

**MOBILE CREDIT RISK AND PERFORMANCE OF COMMERCIAL
BANKS**

BY

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DECLARATION

This research project is my original work and has never been presented to any other university or examination body.



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DEDICATION

I dedicate this research project to God Almighty for the gift of life and the opportunity and also my mum for her continuous support, love and encouragement.

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ABBREVIATIONS

CAR	-	Capital Adequacy Ratio
CBK	-	Central Bank of Kenya
CDD	-	Customer Due Diligence
EDD	-	Enhanced Due Diligence
KYC	-	Know your customer
LGDR	-	Loss Given Default Ratio
LLPR	-	Loan Loss Provision Ratio
NIM	-	Net Interest Margin
NPLR	-	Non-performing Loans Ratio
ROA	-	Return on Assets
ROE	-	Return on Equity

ABSTRACT

Credit creation and issuance being the core revenue making doings for commercial banks comprises dangers to bank and lender. When commercial banks issue loans toward their customers there exists a risk of the client defaulting .on the other hand when clients' deposits funds in to their bank accounts and the banks issue loans usually put clients savings in to a risk. Default by borrowers could consequence to large damages for banks that might ultimately tip to massive economic anguish which affects the whole economy. The objective of the study was to establish effect of mobile credit risk management on the financial performance of commercial banks in Kenya. It also aimed at reviewing the increasing body of theoretical and empirical studies that have endeavored to examine the extent and effect of credit risk on financial institutions' performance. The target population was all the 42 licensed banks. However, 13 banks were expunged from the analysis because they became licensed before the study period, ceased operations in the study period, or were sharia compliant banks that did not charge interest thus making it difficult to obtain management efficiency. Thus, 30 commercial banks were utilized for the analysis. Secondary sources of data were employed, and data was collected on; net income, total loans issued, operating income, loan provisions, net charge offs, total capital, total weighted risky assets, liquid assets, total deposits, net interest income, and operating expenses. The unit period of analysis was annual, and data was collected for the period from 2016 to 2020. The period comprised of five years. The study applied correlation analysis and multiple linear regression equation with the technique of estimation being Ordinary Least Squares (OLS) so as to establish the relationship of liquidity, the lending rate, and non-performing loans on loan volumes issued. The study findings were that the credit risk, capital adequacy, liquidity, management efficiency, and bank size in unison significantly affect banks' financial performance ($\text{Prob} > \text{Chi}^2 = 0.0004 < 0.05$). The study established that credit risk ($P = 0.0000 < 0.05$), capital adequacy ($P = 0.0039 < 0.05$), and bank size ($P = 0.0000 < 0.05$) have an association while credit risk ($P = 0.004 < 0.05$) and bank size ($P = 0.005 < 0.05$) have a relationship with bank's financial performance. The study concluded that there is a better credit risk management leads to improved financial performance of commercial banks. The study concluded that the higher the capital adequacy and bank size, the higher the financial performance of banks. Policy recommendations were that the study findings should guide government regulators in making policies and practices to alleviate the financial system from economic crises and also aid in strategy formulation concerning taxation and other regulatory parameters of the banks. Further recommendations were that commercial banks and by extension, other financial institutions, should mainly concentrate on credit risk, capital adequacy, and bank size in order to provide innovative products and solutions to reach out to greater clientele, increase their profitability, and maximize shareholders wealth and the study findings are important to banking sector shareholders, consultants, and commercial banks administration, as it provides that mitigation of credit risk through correct credit risk management practices can increase performance in the sector.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

The performance of commercial banks is built up on the operational efficiency of loans as well as credit Kiplagat (2020). The loans and credit have been made easier through usage of mobile phones. Nevertheless, the tremendous improvement in accessibility to credit is resulting from mobile credit growth. Mobile-Banking entails the transaction by the aid of mobile phones, tablets among other telecommunication gadgets. It entails execution of transaction and transmission of jurisdiction of rights to the usage goods and services (Mohamed, 2019). The globalization has spearheaded technology advancement and integration. The availability of mobile telecommunication has aided the payment of bills, transaction abroad among others. The performance of the organization demonstrates the return versus the prevailing risks in maximizing resources to earn the returns. Nduku (2019), postulated that performance is blueprint that benchmark strategic priority of the firms. Majority of the banking sector business entails offering loans while putting the key consideration on risk factor associated with clients and security whenever default. Mobile credit money has increased and expedited the growth of banks in Kenya.

The theories underpinning this study include financial intermediation theory which explains the importance of transaction cost in cases of asymmetric information. Technology Acceptance model cements the technology changes and user acceptance and finally the financial distress theory that explains the ability and capability of firms to abide by financial commitment whenever they fall due. IMF (2009) opined those banks which are highly performing in the Sub-Saharan Africa through their ability to generate income by maximizing asset use. This is reinforced by non-interest incomes.

The banks should continue in their innovative ways that increases profitability. Banks have undergone transformations that are key in enhancing financial productivity via mobile banking, incorporating usage of mobile loan, appraisals, and application. Zutt (2010) demonstrated mobile credit risk as challenges facing electronic mobile money.

Since inception, mobile wallet has transformed. It became active in 2001 and has passed through great transformative measures that sharpened the electronic banking. Mpesa elevated its operations in 2007 and went worldwide in delivery of service (Janine Aron, 2015). Mobile money is growing at alarming rate especially growing economies. It is the most convenient method of transactions and outshining banks' services Janine (2015). The innovations in mobile and electronic banking have improved infrastructural development hence improving banking performance. Mobile money development has been more intensive in the developing countries compared to developed nations. However, mobile money is expected to grow drastically in the developed nation. The Forbes (2016) demonstrated increment in sales for that year. There were significant 30% incremental in French Banks revenues but UK had poor performance falling by 22% while German revenues proclaim poor results.

1.1.1 Mobile Credit Risk

Mobile Credit risk is the likelihood of losses that arises due to a borrower's non-fulfilment to make payments on their debt after borrowing while utilizing phone. The norms of loss mitigation is through familiarity with the adequate and sufficient bank's capital and loss reserves during particular period is defined as credit risk management. In banking operations risks are inevitable but that does not mean that they cannot be overcome and prevented. Lenders are continuously taking efforts to minimize risk

associated with fraudulent activities and securities concerns on clients' financial data at the same time safeguarding their own coffers from unreliable clientele who do not repay (Rodina, 2013).

Risk Management Association (2013) indicates that the primary footstep in mitigating the likelihood of non-repayment starts with being cognizant of the clientele abilities and characteristics. The predominant method used is gauging the borrowers based on Asset quality which shows quantity of existing potential credit risk, Asset quality blueprints the availability of capital demonstrates (Stability) and liquidity management illustrates the need for asset management to evade credit risk. This appraisal is conducted on the supposition that previous repayment pattern is litmus test for predicting the borrower's futuristic prospects. The supreme practice indicated by Risk Management Association is through check-up of non-financial risks. Lenders must scrutinize basic capabilities structures and understand the capital optimum levels. The holistic futuristic consideration on tracking tools measures and balance-check scrutiny provide assurance on adequate compensation (Webroot, 2014). The credit risk mitigation is a progressive process that demands urgency and priority.

1.1.2 Performance of Commercial Banks

Performance can be realized easily because of prudentially plans and management of mobile money credit. Performance is the profitability of transaction and transfer of money via mobile phones, tablets, and telecommunication gadgets. In Kenya, mobile money products were accelerated through the launching of Mpesa in 2007. Daniel Runde (2015) Mpesa promoted the transactions involving airtimes among others. The pundit in that area formulated the cooperation plan with Vodafone Firm.

Banks predicted intensive competition and innovated similar productions in collaboration with Mpesa. The collaboration was extended to other mobile operators including orange money and Airtel Money. Globally, Tameer Bank and Telenor followed the same footstep in 2009 and came up with EasyPaisa in Pakistan serving 7.4 million people. Its growth had been unmatched by 2015 it had tremendously become third worldwide among mobile money service providers. In Afghanistan, Roshan company innovated M-Paisa in 2009 in collaboration with Vodafone. The interior ministry started paying wages using mobile money. Expenditure reduced by 10% due phantom remittance to apparition and ghost police officers. As indicated by CAK (2017), the active users of mobile money in Kenya goes beyond 31.9 million. Mpesa, Equitel, Airtel Money and Orange have dominated the market. Equity Bank innovated Equitel and had done significant transactions valuing Ksh251.6 billion subsequent quartile of 2016-2017 fiscal year, it was a record increased to Ksh219.6 billion on the same period previous year.

Kenya's financial industry has spearheaded technological advancement, transactions, borrowing and lending, savings by usage mobile-based system. Kiplagat (2020) postulated that industrialized nations are noncompetitive due well control financial systems with numerous contractual and informational fabric. European countries switch from official bank methods to branch networks. Mobile money has created a predominant driving force that reinforces the countries' greater level of financial inclusion. Immense market development that uses mobile money services in borrowing, saving, paying bills and pay goods and services. Advance in technology, innovations, alliances, cooperation, and collaboration has intensified the financial inclusions. Unlike

Kenya, American usage of electronic mobile transaction accounts for only 10% while 50% uses online banking (Tchouassi, 2012).

1.1.3 Mobile Credit risk and the Performance of commercial banks

The technological advancement has mandated the increase in competition, mobile credit access and introduced the norms of survival for the fittest. The banks that cannot upgrade to suit technological advancement become obsolete and collapse. Empirical evidence resulting from numerous studies indicate a variegated trend. Some studies proclaimed a negative relation between credit risk and performance of commercial banks, others opined contrary to the information. Some studies that have focused on the general risk as a determining factor of a bank's performance while the rest concentrated on credit risk as the factor influencing the profitability of a bank. According to Hosna et al (2009) postulate the relations between nonperforming loans and profitability of four key banks in Sweden for a period 2000-2008 opined that the level of nonperforming loan and capital adequacy ratios were conversely associated to ROE. Chou & Tengu (2008) also indicated similar inverse relations between profitability and credit risk measures.

The recent proliferation and digital advancement have spearheaded the financial inclusion. The market diversity has converged due to globalization with the major fundamental aspect of reinforcing the customers in their unbanked and underbanked funds. The continuous improvement and the strategic target on the underbanked funds have increased significantly in the fast-paced business environment. In nutshell, business borrowings using the mobile phone are approximately 33%, while unpredictable crisis account for 10% (CBK, 2020). Adrian (2018) postulated that the

salaried employees have great probability of seek solace in digital borrowings to meet daily demands. The availability of digital credits stimulates the borrowers to seek refuge in continuous borrowings. In fact, sometimes these huge borrowings are meant to repay other loan. This creates a vicious cycle of loan borrowings and repayments. The salaried personnel can utilize that while waiting for the next paycheck. Regulators have advance in their surveillance concerning repayment pattern to determine the credit worthiness, identify market opportunity, mitigate against risk and holistic creation of responsive market (Karanja, 2017).

Ogboi & Unuafe (2013) assessed the impact of credit risk and capital adequacy on financial performance of banks in Nigeria. The study of 2004-2009 while utilizing published financial statements. The findings showed that credit management and capital adequacy positively impacted the financial performance of a bank. However, advances and loans had negative impacts on performance. In another study by Kithinji (2010) for a period of 2004-2008 found out that the mass profitability of commercial banks is not affected by the credit and the nonperforming loans. There are several ways of measuring financial performance of commercial banks in Kenya. This extensive method includes liquidity, solvency, capacity to pay and profitability. Profitability methods includes ROI, ROE and ROA (Wangari, 2017). According to Greenwood & Jovanovic (1990) profit generation is always terminal goal of banking sector. Mobile Banking and performance of commercial banks has gained momentum growth.

1.1.4 Commercial Banks in Kenya

Commercial Banks are regulated by CBK (Kenya). The paramount mandate of CBK is governance and licensing of banking sector through Companies Act (489), Banking Act

Cap (488). Furthermore, control of commercial banks is stipulated under CBK Cap (491) together with prudential mitigation of risk. Central Bank of Kenya is mandated to oversee and inspect banks. The banking sector has undergone tremendous growth. Currently, there are 42 commercial banks, 30 non-regulated credit companies, 12 deposit taking banks and 1 mortgage finance institution (Muria, 2018). Only 10 commercial banks listed in NSE has been meet standard mandated by CBK.

The 42 commercial banks serve 44 million people while countries like Nigeria with 22 banks and South Africa with 19 banks serves 180Million and 55Million, respectively. The standardized legal and regulatory structures provide comprehensive procedures and process governing banking sector. CBK has shaped banking sector through Licensing and surveillance of financial institutions to promote conformity to laws.

1.2 Research Problem

Mobile banking technology advancement in the Kenya banking sector has enabled them to penetrate easily to the market. It is a strategy that minimizes the immense infrastructural investments. The mobile banking technology has been a contributory tool towards efficiency, high speed and serving with quality (Kombe & Wafula, 2015). Mobile banking is great material in successful driving force of banking sector. It has reinforced the wide spectrum of customer engagement and provide holistic nature of voluminous transactions. While benefits of mobile money are evident, the risks associated with mobile banking have generated considerable concern for the service providers as well as their clients at large (Nduku, 2019). While significant helpful literature exists that outlines the more common risks (such as fraud) associated with digital payments, there are no works that attempts to present credit risks associated with

mobile money. The theories that underpin this study are, Financial Intermediary Theory, Technology Acceptance Model and Financial distress theory.

Mobile money and its credit risk have become the topic of focus both internationally and domestically. Though a lot has been done on this topic no consensus has been reached on actual effects credit risk on performance of the commercial banks. Global studies such as Viswanadham (2015) majored his study on the determinants of non-performing loans in commercial banks, Tanzania. The findings stated a negative correlation between the financial condition and non-performing loans.

In light of the increase of the number of providers of mobile credit, the critical demand is to understand the ramifications of such mobile credit on the performance of banks. As such, studies have been conducted to establish how mobile credit risk has impacted profitability of commercial banks in the Kenyan context. Ndegwa (2014) did an examination on the impact of mobile money on non-performing loans of commercial banks in Kenya. The research tried to elaborate and relate the supremacy Mobile loans charges rate with GDP, inflationary economic, foreign exchanges rates as well as non-performance loans level. The findings a negative relating to mobile money operations and non-performing loans. Rachael Mutua (2014) postulated that mobile-based banking has a weak positive association between the mobile banking as well as profitability. The study had focused on Commercial Banks located in Kenya.

Mobile money has continued dominate the Kenyan financial space. Nevertheless, despite the continuous affectation and execution of Mobile money by different banking firms in Kenya, attestation demonstrating how mobile money is influential in the credit

risk as well as the financial performance of these commercial banks remains limited. To invest in mobile banking, commercial banks need to know how it influences their financial performance with their credit loan advancements to minimize the risks associated with it. Based on the international and local research there is no research that have considered the topic under investigation. The research creates a landmark resolving the immense knowledge gap on; what are the effects of mobile credit risk on Performance of Commercial banks in Kenya? This research, therefore, aimed to bridge the existing gap by establishing mobile credit risk and performance of commercial banks in Kenya.

1.3 Research Objectives

The main aim of the study was to examine the effects of mobile credit risk on the Performance of Commercial banks In Kenya.

1.4 Value of the Study

Mobile money facility has been widely used by commercial banks to cater for the needs of both the banked and the previously unbanked population. Since borrowing via mobile money has become a common trend and now associated with risks, an investigation on mobile credit risk would enable the management to adopt the relevant strategies to assess and manage credit risk associated with mobile money on its performance.

Mobile money experiences are perilous and risky process, some users have been hesitant about their use of the application. A study on mobile credit risk would enable

users to have information about the possible mobile credit risks and their role in mitigating credit risks associated with mobile money.

The researcher endeavors to contribute immense knowledge and upgrade knowhow on credit risk management associated with mobile money and performance of the commercial banks. The researcher shall also propose areas of further study that other researchers can contribute to in contributing towards the field of knowledge.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents reviewed theories in line with the study, accompanied the empirical reviewed conducted by other researchers in the related area and finally a conceptual framework showing the variables.

2.2 Theoretical Review

This part provides an insight on the theories that are vital to this study. The theories provide a firm basis of the theoretical background relating to the study. It is a great yardstick and cornerstone of the study.

2.2.1 Financial Intermediation Theory

Financial intermediation is a fundamental process involving excess units deposit money in the finance institution. The institution thereafter resonates to lending the money to deficiency segments Bisignano (1998). Leland & Pyle (1977) point out that financial mediators are differentiated in consideration of four criteria. The first and foremost criteria is liabilities (deposit) which are particularly fixed amount that cannot correlated with portfolio's performance. The second criteria illustrate a shorter-termed deposits. Third, entails the checkable liabilities hence its withdrawal is upon demand. The fourth one insists that both assets and liabilities non-transferable. Higgins & Lyon (2012) point out that the predominant objective of intermediaries or mediators are to most important contribution of intermediaries is to set the seal on constant flux of funds from surfeit to deficiencies.

According to Ozorumba & Chigbu (2013) the portrayal of financial intermediary creates supremacy in special financial commodities. The four categories outlined are generated in case where mediator want to sell for prices and in doing so, it is an expectation that it covers aggregate production as well as opportunity cost. Financial intermediary come to existence as a result of market imperfection. According to Wakoba (2012) the perfect market does not have any intermediary. This is because there is absence of transactional and informational cost. Numerous markets' traits

portray informational asymmetries relating to buyers and sellers. The borrowers commonly have knowhow on their more collaterally, diligently, and morally integrity than their lenders.

2.2.2 Technology Acceptance Model Theory

The model was designed in the first instance to project user's acceptance rate of information technology and utilization of the same on the job. Technology Acceptance Model concentrates on the attitude descriptions of the intended purpose to maximize the usage of particular technological product. Technology Acceptance Model has gain great momentum this is demonstrated by the voluminous use and user acceptance rate. The model has become well established as a robust and powerful tool for predicting the acceptance of users. The initial Technology Acceptance Model was created as a benchmark of the Theory of Reasoned Action (TRA). Afterwards, Davis extended the TRA to innovate the Technology Acceptance Model. Technology Acceptance Model postulates that whenever the users are given a new technology, there are key determinants on decision-making on how and when. The initial key factor is Perceived usefulness (PU) and secondly Perceived Ease (PEoU) as per the abbreviations. Technology Acceptance Model deals with perceptions and does not observe real usage but how users report their conceptions (Verbeek, 2012). Mobile money transfer is a technology that has evolved over time and has been perceived by users in different ways.

2.2.3 Financial Distress Theory

Financial distress is ineptitude, incapacity and impotence of firm to reach obligatory payment of interest and principal to debt holders. Baldwin and Scott (1983) pointed out

the deterioration of firm's financial health to the point of impotence in payment of financial demands whenever they fall due hence reaching at financial distress. According to Scott the initial implication of financial distress can be seen through violated debt repayments and non-fulfilment or trimming of dividends payouts or nonpayment at all. Muria (2018) associated financial distress to economic collapse, incompetent governance and failure to formulate risk mitigation parameters.

The predominant, supreme and validity of the financial distress theory emerges from the solvency and credit risk incapacity. However, for the banking sector, it is the inability in the provision cash to depositors. Furthermore, failure to offer loans to borrowers during their time of need. This is an indication of rampant liquidity challenges. This are the demanding needs that should be incorporated when firms are designing and executing risk mitigation strategies. Mobile credit risk in the context of a bank needs to be adequately and appropriately resolved to avert from financial incapacity and distress.

2.3 Determinants of mobile credit risk by commercial banks

The following determinants stipulates the performance of commercial banks in the economy because of internal factors.

2.3.1 Profitability

The mobile money performance is measured by the profitability. The profitability is reinforcing the going concern of the commercial banks. Financial performance resulting

from profitability (Return on Assets) is subjective parameter measuring the level of well-being of firms in the usage of assets at their disposal to ensure business continuity. It is a parameter for measuring firms' prosperity and futuristic competitiveness. There are varieties of ways to measure mobile money performance, though getting a better measurement entails prudent consideration of all the determinants.

The key determinants of mobile money performance based on profitability are ROI, ROE and ROA. The progressive technology based, and mobile money have spearheaded product innovation and continuous improvement, process innovation and organization's innovation to enhance the productivity and ensure quality products and services in addition to their operation efficiency. The key milestone is to remain competitive, resourcefulness and to increase the ingredients of wealth creation (Florence & Daniel, 2014).

The ROI, ROE and ROA map out the profitability and going concern state of mobile banking. Return on Investment explains how well the company reaping from the investment. Return on Equity stipulate a picture of the profit generated through proper utilization of total equity. ROA brings a comparison of incomes or revenues to total assets and illustrates how the assets are prudentially, efficiently, effectiveness utilized in generation of income.

2.3.2 Asset Quality

The asset quality influences ROA (Return on Asset). The asset quality is a good blueprint that rubberstamp financial health of the commercial banks. Financial performance and mobile credit risk continued to undergo advancement, creativity and

acumen as prosperous countries seek new technological methods of mobile money advancement. According to Investopedia (2017), financial performance is subjective measurement portraying the financial health and utilization of assets at the disposal. It is a fundamental principle highlighting the accessibility of business assets with predominant aim of generating revenues. This terminology is normally used in overall overview of firm's financial growth in a specific time and can be utilized in comparison of similar organization or comparable firms. Asset quality warrants the efficient and stable country's financial system through reduction risk associated with banks becoming insolvent. Whenever a bank undergoes insolvency, it breaks the confidence bestowed in the financial system and cause imbalance in the whole market system (Kiplagat, 2020). It promotes efficiency, effectiveness and productivity and will ensure the unpredictable financial challenges have great mitigation to averse and avoid the consequences.

2.3.3 Capital Adequacy

Another key determinant of mobile money performance is funding adequacy and capital adequacy. Capital adequacy enhances the stability. It is a pillar rock in the adverse financial challenges and safeguard against financial distress. Capital adequacy is from owners funding and ensures there is sustain and stable business operation and timely delivery of quality services and products. Caroline Njiru (2014) opined that the spontaneous and voluminous rise of mobile banking and internet banking earnings is associated with innovative, creative, and expanded usage. The research implicated the existence of positive relations as well as significant for profitability and internet-banking earnings for commercial banks.

Capital adequacy helps commercial banks in absorbing financial shocks in cases of business uncertainty. It also implies that the ability of the companies' continuity to obey its obligated dues. Capital is a crucial strategic decision variable and the capital positioning of wealth. Capital Adequacy provides protective cushion against losses.

2.3.4 Liquidity Management

Liquidity management is the ability of the commercial banks to state and prudentially manage its obligation to the mobile money depositors. There are varieties of ways to in which mobile credit risk management increases performance (Kiplagat, 2020). Liquidity management improves the performance of commercial banks (Mohamed, 2019). Revenues, operating income, and total turnover is a measurable parameter that depicts performance. Furthermore, shareholders, investors and financial analyst can examine and assess the financial statements at the same time pose more measures including margin of growth (Muria, 2018).

Liquidity management stipulates how the assets and finances are prudentially, efficiently, effectiveness utilized in generation of income while at the same time mitigating mobile credit risk. Mabwai (2016) in his study on impacts of mobile-based banking to the financial performance for commercial-based banks located in Kenya deduced that as a bank fabricates its mobile banking spans and abilities, it generates colossal mobile transactions due to enhanced financial performance. Liquidity management enhances performance through their Return on Assets.

2.4 Empirical Review

Mobile banking risk can originate from several sources. Several researches have been done among global, regional and local. It is important to note that fraudulent can result from consumers, business partners, agencies, or mobile financials service providers. Furthermore system-administrator can create avenues for financial disaster and fraud. As per Hoffmann & Birnbrich (2012) mobile banking fraudulent have a negative effect. For example, Gates and Jacob (2009) postulated that banking experiences immense operation cost while compensating customers' financial losses. Bank customers go through unprecedented time and emotional bankrupts while detecting the fraudulent transactions, communicating, initiating the firewalls, re-issuing or renewal of accounts, and disputing the indemnifying of their pecuniary forfeiture (Hoffmann & Birnbrich, 2012).

Financial sectors utilize mobile-based financial services in the productivity and efficiency operation worldwide. Lenders maximizes credit scoring to generate reports on the creditworthiness. An individual's credit scoring rate from 300 to 850. Fair Isaac Corporation's credit scoring system (FICO) has been applied in financial firms to rate the customers. Banks employs the usage of scoring in risk-based pricing is considered. Furthermore, pricing considers loan cost and cost of likelihood of re-imburement is factored.

Al-Jabri (2012) researched on Mobile Banking espousal and focusing in applying and utilization of diffusion innovation theory. The research investigated a variety of technical elements and adoption in developing country (Saudi Arabia). The research further examined the prospective practitioners. The research was guided by six theoretical model on the relative advantage, complexity, among others. The finding

indicated that Saudi Arabia should promote Mobile banking suitable to user specifications, prior experience, and the state of life.

Ching et al (2011) focused the area of research to Malaysian Mobile Banking. The researchers indicated the technological changes and advancement that has promoted the transaction and improved commercial banks. The products of mobile banking were highlighted using Technology Adoption Model (TAM) to conclude of acceptance and usage. The findings concluded on the benefits of Mobile Banking as competitive and relative advantage, innovation, and behavioral lifestyle changes. However, social norm was raised as the one factor that insignificant affected mobile banking in Malaysia.

Tchouassi (2009) investigated the banking services as a result of mobile banking. The research utilized the empirical lessons on Sub-Saharan Africa Nations. The intended study was to establish the utilization of mobile banking by the poor people. Sub-Saharan African has been facing great challenges in banking and lots of transactions are unbanked. The research concluded on the need for technological innovation to eradicate poverty through Mobile banking leading to instant cash flows.

Agboola, 2016 studied the Information Communication Technology (ICT) in banks functioning of Nigeria. The researcher was interested in technological products that have stabilized the operation of banking industry. The main driving products stipulated were, Automated Teller Machines (ATMs), Electronic Fund Transfer (EFT), Smart Cards, electronic banking, internet banking and office banking, among others. The finding indicated a complete change, transformation, and rejuvenation in the banking sector.

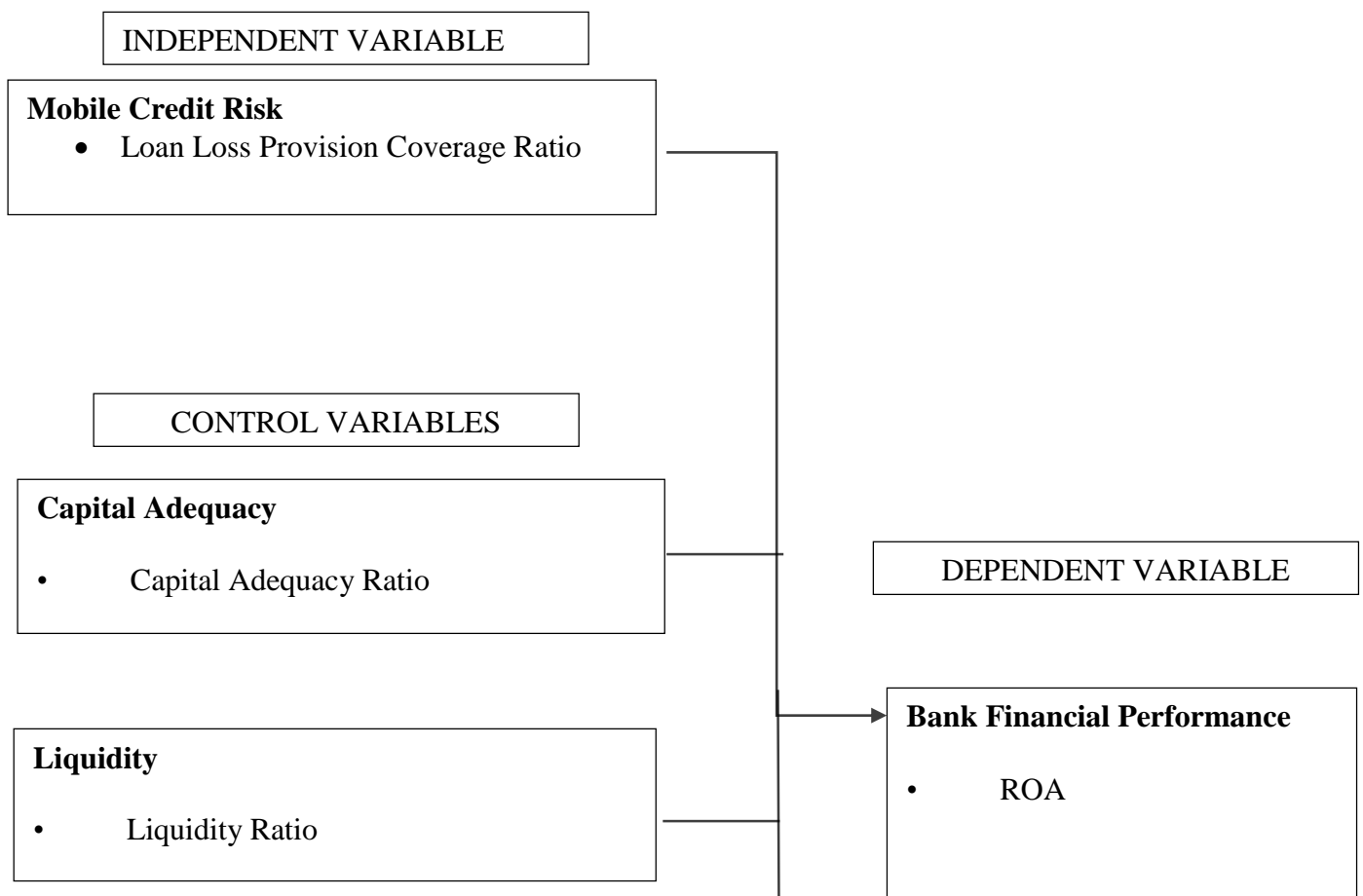
Nduku (2020) expressed positive relationship on the impact of mobile banking on financial institutions in Kenya. The findings indicated the efficiency, productivity, and effectiveness in banking because of Mobile Banking. The recommended for further research on commercial banks.

Mohamed (2019) studied the impacts of M-banking on the financial performance of commercial banks. The researcher opined that mobile banking is innovative design that promotes convenience, time saving, and reliability, ease of congestion and efficient mode of transaction. Mobile Banking accomplishes immense and immensurable tasks instantly. The findings indicated that M-banking negatively and significantly affects the performances of commercial banks. The research indicated cybercrime and threats, malware threats, hijacking and phishing as the key problematic areas in M-Banking. Researcher recommended for further research on mobile banking risk including social risk, security risk, credit risk and financial risk, among others.

Kiplagat (2020) concluded that prudential regulations enhance the operational efficiency of commercial banks in Kenya. The researcher established that there should be more resources and technological advancement to improve the performance and efficiency. Wakarindi (2018) opined those prudential guidelines aid in financial performance. The researcher found positive relations relating to impacts of prudential guidelines and financial performance of commercial banks in Kenya.

2.5 Conceptual Framework

Rocco and Plakhotnik (2009) state that by establishing a study in the appropriate knowledge builds a conceptual framework sets the basis for research goals and issues. Mobile credit risk served as the primary independent variable, and conversely, the bank financial performance was the dependent variable. The control variables included: adequacy of capital, the efficiency of management, the size of the bank, and liquidity.



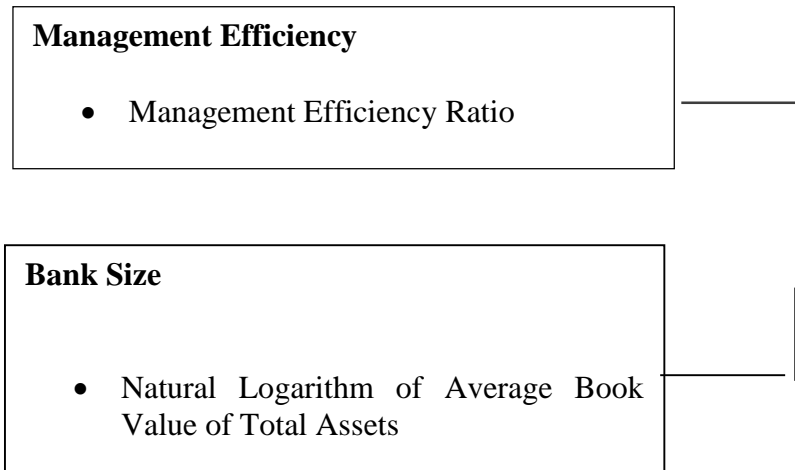


Figure 2. 1. Conceptual Framework

2.6 Summary of literature Review

Various studies masterminded focusing on mobile money credit risk and performance of commercial banks. Literature reviewed proclaimed that the Credit default risk has far reaching consequences due to sensitivity transactional, loans, securities, or derivatives. The prudent balance-check must be put in place to keep an eye on the company. This will ensure that longevity of the financial institution is well taken care of. It is prudent for banks to check credit worthiness, ability, capability and character as initial step before the approval of loan and credit. In the banking sector, Mahad, Mohtar, Yusoff and Othman (2015) assert that the mobile technology has played a critical role in enhancing efficiency, access and convenience to the users.

Credit Default Risk and Probability of default can sink the company to oblivion. The continuous control and monitor of the very risky loans, lenders chart way forward towards holistic mitigative proactive strategies. The continuous improvement of terms and condition to minimize the hazard is a step forward. A paramount facet of resonate credit risk management entails discussion on what is likely go erroneous relating to the individual credits as well as within the numerous credit holdings, and after the

consultation incorporating acquired, analysis and coming up with far reaching conclusion on capital adequacy and provisions. Andrianova (2013) points out that an important element of sound credit risk management involves discussing what could potentially go wrong with the individual credits and within the various credit portfolios, and after the discussion factoring the information obtained into the analysis of the adequacy of capital and provisions.

From the existing literature review done, all the studies have hardly focused on how mobile credit risk is currently affecting the performance of commercial banks and this could be attributed to the very competitive environment witnessed in the commercial banking sector. This study will seek to address the effect of mobile credit risk as a variable on the banks' ROA through the banks data and other publications, an area literature has so far not clarified. Therefore, with the continuous developments, this study will concentrate of focusing on how mobile credit risk has affected the performance of commercial banks which is an area that has not been studied in Kenya and mobile money concept is growing and changing rapidly.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Research methodology designates the design and a cardinal to study the population, sample-size, and sampling methods where necessary and data analytical approach that will be functional in the study.

3.2 Research Design

The researcher proposes descriptive research design which involves describing the current situation by utilizing raw data obtained from the process questionnaire process as well as interviewing. Measures like Correlation analysis would also be paramount to identify the relations linking the dependent and independent variables. According to Cresswell (2014) descriptive research tries to determine factors correlated with specific phenomena, aftermath, state or circumstances, or types of conducts. This is the type of

design is proposed by the researcher because the variables under study have already occurred and beyond the control of the researcher.

3.3 Population

A population is specifically the complete group of elements, constituent, or demonstration that the researcher will optimize in gathering data. Cooper & Schinder (2003) population as the targeted component which the research intends to focus on during research. The research sought to analyze all the 42 licensed commercial banks in Kenya. The complete research components that is prospective in provision of the appropriate data for the exploration.

3.5 Data Collection

The data collection method is crucial because it eventually affects the validity of the findings. The researchers used secondary data in this connection. The researchers depended, in particular, on data from CBK that have highlighted monthly statistics, as well as reports on bank supervision, for Kenya banks. The researchers added this information to the financial records of the published bank. The study collected yearly data for five years, between 2016 and 2020. Data was gathered throughout the period on net income, total assets, gross non-performing loans, gross loan advances, equity adequacy ratios, liquidity ratios, interest incomes, operational costs, and total asset. The study also utilized primary data in the form of questionnaires, which were used to supplement the study findings. The respondents were given a time frame of at least three days within which they were expected to respond to the questionnaires after which the questionnaires will be collected by the researcher to prepare for analysis. The researcher obtained informed consent from the subjects to be used in the study.

3.6 Data Analysis

In order to simplify the analysis, interpret and comprehend the data collected, it was arranged, tabulated, and simplified. Upon organizing the data, the panel data was analyzed through aid of statistical analysis software known as STATA Version 13. Multiple linear regression and correlation analysis was done. Correlation analysis was able to establish the strength and association of the study's independent and dependent variables. On the other hand, regression analysis was used to establish the significance of the association amongst the study variables. Tables were used to present the quantitative results found.

The study maintained the confidence level at 95%. At 0.05 level, the findings are set to be statistical significant and this means that for values to be significant they ought to be below 0.05 In forecasting financial reporting quality a statistical inference technique is used in concluding the accuracy of the model. The 95% confidence level was applied in testing the model significance. The significance values were determined how the predictor variables relate to the response variables.

3.5.1 The Model of Analysis

The study goals were achieved through a multiple linear regression analysis which examined if predictor factors affect loan volume. The statistical tests were carried out at a significance level of 95 percent which means that the research permitted an error of up to 5%. The model is presented as displayed in the model below;

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon$$

Where:

Y = Performance of Commercial banks denoted by ROA

α = Constant

$\beta_1 - \beta_4$ = Beta coefficients

X₁ = Loan loss provision coverage ratio

X₂ = Capital Adequacy Ratio

X₃ = Liquidity Ratio

X₄ = Management Efficiency Ratio

X₅ = Logarithm of Total Assets

ϵ = error term

Table 3.1: Operationalization of the study variables

Variable	Measurement
Return on Assets	Return on assets is calculated as; Net Income/Total Assets
Mobile Loan Credit Risk	Mobile loan credit risk denoted by the loan loss provision coverage ratio is calculated as; ((pretax income + loan loss provision) / net charge-offs)
Capital Adequacy	This will be measured by current ratio defined by Central bank as; ((Tier 1 Capital + Tier 2 Capital)/Total Risk Weighted Assets)
Liquidity	This will be measured by current ratio defined by Central bank as; (liquid assets/ (deposit liabilities, matured and short term liabilities)).

Management Efficiency	Total operational expenditures, split by total interest income, will be given to management efficiency.
Bank Size	Natural average book value logarithm of a bank's total assets for the time.

3.5.2 Diagnostic Tests

Various assumptions are made so as to ensure the validity of the linear regression models. The assumption includes; No Multi-collinearity, random sampling of observation, zero conditional mean, linear regression model is “linear in parameters”, spherical errors: no auto correlation and there is homoscedasticity and finally the optional assumption; normal distribution of error terms. The first five linear regression model assumptions, OLS Regression estimators as indicated by Gauss-Markov Theorem are the best linear non-biased estimators (Grewal et al., 2004). These assumptions are paramount when undertaking regression and violation of any of them would mean that the regression estimates are rendered unreliable and incorrect. Precisely violation would lead to incorrect meaning of the regression estimates of the variation of the estimate would be unreliable leading to confidence intervals which are extreme, either too wide or too narrow (Gall et al., 2006).

To guarantee that the assumptions are met such that the best linear unbiased estimators are available, the researcher ought to undertake diagnostic tests. Regression diagnostics evaluate model assumptions and test whether or not there are interpretations with a large, unjustified impact. The data collected was subjected to diagnostic test such as autocorrelation, multicollinearity, linearity and normality so as to find if it is appropriate for conducting linear regression model. Shapiro-Francia test was applied to

test for normality, this is appropriate to test distributions of Gaussian nature that have a specified variance and mean. Linearity implies a direct proportional link between the dependent and independent variable, which follows a corresponding variance in the dependent variable. (Gall et al., 2006). To test for linearity, homoscedasticity was determined and was established the Breusch-Pagan Cook-Weisberg Test for Homoscedasticity.

Variance Inflation Factors (VIF) was applied in testing for multicollinearity and they showed whether the predictor variables have a significant correlation on each other. Grewal *et al.* (2004) notes that the primary reason for existence of multicollinearity is having small sample sizes, low measure reliability and low explained variables in the independent variables. Durbin-Watson Statistic tested for existence of autocorrelation.

In addition, unit root testing was performed on the panel data to prevent false regression results. The purpose of unit root testing is to verify whether or not the macroeconomic variables under analysis have been integrated of order one (1, 1) before undertaking estimation procedure. Fisher-type unit root test was used. In order to determine if the applicable variables have a constant impact overtime or change and random effect throughout period, the Hausman specifications test was performed. The null hypothesis would therefore be rejected if the value of the meaning is less than α (0.05) and if the alpha value exceed 0.05 it will lead to rejection of the null hypothesis.

CHAPTER FOUR

DATA ANALYSIS, RESULTS, AND FINDINGS

4.1 Introduction

In this section, the researcher presents that findings from the data analysis, gives the interpretation and discusses the findings with respect to the study objective. The chapter is broken down into four sections, which consists of response rate, diagnostic test, inferential statistics findings and finally interpretation and discussion of findings.

4.2 Response Rate

This study had a population target of all 42 commercial banks operating in Kenya as indicated in Appendix II. A census was done to investigate the banks. Nonetheless, 12 banks were expunged from the analysis because they became licensed before the study period, ceased operations in the study period, or were sharia compliant banks that did

not charge interest thus making it difficult to obtain management efficiency. Thus, 30 commercial banks were utilized for this analysis.

4.3 Respondents Background Characteristics

The current study's purpose was to learn more about the background characteristics of 42 respondents who were employees of the respective commercial banks analyzed. The backgrounds characteristics of the current study, which comprised of; gender, age, and work experience, are displayed in this section.

4.3.1 Gender

The participants in the ‘target sample’ were asked to identify their gender. This was done to see whether gender has anything to do with how people think about mobile credit risk and financial performance. Table 4.1 summarizes the findings.

Table 4.1: Gender

		Frequency	Percent	Cumulative Percent
Valid	Male	12	40.0	40.0
	Female	18	60.0	100.0
	Total	30	100.0	

According to Table 4.2, 60% of the respondents surveyed were female while 40% percent were male. The fact that the number of responses was evenly distributed between genders indicates that there was no gender bias. Gender can have a bearing on the perception of the respondents towards mobile credit risk and financial performance.

4.3.2 Age

Respondents who participated in the study were asked to state their age. Specifically, this study sought to determine whether or not one's perception of mobile bank loans and financial performance differs depending on one's age. Results are shown in Table 4.3.

Table 4.2: Age

		Frequency	Percent	Cumulative Percent
Valid	16-19	2	6.7	6.7
	20-29	7	23.3	30.0
	30-39	17	56.7	86.7
	40-49	4	13.3	100.0
	Total	30	100.0	

Table 4.3 demonstrates the various ages of the employees of the commercial banks in Kenya. The highest proportion of the respondents, which constituted 56.7%, were in ages ranging from 30 to 39 years. An estimated 23.3% of respondents surveyed fell into the age bracket ranging from 20-29 years, while 13.3% of the respondents were within the age bracket of 40 to 49 years. The least proportion of the respondents comprised of those aged between 16 to 19 years, which was 6.7%. The equal distribution of the number of respondents based on age is a sign that the survey is free of bias. Aside from that, the older respondents are, the more likely they are to be knowledgeable about mobile loan credit risk and financial performance.

4.3.3 Work Experience

The 'target sample' was asked to specify their work experience with the SME they're presently involved in. This was done in an attempt to ascertain whether duration of working under one organization has anything to do with the respondent's view of

financial performance and the mobile bank loans credit risk. Table 4.4 summarizes the results.

Table 4.3: Work Experience

		Frequency	Percent	Cumulative Percent
Valid	1-2.9	11	36.7	36.7
	3.0 -5.9	10	33.3	70.0
	6.0-9.9	9	30.0	100.0
	Total	30	100.0	

Table 4.4 reveals that 36.7% of respondents had been engaged in their present work stations for a period of one to three years. The proportion of respondents who have been engaged in their respective work stations for between 3 to 6 years was 33.3%, while the proportion of respondents who have been engaged in their respective work stations for between 6 to 10 years was 30%. None of the respondents surveyed had been engaged in their respective work stations for the periods between 10 to 13 years and above 13 years. The even distribution of work experience may indicate a presence of bias and the non-random distribution of respondents. However, employees in the banking industry do not stay long in their respective workstation because of career progression and high intra-industry job switching. Employees who have been engaged in their respective work stations for longer seem to be more inclined to be informed and knowledgeable about mobile bank loans credit risk and financial performance.

4.4 Descriptive Statistics

The research used descriptive cross-sectional methods since they allow for generalization of findings, analysis, and associated factors. Mobile bank loans and its aspects were examined in the study. The study participants were asked to evaluate the usage of mobile money facility in the banks. The measure of frequencies and

percentages were utilized. Consequently descriptive data on usage of mobile money facility in the banks were obtained and the results are presented in Table 4.4.

Table 4.4: Mobile Bank Loans Descriptive Statistics

		Frequency	Percent	Cumulative Percent
Valid	Very Low Extent	13	43.3	43.3
	Low Extent	11	36.7	80.0
	Average Extent	1	3.3	83.3
	Great Extent	3	10.0	93.3
	Very Great Extent	2	6.7	100.0
	Total	30	100.0	

The highest proportion of the respondents, which translated to 43.3%, opined that usage of mobile money facility in their respective banks is to a very low extent. 36.7%, 10%, and 6.7% of the study respondents opined that usage of mobile money facility in their respective banks is to a low extent, great extent, and very great extent respectively. The least proportion of the respondents, which translated to 3.3%, opined that usage of mobile money facility in their respective banks is to an average extent.

The study participants were asked to state the maximum and minimum loan limits offered by their respective commercial banks. The measures of central tendency entailing the mean and median, as well as measures of dispersion entailing standard deviation, minimum statistic and maximum statistic were utilized. Consequently descriptive data on the maximum and minimum loan limits offered are presented in Table 4.5.

Table 4.5: Maximum and Minimum Loan limits Descriptive Statistics

		Mobile Loans Max Limit	Mobile Loans Min Limit
N	Valid	30	30

Missing	0	0
Mean	29373.6667	801.1000
Median	17600.0000	480.0000
Std. Deviation	36972.03757	1008.32830
Minimum	3300.00	90.00
Maximum	154000.00	4200.00

According to the study findings presented in Table 4.5, the average mobile loans maximum limit was Kshs. 29,373 with a standard deviation of Kshs. 36,972.03, while the average mobile loans minimum limit was Kshs. 801.1 with a standard deviation of Kshs. 1,008.33. The median mobile loans maximum limit was Kshs. 17,600, while the average mobile loans minimum limit was Kshs. 480. The minimum value of mobile loans maximum limit is Kshs. 3,300 while the maximum of value mobile loans minimum limit is Kshs. 154,000. The minimum value of mobile loans minimum limit is Kshs. 90 while the maximum of value mobile loans minimum limit is Kshs. 4,200.

The study participants were asked to state the repayment time provided for mobile loans in their respective commercial banks. The measure of frequencies and percentages were utilized. Consequently descriptive data on usage of mobile money facility in the banks were obtained and the results are presented in Table 4.6.

Table 4.6: Repayment Time Descriptive Statistics

		Frequency	Percent	Cumulative Percent
Valid	1 month	14	46.7	46.7
	2- 12 Months	11	36.7	83.3
	Over 1 year	5	16.7	100.0
	Total	30	100.0	

The highest proportion of the respondents, which translated to 46.7%, opined that the repayment time provided for mobile loans in their respective commercial banks was

one month. 36.7% of the study respondents opined that the repayment time provided for mobile loans in their respective commercial banks is between 2 to twelve months. The least proportion of the respondents, which translated to 16.7%, opined that the repayment time provided for mobile loans in their respective commercial banks is over one year.

The study participants were asked to state if mobile loans borrowers in their respective commercial banks paid within the stipulated time. The measure of frequencies and percentages were utilized. Consequently descriptive data on usage of mobile money facility in the banks were obtained and the results are presented in Table 4.7.

Table 4.7: Prompt Repayment Descriptive Statistics

		Frequency	Percent	Cumulative Percent
Valid	Yes	23	76.7	76.7
	No	7	23.3	100.0
	Total	30	100.0	

76.7% of the respondents stated that mobile loans borrowers in their respective commercial banks paid within the stipulated time while 23.3% of the respondents claimed that they did not pay within the stipulated time.

The study participants were asked to state the average repayment of mobile loans borrowers in their respective commercial banks. The measures of central tendency entailing the mean and median, as well as measures of dispersion entailing standard deviation, minimum statistic and maximum statistic were utilized. Consequently descriptive data on the maximum and minimum loan limits offered are presented in Table 4.8.

Table 4.8: Average Repayment Descriptive Statistics

N	Valid	30
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Missing	0
Mean	4.5000
Median	2.5000
Std. Deviation	3.57915
Minimum	1.00
Maximum	9.00

According to the study findings presented in Table 4.8, the mean average mobile loans repayment period was 4.5 months, with a standard deviation of 3.58 months. The median average mobile loans repayment period was 2.5 months. The minimum value of average mobile loans repayment period is 1 month while the maximum value average mobile loans repayment period is 9 months.

The study participants were asked to state the level of mobile credit risk in their respective commercial banks. The measure of frequencies and percentages were utilized. Consequently descriptive data on usage of mobile money facility in the banks were obtained and the results are presented in Table 4.9.

Table 4.9: Level of Mobile Credit Risk Descriptive Statistics

		Frequency	Percent	Cumulative Percent
Valid	Low	2	6.7	6.7
	Moderate	22	73.3	80.0
	High	6	20.0	100.0
	Total	30	100.0	

As displayed in Table 4.9, the highest proportion of the respondents, which translated to 73.3%, opined that the level of mobile credit risk in their respective commercial banks was moderate. 20% of the study respondents opined that level of mobile credit risk in their respective commercial banks was high. The least proportion of the

respondents, which translated to 6.7%, opined that the level of mobile credit risk in their respective commercial banks was low.

In the current study, descriptive research design was selected since it will enable the generalization of the findings of the population; it will allow analysis and relation of variables. The descriptive analysis included measures of central tendency that entailed mean together with deviation of standard and the median. Measures of dispersion such as the minimum and maximum statistic were utilized. Measures of symmetry such as and Kurtosis and Skewness were also employed.

Table 4.10: Variables Descriptive Statistics

		ROA	Loan Loss Coverage Ratio	Capital Adequacy	Liquidity Ratio	Management Efficiency	Ln Total Assets
N	Valid	149	149	149	149	149	149
	Missing	0	0	0	0	0	0
Mean		.01154	4.8968	.2302	.1036	.2990	17.9727
Median		.017	2.42	.194	.099	.33	18.02
Std. Deviation		.03090	6.2326	.2179	.05527	1.2278	1.3121
Skewness		-4.421	2.593	6.390	1.297	4.357	-.052
Std. Error of Skewness		.199	.199	.199	.199	.199	.199
Kurtosis		31.854	8.171	48.399	2.699	38.790	-1.208
Std. Error of Kurtosis		.395	.395	.395	.395	.395	.3
Minimum		-.244	-.111	-.22	.001	-3.013	15.375
Maximum		.05	36.438	1.962	.33	10.976	20.387

Findings in Table 4.10 show that the highest value for ROA is 5% and the lowest value is -24.4%. The mean was 1.15% and the value of the standard deviation depicts

variability in ROA of $\pm 3.09\%$. The other measure of central tendency that entailed the median was 1.7%. The data in the series is not normally distributed because it does not have a kurtosis statistic lying within the range of -3 to +3 and a skewness statistic that lies in the range of -0.8 to +0.8.

Additional findings in Table 4.10 display that the highest value for loan loss coverage ratio is 36.438 and the lowest value is -0.111. The mean was 4.8968 and the value of the standard deviation depicts variability in loan loss coverage ratio of 6.2326. The other measure of central tendency that entailed the median was 2.42. The data in the series is not normally distributed because it does not have a kurtosis statistic lying within the range of -3 to +3 and a skewness statistic that lies in the range of -0.8 to +0.8.

Further findings in Table 4.10 reveal that the highest value for the capital adequacy ratio is 1.962 and the lowest value is -0.22. The mean was 0.2302 and the value of the standard deviation depicts variability in the capital adequacy ratio of 0.2179. The other measure of central tendency that entailed the median was 0.194. The data in the series is not normally distributed because it does not have a kurtosis statistic lying within the range of -3 to +3 and a skewness statistic that lies in the range of -0.8 to +0.8.

Findings in Table 4.10 illustrate that the highest value for the liquidity ratio is 0.33 and the lowest value is 0.001. The mean was 0.1036 and the value of the standard deviation depicts variability in the liquidity ratio of 0.05527. The other measure of central tendency that entailed the median was 0.099. The data in the series is normally distributed because it has a kurtosis statistic lying within the range of -3 to +3 even though it had a skewness statistic that lied slightly out of the range of -0.8 to +0.8.

In addition, findings in Table 4.10 showcase that the highest value for the management efficiency ratio is 10.976 and the lowest value is -3.013. The mean was 0.2990 and the value of the standard deviation depicts variability in the management efficiency ratio of 1.2278. The other measure of central tendency that entailed the median was 0.33. The data in the series is not normally distributed because it does not have a kurtosis statistic lying within the range of -3 to +3 and a skewness statistic that lies in the range of -0.8 to +0.8.

Final study findings in Table 4.10 display that the highest value for firm size is 20.387 and the lowest value is 15.375. The mean was 17.9727 and the value of the standard deviation depicts variability in firm size of 1.3121. The other measure of central tendency that entailed the median was 18.02. The data in the series is normally distributed because it has a kurtosis statistic lying within the range of -3 to +3 even though it had a skewness statistic that lied slightly out of the range of -0.8 to +0.8.

4.5 Diagnostic Tests

Prior to undertaking a linear regression, it is advisable that diagnostics tests be done on the data collected. With regards to the current study, several diagnostics test were undertaken and they comprised of; autocorrelation tests, homoscedasticity tests, multicollinearity tests and normality tests. VIF were used in carrying out the data multicollinearity tests whereas Durbin-Watson statistics tested for autocorrelation. Fisher-type unit root test did the unit root test. In addition, the Hausman test was carried out to assess whether the panel regression of fixed or variable effects ought to be undertaken.

4.5.1 Normality Test

The normality findings for the variables utilized for the study are shown in Table 4.11 below.

Table 4.11: Shapiro-Francia Test for Normality

Variable	Obs	W'	V'	Z	Prob>z
ROA	149	0.6596	43.181	7.638	0.00001
LoanLossCo~o	149	0.69746	38.378	7.399	0.00001
CapitalAde~y	149	0.39714	76.475	8.797	0.00001
LiquidityR~o	149	0.912	11.163	4.894	0.00001
Management~y	149	0.65742	43.457	7.651	0.00001
LnTotalAss~s	149	0.95566	5.625	3.504	0.00023

The outcomes in Table 4.11 determines if the data followed a normal distribution. A significance level of 5% was utilized in the study. All the data series adopted in this study produced significance value with an alpha value below 0.05 hence rejecting the null hypothesis. This implied that the variables in the data series were not normally distributed. The variables were therefore standardized to normalize skewed data.

4.5.2 Homoscedasticity Test

Table 4.12 contains homoscedasticity tests of all independent variable utilized in the study. The null hypothesis holds that no homoscedasticity exists. The study employed a 5% significance levels.

Table 4.12: Breusch-Pagan/Cook-Weisberg Test for Homoscedacity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	
Ho: Constant variance	
Variables: fitted values of ROA	
chi2(1)	= 177.50
Prob > chi2	= 0.0000

The study findings established a significance value of (Prob > chi2= 0.0000) that are below the alpha value of 0.05 leading to rejection of null hypothesis. This implied that all the predictor variable data series are heteroscedastic. The study employed robust standard errors that is an approach adopted to get unbiased standard errors of OLS coefficients under heteroscedasticity.

4.5.3 Test for Multicollinearity

In testing for multicollinearity, VIF were carryout and Table 4.13 below exhibit the findings.

Table 4.13: VIF Multicollinearity Statistics

Variable	VIF	1/VIF
LoanLossCo~o	1.15	0.872494
LnTotalAss~s	1.09	0.915873
Management~y	1.09	0.918302
LiquidityR~o	1.04	0.957207
CapitalAde~y	1.02	0.980566
Mean VIF	1.08	

In statistics, the general principle is that the VIF values ought to be more than 1 and less than 10. According to this study findings, the VIF values for all the independent variables applied are greater than 1 and less than 10. This suggests that the independent variables applied in the study do not have multicollinearity.

4.5.4 Tests for Autocorrelation

In autocorrelation testing amongst the predictor variables, the researcher used the Durbin Watson statistics. As per the findings the Durbin Watson d statistics is (6, 149) = 1.224879. Normally, the Durbin Watson statistics is between value 0 and 4. The value of 2 is revealed in instance where there is no autocorrelation. When the Durbin

Watson value is between 0 and below 2, this means that positive autocorrelation exists whereas on the other hand a value more than 2 and less than 4 shows that there is negative autocorrelation. A general principle in statistic indicates that when the Durbin Watson statistic ranges between 1.5 to 2.5 it is regarded as relatively normal and value not ranging within there are value which are of concern (Shenoy & Sharma, 2015). However, Field (2009) states that values above 3 and below 1 are a clear reason to be concerned. Nonetheless, the panel data applied in the current study do not have autocorrelation because they are not within the stated threshold.

4.5.5 Unit Root Test

Table 4.14 following presents the unit root test findings, which was undertaken on the data series on financial performance. According to the null hypothesis, there is unit root in financial performance whereas the alternative hypothesis holds that there is stationary of the variable. Because the all the significance value for P, Z, L* and Pm tests are below the alpha value at the confidence level at 5 % the null hypothesis is rejected implying that the data is stationary.

Table 4.14: Unit Root Test for Financial Performance

Fisher-type unit-root test for ROA			
Based on augmented Dickey-Fuller tests			
Ho: All panels contain unit roots		Number of panels	= 30
Ha: At least one panel is stationary		Avg. number of periods	= 4.97
AR parameter: Panel-specific		Asymptotics: T -> Infinity	
Panel means: Included			
Time trend: Not included			
Drift term: Not included		ADF regressions: 0 lags	
Statistic	p-value		
Inverse chi-squared(60)	P	91.0040	0.0060
Inverse normal	Z	1.0545	0.8542
Inverse logit t(149)	L*	0.2010	0.5795
Modified inv. chi-squared	Pm	2.8303	0.0023

Table 4.15 below exhibit the findings of the unit root test done on the loan loss coverage ratio. According to the null hypothesis, there is unit root in loan loss coverage ratio whereas the alternative hypothesis holds that there is stationary of the variable. Because the all the significance value for P, Z, L* and Pm tests are below the alpha value at the confidence level at 5 % the null hypothesis is rejected implying that the data is stationary.

Table 4.15: Unit Root Test for Loan Loss Coverage Ratio

Based on augmented Dickey-Fuller tests			
Ho: All panels contain unit roots		Number of panels	= 30
Ha: At least one panel is stationary		Avg. number of periods	= 4.97
AR parameter: Panel-specific		Asymptotics: T -> Infinity	
Panel means: Included			
Time trend: Not included			
Drift term: Not included		ADF regressions: 0 lags	
Statistic	p-value		
Inverse chi-squared(60)	P	393.2694	0.0000
Inverse normal	Z	-8.2198	0.0000
Inverse logit t(154)	L*	-17.1969	0.0000
Modified inv. chi-squared	Pm	30.4232	0.0000

Table 4.16 below exhibit the findings of the unit root test undertaken on capital adequacy panel data.

Table 4.16: Unit Root Test for Capital Adequacy

Based on augmented Dickey-Fuller tests			
Ho: All panels contain unit roots	Number of panels	=	30
Ha: At least one panel is stationary	Avg. number of periods	=	4.97
AR parameter: Panel-specific	Asymptotics:	T ->	Infinity
Panel means:	Included		
Time trend:	Not included		
Drift term:	Not included		
	ADF regressions:	0 lags	
Statistic	p-value		
Inverse chi-squared(60)	P	365.6349	0.0000
Inverse normal	Z	-5.5684	0.0000
Inverse logit t(154)	L*	-14.3067	0.0000
Modified inv. chi-squared	Pm	27.9005	0.0000

According to the null hypothesis, there is unit root in capital adequacy whereas the alternative hypothesis holds that there is stationary of the variable. Because the all the significance value for P, Z, L* and Pm tests are below the alpha value at the confidence level at 5 % the null hypothesis is rejected implying that the data is stationary.

Table 4.17 following exhibit the findings of unit root test undertaken on the liquidity data series.

Table 4.17: Unit Root Test for Liquidity Ratio

Based on augmented Dickey-Fuller tests			
Ho: All panels contain unit roots	Number of panels	=	30
Ha: At least one panel is stationary	Avg. number of periods	=	4.97
AR parameter: Panel-specific	Asymptotics:	T ->	Infinity
Panel means:	Included		
Time trend:	Not included		
Drift term:	Not included		
	ADF regressions:	0 lags	
Statistic	p-value		
Inverse chi-squared(60)	P	117.6794	0
Inverse normal	Z	-2.7920	0.0026
Inverse logit t(154)	L*	-3.5166	0.0003
Modified inv. chi-squared	Pm	5.2654	0

According to the null hypothesis, there is unit root in liquidity ratio whereas the alternative hypothesis holds that there is stationary of the variable. Because the all the

significance value for P, Z, L* and Pm tests are below the alpha value at the confidence level at 5 % the null hypothesis is rejected implying that the data is stationary.

Table 4.18 below exhibit the findings of the unit root test undertaken on the management efficiency panel data. According to the null hypothesis, there is unit root in management efficiency whereas the alternative hypothesis holds that there is stationary of the variable. Because the all the significance value for P, Z, L* and Pm tests are above the alpha value at the confidence level at 5 % the null hypothesis is not rejected implying that the data has unit root. First differencing of the variable is going to be conducted as a remedy for unit root.

Table 4.18: Unit Root Test for Management Efficiency

Based on augmented Dickey-Fuller tests			
Ho: All panels contain unit roots		Number of panels =	
Ha: At least one panel is stationary		Avg. number of periods =	
AR parameter: Panel-specific		Asymptotics: T -> Infinity	
Panel means: Included			
Time trend: Not included			
Drift term: Not included		ADF regressions: 0 lags	
Statistic		p-value	
Inverse chi-squared(60)	P	60.2120	0.468
Inverse normal	Z	3.1314	0.9991
Inverse logit t(149)	L*	3.1228	0.9989
Modified inv. chi-squared	Pm	0.0194	0.4923

Table 4.19 below exhibit the findings of the unit root test undertaken on the bank size panel data.

Table 4.19: Unit Root Test for Bank Size

Based on augmented Dickey-Fuller tests			
Ho: All panels contain unit roots		Number of panels =	30
Ha: At least one panel is stationary		Avg. number of periods =	4.97
AR parameter: Panel-specific		Asymptotics: T -> Infinity	
Panel means: Included			
Time trend: Not included			
Drift term: Not included		ADF regressions: 0 lags	
Statistic		p-value	
Inverse chi-squared(60)	P	85.6992	0.0164
Inverse normal	Z	2.0192	0.9783
Inverse logit t(144)	L*	1.1150	0.8666
Modified inv. chi-squared	Pm	2.3460	0.0095

According to the null hypothesis, there is unit root in board independence whereas the alternative hypothesis holds that there is stationary of the variable. While both Z, L*'s values are higher than the α (0.05) zero, both P and Pm's tests values are both lower than the α value of 0.05. The inverse chi-squared and modified inv. chi-squared are chosen in case of dispute in the testing. The null hypothesis is thus dismissed. The data series is stationary.

4.5.6 Test for Random and Fixed Effects

In determining if the variables had a fixed effect or a random and changing effect overtime, the researcher undertook the Hausman test. Prior to carrying out the Hausman test, the variables had to be modified as the normality, homoscedasticity and stationary criteria were not met. Since all the variables used did not meet the normality condition, they were standardized in order to correct the normality. The "robust standard errors" approach for identifying unbiased standard mistakes in OLS coefficients during heteroscedasticity was used because of the series of predictors used during the study showing heteroscedasticity. The unit root of the data series on management efficiency

was first differentiated as unit root remedy. Table 4.20 below present the findings on the Hausman test of specification.

Table 4.20: Hausman Test of Specification

	---- Coefficients (b) Fe	---- (B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
LoanLossCo~o	0.001022	0.000761	0.000261	0.000238
CapitalAde~y	0.026428	0.025509	0.000918	0.004747
LiquidityR~o	0.070273	0.06415	0.006123	0.016709
Management~y	0.000713	0.00088	-0.00017	0.000771
LnTotalAss~s	0.040974	0.013569	0.027406	0.01051

b = consistent under H_0 and H_a ; obtained from xtreg

B = inconsistent under H_a , efficient under H_0 ; obtained from xtreg

Test: H_0 : difference in coefficients not systematic

$$\text{chi2}(5) = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

$$= 10.55$$

$$\text{Prob}>\text{chi2} = 0.0610$$

In this test the null hypothesis was that the variables have random effect whereas the variables have fixed effect was the alternative hypothesis. The null hypothesis would be rejected if the significance value produced is below the alpha value α of 0.05 whereas on the contrast it would not be rejected when the significance value is greater the alpha value α of 0.05. If the statistics of the Hausman chi-square tests are negative the alternative hypothesis taken since the p value equals asymptotically 1. As indicated by the findings ($\text{Prob}>\text{chi2}=0.0610$), the variables have a random effect and a fixed effect

panel model will be applied. This is a result of the significance value being greater than the alpha value of 0.05, which lead to the null hypothesis not being rejected.

4.6 Inferential Statistics

The researcher did the inferential statistics with the aim of establishing the association, direction, and strength of the relationship amongst the independent and control variables utilized in the study on the financial performance. The inferential statistics undertaken consisted of correlation analysis and multiple linear regression analysis.

4.6.1 Correlation Analysis

Correlation analysis indicates the relationship that exist between two variables. The association varies from strong negative correlation to perfect positive correlation. The researcher employed the Pearson correlation analysis to establish the association of the independent and control variables utilized in the study on the financial performance of commercial banks. The study was applied at 95% confidence level and a two tail test was used .

Table 4.21: Correlation Analysis

	ZROA	ZLoanL~o	ZCapit~y	ZLiqui~o	dZMana~y	ZLnTot~s
ZROA	1.0000					
ZLoanLossC~o	0.3406* 0.0000	1.0000				
ZCapitalAd~y	0.2351* 0.0039	0.0961 0.2435	1.0000			
ZLiquidity~o	0.0058 0.9437	-0.0663 0.4215	-0.0375 0.6496	1.0000		
dZManageme~y	0.0242 0.7936	-0.0098 0.9154	0.0549 0.5531	-0.0559 0.5459	1.0000	
ZLnTotalAs~s	0.5258* 0.0000	0.2385* 0.0034	-0.0507 0.5390	-0.1602 0.0510	-0.0166 0.8574	1.0000

As shown in table 4.21, with significance level at 5 % there is a significant correlation amongst loan loss provision, capital adequacy, and board independence with the commercial banks financial performance. Further, the findings indicate that they are all positively correlated with the financial performance. At significance level of 5% both liquidity and management efficiency are found not to have a significant association with financial performance.

4.6.2 Multiple Linear Regression

The effect of Loan loss coverage, capital adequacy, liquidity, management efficiency, and bank size on the financial performance was established through the random effect panel multiple regression analysis which undertaken at the significance level of 5%. The researcher compared the significance value shown in the ANOVA model with those got from the study. The significance values obtained for the model coefficients were also compared to the significance value of 0.05. Table 4.22 exhibits the findings.

The R^2 indicates that the variations in the dependent variable (financial performance) which emanates from the changes in the independent variables. The overall R^2 value from the findings is 0.3933 which implies that 39.33% of financial performance changes are as a result of changes in the model entailing; Loan loss coverage, capital adequacy, liquidity, management efficiency, and bank size. This implied that other variables which are not incorporated in the model are attributable to the 60.77% of the changes in financial performance.

Table 4.22: Panel Multiple Linear Regression

Random-effects GLS regression		Number of obs = 119	
Group variable: A		Number of groups = 30	
R-sq: within = 0.1133		Obs per group: min = 3	
between = 0.5057		avg = 4.0	
overall = 0.3933		max = 4	
Wald chi2(5) = 22.68		Prob > chi2 = 0.0004	
corr(u_i, X) = 0 (assumed)		(Std. Err. adjusted for 30 clusters in A)	
Robust			
ZROA	Coef.	Std. Err.	z P>z [95% Conf. Interval]
ZLoanLossC~o	.1841328	.0641945	2.87 0.004 .058314 .3099516
ZCapitalAd~y	.2543099	.250827	1.01 0.311 -.2373021 .7459218
ZLiquidity~o	.1403228	.091311	1.54 0.124 -.0386435 .3192891
dZManageme~y	.0028093	.0742813	0.04 0.970 -.1427795 .148398
ZLnTotalAs~s	.5747954	.2041172	2.82 0.005 .174733 .9748579
_cons	-.0158607	.1117155	-0.14 0.887 -.2348191 .2030978
sigma_u	.56297599		
sigma_e	.60363112		
rho	.46519324 (fraction of variance due to u_i)		

The study null hypothesis held that the model entailing; Loan loss coverage, capital adequacy, liquidity, management efficiency, and bank size does not have a significant impact on the financial performance. The findings revealed significance value of (Prob>F=0.0000) that is below the 0.05 critical value leading to rejection of the null hypothesis. This implied that the model significantly influenced the commercial banks financial performance. This therefore means that the model can be applied in forecasting the financial performance of commercial banks.

The null hypothesis also held that loan loss coverage, capital adequacy, liquidity, management efficiency, and bank size individually have no notable relationship with financial performance. The study established that loan loss coverage and bank size have a significant relationship with financial performance as the significance values were below the critical alpha value of 0.05 resulting to null hypothesis rejection. Further, the findings revealed that they both had a positive significant effect on the financial performance while banks size had a significant positive impact on financial performance. On the contrary, capital adequacy, liquidity ratio, and management efficiency were found not to have significant effect on the financial performance as the significance value was higher than the critical alpha value of 0.05. The model indicated below was thus developed.

$$Y = -0.0158607 + 0.1841328X_1 + 0.5747954X_2$$

Where;

Y = Financial Performance

$X_1 = \text{Asset Quality}$

$X_2 = \text{Bank Size}$

The constant co-efficient of -0.0158607 implies that when there is absence of loan loss coverage and the bank size is zero, the banks financial performance decreases by -0.0158607. The beta coefficient of loan loss coverage means that an increment of loan loss coverage with a unit would signify an increase in financial performance with 0.1841328 units. Conversely, the Beta coefficient of bank size suggests that an increment in bank size with a unit would translate to a 0.5747954 units increase on financial performance.

4.7 Interpretation and Discussion of Findings

The study set out to ascertain the effect of credit risk management on the financial performance of commercial banks in Kenya. Individual effect of the independent variable on the dependent variable in terms of the strength and directions were analyzed.

The test for correlation showcases that loan loss provision, capital adequacy, and bank size exhibit a significant association with financial performance. The findings imply that there exists a positive link between each of the three predictor variables and the response variable. However, liquidity ratio and management efficiency did not have a significant association with financial performance. In the regression analysis, the analysis of variance displays that the model developed is significant as evidenced by the significance values obtained when compared to the critical value. This implies that the model is appropriate in predicting financial performance by utilizing, the loan loss

provision coverage ratio, the capital adequacy ratio, the liquidity ratio, the management efficiency ratio, and bank size.

The study findings are in tandem with Achou and Tenguh (2008) which ascertained that there is a significant association between banks' financial performance with regard to ROA and management of credit risk. The current study findings are also congruent with findings of the study conducted by Said and Tumin (2011) in China and Malaysia that revealed that there was no correlation between the liquidity level of banks and their financial performance.

The model coefficients exhibit that only loan loss provision coverage and bank size have an effect that is considerable on financial performance the studied banks. There exists a positive relationship between the variables and ROA. A unit increase in the loan loss provision coverage ratio would cause an increase of 0.001 units in ROA. An increment in capital adequacy with a unit would result to an increase of 0.035 units in ROA. Finally, an increment in bank size with a unit would result to an increment of 0.012 units in ROA.

The current study findings are in contrast to the CAPM proposed by William (1964) and Lintner (1965) which provided that expected returns could be obtained by incorporating the risk involved. The current study findings are in tandem with findings of a studies conducted by Githaiga (2015) and Irresberger, Mühlnickel, & Weiß (2015), which established that credit risk mitigation translates to improved banks' financial performance.

The current study findings are in tandem to findings of a study done by Ho and Saunders (1981) which established that level of bank profitability is augmented by degree of threat aversion in the bank, especially credit risk. However, their findings that bank liquidity had a negative effect on financial performance is not in agreement with current study findings.

The current study findings are also congruent to the findings done by Miller (2013) which established that increase in credit risk led to decreased financial performance in global financial institutions. The current study findings are also similar to the findings of a study conducted by Dang (2011) which established that losses arising from bad loans possess a pose a danger to banks, thereby affecting its performance.

The current study findings concur to findings of a study conducted by Mohammad (2008) which assessed handling of risk of the banks of Bangladesh and established that increased credit risk led to reduced bank profitability. It is also congruent to findings by the study done by Wanjira (2010) which evaluated the relationship loan handling practices and the financial of banks in Kenya and established that increased credit risk led to reduced bank profitability.

Current study findings are in tandem to the study conducted by Aboagye and Otioku (2010) that evaluated credit risk and subsequent profitability among banks in Sweden. It established that handling credit risk affected how banks would perform.

The current study findings are similar to findings conducted by Mutua (2014) that investigated how handling credit risk affected the financial performance commercial

banks in Kenya and established credit risk impacted on the financial performance practices of Kenyan banks. The current study findings are also same to results to a study done by Bakker, Schaveling and Nijhof (2014) that established that large banks have better financial performance in contrast to small banks.

However, the current study findings are not congruent to the findings of the study conducted by Kithinji (2010) which assessed the relationships in credit risk reviews on ROA in banks in Kenya and established that the credit risk did not affect the profitability of Kenyan banks but rather other parameters other than credit risk impacted the profitability of banks.

CHAPTER FIVE: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

In this section, a summarization of findings from the previous section is provided, conclusions are derived, limitation that were encountered on the overall study explained. Additionally, this chapter gives recommendation to decision maker as well as the policy makers. Finally, the researcher offers suggestions on areas that can be covered by other scholars in further research studies.

5.2 Summary

This study aimed at determining the effect of credit risk management on financial performance of Kenyan commercial banks. Control variables introduced into the study were capital adequacy, liquidity, management efficiency, and bank size. The unit period of analysis was annually, and data was gathered for the time frame 2016 to 2020. The study was conducted for the total population of 43 licenced commercial banks. However, 13 banks were expunged from the analysis because they became licenced before the study period, ceased operations in the study period, or were sharia compliant banks that did not charge interest thus making it difficult to obtain management efficiency. Thus, 30 commercial banks were utilized for this analysis.

Secondary data was captured from the individual firms' annual reports. The study employed the use of regression analysis and correlation analysis to establish the effect of the credit risk, capital adequacy, liquidity, management efficiency, and bank size on ROA.

The study established that there is a significant association between ROA and credit risk, capital adequacy, and bank size respectively but a significant relationship between ROA and credit risk and bank size respectively. The study also established that credit risk, capital adequacy, liquidity, management efficiency, and bank size are significant to predict financial performance.

5.3 Conclusion

The study concluded that the model developed in the study is significant hence, it is sufficient to predict financial performance. As per the above findings, it can additionally concluded that credit risk has an inverse association and relationship with

financial performance. The study also concludes that capital adequacy and bank size have a positive association and relationship with financial performance.

The conclusions of the current study are in contrast to the CAPM proposed by William (1964) and Lintner (1965) which provided that expected returns could be obtained by incorporating the risk involved. The conclusions of the current study findings are however in tandem with findings of studies conducted by; Githaiga (2015), Irresberger, Mühlnickel, & Weiß (2015), Ho and Saunders (1981), and Aboagye and Otieku (2010) which concluded that credit risk mitigation translates to improved banks' financial performance. However, the study conclusions are not parallel to conclusions the study conducted by Kithinji (2010) which concluded that the credit risk did not affect the profitability of Kenyan banks but rather other parameters other than credit risk impacted the profitability of banks.

The current study conclusions are in tandem with conclusions of the studies conducted by Achou and Tenguh (2008) and Said and Tumin (2011) which concluded that there is a significant association between banks' financial performance and management of credit risk. Finally, the current study conclusions are to conclusions of a study done by Bakker, Schaveling and Nijhof (2014) that concluded that large banks have better financial performance compared to small banks.

5.4 Recommendations for Policy and Practice

The study findings will aid in further researches to be conducted on the field of credit risk and its impact on banks' performance. The study findings will provide a useful basis that future research on credit risk administration activities in private sector are

done. This study findings will also advance not only researcher's knowledge of risk administration but also the community hence gain experience to the industry. The study findings will be used as referral by later scholars keen in research on credit risk administration and its impact on financial performance of commercial banks.

Policy recommendations are that since it has been established that credit risk has a significant effect on financial performance of commercial banks, and also capital adequacy and bank size, it will guide government regulators in making policies and practices to alleviate the financial system from economic crises. The findings will also assist the regime in strategy formulation concerning taxation and other regulatory parameters of the banks.

The findings of the study will help commercial banks and by extension, other financial institutions, to mainly concentrate on credit risk, capital adequacy, and bank size in order to provide innovative products and solutions to reach out to greater clientele, increase their profitability, and maximize shareholders wealth. The study is important to banking sector shareholders, consultants, and commercial banks administration, as it provides that mitigation of credit risk through correct credit risk management practices can increase performance in the sector.

5.5 Limitations of the Study

The study was only conducted for five years between 2016 and 2020 due to time and cost constraints. It is not certain that the results will apply beyond the period studied. Furthermore, it is uncertain whether the findings would hold beyond 2020.

As consequence of using secondary sources of data, some of this data was not readily available; especially data on liquidity, and it took great lengths and costs to obtain it. Some data were not utilized in their raw form, for instance the loan loss provision coverage ratio and the management efficiency ratio, and further calculations and manipulations of the data were required. Impending delays were experienced due to data processing and further editing before the compilation by the researcher.

The study intended to utilize the whole population of the 43 licensed commercial, however, 13 banks were expunged from the analysis because they became licenced before the study period, ceased operations in the study period, or were sharia compliant banks that did not charge interest thus making it difficult to obtain management efficiency. Thus, 30 commercial banks were utilized for this analysis. It is not certain the study findings would hold if more banks are utilized in a similar analysis in future.

5.6 Recommendations for Further Study

Basing on the concrete information congregated and the expounding understanding elucidated in this study, it has been recommended that some areas for advance future studies to be conducted on. First, other factors influence loan volumes apart from the intrinsic factors. Further research can be done to identify and analyze them. The current study's scope was limited to five years; further research can be done beyond five years to ascertain if the findings would hold. Thus, inherent future studies may use a wider time range, dating back from 1970 to date which can facilitate the confirmation or disapprove the current study findings. Coverage of the study was additionally constrained to context where commercial banks were examined. Further studies can be extended to the other Kenyan financial institutions to complement or critic current findings. Researchers in Africa, other regions of East African and other global countries

can also conduct the study in these jurisdictions to see whether the current study findings would hold.

Secondary data was solely utilized in the study, alternative research can be employed using primary sources of data like in-depth questionnaires and structured interviews to be administered to the commercial bank practitioners and stakeholders. These can then approve or disapprove the current study findings. Multiple linear regression and correlation analysis were used in this research, further research can incorporate other analysis methods like factor analysis, cluster analysis, granger causality and discriminant analysis.

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APPENDICES

Appendix I: Questionnaire

Introduction

This questionnaire purpose solely for an academic research through collection of from respondents on '*MOBILE CREDIT RISK AND PERFORMANCE OF COMMERCIALS BANKS IN KENYA*'. Kindly feel free to indicate your correct choice correctly. Your answers are well safeguarded and confidential

Thank you in advance.

SECTION A: GENERAL INFORMATION

1. Gender

Male []

Female []

2. Age Bracket in Years

16-19 []

- 20-29 []
- 30-39 []
- 40-49 []
- 50 years and above []

3. Years of experience in banking industry

- 1-2.9 []
- 3.0 -5.9 []
- 6.0-9.9 []
- 10-12.9 []
- 13 years and above []

4. Usage of mobile money facility in the bank

- Very Great Extent []
- Great Extent []
- Average Extent []
- Low Extent []
- Very Low Extent []

5. What is the current limits on credit lending using mobile phones:

Minimum limit

Maximum limit

6. Which is the repayment time provided for mobile loans?

- i) 1 month []
- ii) 2- 12 Months []

iii) Over 1 year []

7. Do borrower pays within the stipulated time?

i) Yes []

ii) No []

iii) Some (specify average)

8. Kindly estimate the level of mobile credit risk in your bank.

i) High []

ii) Moderate []

iii). Low []

Thank you for participating

Appendix II: List of Commercial Banks in Kenya as at 30th June, 2020

1. Absa Bank Limited
2. African Banking Corp. Ltd
3. Bank of Africa Kenya Ltd
4. Bank of India
5. Bank of Baroda (K) Ltd
6. Stanbic Bank Ltd
7. Chase Bank (K) Ltd (In Receivership)
8. Citibank N.A.
9. Consolidated Bank of Kenya Ltd
10. Co-operative Bank of Kenya Ltd
11. Credit Bank Ltd
12. Development Bank (K) Ltd
13. Diamond Trust Bank (K) Ltd
14. Dubai Bank Ltd (In Receivership)
15. Dubai Islamic Bank (Kenya) Ltd
16. Ecobank Limited
17. Spire Bank
18. Equity Bank Ltd
19. Family Bank Ltd
20. Guaranty Trust Bank
21. First Community Bank Ltd
22. Guardian Bank Ltd
22. Gulf African Bank Ltd

24. Habib Bank A.G. Zurich
25. HFC Ltd
26. Imperial Bank Ltd (In Receivership)
27. I & M Bank Ltd
28. Jamii Bora Bank Ltd
29. KCB Bank Kenya Ltd
30. Mayfair Bank Ltd
31. Middle East Bank (K) Ltd
32. M Oriental Bank Ltd
33. National Bank of Kenya Ltd
34. NCBA Bank Kenya
35. Paramount Universal Bank Ltd
36. Prime Bank Ltd
37. Sidian Bank
38. Standard Chartered Bank (K) Ltd
39. SBM Bank (Kenya) Ltd
40. Transnational Bank Ltd
41. UBA Kenya Bank Ltd
42. Victoria Commercial Bank Ltd

Source: CBK Website (2020)

Appendix III: Data Collection Form

Name of Commercial Bank	YEAR				
	2016	2017	2018	2019	2020
Net Income					
Total Assets					
Return on Assets					
Pre-Tax Income					
Loan Loss Provision					
Net Charge-Offs					
Loan Loss Provision					
Capital Adequacy Ratio					
Liquidity Ratio					
Interest Income					
Operating Expenses					
Management Efficiency					
Total Assets					
Firm Size (Ln Total Assets)					

Appendix III: Research Data

	COMPANY	Year	ROA	Loan Loss Coverage Ratio	Capital Adequacy	Liquidity Ratio	Management Efficiency	Ln Total Assets
1	ABC Bank	2016	0.007	2.459	0.172	0.075	0.877	16.91
1	ABC Bank	2017	0.008	0.813	0.165	0.078	0.918	16.934
1	ABC Bank	2018	0.003	0.716	0.153	0.09	0.849	16.945
1	ABC Bank	2019	0.006	0.601	0.156	0.122	0.872	17.058
1	ABC Bank	2020	0	0.549	0.184	0.078	0.875	17.145
2	Bank of Africa	2016	0.002	2.203	0.159	0.153	0.935	18.16
2	Bank of Africa	2017	-0.015	0.267	0.164	0.125	1.576	18.054
2	Bank of Africa	2018	0	0.382	0.162	0.185	1.012	17.841
2	Bank of Africa	2019	0.001	0.36	0.158	0.163	0.972	17.808
2	Bank of Africa	2020	0.004	0.325	0.16	0.33	0.823	17.709
3	Bank of Baroda	2016	0.036	5.122	1.88	0.062	0.202	17.942
3	Bank of Baroda	2017	0.03	2.486	1.962	0.061	0.33	18.038
3	Bank of Baroda	2018	0.036	2.442	0.305	0.111	0.223	18.233
3	Bank of Baroda	2019	0.041	3.747	0.323	0.104	0.125	18.381
3	Bank of Baroda	2020	0.032	2.42	0.347	0.154	0.199	18.628
4	Barclays Bank	2016	0.037	5.453	0.16	0.149	0.373	19.235
4	Barclays Bank	2017	0.035	33.959	0.184	0.11	0.408	19.3
4	Barclays Bank	2018	0.028	17.314	0.179	0.075	0.514	19.375
4	Barclays Bank	2019	0.026	22.979	0.18	0.088	-0.245	19.42
4	Barclays Bank	2020	0.023	13.962	0.164	0.113	-0.265	19.6
5	Bank of India	2016	0.03	36.438	0.394	0.059	0.137	17.353
5	Bank of India	2017	0.026	9.003	0.423	0.062	0.188	17.557
5	Bank of India	2018	0.034	15.317	0.457	0.06	0.118	17.683
5	Bank of India	2019	0.037	11.082	0.54	0.071	0.112	17.852

5	Bank of India	2020	0.031	2.001	0.439	0.052	0.225	17.954
6	Citibank	2016	0.031	17.16	0.273	0.182	-0.633	18.19
6	Citibank	2017	0.039	7.359	0.283	0.158	-0.533	18.295
6	Citibank	2018	0.033	22.257	0.264	0.111	-0.449	18.453
6	Citibank	2019	0.04	9.67	0.256	0.127	-0.756	18.403
6	Citibank	2020	0.037	28.826	0.276	0.134	-0.832	18.266
7	Commercial Bank of Africa	2016	0.017	2.132	0.179	0.098	0.438	19.101
7	Commercial Bank of Africa	2017	0.017	1.387	0.179	0.106	0.549	19.189
7	Commercial Bank of Africa	2018	0.029	2.26	0.184	0.174	0.504	19.251
7	Commercial Bank of Africa	2019	0.023	1.954	0.173	0.12	0.265	19.32
7	Commercial Bank of Africa	2020	0.023	3.442	0.157	0.094	-1.185	19.317
8	Consolidated bank	2016	-0.019	0.588	0.11	0.132	1.3	16.529
8	Consolidated bank	2017	0.003	1.903	0.094	0.076	0.952	16.464
8	Consolidated bank	2018	-0.015	0.594	0.079	0.069	1.403	16.449
8	Consolidated bank	2019	-0.025	0.314	0.051	0.099	1.88	16.415
8	Consolidated bank	2020	-0.042	0.38	0.028	0.107	1.547	16.372
9	Credit bank	2016	-0.01	1.015	0.188	0.027	1.165	15.998
9	Credit bank	2017	-0.006	1.172	0.155	0.035	1.289	16.146
9	Credit bank	2018	0.009	1.672	0.228	0.033	0.796	16.32
9	Credit bank	2019	0.009	1.58	0.148	0.027	0.767	16.49
9	Credit bank	2020	0.014	1.744	0.145	0.031	0.633	16.701
10	Co-operative bank of Kenya	2016	0.028	8.455	0.216	0.112	0.444	19.469
10	Co-operative bank of Kenya	2017	0.034	10.849	0.213	0.111	0.242	19.652

10	Co-operative bank of Kenya	2018	0.036	7.489	0.228	0.099	0.283	19.679
10	Co-operative bank of Kenya	2019	0.029	4.526	0.023	0.085	0.322	19.774
10	Co-operative bank of Kenya	2020	0.031	4.19	0.162	0.106	0.425	19.841
11	Diamond Trust Bank	2016	0.027	14.554	0.229	0.026	0.37	19.17
11	Diamond Trust Bank	2017	0.024	6.145	0.146	0.022	0.334	19.42
11	Diamond Trust Bank	2018	0.024	4.894	0.185	0.025	0.433	19.609
11	Diamond Trust Bank	2019	0.019	2.275	0.19	0.029	0.487	19.711
11	Diamond Trust Bank	2020	0.019	2.493	0.211	0.028	0.452	19.75
12	Ecobank	2016	-0.007	0.899	0.318	0.091	1.5	17.643
12	Ecobank	2017	0.002	1.659	0.25	0.104	0.946	17.775
12	Ecobank	2018	-0.043	-0.111	0.194	0.07	10.976	17.668
12	Ecobank	2019	-0.021	0.033	0.16	0.104	1.646	17.794
12	Ecobank	2020	0.001	0.637	0.166	0.09	0.921	17.813
13	Equity Bank	2016	0.05	9.397	0.212	0.059	-0.633	19.658
13	Equity Bank	2017	0.04	11.334	0.202	0.115	-0.643	19.875
13	Equity Bank	2018	0.035	5.422	0.197	0.069	-0.531	19.976
13	Equity Bank	2019	0.036	6.027	0.204	0.071	-0.734	20.078
13	Equity Bank	2020	0.035	4.021	0.204	0.058	0.313	20.167
14	Family bank	2016	0.029	7.561	0.269	0.117	0.504	17.94
14	Family bank	2017	0.024	4.845	0.144	0.098	0.538	18.213
14	Family bank	2018	0.005	0.946	0.208	0.133	0.906	18.057
14	Family bank	2019	-0.014	0.358	0.199	0.119	1.31	18.052
14	Family bank	2020	0.004	0.679	0.195	0.13	0.9	18.02
15	Guaranty Trust Bank	2016	0.01	0.984	0.233	0.131	0.77	17.634
15	Guaranty Trust Bank	2017	0.009	1.336	0.265	0.122	0.834	17.528

15	Guaranty Trust Bank	2018	0.013	1.193	0.255	0.268	0.778	17.286
15	Guaranty Trust Bank	2019	0.007	1.062	0.239	0.226	0.865	17.277
15	Guaranty Trust Bank	2020	0.002	0.792	0.26	0.063	0.913	17.452
16	Guardian Bank	2016	0.018	11.148	0.171	0.125	0.559	16.495
16	Guardian Bank	2017	0.016	4.459	0.176	0.106	0.653	16.497
16	Guardian Bank	2018	0.016	7.907	0.19	0.124	0.689	16.504
16	Guardian Bank	2019	0.01	2.732	0.202	0.094	0.721	16.576
16	Guardian Bank	2020	0.014	2.805	0.227	0.105	0.62	16.6
17	Housing finance Company ltd	2016	0.016	2.136	0.391	0.112	0.538	17.926
17	Housing finance Company ltd	2017	0.017	3.042	0.181	0.001	0.515	18.087
17	Housing finance Company ltd	2018	0.013	1.806	0.177	0.13	0.653	18.091
17	Housing finance Company ltd	2019	0.002	0.983	0.17	0.111	0.895	18.028
17	Housing finance Company ltd	2020	-0.01	0.341	0.153	0.08	1.288	17.919
18	I&M Bank	2016	0.032	18.115	0.189	0.099	0.143	18.989
18	I&M Bank	2017	0.037	7.444	0.202	0.075	0.144	19.072
18	I&M Bank	2018	0.037	6.831	0.182	0.076	0.155	19.165
18	I&M Bank	2019	0.03	2.162	0.186	0.07	0.134	19.297
18	I&M Bank	2020	0.029	2.777	0.179	0.07	-0.226	19.48
19	Jamii Bora Bank Ltd	2016	0.002	1.393	0.261	0.068	0.835	16.389
19	Jamii Bora Bank Ltd	2017	0.001	2.002	0.163	0.099	0.95	16.636
19	Jamii Bora Bank Ltd	2018	-0.011	0.277	0.201	0.086	1.679	16.574
19	Jamii Bora Bank Ltd	2019	-0.037	0.082	0.193	0.032	4.02	16.371
20	KCB Bank	2016	0.034	9.726	0.21	0.258	-0.612	20.011
20	KCB Bank	2017	0.035	6.234	0.154	0.228	-0.567	20.14

20	KCB Bank	2018	0.033	3.972	0.18	0.025	-0.477	20.204
20	KCB Bank	2019	0.03	3.511	0.166	0.023	-0.475	20.287
20	KCB Bank	2020	0.034	4.109	0.195	0.021	-0.47	20.387
21	National Bank of Kenya	2016	0.007	1.152	0.139	0.164	0.642	18.628
21	National Bank of Kenya	2017	-0.009	0.679	0.14	0.149	1.256	18.647
21	National Bank of Kenya	2018	0.001	0.58	0.071	0.091	0.99	18.535
21	National Bank of Kenya	2019	0.007	0.254	0.054	0.08	1.185	18.515
21	National Bank of Kenya	2020	-0.001	0.159	0.037	0.062	1.227	18.559
22	NIC Plc bank	2016	0.028	15.71	0.21	0.105	-0.397	18.798
22	NIC Plc bank	2017	0.027	2.249	0.206	0.08	-0.236	18.926
22	NIC Plc bank	2018	0.026	2.145	0.23	0.065	-0.33	18.948
22	NIC Plc bank	2019	0.02	2.064	0.223	0.069	-0.387	19.144
22	NIC Plc bank	2020	0.02	1.646	0.187	0.083	0.035	19.155
23	Paramount Bank Ltd	2016	0.014	2.061	0.255	0.062	0.524	16.158
23	Paramount Bank Ltd	2017	0.015	2.48	0.241	0.125	0.697	16.169
23	Paramount Bank Ltd	2018	0.011	2.205	0.274	0.1	-0.617	16.059
23	Paramount Bank Ltd	2019	0.012	1.707	0.295	0.142	-0.268	16.071
23	Paramount Bank Ltd	2020	0.024	1.408	0.285	0.152	-0.331	16.107
24	Prime Bank	2016	0.032	16.017	0.168	0.055	-0.328	17.821
24	Prime Bank	2017	0.031	12.349	0.173	0.074	-0.347	17.99
24	Prime Bank	2018	0.029	5.957	0.222	0.055	-0.316	17.995
24	Prime Bank	2019	0.029	4.754	0.225	0.083	-0.359	18.172
24	Prime Bank	2020	0.023	4.224	0.373	0.123	-0.582	18.422
25	Sidian Bank	2016	0.033	4.119	0.206	0.221	-0.297	16.576

25	Sidian Bank	2017	0.019	2.075	0.247	0.223	-0.258	16.766
25	Sidian Bank	2018	0.001	1.197	0.232	0.227	-0.309	16.854
25	Sidian Bank	2019	-0.022	0.892	0.165	0.301	-0.613	16.776
25	Sidian Bank	2020	-0.015	1.295	0.144	0.126	-1.02	17.047
26	Stanbic Bank Kenya Ltd	2016	0.022	6.778	0.191	0.107	0.549	19.107
26	Stanbic Bank Kenya Ltd	2017	0.024	6.201	0.187	0.107	0.509	19.155
26	Stanbic Bank Kenya Ltd	2018	0.021	5.207	0.181	0.072	0.562	19.185
26	Stanbic Bank Kenya Ltd	2019	0.017	6.347	0.168	0.052	0.58	19.332
26	Stanbic Bank Kenya Ltd	2020	0.021	9.722	0.172	0.115	0.554	19.487
27	Standard Chartered Bank	2016	0.047	4.315	0.198	0.1	-0.456	19.22
27	Standard Chartered Bank	2017	0.027	3.157	0.212	0.083	-0.4	19.271
27	Standard Chartered Bank	2018	0.036	3.96	0.209	0.083	-0.443	19.339
27	Standard Chartered Bank	2019	0.024	3.531	0.185	0.063	-0.472	19.471
27	Standard Chartered Bank	2020	0.028	2.917	0.195	0.09	-0.474	19.469
28	Spire Bank Ltd	2016	-0.02	0.951	0.107	0.07	-0.517	16.624
28	Spire Bank Ltd	2017	-0.034	0.587	0.175	0.076	-0.299	16.488
28	Spire Bank Ltd	2018	-0.054	1.272	0.163	0.115	-0.777	16.44
28	Spire Bank Ltd	2019	-0.101	0.48	0.127	0.05	-0.937	16.227
28	Spire Bank Ltd	2020	-0.244	0.277	-0.22	0.062	-3.013	16.037
29	Transnational Bank	2016	0.012	2.953	0.277	0.092	-0.237	16.142
29	Transnational Bank	2017	0.016	2.388	0.216	0.134	-0.262	16.162

29	Transnational Bank	2018	0.011	2.34	0.223	0.161	-0.251	16.155
29	Transnational Bank	2019	0.004	1.023	0.291	0.18	-0.415	16.142
29	Transnational Bank	2020	-0.007	0.837	0.211	0.165	-0.467	16.141
30	UBA Kenya Bank Ltd	2016	-0.059	6.911	0.586	0.136	-2.804	15.375
30	UBA Kenya Bank Ltd	2017	-0.034	12.664	0.238	0.059	-2.158	15.867
30	UBA Kenya Bank Ltd	2018	0.004	15.767	0.387	0.105	-1.669	15.539
30	UBA Kenya Bank Ltd	2019	0.003	6.527	0.388	0.159	-0.911	15.688
30	UBA Kenya Bank Ltd	2020	0.003	2.381	0.332	0.218	-0.495	16.545

