stem from the original conceptualization of fixed, unchanging innovations being diffused from producers to adopters.

The limitation of innovation adoption in banking also faces a completely different challenge arising from an unfavorable regulatory environment. Most regulators are sluggish in keeping up with changes and end up stifling adoption of innovative technology. Dr. James Mwangi, CEO Equity Bank, in a conference organized by Central Bank (2010), lamented on the slowness of the CBK in keeping up with the speed of changes within the industry. He requested the regulator to allow banks to implement innovative products and services as long as they were not explicitly against the written law.

2.3 Technological Innovation

In the study, innovation was specifically assumed to refer to technological innovation as opposed to any other form of innovation- the word and the phrase are used interchangeably. Any firm’s innovation process will be affected by several factors including but not limited to; the firm’s internal capabilities, its networking and its technological learning capacity and the inherent influence by its environmental factors. In order to succeed one would need to mobilize all existing potential resources to augment the firm's innovation capacities, ending with the introduction of a new or better product and/or production process, opening up a new market segment etcetera.

The core consideration in the research was not necessarily upon everything that is new or ingenious, rather the emphasis was placed on those minor or major changes in service, products or production processes that involve human activities and result to new or better ones for the firm or its economy, regardless of their introduction elsewhere before. These changes include the adaptation, imitation, customization or indigenization/localization and associated development efforts in technology evolution process.
Technological innovation and the appropriate implementation of new technologies are a fundamental part of development process of all organizations (Bagherinejad, 2006).

2.3.1 Models of Technological Innovation
The early innovation models were the linear models of innovation. The models of innovation can be classified using, iteration in and adoption of the innovation, as the classifying variable. Iterative models look at the interactions of the people involved in the innovation process whereas adoptive models examine the feedback after the innovation has been adopted. Innovation is viewed as an outcome of numerous organizational iterations in the technology push-market pull model and the value build up model. Two kinds of adoptive models are discussed in literature: static and dynamic models, based on feedback after the innovation diffusion. In static models there is no feedback after the user has adopted the innovation, which is not the case with dynamic models of innovation.

The interest in the technological innovation process still continues in the pursuit to capitalize on the many opportunities offered by new technologies. It is now also widely acknowledged that the process of technological innovation is a complex process with many actors playing active roles in it (Afuah, 1998). The presence of the various actors is a necessary condition for innovative output but not sufficient enough. Questions of organizational integration, environment assessment and the development of technological capabilities are crucial to the process, (Narvekar, 2006).

2.3.2 Technological Innovation Process
Technological innovation is fundamentally competitive and conflictual (Allen, 2000). Management researchers, sociologists, and economists all agree that, despite the need for cooperation in technology development and diffusion, technological innovation fundamentally takes place within a competitive and conflictual atmosphere. For the social shaping of technology theorists, different social groups are inevitably involved in technological innovation (Bijker, 1992), each with their own interpretation of what the technology is, and what problem it is trying to solve. For technological innovation to happen, networks of interest groups must be attracted into a new technological system, and their commitment to it preserved (Bijker and Law, 1992). For the economists of innovation, technological innovations compete for scarce resources and have uncertain returns (Rosenberg, 1994). Within the firm, each stage of the innovation process – expressing the idea, exploring the feasibility, building prototypes – can be seen as a separate hurdle where a number of ideas are in fierce competition with each other (Jolly, 1997). Between firms, the speed of technological innovation puts organizations under severe pressure to innovate effectively (Brown and Eisenhardt, 1997) and to maneuver strategically within their industries to establish commercially lucrative positions for themselves in the face of technological change (Utterback, 1994).

2.4 Factors Affecting the Adoption of ICT Innovation
The process of technological innovation at the firm level depends upon a number of inter-related factors which range across all sections of a firm. It is strongly influenced by the interplay of many components within and without the firm's environment.

2.4.1 Firm-specific Characteristics
This refers to the most important determinants that explicitly influence the firm's technological innovation behaviour. These are a combination of factors including firm's contextual variables, managerial and employment structures, organisational structure, technological infrastructure and staff-skill development. The variables are largely internal and contextual to the firm. These variables include the ownership structure, size, production location, age of the enterprise, experience and its industrial sector (Mansfield, 2001, Andriessen, 2001).

2.4.2 Firm's External Potential Sourcing and Networking
This refers to an organization's networking configuration. This network consists of firm's technological relationships including technological collaborations, technology transfer
relationships and technical feedback, with other firms, institutes, organizations, customers and agents (Kelly and Brooks, 2008; Mansfield, 2001).

2.4.3 Firm's Environmental Condition
Firm's environmental condition points to the factors, which indirectly influence technological innovation process of the industrial sector. These factors could be the effects of government policies, tax laws and central bank.

2.5 Firms Operational Efficiency
Efficiency measurement determines how organizations provide an optimal combination of financial services from a set of limited inputs. Commercial banks are faced with a multitude of unique challenges as opposed to other industries. These banks therefore constantly strive to build capacity to efficiently produce financial services for their customers by employing minimal resources and the most efficient delivery system.

The banking sector has an important role to play in the economic development process. Banks are the main intermediation channels between saving and investment in a country. The most effective and efficient banking systems must limit, quantify, gather and negotiate all operational risks, and incite the savers to invest, by offering them a proportional payment to the scale of the incurred risks. A banking system which efficiently channels financial resources to productive use is a powerful mechanism for economic growth (Levine, 1997).

In the study, the researcher was focused on four main efficiency types; Product efficiency, process efficiency, markets and profitability as basis for evaluating bank’s operational performance.

2.5.1 Firm's Product Efficiency
Product efficiency refers to the ratio of output relative to the inputs employed or the maximum goods that can be produced given a certain level of inputs. At the ultimate product efficient level, it is impossible to produce an extra good in a firms’ portfolio without producing less of another within the same portfolio. In a banking environment, product efficiency was taken to refer to the number of services or products that a bank could provide within the existing ICT investment (Farrel, 1957).

The evaluate product efficiency, number of products offered and channels of delivery were used as basis for the research.

2.5.2 Firm's Process Efficiency
Process efficiency refers to the re-alignment or re-engineering of business processes to ensure that an organization is able to deliver quality service at a faster, cheaper and better way in order to achieve better margins than the competition. Process efficiency minimizes on waste while at the same time improving on the customer experience (Radnor, 2010). In banking, process efficiency focuses on how the bank is able to deliver its services to the customers at minimum cost, conveniently and at minimum operational risk. This measure can be achieved by evaluating the percentage return on every shilling invested or the time taken to complete a given task like cheque processing or account opening.

In the study, process efficiency was captured by requesting respondents to indicate the impact of ICT in enabling speedy service delivery, time taken to complete transactions, staff productivity and effect on controls.

2.5.3 Firm's New Markets
In the survey, new markets were taken to refer to opportunities arising in the immediate environment and the wider environment like new geographical areas or different countries. New markets include deepening access or presence in existing market or reaching out to new markets, region, countries or continents.

In the study, respondents were asked to indicate impact of innovation in increasing market share, opening of branches, deepening of customer loyalty and sustaining retention.
2.5.4 Firm's Profitability
Profitability is usually the primary goal of commercial enterprises. Profitability is derived by comparing the incomes generated against the expenses generated (Hofstrand, 2009). Banks are profitable when their revenues exceed their total cost of operations. By using technology innovations, banks can increase their profits by increasing their revenues while at the same time reducing the costs required to generate the revenues. In the research, the contribution of ICT innovation was evaluated based on its perceived impact on profitability.

In the study, respondents were requested to give their opinions regarding the impact of technology innovations in increasing sales, reducing operational costs and contribution of new products, new services and new markets in annual revenues.

2.6 Technological Innovation Capability and Banks Operational Performance
Technological innovation capability can be defined as a comprehensive set of characteristics of a firm that facilitates and supports the firm’s technological innovation strategies (Richard et al, 2010). In banking this capability will be evidenced by the bank’s ability to apply available technology to improve operational performance through various means like creation of new products, redefining processes, enhancing customer interaction and experience, improving internal controls and generally increase profitability.

Operational performance refers to the degree of achievement which an organization is able to deliver given a set of limited resources (www.isixsigma.com). Performance can be measured in terms of profitability, market share, customer satisfaction or return on Equity to shareholders. In the study, operational performance was taken in the context of how many products a bank was able to offer its customers (product efficiency), the cost of delivering these products and services to the same customers (process efficiency) and the extent to which the bank was able to reach out to more customers.

A bank’s capacity to use technology innovation can be a source of competitive edge. Being competitive means ability to design the most efficient processes, or creating the most attractive and profitable products or the ability to reach out to the most profitable customers. Technological innovation can assist commercial banks to improve their performance by reducing their inputs, utilizing less factors of production like labour, time, and capital and still achieve better results. Technology forms the most useful enabler or facilitator in achieving the highest level of operational efficiency given limited factors of production.

2.7 Theoretical Orientation
A theoretical orientation is the model used to describe behavior or personality. Different people use different approaches to explain behavior or personality. A theoretical approach defines an approach that seeks to explain an idea, behaviour or personality and forms a foundation against which a discussion or research is founded.

2.7.1 Rogers Innovation Diffusion Theory
Innovation is a relatively diverse subject. It can refer to ground breaking new discoveries or it can simply mean an improvement of an already existing process. Adopting an idea already implemented in another industry, field or geographical location still falls within the realm of innovation. Innovation generally arises out of existing or emergent needs. When an innovator creates a solution to a need, the solution is first adopted within his/her area of operation but this later spreads to other users experiencing the same challenge both within the same industry or a different industry all together.

Rogers’ Diffusion of Innovation Theory (Rogers, 1995) seeks to explain how new ideas or innovations are adopted, and this theory proposes that there are five attributes of an innovation that affect adoption: relative advantage, compatibility, complexity, trialability, and observability. Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes. Rogers’ theory suggests that innovations that have a clear advantage over a previous approach will be more easily adopted and implemented. It can be measured in terms that matter to those users for instance prestige, convenience, economic
advantage or general satisfaction. For Argote (1999) if a potential user sees no relative advantage in using an innovation, it would not be adopted because adoption depends on the particular perceptions and needs of the user group.

Compatibility is the degree to which an innovation fits with the existing values, past experiences, and needs of potential adopters. Complexity is the degree to which an innovation is perceived as difficult to understand and use, the easier it is to understand or use, the more rapidly it can be adopted. Trialability refers to the degree to which the innovation can be tested or experimented; the more testable it is the more the uncertainty about its use and hence the more the adoption. Observability refers to the visibility of the innovation results, the more the results can be seen the more the innovation will be easily adopted. Visual results stimulate discussions among potential users and elicit requests for more information regarding the subject innovation.

The study was informed by Rogers' diffusion of innovation theory which assisted the researcher to explain the adoption of innovations in commercial banks and the impact on performance. The theory was vital for the study as it provided an invaluable checklist against which relevant evaluations were made.

2.7.2 Social-Technical System Theory of Information Technology

According to the Technology Acceptance Model TAM (Davis, 1989), users adopt certain technologies based on perceived usefulness and perceived ease of use. In other words, a strong perception towards an idea creates the motivation to try it out. The stronger the drive to achieve a certain goal the more willing the user will be to adopt a new idea, product or process. The Theory of Planned Behavior (TPB) proposes that a person's intention to perform certain behaviour is the central determinant of that behavior because it reflects the level of motivation a person is willing to exert to perform the said behavior (Teece, 1997). The TPB has been largely used by researchers to understand a variety of health-related behaviors in various population groups.

A fundamental principle of socio-technical systems thinking is that a technology on its own has little meaning for purposes of organizational performance analysis. It can only be understandable in terms of the context in which it was embedded and the organizational goals or transformations that it serves or enables (Rothwell, 1992). Socio-technical systems theory argues that a network of social relationships surround all working practices (cooperation among workers over the course of a task or activity, supervisory relationships, and general social interaction). Productive application of any technology relies heavily on the ability and willingness of users to employ it for worthwhile tasks.

In the study, the researcher applied the TPB model as a foundational framework in creating the questionnaire. The study was to identify, from the senior management, the motivation behind the perceived benefits or perceived ease of ICT innovations.

2.8 Conclusions

The available literature shows that there exist a strong relationship between technological innovations and performance of banks. As noted by Ayres (2008) technology affects the wealth of companies. There was, however, need to investigate the specific effects of these technological innovations with a specific reference to commercial banks. There have been no studies done to investigate the effects of technological innovations on performance of commercial banks despite their strategic positioning to adopt technological innovations. The available literature provided insights on how different technological innovations were adopted in different contexts. Due to contextual, sectoral, and managerial differences among the organizations, issues of technological effects on performance gained from these studies could not be assumed to explain effects of technological innovations on performance of commercial banks in Kenya. It was in this light that the researcher carried out a study on the effects of technological innovations on performance of commercial banks in Kenya.
3.1 Research Methodology
This section sets out various stages that were followed in completing the study. The section gives details about the collection, measurement and analysis of data. The steps included; research design, identifying the target population, data collection instruments, data collection procedures and finally data analysis.

3.2 Research Design.
The study was a descriptive survey. A descriptive study attempts to describe or define a subject, often by creating a profile of a group of problems, people, or events, through the collection of data and tabulation of the frequencies on research variables or their interaction, (Cooper and Schindler, 2003). The decision to apply descriptive survey research design was made based on the fact that in the study, the researcher’s interest was on the state of affairs already existing in the field and that no variable was to be manipulated, (Orodho, 2004). Descriptive research design was therefore perfect for the study.

3.3 Population of Study
The population of interest comprised commercial banks in Kenya. There were 43 commercial banks in Kenya as of December 2010 (CBK Report, 2010). The study conducted a census survey owing to the small number of commercial banks in Kenya.

3.4 Data Collection
Primary data was collected using a questionnaire with close ended and open ended questions administered to senior management staff of various commercial banks. The target respondents were business growth and operation managers, customer service executives and finance managers. The questionnaire was divided into three parts. The first two parts were mainly on the personal information of the respondents and background data about the banks. This was to enable the researcher get an indication of the nature of the respondent and the commercial bank being referred to. The third part was on technological innovations and their effects on performance.

The researcher hand-delivered the questionnaires and requested the target respondents to complete them. The researcher followed up the respondents through phone calls and emails to clarify any emergent queries relating to the questionnaires.

3.5 Data Analysis
Before processing the responses, the completed questionnaires were checked for completeness. The data was coded and then captured in excel worksheet. Descriptive statistics like mean, mode and standard deviation were used to analyze the data.

4.1 Data Findings, Analysis and Interpretation
This section covers data analysis and findings of the research. The data collected was analyzed and interpreted in line with the aim of the study which was to assess the impact of ICT induced innovation in the performance of commercial banks in Kenya. Qualitative data collected from the respondents was encoded and analyzed using excel. Tables and figures were used to present the data.

4.1.1 Response Rate
The study targeted 43 respondents from the various commercial banks in Kenya. From the study, 26 out of the 43 targeted respondents successfully filled the questionnaires. This represents a 60% response rate. This response rate compared favorably to similar census surveys conducted on commercial banks in Kenya done by Lunyiro (2006) and Njogu (2006) who achieved 50% and 51% response rate respectively.
4.2 Demographic Information
In this section the respondents were to asked provide background information about themselves and also information about their organizations.
(a) Distribution of respondents by gender
The respondents were asked to provide information relating to their gender, 46% of the respondents were male while 54% of the respondents were female as shown in Table 4.1
Table 4.1: Distribution of respondents by gender

<table>
<thead>
<tr>
<th>Gender of Respondent</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>12</td>
<td>46%</td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>54%</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100%</td>
</tr>
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Source: Research 2011
(b) Distribution of Respondents by Level of education
The respondents were to provide details relating to their level of education, Table 4.2 represents the findings. A majority (54%) of the respondents had a Bachelor Degree, 11% of the respondents had a Diploma or Certificate, 31% of the respondents had masters and none of the respondents were educated up to PhD level.
Table 4.2: Distribution of respondents by level of education

<table>
<thead>
<tr>
<th>Education level</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhD</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Masters</td>
<td>8</td>
<td>31</td>
</tr>
<tr>
<td>Bachelors</td>
<td>14</td>
<td>54</td>
</tr>
<tr>
<td>Certificate/Diploma</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Not indicated</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Research 2011
(c) Distribution of respondents based on Specialized Training/Professional qualifications
In order to establish level of specialized training over and above standard education, respondents were asked to indicate if they had undergone any specialized training. From the findings represented in Table 4.3, 62% of the respondents had specialized professional qualifications. 38% of the respondents had not undertaken any specialized training and professional qualifications ranging from ICT, Customer Care, Public Relations, Certified Accountants and Certified Bankers.
Table 4.3: Distribution of respondents based on specialized/professional qualifications

<table>
<thead>
<tr>
<th>Specialized training or professional qualification</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>16</td>
<td>62%</td>
</tr>
<tr>
<td>No</td>
<td>10</td>
<td>38%</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Research 2011
(d) Distribution of respondents by period in the Bank
The study was to establish how long the respondents had been working in the bank. From the findings (Table 4.4), 85% of the respondents had worked for more than one year, 12% of the respondents had worked for more than 6 months but less than one year, and 4% of the respondents had worked for less than six months.
Table 4.4: Distribution of respondents by period in the bank

<table>
<thead>
<tr>
<th>Period in Bank</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 6 months</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>6 to 12 months</td>
<td>3</td>
<td>12%</td>
</tr>
<tr>
<td>more than 12 months</td>
<td>22</td>
<td>85%</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Research 2011

From the findings in Table 4.4, most respondents (modal class) had worked for more than 12 months. The average period in which the respondents had worked in the bank was 22 months.

(e) Ownership structure of the banks in the survey

The study was to establish the ownership structure of the banks in the survey. As indicated in Table 4.5, most (62%) of the banks represented by respondents were local privately owned, 23% were publicly listed banks, while 15% of the respondents were from banks with other forms of ownership.

Table 4.5: Distribution of banks by ownership structure

<table>
<thead>
<tr>
<th>Ownership structure</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>6</td>
<td>23%</td>
</tr>
<tr>
<td>Local Private</td>
<td>16</td>
<td>62%</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Research 2011

(f) Distribution of banks by number of permanent staff

To establish the size of the banks in the survey in terms of staffing, respondents were requested to indicate the number of permanent staff in their organizations. From the results presented in Table 4.6, it was established that 18 of the banks in the survey had less than 1,000 permanent staff representing 68% of the sampled banks. 16% of the banks had between 1,000 and 3000 permanent staff, and 16% of the respondent banks had more than 3,000 permanent staff.

Table 4.6: Distribution of banks by number of permanent staff

<table>
<thead>
<tr>
<th>Number of permanent staff in the bank</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 1,000</td>
<td>18</td>
<td>68</td>
</tr>
<tr>
<td>Between 1,000 and 3,000</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Above 3,001</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Research 2011

(g) Distribution by number of active depositors

In order to establish the size of banks in terms of number of customers, respondents were asked to indicate the number of active depositors in their bank. From the findings represented in Table 4.7, 35% of the respondents banks had between 100,000 and 1,000,000 depositors, 27% of the respondents were from banks with depositors below 100,000 and 38% of the respondents came from banks with over 1,000,000 depositors.

Table 4.7: Distribution of respondents by number of active depositors

<table>
<thead>
<tr>
<th>Number of Savers</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>below 100,000</td>
<td>7</td>
<td>27%</td>
</tr>
<tr>
<td>between 100,000 and 1,000,000</td>
<td>9</td>
<td>35%</td>
</tr>
<tr>
<td>above 1,000,000</td>
<td>10</td>
<td>38%</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Research 2011
(h) Distribution of respondents by size of bank balance sheet
In order to establish the capacity of the banks to invest in ICT innovations, the researcher used the size of the bank’s balance sheet as an indicator of investment potential. Table 4.8 shows the outcomes from the respondents;

<table>
<thead>
<tr>
<th>Size in Billions</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>not indicated</td>
<td>2</td>
<td>8%</td>
</tr>
<tr>
<td>below 10 Billion</td>
<td>9</td>
<td>35%</td>
</tr>
<tr>
<td>between 10 billion and 50 billion</td>
<td>10</td>
<td>38%</td>
</tr>
<tr>
<td>above 50 billion</td>
<td>5</td>
<td>19%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

The study established that 35% of the banks in the survey had balance sheet size of below 10 billion, 38% of the banks had a balance sheet of between 10 billion and 50 billion while 19% of the banks had a balance sheet size of over 50 billion. On average the banks had a balance sheet size of 26 billion.

(i) Distribution of respondents by presence in different countries
In order to evaluate market coverage, the researcher used individual banks’ presence in different countries as a measure. Table 4.9 shows that 46 percent of the banks in the study were operating within Kenya, 27 percent were operating beyond Kenya but within the East African region, 8 percent were operating beyond East Africa but within Africa while 19 percent of the banks in the survey were global banks operating beyond Africa.

<table>
<thead>
<tr>
<th>Presence of Bank in different countries</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only in Kenya</td>
<td>12</td>
<td>46</td>
</tr>
<tr>
<td>In East Africa</td>
<td>7</td>
<td>27</td>
</tr>
<tr>
<td>Beyond East Africa but with Africa</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Rest of World</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

4.3 Product Efficiency
To establish the contribution of ICT innovation in improving performance, the study evaluated the various products and services that rely heavily on technology. Banks can rely on ICT innovations to increase consumer product uptake by facilitating the availability of products through different delivery channels. The researcher’s objective was to establish how many banks in the survey had invested in technologies like operating an ATM network, issuing credit/debit cards, offering services on mobile phones, agency and internet banking.

(a) Distribution by technology driven value-adding services
From the findings presented in Table 4.10, on average, 72 percent of the banks in the survey were offering technology driven products and services. 85 percent of the banks were offering ATM services, 69 percent were offering internet banking services and 65 percent were offering mobile banking. 58 percent of the banks in the survey were offering agency banking; a clear indication that banks had embraced the new innovative business approach of agency banking.
Table 4.10: Distribution of respondent by technology enabled value-adding services

<table>
<thead>
<tr>
<th>ICT enabled value adding services</th>
<th>Yes</th>
<th>No</th>
<th>Percentage (%) Yes</th>
<th>Percentage (%) No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offer internet banking services</td>
<td>18</td>
<td>8</td>
<td>69%</td>
<td>31%</td>
</tr>
<tr>
<td>Offer mobile banking services</td>
<td>17</td>
<td>9</td>
<td>65%</td>
<td>35%</td>
</tr>
<tr>
<td>Offer Agency banking services</td>
<td>15</td>
<td>11</td>
<td>58%</td>
<td>42%</td>
</tr>
<tr>
<td>Issue cards (Debit or Credit)</td>
<td>22</td>
<td>4</td>
<td>85%</td>
<td>15%</td>
</tr>
<tr>
<td>Offer any ATM services</td>
<td>22</td>
<td>4</td>
<td>85%</td>
<td>15%</td>
</tr>
<tr>
<td>Total</td>
<td>94</td>
<td>36</td>
<td>72%</td>
<td>28%</td>
</tr>
<tr>
<td>Average</td>
<td>19</td>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) Contribution of technology to delivering quality products and good customer service

The respondents were asked to indicate their opinion regarding contribution of technology in delivering quality products to the customers and also in delivering good customer service. The respondents were to rate their opinion in a scale of 1 to 4 (Very High =4, High=3, Moderate=2 and Low= 1).

Table 4.11 shows 58% and 38% of respondents rated the contribution of technology as very high in delivering good customer service and differentiated products respectively.

Table 4.11: Contribution of technology to products delivery and customer service

<table>
<thead>
<tr>
<th>Rating</th>
<th>Very high</th>
<th>High</th>
<th>Moderate</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating the contribution of technology in delivering world class customer service?</td>
<td>15</td>
<td>9</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>58%</td>
<td>35%</td>
<td>8%</td>
<td>0%</td>
</tr>
<tr>
<td>Rating the contribution of technology in delivering differentiated products to customers?</td>
<td>10</td>
<td>11</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>38%</td>
<td>42%</td>
<td>19%</td>
<td>0%</td>
</tr>
</tbody>
</table>

35% and 42% of respondents rated technology contribution to customer service and quality products respectively, as high. This observation agrees with CBK’s conclusion (CBK Report, 2010) that stated technology in banking had led to ‘greater product differentiation resulting in niche market growth’.

4.4 Process Efficiency

Process efficiency can be evaluated on the basis of time taken to complete or execute a particular task to achieve a desired standard or quality. It can also be evaluated on the basis of savings on waste of inputs in any given input-output process.

In the study, a few metrics were used to measure the impact of technology on process efficiency. This included time taken to open an account and time taken to prepare bankers cheque.

(a) Distribution by time taken to open a savings account

The process of opening a savings account is important to any bank. It is the process through which the relationship between a bank and a customer is established. The process includes keying in of customer details, scanning of documents and taking of customer photograph and uploading them into the system. Most banks have implemented various electronic systems to facilitate this activity to ensure high standards of control and speedy completion of the process.

In the study, respondents were asked to rate how long the process of account opening was taking to complete in their organization. The results are as indicated in Table 4.12

From the results, 58% of the banks in the survey took between 5 and 30 minutes to complete the process, 19% of banks took more than a day while another 19% of the banks took less than 5 minutes.
Table 4.12: Distribution by average time taken to open a savings account

<table>
<thead>
<tr>
<th>Time taken to process account opening</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 5 minutes</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>more than 5 but less than 30 minutes</td>
<td>15</td>
<td>58</td>
</tr>
<tr>
<td>more than 30 minutes but less than 1 day</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>more than 1 day</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

From the findings, the process of account opening took less than a day in most of the banks covered in the survey.

(b) Preparing a bankers cheque

Most banks have automated most of their back office activities. Banks automate back office operations in order to reduce errors, improve internal controls and enhance speed of operations. Banker’s cheque processing is an example of an activity that can be automated. The researcher selected bankers cheque processing as a representative of the many activities at the back office and sought to establish how long this process was taking to complete in the banks. Table 4.13 shows that 54% of the banks in the survey, took less than 5 minutes to finish the task while 46% of the respondents indicated it took between 5 to 30 minutes to finish the same process.

None of the respondents indicated the process taking more than 30 minutes. Some of the respondents indicated their organizations had improved the process by allowing customers to order for bankers cheques through internet banking. This is an improvement to the traditional request done through a paper requisition, manual capturing of the entries and eventual preparation of a hand written cheque.

Table 4.13: Distribution by time taken to process a banker’s cheque

<table>
<thead>
<tr>
<th>Time it takes to process a banker’s cheque</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5 minutes</td>
<td>14</td>
<td>54</td>
</tr>
<tr>
<td>Above 5 minutes but less than 30 minutes</td>
<td>12</td>
<td>46</td>
</tr>
<tr>
<td>Above 30 minutes but less than 1 day</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Above one day</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

(c) ICT innovation and its impact on the speed of delivering service, strengthening internal controls and improving staff productivity

There are many reasons why banks invest in technology innovation. Banks invest in technology innovation in order to improve their capacity to deliver faster services to customers, reduce time-to-market new products, fortify their internal controls and improve productivity. In the study, the respondents were asked to indicate the extent to which speed of delivering service, staff productivity and internal controls were impacted by ICT innovation. This was in a five Likert-scale where Very Great Extent =5, Great Extent = 4, Moderate=3, Low Extent = 2 and Very Low Extent=1. The results are as shown in Table 4.14

Table 4.14: ICT impact on speed of delivering service, controls and productivity

<table>
<thead>
<tr>
<th>Impact of ICT on Process efficiency</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT induced innovation influence on the speed of delivering service</td>
<td>4.19</td>
<td>0.80</td>
</tr>
<tr>
<td>ICT innovations impact on staff productivity</td>
<td>4.27</td>
<td>0.82</td>
</tr>
<tr>
<td>ICT innovation impact on robust internal controls</td>
<td>3.81</td>
<td>1.20</td>
</tr>
</tbody>
</table>

Source: Research 2011
From the results in Table 4.14, the highest impact of ICT innovations is the delivery of fast service and staff productivity (mean of 4 and low standard deviation of 0.8). Impact on controls had the lowest mean of 3.8 and the highest deviation of 1.2.

(c) Communication media between Banks and customers

Communication between bank and customer forms a critical link relevant in strengthening the relationship between the banks and their customers. Satisfied customers are the best form of marketers that a bank can use to attract more customers and to get feedback on customer satisfaction.

There are various media available that banks can communicate with the customers. In the study, respondents were requested to indicate the most preferred form of communication between their organization and the customers. The importance of this question was to gauge to what extent banks had embraced new technologies in ensuring efficient communication with their clients. The findings were as tabulated in Table 4.15

<table>
<thead>
<tr>
<th>Communication Media</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical letters</td>
<td>5</td>
<td>19%</td>
</tr>
<tr>
<td>Phone/mobile</td>
<td>8</td>
<td>31%</td>
</tr>
<tr>
<td>Emails</td>
<td>3</td>
<td>12%</td>
</tr>
<tr>
<td>Social media</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Combined media</td>
<td>10</td>
<td>38%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Table 4.15: Distribution by preferred communication media

From the results ICT enabled communication media were most popular. These included emails, faxes and mobile phones. Interestingly, none of the respondents indicated use of social media like Facebook, Twitter and Chat with some commenting that social media was yet to be accepted as appropriate for conducting official communication.

4.5 ICT Induced Innovation on New Markets

The biggest challenge banks have faced in venturing to new markets has been the huge capital outlay associated with establishing presence in remote areas or areas with challenging infrastructure like lack of electricity, communication links and security (CBK 2010). However, advancement in technology has made it easier to overcome some of the obstacles. Some of the solutions have been the introduction of agency banking and cheaper wireless or satellite communication.

The respondents were asked to indicate (in Likert scale of 1-5 with Very Great Extent =5, Great Extent = 4, Moderate=3, Low Extent = 2 and Very Low Extent=1) the extent to which technological innovation had facilitated banks to venture into new markets and the extent to which they had been able to reach to more customers within existing markets. The Results are tabulated in Figure 4.16

<table>
<thead>
<tr>
<th>Impact of ICT innovation on Bank Market</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role of ICT innovation facilitating opening of branches in remote areas</td>
<td>4.04</td>
<td>0.66</td>
<td>1</td>
</tr>
<tr>
<td>Impact of ICT innovations in deepening customer loyalty and increasing customer retention</td>
<td>4.03</td>
<td>0.91</td>
<td>2</td>
</tr>
<tr>
<td>Extent that ICT innovations has helped increase local market share</td>
<td>3.92</td>
<td>0.79</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 4.16: ICT innovation in facilitating bank’s market expansion

Source: Research Data
From results in table 4.16, it was found that ICT facilitated to a Great Extent (mean=4), the opening of branches in remote areas. Results also indicate that ICT innovation assisted banks to deepen their customer loyalty and increased customer retention (Mean=4). Opening of branches had the lowest standard deviation of 0.6 signifying that respondent’s common opinion was that ICT innovation had facilitated banks to expand their market reach.

4.6 ICT Induced Innovation on Profitability

The ultimate goal of many commercial enterprises is to make a profit. Profits signify that an enterprise is sustainable in the short run. To achieve desired profits, organizations seek to increase their revenues while at the same reducing their operation costs. Respondents were asked to indicate their opinions in regards to the impact of technology innovation on increasing revenues and also impact of technology innovation in reducing operational costs. This was on a Likert scale of 1-5 (Very Great Extent =5, Great Extent = 4, Moderate=3, Low Extent = 2 and Very Low Extent=1).

From the results in table 4.17, it was found out that to Great Extent (Mean =4 and standard deviation of 0.8) the respondents felt that banks were able to generate higher revenues by investing in ICT innovations. On the other hand, respondents indicated ICT innovation had a moderate impact to reduction of operational costs (Mean=3.9).

Table 4.17: Impact of ICT innovation on profitability

<table>
<thead>
<tr>
<th>Profitability</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>How would you rate the role of ICT innovations in increasing sales?</td>
<td>4.00</td>
<td>0.84</td>
<td>1</td>
</tr>
<tr>
<td>How would you rate the role of ICT innovation in reducing operational costs?</td>
<td>3.92</td>
<td>0.93</td>
<td>2</td>
</tr>
</tbody>
</table>

(a) Contribution of New technology innovations to revenues

Customer centric organizations are continuously innovating in order to meet their customer’s ever-changing needs. Innovations enable such organizations to remain relevant in their market place and at the same time improve their revenue base. Respondents were asked to rate the contribution of new innovations on new products and services, new delivery channels and new markets on annual revenues. The responses are as shown Table 4.18

Table 4.18: Distribution by Contribution to annual revenues

<table>
<thead>
<tr>
<th>Contribution of New Technology innovations to Annual Revenues</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5 Percent</td>
<td>2</td>
<td>8%</td>
</tr>
<tr>
<td>Above 5% but less than 20%</td>
<td>6</td>
<td>23%</td>
</tr>
<tr>
<td>Above 20% but less than 50%</td>
<td>9</td>
<td>35%</td>
</tr>
<tr>
<td>Above 50%</td>
<td>9</td>
<td>35%</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100%</td>
</tr>
</tbody>
</table>

From the results, 35% of the respondents said new innovations accounted for more than 20% but less that 50% of the bank’s annual revenue. A similar percentage of respondents (35%) indicated that new innovation accounted to more that 50% of annual revenues. A minority 8% said new innovations accounted for less than 5% of their bank’s annual revenues.

5.1 Findings, Conclusions and Recommendations

The section provides the summary of the findings, the conclusions and recommendations that can be drawn from the study.
5.2 Summary of the Findings
The study aimed at establishing the impact of ICT-induced innovation on operational performance in commercial banks in Kenya. The operation performance was measured by focusing on four concepts that is; impact on product efficiency, process efficiency, expansion to markets and profitability.

5.2.1 Product Efficiency
The study established that, banks that had invested in technology innovations in order to offer a variety of products and services. Technology had enabled banks to expand delivery of services through new channels like ATMs, internet banking, mobile banking and agency banking. From the study, ATMs services were the most popular of the channels of service delivery across the banks (85%). Through the ATMs, banks were able to offer various services like electronic funds transfer between accounts, payments of utility bills, airtime top ups, balance enquiries and loan applications.

Technology innovation had facilitated banks to increase their products thereby improving operational performance. By relying on technology innovation, banks were able to offer differentiated products designed for specific markets and customer segment.

5.2.2 Process Efficiency
To evaluate process efficiency, the study evaluated several activities within banking operations that could indicate how well technology innovation had impacted on the said activities. From the results of the study, most of the back office activities had been automated enabling the banks to improve on time to complete tasks, enforce internal controls and enhance staff productivity.

Banks had invested in software application like customer relationship management systems and enterprise resource management systems to simplify operational activities, enhance internal controls and facilitate performance management through budgeting, forecasting and performance review processes.

Results indicate that technology had greatly improved staff productivity. The returns per staff improved with investment on ICT innovations leading to overall better organizational performance.

It is clear that investment in ICT innovation has facilitated banks to improve on their processes by reducing waste, improving process turn-around time and maintaining robust internal controls.

5.2.3 ICT Induced Innovation on New Markets
Respondents indicated that with technology innovations, banks had managed to extend their presence to remote areas erstwhile inaccessible. With the introduction of agency banking, which heavily relies on technology, the banks were able to offer services beyond regular banking hours both in urban areas and the villages.

Technology had enabled banks to develop specialized products and services and to offer them through convenient delivery channels like ATMs, mobile and agency banking thereby making the banks more attractive to customers. From the CBK statistics (CBK Report, 2010) the number of banked population had continued to increase in the past five years signifying continued recruitment of new customers.

The advent of efficient communication links had empowered banks to reach out to remote areas through satellite branches leading to a general increase in number of branches. Technology innovation had also attracted new customers in existing markets leading to better performance from the banks.

5.2.4 ICT Induced Innovation on Profitability
The results indicate that banks have sustained their profitability by capitalizing on innovations. Respondents indicated that the contribution of new innovations to annual revenues was quite significant.

It is also clear that technology innovations played a significant role in managing operational costs. This was through process or task automation which leads to more efficient processes.
5.3 Conclusions
The study concludes that technology has enabled banks to offer differentiated products and services. Majority of the banks have built their core competencies around innovative products and unrivalled customer service. To achieve these competencies, banks have hedged on ICT innovations.

The study concludes that the banks have invested in technological innovation to improve speed of service delivery and to reinforce operational controls to ensure operations meet expected regulatory standards.

ICT innovations have facilitated banks expansion to wider geographical areas and enabled them to reach out to non-banked customers within existing markets. ICT innovations have helped increase the local market share as well as deepen the customer loyalty and increase customer retention. Several banks incorporated in Kenya have spread their operations to neighboring countries driven by their internal capabilities created by investments in ICT. The availability of ICT infrastructure has played a key role in achieving expansion.

It is therefore true to conclude that ICT induced innovation plays a critical role in sustaining good operational performance of commercial banks. High performance has been achieved through growth in revenues while at the same time reducing operational costs. The study revealed that increase in expected returns was positively impacted by product efficiency, process efficiency and expansion of market share.

5.4 Recommendations
The study recommends banks to invest in ICT innovations in order to build capacity to design specialized products to serve niche markets. The introduction of innovative products and services like internet banking, mobile and agency banking does not just attract new customers but also improves on customer retention and loyalty. Most customers are moving towards self service channels that are accessible at all times. Such services can only be made available through innovative technologies and banks must strive to seize and capitalize on such opportunities.

Commercial banks need to keep pace with changing technologies. Customer preferences are very dynamic and banks must be careful when investing in technology by ensuring they derive expected returns from such investments before the technologies become obsolete.

Commercial banks also need to be alert and establish impregnable controls like firewalls, physical and electronic access controls to ensure their data is safe and that information cannot be accessed by unauthorized personnel.

The study recommends commercial banks to embrace and invest in useful ICT innovations in order to remain successful.

5.5 Recommendation for Further Studies
The study reviewed the impact of ICT-induced innovation on operational performance in commercials banks in Kenya. To this end therefore, a similar study should be carried out in other industries to find out if similar results can be obtained.
REFERENCES


