THE RELATIONSHIP BETWEEN TECHNOLOGICAL ADVANCEMENTS AND OPERATIONAL EFFICIENCY OF COMMERCIAL BANKS IN KENYA

BY

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DECLARATION

I, the undersigned, make the declaration that this study is my original work and has not been submitted for evaluation in any other university or institution of higher learning other than the University of Nairobi.

Signed: …………………………………….... Date: …………………………………

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

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DEDICATION

I dedicate this work to my family. You were my rock when everything else seemed shaky. Thank you.

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LIST OF ABBREVIATIONS

ANOVA   Analysis of Variance

ATM   Automated Teller Machine

CBK   Central Bank of Kenya

E-BANKING   Electronic Banking

M-BANKING   Mobile Banking

EFT   Electronic Funds Transfer

ICT   Information and communication Technology

MIS   Management Information System

PIN   Personal Identification Number

ROE   Return on Equity

ROA   Return on Assets

SMS   Short Message Service

SPSS   Statistical Package for Social Science

SWIFT   Society for Worldwide Interbank Financial Telecommunication

TAM   Technology Acceptance Model

RBT   Resource Based Theory

UK   United Kingdom

USA   United States of America

ABSTRACT

Globally, the banking sector has witnessed a significant transformation in the recent past. This has been triggered by the considerable impact of innovations and emerging trends in ICT, automated risk management and next-level business intelligence. The emerging business elements to be addressed revolve around methods to be adopted in order to operate better in the evolved business environment brought about by technological advancement in order to redefine customer service, and take advantage of the new opportunities created by the innovations. For banks to progress, they have to be willing to adapt continuously to the evolving technologies. This study concentrates on the impact on the operational efficiency of commercial banks domiciled and operating in Kenya, which is brought about by the advancement and complexity of emerging technologies. The research hypothesis was verified via an analysis of both quantitative and qualitative data obtain over a period of five years (2012–2016). Statistical package for the social sciences (SPSS) and MS Excel were used in the detailed analysis of the data collected. To establish the associations and level of correlation between the variables under study, a multiple linear regression model was used. The study established that technological advancements in banking has positively impacted the operational efficiency of the commercial banks domiciled and operating in Kenya. The research also illustrated that mobile banking, internet banking and ATMs have a strong positive correlation with the operational efficiency of the banks as measured by the operating cost to income ratio.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

The convergence of ICT and knowledge witnessed in the 21st century will bring about a radical change in the normal world order (how we live, work, and think). This stiff spurt in technological innovations is transforming the banking industry from paper, manual process and retail banking centres to digital and virtual banking platforms. Significant changes have already been observed in the internal bookkeeping and management processes. It is now cardinally revolutionising the customer delivery systems used by banks in serving and interacting with their customers.

Globally, banks are on the quest to find technological solutions to help them adapt to the inherent challenges of the dynamic environment in which they are operating. It is clear that the revolution being championed by technology in the banking sector is noteworthy. Banks that will invest in technological innovation will dominate the highly competitive global market. A majority of banks are therefore now convinced that investments in technology are fundamental (Arnaboldi & Claeys, 2010).

Moreover, as computing gets more sophisticated, the expectation of customers is on the rise accordingly. The assimilation of technology in banking has brought about major changes. These changes have a direct impact on management, employees, and customers alike. Innovations in technology are creating a provision for convenient and efficient service delivery like never before - thus creating new bases for gaining competitive advantage. Banks of the future will distinguish themselves by their ability to provide

immediate access and integration with critical information sources and their ability to act fast (Auta, 2010).

The advantages of technological advancements in banking are three-pronged - to the customer, to the employee and to the bank. Customer needs and preferences are constantly evolving. Banks thus have to be aware of these needs for constantly evolving service and plan to avail them. This has increased the competition levels banking sector and forced banks to assimilate emerging technologies to meet customers at their point of need (Centeno, 2004). Majority of banks have come up with innovative solutions to enhance customer experience, among them: Self- Service Banking, Remote banking services, Anytime and Anywhere banking and Telephone banking among others. Banks have benefited from adoption of emerging technologies during the last decade mainly due to their ability to revolutionise customer service and broaden product offerings that provide them with competitive advantage. For the bank employees, technology has increased employee productivity through minimisation of redundancies and simplification of previously complex tasks (Delgado & Nieto, 2007).

This study was inspired by the recent spurt in the growth of technology within the banking industry coupled with the convenient access, secure and round the clock banking options that are a result of technological advancements (Girardone and Molyneux, 2006).

1.1.1 Technological Advancements

Technological advancements is defined as the creation of new information or the discovery of new knowledge that is used to improve current technology and working methods. The term 'Technology" is broad. This causes it to have wide range of definitions based on the context and are of application. Briefly, technology can be

described a combination of factors that bring about a change that was not experienced before. Therefore, technology is used to improve our abilities (Griliches, 1992).

Sullivan (2000) suggests that human demands for technology keep transforming and growing, this makes technology highly dynamic. We have experienced a paradigm shift from the traditional industrial age to an information age. Previously, firms with large capital bases would gain competitive advantage by employing costly technological tools. Smaller firms had an under hand as they could not afford the cost of assimilating similar technological tools. However, emerging technologies have led to a setting that is highly dependent on information. This is now being referred to as ''INFORMATION AGE''. This period is highly significant as it has shifted dynamics in the traditional work environment thus enabling small firms to have a "seat at the table" in very competitive markets (Brynjolfsson and Hitt,1996).

1.1.2 Operational Efficiency

Operational efficiency is the capability of a firm to reduce the potential effects of unwelcome events and maximize resource capabilities so as to deliver quality products and services to customers (Kalluru & Bhat, 2009). The term "efficiency" is commonly known to the corporate world as the product of firm-specific factors such as management skills, innovation, cost control and market share as determinants of current firm performance and its stability. Often, the terms 'productivity' and 'efficiency' are used in place of each other in literature. However, there is a distinction between the two terms. Productivity is measured by evaluating the performance of the labour variable, while efficiency is more extensive and it defines the joint performance of all variables in production. In banking, while productivity reviews and evaluates the output of their

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employees, efficiency is an indicator of the combined variables such as staff performance, capital and management (De Young & Hunter, 2002).

According to Kalluru & Bhat (2009), the operational efficiency of a firm is based on certain factors like Skilled and competent personnel, effective adoption and implementation of technology, well-defined procurement policies, scalability of the business among many others. An understanding and analysis of banks' non-interest costs relative to the non-interest income is necessary in order to effectively evaluate the operational efficiency (Daniel, Longbrake & Murphy, 1973).

Efficiency scores can be used to formulate operational strategies to enable a firm to meet its business objectives and goals by enhancing allocation of available resources in order to maximize outputs of the firm (Reid & Sanders, 2007). According to Berger & Mester (1997), statistical based "efficient cost frontier" tactics would result in a more accurate measurement of efficiency. Firms that operate efficiently might have expectations of increased productivity and hence worth greater profits. As a result, consumers' expectations of fair pricing, quality service and proper financial structures will increase (Berger, Hunter & Timme, 1993).

1.1.3 Technological Advancement and Operational Efficiency

Technological development has provided the banking history with a kind of directionality. Banks have been influenced tremendously by technological advancements. The developments in e banking have significantly redefined and transformed banks' operations (Kolodinsky, Hogarth & Hilgert, 2004). Technology is viewed as the major driving force in a firm's performance success. All banks irrespective of whether local or foreign are investing heavily on emerging technologies that assure customer satisfaction

in banking. Technology such as internet and mobile banking, electronic transfer of funds (EFT), PC banking, online payments, e-statements, account-to-account transfers, ATMs and bankcards, the banks major services.

Agboola (2006) studied the application of ICT in Nigeria's banking industry. The study's findings established that banks gained competitive advantage from assimilation of modern technology. In the study, an upsurge in the deployment of various e-banking tools was highly evident. The study indicated that the utilization of modern ICT practices significantly improves the bank's reputation and eventually results to foster efficient and effective service delivery. Efficient and effective service delivery in the long run results in reduction in operating costs, attraction of new clientele and this impacts the operational efficiency of the bank.

1.1.4 Commercial Banks in Kenya

The Central Bank of Kenya (CBK) is solely responsible for regulating the operations of banks in Kenya. The banks subsequently formed an umbrella body for lobbying referred to as the Kenya Bankers Association (KBA).

Kenya's financial services industry has experienced vast transformation in the most recent years. The monetary base has gradually come into spot, the business sector reaction has been effective and the financial action has upheld development. In the last six or so years, we have seen barriers of entry to the financial sector, huge decrease in cost of small scale accounts, the launching of new ideas focusing on lower sectors of the populace and expanded branch system of branches across the nation (Njuguna, 2011). Central Bank of Kenya has offered opportunities to creative arrangements giving more attention to the access of financial services through mobile telephones. Utilization of telephones from

individual to individual, individual to business, business to individual and ATM transactions have progressively taken off and numerous banks are putting forth such administrations. Agent banking is another advancement used while accessing advanced financial services. Non-bank outlets are transformed into financial service providers. By 2011, there were 8,809 mediators (agents) permitted, leveraging on mobile telephone money agents (CBK, 2011). These specialists have created a leading edge on financial inclusions.

Technological advancement in specific banks has resulted to increased revenues since the the year 2000. For instance, the introduction of EQUITEL & M-KESHO by Equity Bank and Agency banking services by Cooperative bank, Equity bank and Kenya Commercial Bank. This can be accredited to outlook change from the past results of enhanced technologies to the present indigenous product advancement in the business.

1.2 Research Problem

Operation efficiency can be viewed as what occurs when the right combination of people, process and technology come together to boost the productivity and worth of any business operation, whereas driving down the cost of routine operations to a preferred level (Dhillon, 2012). The result is that resources previously needed to manage operational tasks can be redirected to new, high value initiatives that bring additional capabilities to the organization.

Banks are at a crossroad, the structural setup of a bank is in constant conflict with the dynamic environment as defined by morphing products, customer service delivery and the evolving needs of their customers. The future belongs the banks that adapt fast to these changes. Majority of banks are moving away from the traditional banking by

creating value networks (De Young & Hunter, 2002). This move is accompanied by significant challenges. In order to survive, thrive and gain competitive advantage, banks will need to develop elaborate distribution systems to reach customers at multiple points of need. Banks must also review their operational strategies to ensure that the product and service mix offered have value addition to both the customers and the bank.

Kenyan banks have taken big leaps in setting the bar high for themselves as pertains to emerging technology, improved facilities, redefined customer service and customer experience with most, if not all of the operational process fully automated. The banks have also used communication technology to a great extent to provide their facilities and services off-site. The key motivation for these banks is to out-compete the competition by offering superior services to their clientele (Al Hajri, 2008). Access to financial services facilitators has realised numerous progressions since the developments in technology started taking root. Currently, customers of listed institutions that provide access to financial services have effective, quick and advantageous services, which are delivered through technological advancement, while a few question the capacity of making estimates of inventions ahead of time (Thomond and Lettice, 2002).

Mixed evidence is clearly witnessed on e-banking effect on banks' performance. Some of the studies also have a limited focus on the subject, limiting the study to the impact of mobile and internet banking (Okiro, 2013) and impact of mobile banking (Mwange, 2013). This study aimed to ascertain the impact of technological improvements on the operational efficiency of Kenya's commercial banking sector.

1.3 Research Objective

The key objective of this study is to examine the relationship between Technological advancements and operational efficiency of commercial banks in Kenya.

1.4 Value of the Study

The fast growing need to serve and conveniently meet customers at their point of need is a key factor that influences the decision to assimilate technology. This study will inform the benefits of adopting technology as a tool to enhance efficiency and cost reduction. Central bank and other policy makers might use the conclusions drawn from the study to set policies that promote technological innovation and adoption by commercial banks in order to boost operational efficiency.

The contents of the study will aid commercial banks in their quest to learn the benefits of technologic and its influence on operational efficiency. They will also understand the challenges faced by other commercial banks in implementing technological solutions and provide solutions for these challenges. This will encourage commercial banks and microfinance institutions that are still reluctant to embrace technology to implement it and enjoy the benefits.

This study will make an addition to existing knowledge in terms of theory, application and relevance. Students will be able to learn how the theories relate to empirical studies and how it contributes to knowledge.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The literature review chapter reviews current studies and written work that is related to the variables under study. The literature review illustrates the existing knowledge from prior research done to obtain a deeper understanding of the subject matter. This will consist of theories that support and explain the relationship between technological advancements and operational efficiency of commercial banks domiciled in Kenya. The chapter highlights the hypothetical background and conceptual framework, the key determinants of operational efficiency from previously conducted studies, empirical evaluation, a synopsis of the section and a conceptual framework.

2.2 Theoretical Review

Innovations in technology has significantly influenced operational efficiency and enhanced effectiveness of processes in banking (Nadim & Begum, 2008). In the recent past technological advancements in banking have been well received, accepted and implemented in the core business of banking as well as customer service provision in operational activities of commercial banks. Large as well as smaller banks are embracing the rapid changes in technology to improve their service and product offerings in order to better retain clients.

The theories evaluated in this study to establish the relationship between technological advancements and operational efficiency are the Technology Acceptance Model (TAM), Diffusion of Innovation Theory (DIT) and Resource Based Theory (RBT).

2.2.1 Technology Acceptance Model

Davis (1989) first defined the Technology acceptance model (TAM). TAM models a forecast of user acceptance and embracement of technology. The model illustrates that various factors will influence users' decisions to assimilate new technology when they encounter it. Lawrence & Shay (1986) coin that numerous organizations are investing in and embracing new technology in order to keep up with the highly dynamic external environment. This model has been structured in such a way that it accommodates changes for better cost reductions and improved efficiency. TAMs fundamentals however, do not fully demonstrate the relationship between technological advancements and the factors influencing usability that actually determines the level of user acceptance (Moon & Kim, 2001).

The factors to consider in establishing the users decision on assimilation of technology are Perceived usefulness and Perceived ease-of-use. Perceived usefulness is the extent of belief by users that employing a specific system would result in greater levels of efficiency (Prasad & Harker, 1997)**.** Perceived ease-of-use is the extent to which users consider that using particular systems would improve their productivity (Davis, 1989).

TAM expounds on the objective to embrace and use technology in regular processes or in service provision. This model is relevant to this study because it defines in detail the levels of user's acceptance of technological advancements and usage in an organizational setting. In embracing technological advancements, acceptance is the first and key step in the process; this has a bipolar ramification. First, acceptance is a precursor to adoption and thus TAM complements previous theories and models. Second, acceptance determines the users' attitudes and perceptions which ultimately has an impact on the

efficiency of use and hence worth the level of productivity (Lawrence & Shay, 1986). According to Brynjolfsson & Hitt (1996), Well-strategized adoption, operational efficiency and productivity of systems are a function of acceptance of the technological advances. It is hence logical to draw a conclusion to the effect that without acceptance, the other of the theories would be redundant and invalid. Though acceptance is an initial phase, it is also an attitude-shaping facet that influences adoption and efficiency of use.

2.2.2. Diffusion of Innovation Theory

This theory examines how ideas or products gain traction and diffuse through groups of people. It originates initially in communication to explain how, over a period of time, new ideas and technological advances spread through specific cultures or social systems (Rogers, 1962). The ultimate goal of this diffusion is that people forming part of a social system assimilate new ideas and emerging technologies. The key to assimilation and embracing new technology lies in the fact that the technology must be perceived as an improvement on the existent technology or be innovative.

Assimilation of new technology occurs systematically. Some users will be fast to adopt it while others would be rather slow in the adoption. Previous research has shown that early adopters of innovation are characteristically different from late adopters. Developing an in-depth understanding of a population is key in order to promote the adoption of technology in that group. The understanding that will help isolate technology resistance factors (Davis, 1989).

Rogers (1962) identified the key elements that influence the assimilation of technological innovation. These are Relative advantage, Compatibility, Complexity, Triability and Observability.Relative advantage is the extent to which emerging technology is perceived

to be superior to the concepts it is replacing. This innovation should generally result in improved efficiency and greater productivity. In essence, superiority of technological advancements over manual processes or older technology they tends to influence users to adopt it. In the Kenyan banking sector, impacts on time savings, availability and affordable customer convenience have been observed and reported. Thus, it is seen that customers are more likely to adopt emerging technologies based on their positive perception of the advantages they offer (Roberts & Amit, 2003).Compatibility is tied to consistency i.e. the ability of the innovation to align with current requirements and expectations of the users (Chen et al., 2004). Alignment with the users' current trends has a potential to increase the assimilation rate of innovation (Rogers, 2003).Observability is tied to actual benefit. It refers to degree to which technology adoption leads to actual and visible results to the users (Rogers, 2003). Ram & Sheth (1989) define Trialability as the extent that technology is testable by users prior to adoption. Experimenting on new technology will make users more comfortable with it and will increase the likelihood of adoption. Complexity refers to how difficult it will be for the users to understand and use the innovation in their normal routine. Innovation and technological advancements, which are easy to understand and implement, will generally increase the rate at which such is adopted (Rogers, 2003).

2.2.3 Resource Based Theory

This theory suggests that organizations are poised to achieve competitive advantage over the competition owing to the possession of strategic resources (Barney, 1991). Developing such competitive advantage then enables the organizations to attain good profits. A strategic resource is extremely valuable and cannot be replicated or substituted

with another. The value of such a resource is assessed on its ability to enable the firm maximize on opportunities whilst managing any potential threats (Wernerfelt, 1984).

Prehalad & Gary (1990) posit that firms align their resources, skills and expertise into core competence to gain a competitive edge against their competitors. Core competencies in this case are the activities that an organization has specialized in and does better than its competitors (Chi, 1994). A strategy acts as an integral part of the organization's goals and objectives in a firm, strategy acts as a plan of action that creates a link between the goals and actionable steps towards achieving the mission and the vision (Barney and Clark, 2009). A strategy that is well aligned to the organization's goals and objectives plays an essential role in assembling and allocation of an organization's resources into a viable setting based on the organizational capabilities, external environment and contingent moves by their competitors. Mintzberg (1994) defines a strategy as an action plan designed to attain certain goals and objectives.

2.3 Determinants of Operational Efficiency of Commercial Banks

Operational efficiency in its basic form is the capacity of a business to provide quality products and services to their customers while minimizing costs. Numerous studies indicate that technology is a key factor of operational efficiency based on its effect in improving the effectiveness of service delivery and the diversification of product offerings. Factors that influence operational efficiency include competitive environments, regulation and management efficiency.

2.3.1 Competitive Environment

Financial technological advancements are a key element in assisting firms to penetrate markets (new and existing). The status in economic businesses, levels of attentiveness in addition to rivalry within investment area, effortlessness entrance, cost-effectiveness, collective business resources accessibility decisions, as well as the collaboration of demand versus supply by means of controls influences technological innovation. Variations within the worldwide economic setting plus cumulative coordination of local also universal economic marketplaces trigger economic advancement (Summers, 2000).

Ho (2006) posits competition has risen to a stiff level between commercial banks and financial institutions, for example, investment banks, insurance agencies, pension organizations and many more. In addition, in the same way, the improvement of financial globalization has heightened the requirement for altering the current structure and the state of financial systems and technology deployed in the banking industry. The accomplishment of financial institutions relies on free market economy given that the important existing structures of financial industry are accessible. These are the levels of focus, ease of entry, competition in banking sector and financial advancement instruments.

2.3.2 Regulatory Environment

A regulatory body is responsible for the defined practices of firms in their selected activities and is driven towards decreasing the danger of systematic failure therefore staying away from the disruption brought on by financial breakdown. With reference to Chew (1997), it is explained that the primary motivation to advance is a need to avoid official rules and controls. These require financial institutions to fulfil capital sufficiency

necessities, spread their risk, embrace for the most part acknowledged accounting guidelines, draw in professionally appropriate managers, report their actual financial position and be liable to successful supervision.

Directors, managers and financial institutions are required to reduce adverse selections and detailed conduct rules to decrease against moral hazard. The objective of sensible rules is to restore stability without including efficiency. The degree and success of designing sensible rules based on market mechanism which do not bias competition and financial behaviour remains a paradox (Claessens & Kose, 2013)

2.3.3 Management Efficiency

Management efficiency is a qualitative aspect referring to the managerial style, systems and policies in place, firm discipline and competence and quality of personnel. This has a bearing on the bank's ability to take advantage of the resources at its disposal efficiently in order to realize set goals and maximize returns (Ikpefan, 2013).

Management efficiency as measured through the magnitude of the Bank's operating costs, majorly the fixed costs that are under management's prerogative and are a direct result of management's preferences, that is, luxury or prestige, has an inverse relationship with the bank's operational efficiency as measured by cost to income ratio (Ikpefan, 2013).

The higher the operating profits to total income (revenue) the more the efficient management is in terms of operational efficiency and income generation. The other important ratio is that proxy management quality is expense to asset ratio. The ratio of operating expenses to total asset is expected to be negatively associated with profitability.

Management quality in this regard, determines the level of operating expenses and in turn affects profitability (Athanasoglou et al. 2005).

2.4 Empirical Review of the study variables

2.4.1 International Evidence

A study in the United States by Kozak (2005) indicates an increase of 51% on the return on asset (ROA) values owing to technology investments in banking. This is a clear suggestion that increased technological investments has had a key role to play in the increase noted in bank revenues. This further solidifies the fact that diversifying banking products and services requires higher technological investments.

The study conducted by Osei & Harvey (2011) on investments in technology and the performance of banks in Ghana illustrated increased profit levels for banks with high level of technology adoption as compared to those with lower levels.

Katagiri (1989) and Shawkey (1995) researched on automated teller machines (ATMs) and their impact on banks' efficiency and profitability. The study showed that investment in ATM technology increased both the volume of deposit and withdrawal transactions. It subsequently led to a reduction in banking transaction costs and the personnel requirement in branches. This led to improved bank efficiency and profitability.

In a study on technological innovation and banking, Berger et al. (2003) illustrated that technology adoption leads to a reduction in operational costs. This also leads to productivity increase and efficiency in perfuming "back-office" and "front-office" processes, which is reflected by a reduction in cost of operation and enhanced quality of customer service respectively.

Nader (2011) illustrates Saudi Arabia's commercial banks profit efficiency over a period of 10 years (1998-2007). The survey study findings indicate that accessibility of banking via the mobile phone, the ATMs and the various bank branches had a significant influence on profitability and efficiency in Saudi Arabia's banks.

Malhotra & Singh (2009) researched on the relationship between internet banking and performance of the banking sector in India and established there is indeed a direct relationship between the two. This finding corresponds to deductions put forward by DeYoung (2005) and Arnaboldi & Claeys (2010).

Banks save cut significant costs by providing online banking services. Online banking has enabled banks to trim their branches and reduce on the staff numbers which gives way to self-service channels. Pikkarainen et al (2004) established this in a study on the consumer acceptance of online banking.

2.4.1 Local Evidence

Yegon (2012) researched on the effect of technology investments on firm performance at KCB Bank Group. His study indicated that there was little or no correlation between the two variables. Osage (2012) studied the uptake of electronic banking in commercial banking in Kenya. The study's outcome affirmed that adoption of e-banking drew great benefits but was dependent on the bank services being available round the clock every day thus facilitating fast and efficient service delivery which increased the level of customer satisfaction.

Cheruiyot (2010), researched on internet banking and the impact it has on the financial performance of banks in Kenya. The conclusion was inclined on the fact that banks

offering internet-banking services are the ones with a large asset base as well as higher profit margins as compared to the smaller banks that do not offer the services.

Kariuki (2005) conducted a study on electronic money and mobile banking which demonstrated the positive effect of Technological innovation on the overall performance of the banking sector. He established that deployment of e-banking results in increased profits though in the long run rather than immediately due to the initial capital outlay required for technological advancements. In addition, he evidenced increase in market share growth, diversified product range and products that are tailored to suit customer needs which ensures that the commercial banks are in an improved position to satisfy customer demands which is as a result of e-banking.

Zewdie (2013) in another study highlighting the relationship between financial and Technological innovation and the overall performance and operational efficiency in Kenyan commercial banks indicated that financial and technological advancements exhibited a favourable outcome on the operations of the banking industry.

2.5 Conceptual Framework

A conceptual framework is necessary to develop how the correlation between technological advancements and operational efficiency of the Kenyan banking and the direction between the pairs.

Figure 1: Conceptual Framework

Independent Variables
Technological Advancements
ATM
Internet Banking
Mobile Banking

Dependent Variable

Operational Efficiency (Operating costs/total operating income)
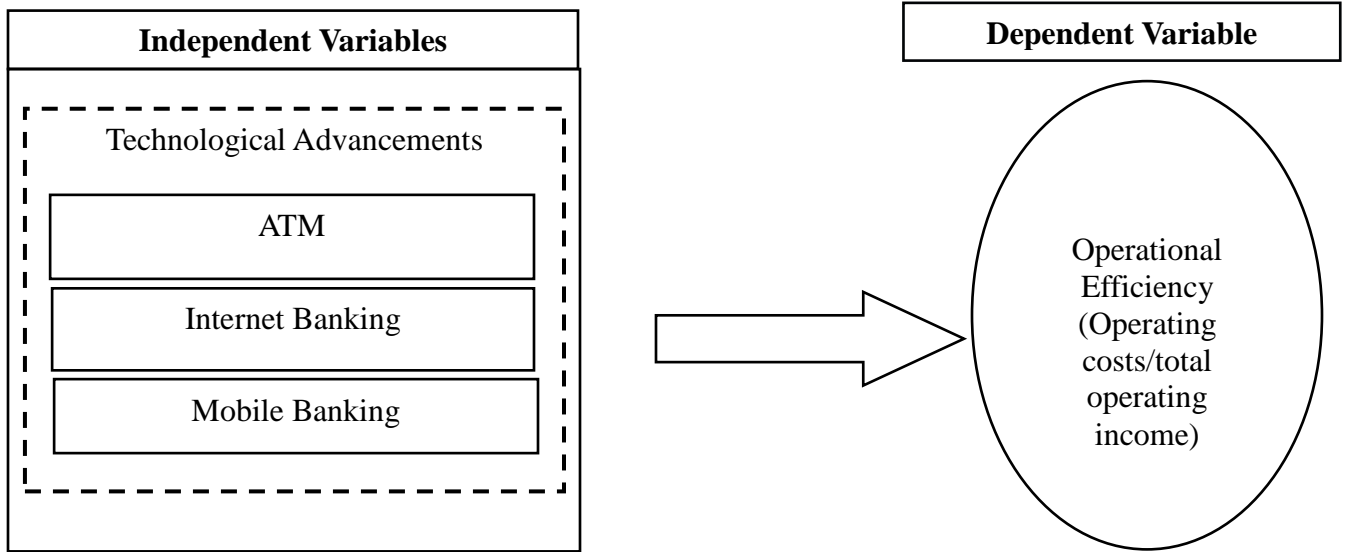
2.6 Literature Review Summary

The synopsis of literature review emphasizes that different realities of Banks have been exuded in relations to Technological advancements. Drawing from the empirical review of previous conducted locally or internationally, mixed conclusions are witnessed on the impacts of technological advancements on banks' operational efficiency. Local studies were conducted at a time when internet banking was a rather new phenomenon in Kenya (Cheruiyot, 2010). This study strived to unequivocally depict the effect of technological advancements (whether positive or negative) on the operational efficiency of commercial banks domiciled and operating in Kenya.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology employed in collecting the data relevant to the research. It includes a description of the type of data, data sources, sampling design, tools used in data collection and data analysis techniques.

3.2 Research Design

Research design is a collection of conditions that facilitate collection of data and subsequent analysis in such a manner that combines relevant data on the topic of study Dul & Hak (2008).It is the general pattern that specifies the type of information to be collected, sources to be used, and procedures to be employed. The data collected and analysed purports to provide answers to solve a particular research problem or answer specific research questions.

This research applied a descriptive design. It is a research whereby quantitative data is gathered and analysed to illustrate the current trends in given phenomenon and linkages between various factors at the time of study (Green & Tull 1966). The choice of descriptive research was on the basis that it allows a researcher to determine the correlations among several variables either in isolation or in combination and their effects on the dependent variable (Cooper & Schindler, 2001). This kind of design was appropriate in establishing the relationship between Technological Advancements and operational efficiency of commercial banks domiciled and operating in Kenya.

3.3 Population

A population is a group of elements with common observable characteristics (Kothari, 2004). An element is the unit from which measurement of the subject of study is drawn from according to Cooper & Shindler (2001). The identified population included all licensed commercial banks that were domiciled and operated in Kenya in the period 1 January 2012 and 31 December 2016 (See Appendix I).

A census survey was employed in conducting the study targeting all the commercial banks in Kenya. Other studies such as Ongore (2008) used this approach to study among others board effectiveness. Further, Dennis (1989) when the sample is small it is important to take the whole population to determine the needs of an organization. No sampling was needed.

3.4 Data Collection

Secondary data composed of both published and unpublished material relevant to the research was used. The data was collected from financial statements with key focus on the variables under study, periodical reports from the CBK and banking survey documents. Kieso, et al., (2007) suggests that a study period of at least five years is better in developing and determining trends.

To attain sufficient representation, the study reviewed data for a period of five years (2013-2017). The time frame was selected based on the understanding that technological advancements in banking has risen steeply in the past decade with major leaps occurring in the past five years that has seen many organisations transforming from paper work and manual processes to automated modes of operation. This data collected was related to the

number of customers who transact using debit and credit cards among other technological innovations from commercial banks. It also includes the volume of transactions that have been done by commercial banks based on Internet banking, Mobile banking, ATMs, Debit and credit cards and the transactions mobilized through the internet platform for example Electronic Fund Transfers (EFTs) and Real Time Gross Settlements (RTGS).

3.5 Data Analysis

This process begins at the end-point of data collection and ends once the processed results are interpreted. The researcher needs to determine the relevant statistical data analysis tools to adequately analyse the data collected. These include descriptive statistics, inferential statistics and tests of significance.

The data collected was cleaned, sorted and coded using Statistical Package for Social Sciences (SPSS) and MS Excel. Descriptive statistics were used to present the rates of dependent and independent variables in the form of tables and charts. To determine the relationship between the variables under study, regression analysis was used.

3.5.1 Analytical Model

A single equation regression model was employed in the study to establish the relationship between technological advancements and operational efficiency of commercial banks domiciled and operating in Kenya.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

Y - is the operational efficiency. Measurement was done by dividing the total earnings of the bank by the operating costs and getting their percentages.

X_1 – represents the number of ATM transactions, which was measured using the average daily number of ATM cash withdrawal transactions.

X_2 – M-banking, which was measured using the average daily number of mobile banning transactions.

X_3 – Internet banking which was determined using the average daily number of internet banking transactions

β_0 – this is the gradient of the model. It measures the amount of change in Y that is associated with a unit change in X.

e – Error term

3.5.1 Diagnostic Tests

This procedure is performed in order to confirm or determine the presence of an existing relationship between variables. The whole point of a diagnostic test is to use it to make a diagnosis, so as to enable us determine the probability that the test will give us the correct diagnosis. Sensitivity and specificity do not give us this information and we therefore need to approach the data from the direction of the test results, using predictive values.

From a patient point of view, a positive predictive value is the proportion of patients with negative test results who are correctly diagnosed while a negative predictive value is the proportion of patients with negative test results who are correctly diagnosed.

3.5.2 Test of Significance

Reliability is the extent to which values are error free, hence worth giving consistent outcomes after repeated trials Mugenda & Mugenda (2003). This study tested statistical significance level at 95% confidential level. The significance of the model will be measured by applying the F-test at 5% level of significance. The correlation coefficient (R) and coefficient of determination (R^2) will be used to test the significance of the model in illustrating the relationship between the variables under investigation.

CHAPTER FOUR: DATA ANALYSIS RESULTS AND DISCUSSION

4.1 Introduction

This section describes the information managed out of samples gathered throughout the research with regards to the relationship between technological advancements and operational efficiency of commercial banks in Kenya. The population section consisted of operational 43 Kenyan commercial banks as at 31 December 2016.

4.2 Response Rate

The response rate was at 100% as the sample member includes the entire bank industry licensed with the central bank. The Central bank regulation provides that all the banks to publish their financial statement hence availability of the data.

4.3   Descriptive Statistics

The descriptive statistics and the distribution of the variables were presented in the Table below. The mean value, minimum, maximum and the standard deviation of Operational efficiency, daily number of internet banking transactions, daily number of mobile banking transactions and the daily number of ATM cash withdrawal transactions were analysed.

Table 4.1 Descriptive Statistics

	Y= Cost Income Ratio (Efficiency Ratio)	X1= ATM Cash Withdrawals	X2=Mobile Banking Transactions	X3= Internet Banking Transactions
Mean	5.076001597	95.10274473	78.32729863	2.712803
Standard Error	0.177052124	1.862303794	1.935518426	0.124349
Median	4.979122	92.3713	78.47367	2.211418
Standard Deviation	2.53500063	26.66413249	27.71240648	1.780411
Sample Variance	6.426228197	710.9759614	767.977473	3.169865

Kurtosis	-0.494929341	-1.372238818	-0.986162216	-0.77745
Skewness	0.423923726	0.267242444	0.383032738	0.646996
Range	11.9994347	73.10998	81.69698	6.663626
Minimum	0.4814653	62.50302	42.81242	-0.35463
Maximum	12.4809	135.613	124.5094	6.308996
Sum	1040.580327	19496.06267	16057.09622	556.1245
Count	205	205	205	205
Confidence Level(95.0%)	0.349086748	3.671831555	3.816185981	0.245175

From the table above, the variable Y that measures the cost income ratio in percentage form has a minimum value of 0.48% and a maximum value of 12.48%. It has a mean of 5.07 with a standard deviation of 2.54 and a kurtosis of -0.49. The data is positively skewed with a skewness of 0.42.

Our independent variable X1 shows the natural log of ATM daily withdrawals. The maximum is 135.61 while the minimum is 62.5 with a mean of 95.1 and a standard deviation of 26.66. This data is also positively skewed with a skewness of 0.27 and a kurtosis of -1.37.

The variable X2 on the other hand represents the natural log of daily mobile banking transactions. The data has a minimum value of 42.8 and a maximum value of 124.5 with a mean of 78.32 and a standard deviation of 27.7. The data is positively skewed with a skewness of 0.38 and a kurtosis of -0.99.

The independent variable X3 on the other hand represents the natural log of internet banking transactions. It has a maximum of 6.3 and a minimum of -0.35. The data is also positively skewed with a skewness of 0.65 and a mean of 2.71 with a standard deviation of 1.78.

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4.3 Diagnostics Statistics

4.3.1   Multicollinearity Tests

The multicollinearity test is conducted after the normality of the data in the regression model are met, and hence we determine whether there is similarity between the independent variables in a model. Similarities between the variables shows strong correlation.

The rule is that if the VIF value lies between 1-10, then there is no multicollinearity. If the VIF <1 or>10, then there is multicollinearity.

Coefficients^a

Model		Sig.	Collinearity Statistics	
			Tolerance	VIF
1	(Constant)	.007		
	X1= ATM Cash Withdrawals	.185	.026	38.633
	X2=Mobile Banking Transactions	.003	.027	37.322
	X3= Internet Banking Transactions	.013	.086	11.659

a. Dependent Variable: Y= Cost Income Ratio (Efficiency Ratio)

The VIF value of all the independent valuables are above 10. We therefore conclude that there is multicollinearity between the independent variables.

Collinearity Diagnostics^a

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions			
				(Constant)	X1= ATM Cash Withdrawals	X2=Mobile Banking Transactions	X3=Internet Banking Transactions

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	1	3.826	1.000	.00	.00	.00	.00
1	2	.165	4.810	.05	.00	.00	.08
	3	.008	22.262	.49	.03	.15	.90
	4	.001	56.437	.46	.97	.85	.02

a. Dependent Variable: Y= Cost Income Ratio (Efficiency Ratio)

4.3.2   Auto Correlation Tests

The analysis of autocorrelation is a mathematical tool for finding repeating patterns. It is recommended to test for the presence of autocorrelation. The Durbin-Watson test is a widely used method of testing for autocorrelation. This is used to test for first-order autocorrelation.

Correlations

		Y= Cost Income Ratio (Efficiency Ratio)	X1= ATM Cash Withdrawals	X2=Mobile Banking Transactions	X3= Internet Banking Transactions
Y= Cost Income Ratio (Efficiency Ratio)	Pearson Correlation	1	.775**	.782**	.715**
	Sig. (1-tailed)		.000	.000	.000
	N	205	205	205	205
X1= ATM Cash Withdrawals	Pearson Correlation	.775**	1	.986**	.954**
	Sig. (1-tailed)	.000		.000	.000
	N	205	205	205	205
X2=Mobile Banking Transactions	Pearson Correlation	.782**	.986**	1	.952**
	Sig. (1-tailed)	.000	.000		.000
	N	205	205	205	205
X3= Internet Banking Transactions	Pearson Correlation	.715**	.954**	.952**	1
	Sig. (1-tailed)	.000	.000	.000	
	N	205	205	205	205

**. Correlation is significant at the 0.01 level (1-tailed).

a. Dependent Variable: Y= Cost Income Ratio (Efficiency Ratio)

4.4 Correlation Analysis

The Pearson product-moment correlation coefficient is a measure of the strength of a linear association between two variables and is denoted by r. The Pearson correlation coefficient, r, can take a range of values from +1 to -1. A value of 0 indicates that there is no association between the two variables. A value greater

than 0 indicates a positive association, that is, as the value of one variable increases so does the value of the other variable.

Table 4.5 Correlation Analysis

	Operating Efficiency Ratio	ATM Cash Withdrawal Transactions	Mobile Banking Transactions	Internet Banking Transactions
Operating Efficiency Ratio	1			
ATM Cash Withdrawal Transactions	0.775128474	1		
Mobile Banking Transactions	0.781808208	0.985715067	1	
Internet Banking Transactions	0.714831529	0.953517866	0.951842959	1

A value less than 0 indicates a negative association, that is, as the value of one variable increases the value of the other variable decreases. Table 4.5 above gives a summary of the correlation between the dependent variables and the explanatory variables. Operational efficiency shows a strong and positive correlation (R= 0.775) with the number of ATM transactions. Mobile banking transactions, also has a strong positive association with the operational efficiency of commercial banks (R = 0.781). Finally, the number of internet banking transactions also has a strong and positive relationship with the operational efficiency of commercial banks in Kenya (R= 0.714).

4.5 Regression Analysis and Hypotheses Testing

The study conducted a multiple regressions on the relationship between technological advancements and operational efficiency of commercial banks in Kenya. Coefficient of determination determines the proportion of the variation in dependent variable that is attributed to the changes in the explanatory variables.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.790[a]	.624	.618	1.5666518

a. Predictors: (Constant), X3= Internet Banking Transactions, X2=Mobile Banking Transactions, X1= ATM Cash Withdrawals

The study established R^2 of 0.618, which implies that 61.8% of the variation in operational efficiency of commercial banks in Kenya is attributed to the changes in explanatory variables (number of cash withdrawal ATM transactions, number of mobile banking transactions and number of internet banking transactions).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	817.617	3	272.539	111.041	.000[b]
	Residual	493.334	201	2.454		
	Total	1310.951	204			

a. Dependent Variable: Y= Cost Income Ratio (Efficiency Ratio)

b. Predictors: (Constant), X3= Internet Banking Transactions, X2=Mobile Banking Transactions, X1= ATM Cash Withdrawals

The study used ANOVA statistics to establish the significance of the relationship between value of the operational efficiency of commercial banks domiciled and operating in Kenya and the explanatory variables. The regression model is significant given the level of

significance 0.000^b, which is below 0.05; therefore, the model shows that the relationship between independent variables and dependent variable is significant.

The value of calculated F should also be greater than the critical value of F, for the relationship to be significant. The calculated F is 111.04 while the critical F is 2.7; therefore $111.04 > 2.7$, hence the model is significant.

Table 4.8 Regression coefficients

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	-2.328	.848		-2.743	.007
X1= ATM Cash Withdrawals	.034	.026	.357	1.329	.185
1 X2=Mobile Banking Transactions	.072	.024	.782	2.957	.003
X3= Internet Banking Transactions	-.527	.210	-.370	-2.505	.013

Therefore, the estimated model becomes:

$Y = -2.328 + 0.034 X_1 + 0.072X_2 - 0.527X_3 + 0.848$

4.6   Discussion of Research Findings

With all other factors kept constant, operational efficiency for commercial banks in Kenya registered an average value of -1.48 units over the period under study. The findings show that the number internet banking transactions negatively impacts on the

operational efficiency of commercial banks in Kenya. The effect of internet banking transactions on operational efficiency is statistically significant at 5% level of significance (t=-2.51, p=0.013, p<0.05). This illustrates that one unit increase in number of internet banking transactions will contribute to 0.527 unit decrease in operational efficiency of commercial banks. Number of mobile banking transactions positively affects operational efficiency of commercial bank in Kenya and one unit increase in Mobile banking transactions will lead to 0.072 unit increases in operational efficiency. The effect is statistically significant at 5% level of significance (t=2.96, p=0.003, p<0.05). Therefore, the study can conclude that the number of mobile banking transactions is an important determinant of operating efficiency of commercial banks in Kenya.

The regression result further shows that the number of ATM cash withdrawal transactions positively affects the operating efficiency of commercial banks. ATM transactions has a coefficient of 0.034 implying that one unit increase in number of ATM transactions will lead to 0.034 unit increase in operating efficiency of the banks. With a p-value of 0.185, which is greater than 0.05, this implies that the number of ATM transactions is statistically insignificant at 5% level of significance in affecting operational efficiency.

CHAPTER FIVE: SUMMARY OF FINDINGS AND CONCLUSION

5.1 Introduction

The section gives a summary of findings, conclusions of findings and recommendation based on the main findings on the results of the study on the relationship between technological advancements and operational efficiency of commercial banks in Kenya.

5.2 Summary of Findings

With reference to the regression model discussed in chapter four, the research established that the number of cash withdrawal ATMs transactions, daily number of mobile banking transactions and the daily number of internet banking transactions influenced operational efficiency. The research established that the intercept was -2.328 for the five-year period. Specifically, the research established that the coefficient for number of ATMs was 0.034, meaning that number of ATMs positively influenced operation efficiency of commercial banks domiciled and operating in Kenya.

Relating to mobile banking, the study revealed that an increase in mobile banking would lead to increase in the operational efficiency of commercial banks. The study established a strong positive correlation between operating efficiency of in Kenya and adoption of mobile banking transactions as shown by the correlation coefficient of 0.781 at 0.000 levels of confidence in chapter 4 above. The study also established that internet banking affects the financial performance of commercial banks in Kenya. The study also found strong positive correlation coefficient between operational efficiency of commercial banks in Kenya and internet banking, (Pearson correlation coefficient $r = .714$ Sig. $= p$ - value.013). Internet banking provides alternatives for faster delivery of banking services to a wider range of

customers. To cope with the pressure of growing competition, commercial banks have adopted several initiatives and E-banking is one of them (Centeno, 2004). The competition has been especially tough for the public sector banks, as the newly established private sector and foreign banks are leader in the adoption of E-banking. This study, however, established that increase in the use of internet banking decreased operational efficiency.

5.3 Conclusion

This study looked at the relationship between technological advancements and operating efficiency of commercial banks in Kenya. The three explanatory variables that were studied (ATM numbers, number of mobile banking transactions and number of internet banking transactions) give details on a substantial influence of 61.8% on the operational efficiency of commercial banks as represented by adjusted R^2 (0.0.618). This is in line with Nyathira (2012) and Mwangi (2011) who argued that the technology inventions influence and is positively correlated to cost-effectiveness in investment area predominantly commercial banks and that there is a significant connection among the acceptance of various economic innovations as well as levels of operating efficiency of Kenyan commercial banks. Therefore, if banks are efficient, we might then anticipate enhanced cost-effectiveness, larger quantities of monies intermediated, improved charges and quality of services to consumers, and bigger security and safety if some of the competence investments stay functional to improve capital buffers, which absorb moments of uncertainty.

5.4 Recommendations

The findings of this study indicate that operational efficiency of commercial banks in Kenya is significantly influenced by technological advancements. Commercial banks of Kenya, being the controller of their own investments in technology advances, should

think through strategies that will not only benefit the banks in terms of population and popularity but also consider that their operational efficiency level is increased.

The study further recommends that commercial banks should continue investing in ATMs, mobile banking platforms and internet banking platforms as this was found to have positive influence on operational efficiency. This is highly attributed to the fact that service provision is diversified and the number of people with access to banking is increased on a daily basis due to ease of access to mobile devices.

5.5 Limitations of the Study

Main objective of the research has been achieved. However, the Central bank of Kenya and commercial banks exchange well-thought-out material that is sensitive in addition to confidential therefore, the researcher needed to convince the sample populace that the main purpose of data is educational study simply and not for any malicious intent.

A second limitation is that the findings are applicable to commercial banks in Kenya within the period under study. It is not established whether the results are applicable outside the country.

5.6 Suggestions for further research

The study recommends that a further study should be done with key focus on the challenge facing the adoption of technological advancements by commercial banks in Kenya.

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APPENDICES

Appendix I: List of Commercial Banks in Kenya

Classification	Description	Commercial Banks
Tier I	Comprises of banks with a balance sheet of more than Kenya Shillings 40 billion	1. Citibank 2. Equity Bank 3. Standard Chartered Bank 4. Barclays Bank of Kenya 5. NIC Bank 6. Kenya Commercial Bank 7. National Bank of Kenya 8. Diamond Trust Bank 9. Co-operative Bank of Kenya 10. CFC Stanbic Bank
Tier II	Comprises of banks with a balance sheet of less than Kenya Shillings 40 billion but more than Kenya Shillings 10 billion	11. I&M Bank 12. Bank of India 13. Bank of Baroda 14. Family Bank 15. Prime Bank 16. Commercial Bank of Africa 17. Bank of Africa 18. Consolidated Bank 19. Chase Bank 20. Fina Bank 21. Ecobank 22. HFCK

Classification	Description	Commercial Banks
Tier III	Comprises of banks with a balance sheet of less than Kenya Shillings 10 billion	23. Habib A.G. Zurich 24. Victoria Commercial Bank 25. Credit Bank 26. Habib Bank (K) Ltd 27. Oriental Commercial Bank 28. K-Rep Bank 29. ABC Bank 30. Development Bank of Kenya 31. Middle East Bank 32. Equatorial Commercial Bank 33. Trans-National Bank 34. Dubai Bank 35. Fidelity Commercial Bank 36. City Finance Bank 37. Paramount Universal Bank 38. Giro Commercial Bank 39. Imperial Bank 40. Guardian Bank 41. Southern Credit Bank 42. Gulf African Bank 43. First Community Bank

Appendix II: Secondary data collection form

Date:…………………………… Name of Assistant:……………………………………

Bank:…………………………………………………

Data	2012	2013	2014	2015	2016
Total operating profit					
Total operating income					
Total operating expense					
Number of ATM transactions					
Number of internet banking transactions					
Number mobile banking transactions					
Total Income					
Total Assets					

Signature:…………………………………………………

Appendix III: Raw Data Collected

	Internet Banking Transactions				
	2016	**2015**	**2014**	**2013**	**2012**
Kenya Commercial Bank	5.658	3.284	2.229	1.172	0.940
Equity Bank	5.663	3.222	2.281	1.921	1.446
Co-operative Bank of Kenya	5.620	3.170	2.415	1.312	1.190
Standard Chartered Bank	5.378	3.198	2.211	1.422	1.579
CFC Stanbic Bank	5.897	3.376	1.739	0.854	1.428
Barclays Bank of Kenya	6.018	3.483	1.828	1.942	1.441
NIC Bank	5.757	3.624	2.007	0.293	0.831
Commercial Bank of Africa	5.685	3.200	2.015	0.560	0.888
Diamond Trust	5.738	3.314	2.391	0.698	0.727
I&M Bank	5.753	3.393	1.912	1.682	1.158
Citibank	5.830	3.593	2.239	0.670	1.017

Bank of Africa	6.033	3.551	1.878	1.575	1.272
Bank of Baroda	5.539	3.440	1.926	1.012	1.040
National Bank of Kenya	5.719	3.212	2.393	1.803	0.911
Prime Bank	5.760	3.523	2.303	1.589	1.110
Housing Finance	5.420	3.327	2.355	0.926	1.204
Ecobank	5.989	3.466	1.959	1.101	0.999
Family Bank	5.683	3.271	2.759	1.038	1.716
Bank of India	5.710	3.562	2.090	-0.103	0.975
ABC Bank	5.474	3.471	2.092	-0.355	1.143
Consolidated Bank	5.689	3.418	1.885	-0.059	1.263
Spire Bank Ltd	5.759	3.599	2.218	1.923	1.082
Gulf African Bank	5.802	3.402	2.482	0.199	1.538
Development Bank of Kenya	6.092	3.504	2.084	1.624	0.955
GT Bank Kenya	6.309	3.567	1.888	0.730	1.204
Giro Commercial Bank	5.603	3.597	2.604	1.271	1.235
Fidelity Commercial Bank	5.772	3.407	1.718	0.992	0.650
Guardian Bank	5.332	3.472	2.139	1.134	1.398
Victoria Commercial Bank	5.917	3.334	2.159	0.308	0.584
First Community Bank	5.982	3.453	2.047	0.667	1.099
Habib A.G. Zurich	6.000	3.375	1.780	1.483	0.962
Sidian Bank	5.735	3.406	1.836	-0.033	1.210
Trans-National Bank	5.657	3.412	1.730	2.331	0.978
Paramount Universal Bank	5.551	3.464	2.244	1.072	0.978
Habib Bank Ltd	4.992	3.633	2.381	2.223	1.275
Credit Bank	5.690	3.352	2.065	1.753	0.810
Oriental Commercial Bank	6.116	3.483	1.890	1.585	1.377
Middle East Bank	5.918	3.584	2.465	2.144	1.295
Jamii Bora Bank	5.616	3.441	2.600	1.306	1.194
UBA Kenya Ltd	5.908	3.634	2.731	1.057	0.740
Dubai Bank	5.922	3.284	2.271	0.858	1.182

	Mobile Banking Transactions				
	2016	**2015**	**2014**	**2013**	**2012**
Kenya Commercial Bank	123.275	89.004	81.259	56.783	43.475
Equity Bank	124.413	89.160	80.870	57.228	42.919
Co-operative	122.954	89.485	77.719	57.685	43.068

Bank of Kenya					
Standard Chartered Bank	122.471	88.957	81.376	58.022	43.227
CFC Stanbic Bank	122.620	88.721	78.733	59.384	43.177
Barclays Bank of Kenya	123.048	89.027	79.384	59.169	43.262
NIC Bank	123.091	88.855	79.278	57.439	43.365
Commercial Bank of Africa	123.222	88.658	76.026	59.187	42.846
Diamond Trust	123.969	89.226	79.456	56.173	43.055
I&M Bank	123.754	89.098	78.109	57.746	43.170
Citibank	123.044	89.251	80.057	56.793	43.380
Bank of Africa	123.133	89.553	76.230	55.102	42.980
Bank of Baroda	123.072	88.947	76.511	56.722	43.254
National Bank of Kenya	123.542	89.024	80.967	55.171	43.022
Prime Bank	123.348	88.753	78.873	58.830	43.408
Housing Finance	123.845	89.114	78.694	55.660	43.072
Ecobank	123.766	88.949	77.704	57.940	43.154
Family Bank	123.995	89.125	78.474	56.934	43.169
Bank of India	124.509	89.301	82.637	56.470	42.931
ABC Bank	123.933	89.074	77.866	58.808	43.348
Consolidated Bank	124.266	89.287	76.990	57.856	43.033
Spire Bank Ltd	123.174	89.267	78.878	57.538	43.262
Gulf African Bank	123.482	88.950	78.346	57.556	43.243
Development Bank of Kenya	123.856	89.372	78.359	57.583	42.822
GT Bank Kenya	123.097	88.888	77.845	58.669	43.312
Giro Commercial Bank	122.158	89.584	76.680	55.768	43.155
Fidelity Commercial Bank	123.933	89.002	78.548	56.669	43.286
Guardian Bank	123.390	89.162	78.750	59.015	42.888
Victoria Commercial Bank	122.422	89.102	77.737	55.560	43.408
First Community Bank	123.872	88.941	78.288	55.883	43.108
Habib A.G. Zurich	123.932	88.775	79.028	58.424	42.842
Sidian Bank	123.209	88.926	79.448	56.930	43.150
Trans-National Bank	123.117	88.858	74.883	57.243	43.096
Paramount Universal Bank	123.297	89.458	79.936	57.739	42.812
Habib Bank Ltd	123.566	89.125	76.568	57.162	42.930
Credit Bank	123.704	88.875	78.617	59.298	42.995
Oriental Commercial	122.969	89.065	76.638	59.862	43.222

Bank					
Middle East Bank	123.883	89.274	77.904	56.975	43.455
Jamii Bora Bank	122.706	89.123	78.929	57.455	42.928
UBA Kenya Ltd	123.072	88.761	77.573	57.688	43.370
Dubai Bank	123.032	89.118	77.643	60.977	43.256

	ATM Cash Withdrawal Transactions				
	2016	**2015**	**2014**	**2013**	**2012**
Kenya Commercial Bank	135.414	113.651	92.503	71.398	63.126
Equity Bank	135.291	113.944	92.045	71.371	63.092
Co-operative Bank of Kenya	135.576	112.440	92.426	72.241	63.539
Standard Chartered Bank	135.440	113.173	91.948	71.153	63.041
CFC Stanbic Bank	135.366	112.987	92.479	71.223	62.777
Barclays Bank of Kenya	135.241	113.547	92.279	71.629	63.274
NIC Bank	135.419	113.028	92.187	71.175	63.330
Commercial Bank of Africa	135.138	113.227	92.695	71.550	63.388
Diamond Trust	135.311	112.965	92.215	71.971	63.180
I&M Bank	135.363	113.830	92.176	70.870	63.505
Citibank	135.279	113.157	92.413	72.317	63.011
Bank of Africa	135.564	113.429	91.792	71.732	62.878
Bank of Baroda	135.362	112.625	92.594	72.312	62.806
National Bank of Kenya	135.299	113.457	92.729	70.945	63.138
Prime Bank	135.336	113.231	92.704	71.694	62.941
Housing Finance	135.019	112.880	92.250	71.643	63.078
Ecobank	135.402	113.817	91.835	71.394	63.203
Family Bank	134.839	112.980	92.288	71.360	63.346
Bank of India	134.713	112.962	92.225	71.671	62.661
ABC Bank	135.613	113.063	92.718	70.875	62.760
Consolidated Bank	135.380	112.480	92.174	71.302	62.503
Spire Bank Ltd	135.400	113.318	92.620	71.555	62.923
Gulf African Bank	135.286	113.011	92.524	71.406	63.134
Development Bank of Kenya	135.235	113.690	92.284	72.055	63.093
GT Bank Kenya	135.527	113.813	92.766	71.734	63.468
Giro Commercial Bank	135.371	113.313	92.483	71.420	63.080
Fidelity Commercial Bank	135.361	113.889	92.128	71.344	63.853

Guardian Bank	135.298	113.077	92.400	71.487	62.960
Victoria Commercial Bank	135.231	113.733	92.307	71.543	62.956
First Community Bank	135.266	113.500	92.266	71.344	63.230
Habib A.G. Zurich	135.323	113.009	92.875	71.732	62.807
Sidian Bank	134.914	113.038	91.782	71.243	63.050
Trans-National Bank	134.876	113.125	92.371	70.883	63.528
Paramount Universal Bank	135.294	114.002	92.971	71.381	63.099
Habib Bank Ltd	135.513	113.474	92.449	70.991	62.966
Credit Bank	135.413	113.466	92.075	71.765	62.558
Oriental Commercial Bank	135.413	112.547	92.536	71.470	63.097
Middle East Bank	135.321	113.700	92.037	71.336	63.226
Jamii Bora Bank	135.231	112.860	92.441	71.258	62.648
UBA Kenya Ltd	135.387	113.280	92.281	71.673	62.975
Dubai Bank	135.411	113.908	92.397	71.185	63.470

	Cost Income Ratio				
	2016	**2015**	**2014**	**2013**	**2012**
Kenya Commercial Bank	0.081	0.093	0.056	0.018	0.020
Equity Bank	0.068	0.066	0.018	0.045	0.007
Co-operative Bank of Kenya	0.083	0.057	0.072	0.042	0.032
Standard Chartered Bank	0.106	0.077	0.059	0.042	0.005
CFC Stanbic Bank	0.050	0.043	0.071	0.031	0.036
Barclays Bank of Kenya	0.084	0.077	0.069	0.022	0.018
NIC Bank	0.072	0.039	0.039	0.041	0.020
Commercial Bank of Africa	0.066	0.085	0.063	0.039	0.025
Diamond Trust	0.080	0.024	0.058	0.042	0.035
I&M Bank	0.090	0.063	0.032	0.031	0.011
Citibank	0.083	0.070	0.031	0.027	0.010
Bank of Africa	0.072	0.065	0.042	0.019	0.023
Bank of Baroda	0.101	0.094	0.075	0.067	0.017
National Bank of Kenya	0.104	0.073	0.047	0.016	0.029
Prime Bank	0.108	0.071	0.037	0.026	0.023
Housing Finance	0.115	0.036	0.033	0.036	0.024
Ecobank	0.115	0.056	0.036	0.034	0.031
Family Bank	0.070	0.060	0.050	0.062	0.026

Bank of India	0.069	0.066	0.052	0.061	0.019
ABC Bank	0.081	0.069	0.047	0.023	0.031
Consolidated Bank	0.079	0.046	0.058	0.059	0.019
Spire Bank Ltd	0.056	0.050	0.074	0.053	0.020
Gulf African Bank	0.037	0.061	0.039	0.053	0.018
Development Bank of Kenya	0.083	0.032	0.074	0.020	0.020
GT Bank Kenya	0.080	0.028	0.057	0.043	0.014
Giro Commercial Bank	0.070	0.069	0.056	0.037	0.031
Fidelity Commercial Bank	0.084	0.051	0.057	0.031	0.028
Guardian Bank	0.036	0.041	0.050	0.035	0.012
Victoria Commercial Bank	0.094	0.050	0.032	0.085	0.007
First Community Bank	0.080	0.060	0.069	0.016	0.033
Habib A.G. Zurich	0.079	0.055	0.052	0.052	0.029
Sidian Bank	0.091	0.056	0.035	0.025	0.021
Trans-National Bank	0.104	0.067	0.025	0.044	0.022
Paramount Universal Bank	0.090	0.054	0.095	0.044	0.030
Habib Bank Ltd	0.125	0.075	0.045	0.046	0.018
Credit Bank	0.076	0.079	0.032	0.020	0.020
Oriental Commercial Bank	0.097	0.070	0.057	0.034	0.020
Middle East Bank	0.062	0.052	0.040	0.050	0.022
Jamii Bora Bank	0.068	0.052	0.085	0.029	0.025
UBA Kenya Ltd	0.073	0.078	0.064	0.017	0.030
Dubai Bank	0.061	0.076	0.052	0.039	0.032