THE RELATIONSHIP BETWEEN LIQUIDITY AND OPERATIONAL RISK OF

COMMERCIAL BANKS IN KENYA

BY

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DECLARATION

This research project is my original work and has not been submitted for a degree in any other University or for any other award.

Signature..   **Date.......................................**

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

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DEDICATION

I humbly dedicate this project to the Kenya Banking Industry, to help make informed decisions on management of liquidity and operational risk.

I also would like to dedicate this work to my beloved wife, Deborah Mulandi and our children - Samuel, Joy and Faith, whose encourage and endless support enabled the accomplishment of this milestone; and most of all to our creator our Almighty God, the author of knowledge and wisdom who made this possible.

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LIST OF ABBREVIATIONS AND ACRONYMS

ATMs   **-**   Automatic Teller Machines

CBK   **-**   Central Bank of Kenya

CMA   -   Capital Markets Authority

MFIs   **-**   Micro financial Institutions

ABSTRACT

The purpose of this study was to determine the relationship between liquidity and operational risk of commercial banks in Kenya. The study objective was to establish the influence of liquidity, asset quality, bank size, capital adequacy and ownership type on operational risk of commercial banks. This study adopted a descriptive survey design and targeted the 43 fully operational commercial banks in Kenya as at December 2015. However, three of these banks had been placed under receivership, thus excluded from the study. Thus, a survey of 40 commercial banks that had complete data was used. Data analysis was done using descriptive statistics, Pearson's correlation coefficient and regression analysis. The study found out that bank size, asset quality, liquidity and capital adequacy were satisfactory variables in explaining the operational risk of commercial banks in Kenya, supported by a coefficient of determination of 60.1%. Result findings revealed that bank size was positively and significantly related to operational risk of a commercial bank (2.802, 0.053). The findings revealed that asset quality and the operational risk of a commercial bank is positively and significantly related (r=13.042, p=0. 001); liquidity and operational risk of commercial banks are negatively and significantly related (r= -7.025, p=0.030); capital adequacy and operational risk are negatively and significantly related (-15.4, 0.025), while binary logistic results showed that ownership type was statistically significant (indicated by a p value of 0.014), negatively and significant predictor of operational risk (r= -0.082, p=0.011). The study concluded that bank's size, asset quality, liquidity, capital adequacy and ownership type affect the operational risk of a bank. Liquidity, capital adequacy and ownership type were found to have an inverse relationship with the operational risk of a bank. The study recommended that, commercial banks should focus on maintaining high levels of liquidity and capital adequacy, so as to enhance performance by cushioning themselves against operational risk. The study also recommends upgrading of internal control systems, to detect attempted frauds and so cushion banks against financial loss by fraudsters.

1.1 Background of the Study

Globally, banking regulators have policy frameworks that focus principally on maintaining public confidence in banking. In their intermediary capacity, banks play a key role in safekeeping, and handling of customer deposits' funds, whilst on the other hand, channeling funds to meet consumer and business credit needs. As an intermediary, a bank is therefore required to manage liquidity prudently, without exposing themselves to potential risks associated with liquidity. This therefore poses a challenge as to what levels of liquidity banks should hold to operate effectively.

Liquidity of a firm is the cash flow which is determined by the level of cash and cash equivalent or current assets held (Laker, 2007). Whilst it is generally perceived that holding high levels of a bank's asset in liquid form may lead to lower profitability, on the contrary, maintaining high levels of liquidity contribute to a bank's operational efficiency, especially in meeting depositors' withdrawals on demand. Liquidity management therefore produces two dilemma scenarios – whether to maintain high liquidity, resulting in low risk and low profitability or; whether to maintain low liquidity, resulting in high risk and high profitability level.

Liquidity levels influence operational efficiency and therefore profitability of an organization. It also influences the risk level in the organization. Therefore, there is an overlap between liquidity levels and operational risk, as liquidity influences integrity of operations. Liquidity risk which is influenced by a bank's liquidity can lead to reputational damage to a bank, or bankruptcy (Hopkin, 2014).

1.1.1 Liquidity

Laker (2007) describes a bank's liquidity to include cash assets and short term cash convertible assets which the bank would include in determining its cash flow. Liquidity of a bank is the "blood" that enables a bank to maintain its operational activities and to survive. The nature of the banking function demands that a bank maintain health liquidity levels to be able to sustain normal lending operations, pay customer deposits as they fall due, transact in the foreign exchange market, as well as meet its general administration functions. Failure to meet depositors' demand and other short term obligations may lead to confidence crisis, panic, withdraw, creditors winding up and eventual closure of banks (Goddard, Molyneux & Wilson, 2009).

A bank can increase liquidity by holding relatively higher levels liquid assets, and more liquid liabilities to total liabilities (Goddard, Molyneux & Wilson, 2009). A bank can also increase liquidity by raising level of cash reserve with monetary regulatory institutions. Deposits from customers provide the inflow of liability into the bank thereby increasing liquidity. A change in macro-economic factors may lead to non-performing loans, thereby affecting the liquidity of a bank (Kashyap, Rajan & Stein, 2002). Banks therefore strive to maintain liquidity by maintaining more liquid assets to short term liabilities.

Liquidity levels can be increased through maintaining adequate cash reserves, increasing the deposit base, as well as decreasing non-performing loans and the liquidity gap (Fiedler, Brown & Moloney, 2002). Maintenance of high cash reserve has an opportunity cost as the bank may fail to invest in some arising opportunities (Brink & Jan, 2002). Therefore, understanding a bank's liquidity position provides management the abilities to make informed investment decisions.

1.1.2 Operational Risk

Operational risk is the only risk category not associated with interest or revenue earning and has received considerable attention after the realization that it's embedded in the organization's operating systems and strategy (Raman, 2008). The complex nature of operational risk requires that the relationship with other categories of risks and activities of a bank, be established for effective risk management.

Basel II Accord (2008) defines operational risk as the risk of direct or indirect loss occasioned by insufficient or failed internal processes, systems, people or emanating from external events. The sophisticated technology used under the modern banking environment, coupled with increased transaction volumes and delivery channels have heightened operational risk in banks (Greuning & Bratanovic, 2009). Therefore, there is need to ensure that all potential risks are monitored and corrective action taken on a timely basis, by having efficient tracking and reporting processes in place.

Human factors in operational risk are the human induced risks arising out of employees. They include; lack of information about new products, low qualifications, incomplete knowledge about the product, failure to follow processes, carelessness or negligence during work and abuse of authority by employees in the bank (Djapan, Tadic, Macuzic & Dragojovic, 2015). Human factors leads to increase in personal errors, such as; making transactions without authority, accounting mistakes in records, entering wrong information into bank databases or systems, establishing credit account without obtaining the necessary guarantee (Brink *et al.,* 2002). Deliberate actions by a bank's employee - which are classified as fraud or embezzlement - are part of operational risk.

Such actions include but are not limited to money laundering, embezzlement of customers' accounts, damage to properties, intellectual theft and alteration of bank account transactions.

Systems operational risk arises from a bank's insufficient technological investments or weak information systems. Adoption of technology in a bank's operations is more noticeable in internet application products such as Automatic Teller Machines (ATMs) and telephone banking. System based operational risk can be analyzed in five categories; Technology and Investment Risk, Systems Development and Implementation risk, Systems Capacity, Systems Failure and Systems Security.

1.1.3 Effect of Liquidity on Operational risk

Liquidity largely influences the operational activities that a bank is engaged in and hence influences operational risk (Fiedler *et al.,* 2002). There is an overlap between liquidity levels and operational risk, as liquidity influences the integrity of operations. Cash flow problems may be occasioned by a variety of factors, ranging from internal as well external events, thus liquidity management is paramount.

Brink *et al.,* (2002) observes that liquidity is highly associated with operational risk arising from human factor in a bank. High levels of cash and cash equivalents precipitate fraudulent incidents by employees, especially where there are weak internal control systems. Credit mismanagement including the opening of fictitious credit accounts occurs where bank liquidity is high and the bank pursues a credit expansion policy that is associated with unsecured loans. Managers engage in malfeasant investment activities or invest more in short term assets that drive the bank into a

liquidity gap during periods of high liquidity. Managerial complacence in decision making occurs at times of high liquidity in a firm (Jensen & Meckling, 1976).

System induced operational risk or technology based risks of the bank are linked to liquidity. Large sized banks with a network of branches and ATMs are liquid enough to serve their large number of customers. Technical breakdowns occur due to systems overload arising from customer withdraws, credit application and enquiries resulting to incapacity and failure. Process based operational risks are influenced by liquidity, as banking activities increases with liquidity levels. Employees get overworked; lose concentration and focus, thereby increasing process errors (Goodhart, 2008). The errors increase documentation and contract risk and payment and delivery risk. Growth of banks through branch networks leads to branch autonomy and positive overlaps leading to distortion of structure, tasks and process flows and hence process operational risk.

External induced operational risks are largely associated with low liquidity. The bank finds it difficult to comply with various government policy changes which are supported by cash flow. Tax avoidance is likely to occur during low liquidity (Diamond & Rajan, 2001).Further, external service providers' contract claims are not honoured leading to breach of contract. The bank faces supplier's crisis which affect operations.

1.1.4 Commercial Banks in Kenya

Central Bank of Kenya report (2015) indicates that there are 43 commercial banks, 13 micro-finance banks and 1 mortgage finance institution, all regulated by CBK. CMA has an additional oversight role over the banks listed on the Nairobi Security Exchange. The banks can be categorized on the basis of ownership, size and capitalization. Government ownership is predominantly on 3 banks, while 28 banks are privately owned. Nairobi Security Exchange report (2015) indicates that there are 11 listed banks. 29 banks are locally owned while 14 are foreign owned.

The banking sector's aggregate balance sheet grew by 14.9% from KShs 2.4 trillion in December 2014 to KShs 2.8 trillion by December 2015 (Cytonn Investments report, 2016). The growth can be attributed to the following factors; cost contingent initiatives, increased use of alternative delivery channel, growth of retail segment, expansion in branch network both regionally and domestically, and a resilience for banks to reduce their rates (Cytonn report, 2016). Risk based management and accounting approach has been largely adopted by commercial banks in Kenya in line with global regulatory initiatives. Corporate governance practices have also opened a new frontier towards managing of risk, whereby risk management responsibility is mandated to the board and senior management.

CBK's Annual statutory report for 2015 indicated that the commercial banks in the country are very liquid with an average liquidity of 37.7 % against a statutory minimum of 20%, an indication that commercial banks had the ability to fund growth in assets, while at the same time being in a

position to meet depositors' withdrawal requirements. Liquidity shortfall in one bank can cause systematic crises in the banking sector due to their interconnected operations.

1.2 Research Problem

High profile incidents of bank collapse and losses in the world are compelling bank managers to rethink their risk management strategies. Whilst credit, liquidity and market risks and their impact on banks are well known and documented, continuous collapse or downward performance of banks have exposed operational risk as the key contributor towards unprofitable bank operations. The Basel Accord has therefore recognized operational risk in the capital adequacy framework, and currently requires commercial banks to maintain 15% of their capital to cater for operational risk.

Bank's liquidity levels are imperative owing to the nature of a bank's operations. Long term assets and liabilities impair liquidity of the bank; hence regulatory institutions require prudent liquidity management, to ensure that banks do not end up into a liquidity crisis, disrupting operations. The importance of liquidity and operational risk to a bank elicits research interest because their effective management shall lead to a sound banking industry (Vento, & La Ganga, 2009). Between 1993 and 2005, a total of 20 financial institutions in Kenya were placed under liquidation (Omondi, 2015). In October 2015 and April 2016, CBK placed Dubai bank, Imperial bank and Chase bank under receivership because of liquidity crisis that threaten the normal operations of these banks.

Several studies on liquidity levels and operational risk have been undertaken by scholars on various dimensions. Al-Tamimi and Obeidat (2013) study on capital adequacy determinants in commercial banks of Jordan concluded that there is a statistically significant positive correlation

between level of capital adequacy, liquidity risk, and the rate of return on assets. This is a geographical gap that this study seeks to address. Cummins, Wei and Xie (2012) studied on financial sector and integration spillovers, with emphasis on effects of operational risk events on US banks and insurers. Htay and Salman (2015) studied operational and liquidity risk disclosure practices by Malaysian listed banks. The study concluded that among all the disclosures about a bank, liquidity and operational risk disclosure were crucial to enable investment decision making.

From the empirical studies, it is clear that there are no studies undertaken on the relationship between liquidity and operational risk in commercial banks in Kenya. This is a geographical gap that this study seeks to address. This study will close this gap by answering the research question; what is the relationship between liquidity and operation risk of commercial banks in Kenya?

1.3 Research Objective

To determine the relationship between liquidity and operational risk of commercial banks in Kenya.

1.4 Value of the Study

The study shall be of value to the banking industry, investors, researchers, scholars, consultants and industrial regulators. The banking industry shall find the study useful by providing insight on the importance and relationship between liquidity and operational risk. They shall in their strategies develop appropriate mix of liquidity that would generate profitability on a minimal operating risk level. Investors shall apply the knowledge from the study in making investment decisions. They shall review financial disclosure information on liquidity levels and assess the operational risk profile attributable to a particular bank. Regulators of financial sector, central

banks and capital market authority shall find the study useful when developing regulatory policies aimed at guaranteeing profitability, discipline and stability in the financial sectors.

Researchers and scholars shall use the Kenya based experience of liquidity and operational risk in the study to benchmark against world standards and best practices. Gaps identified on benchmarking shall be used for further research and improvement of banks' operations. Consultants shall apply the knowledge gained from the study as an advisory tool to their clients when designing financial interventions.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter consists of the theoretical framework, the empirical review, determinants of operational risk and the summary of the literature.

2.2 Theoretical Review

This is anchored by three theories namely: liquidity preference, stakeholders' and stewardship theories. Below is the conceptual discussion;

2.2.1 Liquidity Preference Theory

Liquidity management is viewed as key to the survival of any organization. This is consistent with the Liquidity Preference theory (LPT), as stated by Modigliani (1944), which suggests that investors preferred short term investments to long term, as these are easily convertible to cash with little danger of loss of principal. On the other hand, borrowers prefer long term debt as it eliminates the danger of having to repay the debt under adverse conditions. As the repayments are spread in the long run, proper financing planning can be put in place in order avoid interrupting normal operations, thus ensuring an entity's survival during adverse conditions.

Bibow (2005) suggests that LPT determines the mix of assets and liabilities that an entity can hold. Therefore, a bank's decision problem will therefore be on how to balance returns and liquidity, consequently growing profitability (Dafermos, 2009).

This theory is relevant to the study because it will enable the bank to balance holding short term bonds and long term bonds and hold more of short term securities that are more liquid. Since short term investments are more liquid, a bank can easily convert them into cash, which can then be used to cushion the bank against operational risk that can arise.

2.2.2 Stakeholders Theory

The Stakeholder theory attempts to explain the importance of various stakeholder groups to a specific entity (Freeman, 1984). In the stakeholders theory, Freeman (1984) argues that, besides the proprietors of an entity, there are other groups involved, for example; financiers, the Government, trade unions, suppliers, employees, customers amongst others. The stakeholders theory, contradict the traditional view of a firm, where the owner of a firm is the solely important to the decisions affecting the firm. According to the stakeholders' theory, there definitely exist varied interests amongst the various interested group to a firm. For instance, suppliers, customers and employees may desire to trade/associate with entities that are cash rich as this is usually seen as a sign of stability.

In the case of banking institutions, management therefore must ensure that the interests of all stakeholders are taken in consideration in performing their oversight role. Management must formulate liquidity management strategies that will ensure the going concern concept of the institution is not threatened. This will ensure that all stakeholders have confidence in the management of the bank. Specifically, customers will be assured of the safety of their savings; creditors and suppliers will be confident that the institution will be able to meet its financial

obligations; regulators will be assured that the institution is adhering to the laid down regulations; while the shareholders will be assured of the safety of their investment (Freedman, 1970).

Since this theory is of organization management and business ethics, it addresses morals of managing an organization. It does this by ensuring that the interests of the stakeholders' who are the financiers of the organization (in our case commercial bank) are taken care of. The management of the bank can adopt liquidity management strategies to protect the stakeholders' money. When the stakeholders' demands are made, employees, customers and suppliers will be assured of their payment because the bank has no problem of liquidity.

2.2.3 Stewardship Theory

Donaldson & Davis (1991) explains the stewardship theory as the employment relationship between two parties - the principal (owner), and the steward. This theory examines the relationship between the principal and the steward from a behavioral as well as a structural viewpoint. The theory indicates that the steward's behavior will be towards the maximization of both the owner's and the organization's goals (Zahra, Hayton, Neubaum, Dibrell, & Craig, (2008). Corbetta & Salvato (2004) suggests that the steward's behavior is motivated by amongst other thing, the nature of the relationship between the owner and the steward, as well as the organization's values.

Tosi, Brownlee, Silva & Katz (2003) identifies profitability as one of the desired objectives by most organizations. The stewardship theory suggests that profit maximization as well as growth in the owner's wealth is attained when both parties choose to place the principal's interest first.

This theory applies to the study in the sense that when the steward's behavior is aligned to the firm's and the owner's objectives, agency costs are minimized. Agency costs can cause a firm to

experience liquidity crisis, which undermines the normal operations of a firm. The theory supports the decision making role of the top management to ensure a commercial bank and its employees adopt the best financing strategies and optimally utilize the resources within the organization to reduce the bad effects of liquidity risk.

2.3 Empirical Review

Raman (2008) carried out a survey to examine the preparedness by firms in the adoption of Basel II framework. The survey that targeted firms in India, Asia, Africa and Middle East noted insufficient internal data, challenges in collecting external loss data, as well as modeling complexities as some of the challenges faced by banks in implementing the operational risk management framework. The survey indicated varying degree of preparedness across regions as at 2009; India (100%); Asia (70%); Africa (65%) and Middle East (89%).

Ismal (2010) analyzed the practices of liquidity management in Islamic banks. The research that used a quantitative research methodology to analyze primary data drawn from direct surveys to depositors and Islamic banks, as well as secondary data, indicated liquidity risk as one of the key risks that conventional and Islamic banks faced.

Odunga, Nyangweso, Carter & Mwarumba (2013) studied the effect of liquidity and capital adequacy ratios, and bank's operating efficiency. The study which was an explanatory one analyzed the data using fixed regression. The study concluded that there was a positive relationship between liquidity, capital and operational efficiency. Therefore, the study concluded that banks should work towards improving their liquidity and capital ratios, so as to improve enhance operational efficiency.

Maaka (2013) explored the relationship between liquidity risk and commercial banks' financial performance in Kenya. The study used a correlation research design, with secondary data being drawn from financial statements of thirty- three Kenyan banks during 2008-2012. Result finding generated using multiple regression depicted increased liquidity gaps to have a negative impact on profitability.

Sushil and Bivab (2013) studied the determinants of liquidity and their impact on financial performance in Nepalese commercial banks. The results of the regression analysis conducted revealed that capital adequacy, bank size, non-performing loans and liquidity premium paid by borrowers had negative and statistically significant impact on a bank's liquidity. Capital adequacy, bank size and gross domestic product were identified to have negative impact on financial performance, while, liquidity premium paid by borrowers had a positive impact on financial performance.

Mukoswa (2014) examined the effect of capital adequacy, credit risk, liquidity, profitability and asset quality on operating efficiency of banks in Kenya. The study further examined the existence of statistically significant difference between low and high market share banks in relation to their operational efficiency. The study adopted an explanatory research design using panel data and was based on secondary data obtained from annual financial statements of the 43 commercial banks operating in Kenya for seven-year period 2005 - 2011. Data was analyzed using fixed effects regression model to attain the best regression equation. The results indicate that previous year's operating efficiency together with equity capital to total assets as proxy for capital adequacy, loan loss provision to total assets as proxy for credit risk, recurring earning power as proxy for

Profitability and loan loss provision to net interest revenue as proxy for asset quality were significant in explaining operating efficiency.

Mitku (2015) conducted a study on Risk Management and its Impact on Financial Performance of Commercial Banks in Ethiopia. The study investigated the impact of risk management on Ethiopian banks performance. Panel data regression analysis covering eight commercial banks performance between 2002 and 2013 was used. Four risk management variables that affect banks' performance were analyzed. The findings showed that credit risk management indicator, liquidity risk management indicator and operational risk indicator had negative and statistically significant impact on a bank's performance. Capital adequacy ratio had positive statistically insignificant impact on a bank's performance.

2.4 Determinants of Operational Risk

This section provides the determinants of operational risk. The study has discussed the following determinants: liquid assets, asset quality, bank size, capital adequacy and ownership type as follows:

2.4.1 Liquid Assets

Jasienei, Jonas, Filomena & Grazina (2012) indicated that the nature of bank's assets in terms of the propensity to transforming them into cash or very liquid assets affects its liquidity. Holding more liquid assets can help the liquidity risk, as these can easily be converted to cash or collateralized to obtain liquid funds. However, this may not be the case for all the banks due to the difficulty in selling or collateralizing their liquid assets. As a result, in order to ascertain the degrees of liquidity of each bank's assets, the liquid assets can be classified into two categories - risky liquid assets and less risky liquid assets. Less risky liquid assets include liquid assets such as cash

and balances with Central Banks, treasury bills, monies due from other banks and other short term government securities which could be sold with little price risk and low transaction cost.

2.4.2 Asset Quality

Dang (2011) noted that loans comprise a large component of a bank's total earning assets. Thus, the quality of loan portfolio determines the bank's liquidity, with increase in delinquent loans negatively impacting liquidity. Li (2007) posited that loan loss provision to total loans ratio is a measure of bank's asset quality that indicates how much of the total portfolio has been provided for but not charged off. Higher non-performing loan portfolios cast doubt on to the repayment of these loans, and may impact on a bank's liquidity levels and operational efficiencies.

2.4.3 Bank Size

Shen, Chen, Kao & Yeh (2009) considered bank size as one of the major determinants of bank liquidity risk. They suggest that bank size measured by the bank's total assets contributes to its liquidity levels. As banks grow in size, they are in a better capacity to mobilize many deposits with less difficulty and for that matter to grant more loans at any point in time. Further they noted that the huge financial commitments associated with several branch openings increases vulnerability to liquidity risk. Bunda and Desquilbet (2008) factored in the size of a bank in the determinants of liquidity risk of banks from emerging economies. Their result depicted bank size to have a positive effect on liquidity risk.

2.4.4 Capital Adequacy

Ayele (2012) observes that that capital adequacy offers banks the ability to withstand operational costs, fund liquidity as well as enable banks to undertake additional business. The study therefore

suggests that the banks should maintain sufficient capital in line with the regulatory requirements. The level of capital provides financial flexibility, thus banks with high capital ratio tend to experience lesser probability of liquidity risk.

2.4.5 Ownership Type

Siaw (2013) suggested that ownership structure of banks can also determine the vulnerability of a bank to liquidity risk. Foreign owned banks have the opportunity of getting external help from their foreign partners in times of financial difficulties, which may not the same for a local bank. Banks' vulnerability to liquidity is expected to be significantly different from the other in line with the type of ownership be it foreign or local. The study suggests that liquidity risk is thus expected to have a positive relationship with local owned banks but a negative relationship with foreign owned banks.

2.5 Conceptual Framework

A commercial bank which has more liquid assets is less likely to experience operational risks. This is because it can easily convert those assets to cash to maintain its daily operations and pay the workers (Jasienei *et al.,* 2012). Liquidity therefore has a negative relationship with operational risks. The assets quality and capital adequacy determines the liquidity level of the bank. A bank holding more quality assets and more capital is less likely to face liquidity risks hence low operational costs.

Bank's vulnerability to liquidity risk is expected to be significantly vary, depending on ownership type – whether foreign or local. Capital adequacy, bank size, asset quality and liquid assets have a negative relationship with operational risk. Ownership type can either have a positive for foreign

ownership or negative relationship for local ownership with operational risk (Al-Tamimi *et al.*, 2010).

Figure 2.1: Conceptual Model

Independent variables   **Dependent variable**

LIQUIDITY

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┌─────────────────────────────────────────────┐
│  ┌─────────────────────────────────┐         │
│  │ Liquid Assets                    │         │
│  │   – Liquid assets to deposits    │────────▶│
│  └─────────────────────────────────┘         │
│  ┌─────────────────────────────────┐         │         ┌──────────────────────────────┐
│  │ Asset Quality                    │         │         │ Operational risk              │
│  │                                  │         │         │                               │
│  │   – Gross non-performing         │─────────┼────────▶│   – Frauds                    │
│  │     Loans to Gross Loans         │         │         │   – Frequency system failures │
│  └─────────────────────────────────┘         │         │   – Human Factors             │
│  ┌─────────────────────────────────┐         │         └──────────────────────────────┘
│  │ Bank Size                        │         │
│  │   – Size of the assets           │────────▶│
│  └─────────────────────────────────┘         │
│  ┌─────────────────────────────────┐         │
│  │ Capital Adequacy                 │         │
│  │   – Core capital ratio           │────────▶│
│  └─────────────────────────────────┘         │
│  ┌─────────────────────────────────┐         │
│  │ Ownership Type                   │         │
│  │   – Local or foreign             │────────▶│
│  └─────────────────────────────────┘         │
└─────────────────────────────────────────────┘
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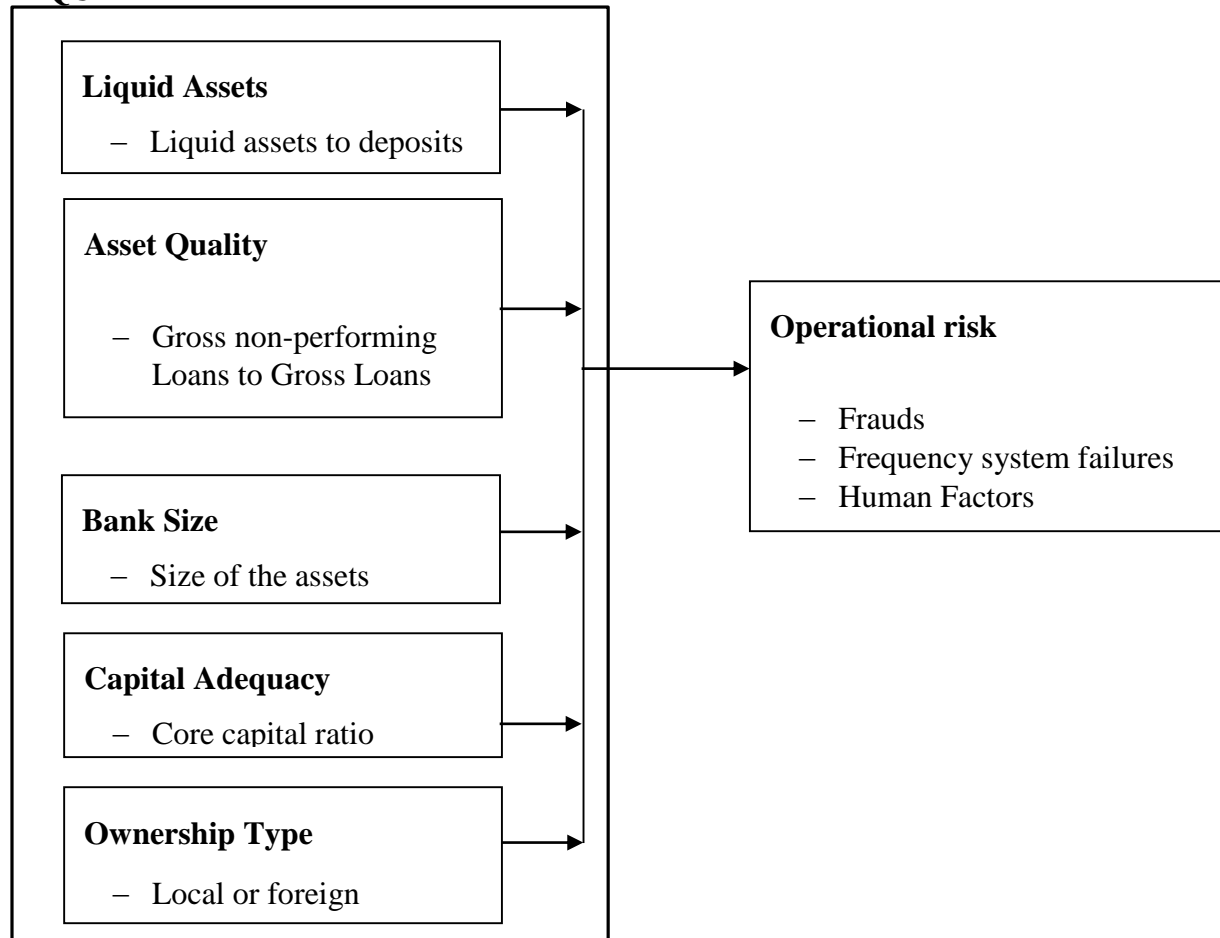
Source: Researcher

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter describes the research methodology used for this study. The chapter describes the research design, target population and area, data collection instruments, procedures and data analysis methods that the study employed.

3.2 Research Design

A descriptive survey design was used in the study. With such a study, information will be obtained to meet the underlying purposes and objectives of the study. Descriptive survey was considered important in investigating the existing relationships among the variables captured in this study.

3.3 Population

The population of study comprised all the 43 commercial banks licensed and regulated by CBK, and operating under the Banking Act as at 31 December 2015 (Appendix1). However, Imperial Bank, Chase Bank and Dubai were excluded in the final study since they were under receivership.

3.4 Data Collection

The study used secondary data extracted from 40 commercial banks 2015 financial statements. Three (3) banks were excluded from the study since they were under receivership and there was no any available data from the CBK regarding their financial statements. Data to be extracted were

on liquid assets, total assets, capital held by these banks. Data on bank size and ownership type were also drawn.

3.5 Data Analysis

Data analysis was done using Statistical Package for Social Sciences (SPSS Version 20.0) software.

3.5.1 Analytical Model

A regression model was used for data analysis to expressing the relationship between liquidity levels and operation risk of commercial banks in Kenya. The regression model was as shown below:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon$$

Where,

Y – Operational risk (Dependent variable) as measured by total number of frauds

β_0 – Constant term

$\beta_1 - \beta_5$ are constants that measure sensitivity of variable X to changes in operational risk

X_1 – Liquidity as measured by liquid assets to deposits

X_2 – Asset quality as measured by the proportion of gross non-performing loans to gross loans

X_3 – Bank size as measured by log of total assets

X_4 – Capital adequacy as measured by core capital ratio

X_5 – Ownership type as measured by whether local or foreign owned

Є= Error term

3.5.2 Tests of Significance

The study conducted an F- test to establish the significance of the independent variables against the dependent variable namely liquidity, asset quality, bank size, capital adequacy and ownership type. The significance of variables was interpreted at 95% confidence level. Interpretation was as follows; a variable with p-value of 0.05 and below is significant while that variable with p-value above 0.05 is insignificant.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

The objective of the study was to determine the relationship between liquidity and operational risk of commercial banks in Kenya. This chapter consists of the data analysis, results and discussions.

4.2 Descriptive Statistics

This section provides results on measures of central tendency of independent variables in Table 4.1 below. The results show that the overall mean of bank size measured in terms of assets log was 1.613 which indicated the average bank size of commercial banks in Kenya. The minimum and the maximum asset size for commercial bank's size was 0.800 and 2.700 respectively. Its standard deviation was 0.5497 which indicated that bank size varied across the banks.

The overall mean of asset quality was 0.09928. The minimum and the maximum asset quality for commercial banks was 0.000 and 0.3258 respectively. Its standard deviation was 0.07758 which indicated that asset quality varied across the commercial banks.

The overall mean of liquidity was 0.39171. The minimum and maximum liquidity for the commercial banks was 0.136 and 0.761 respectively. Its standard deviation was 0.15178 which indicated that liquidity varied across the commercial banks.

The overall mean of capital adequacy was 0.19307. The minimum and maximum capital adequacy for the commercial banks was 0.078 and 0.4114 respectively. Its standard deviation was 0.07168 which indicated that capital adequacy varied across the commercial banks.

Finally, the overall mean of operational risks was 3.600. The minimum and the maximum operational risks for the commercial banks was 0.000 and 30.000 respectively. Its standard deviation was 5.817 which indicated that operational risks varied across the commercial banks.

Table 4.1: Descriptive Statistics

Variable	Observations	Minimum	Maximum	Mean	Std. Deviation
Bank size (log assets)	40	0.800	2.700	1.613	0.5497
Asset quality	40	0.000	0.3258	0.09928	0.07758
Liquidity	40	0.136	0.761	0.39171	0.15178
Capital Adequacy	40	0.078	0.4114	0.19307	0.07168
Operational Risk	40	0.000	30.000	3.600	5.817

Source: Research Findings

4.3 Trend Analysis

Figure 4.1 indicates that the general trend of bank size measured in terms of log assets was varying across the 40 commercial banks.

Figure 4.1: Trend line of bank size
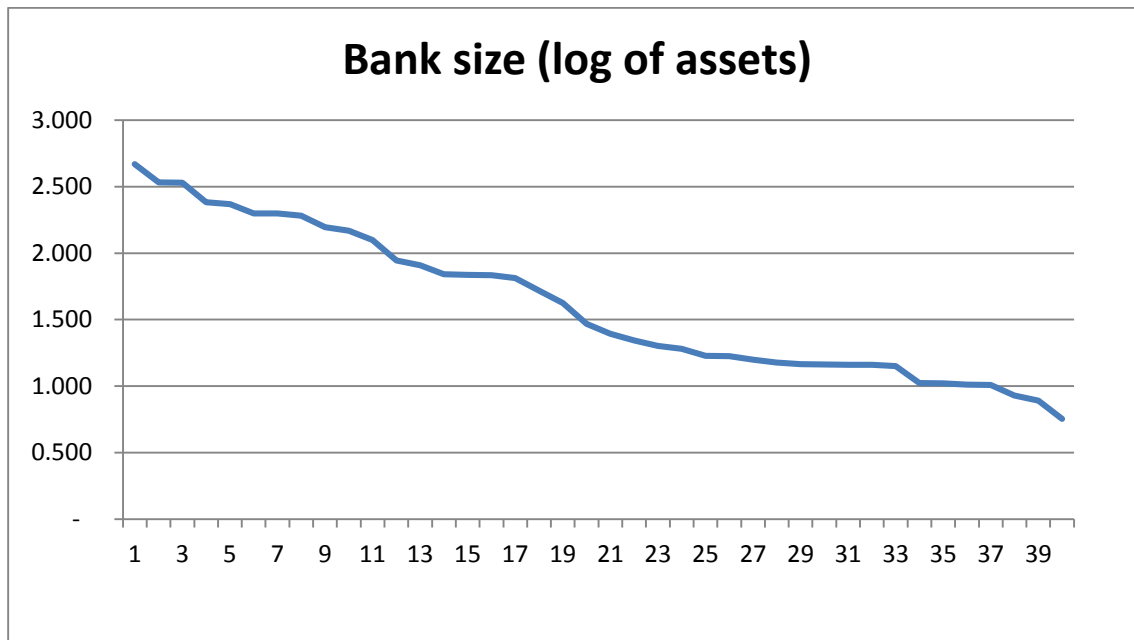
Source: Research Findings

Figure 4.2 indicated the liquidity of the banks. The trend line shows that liquidity was varying across all banks included in the study.

Figure 4.2: Trend line liquidity across banks
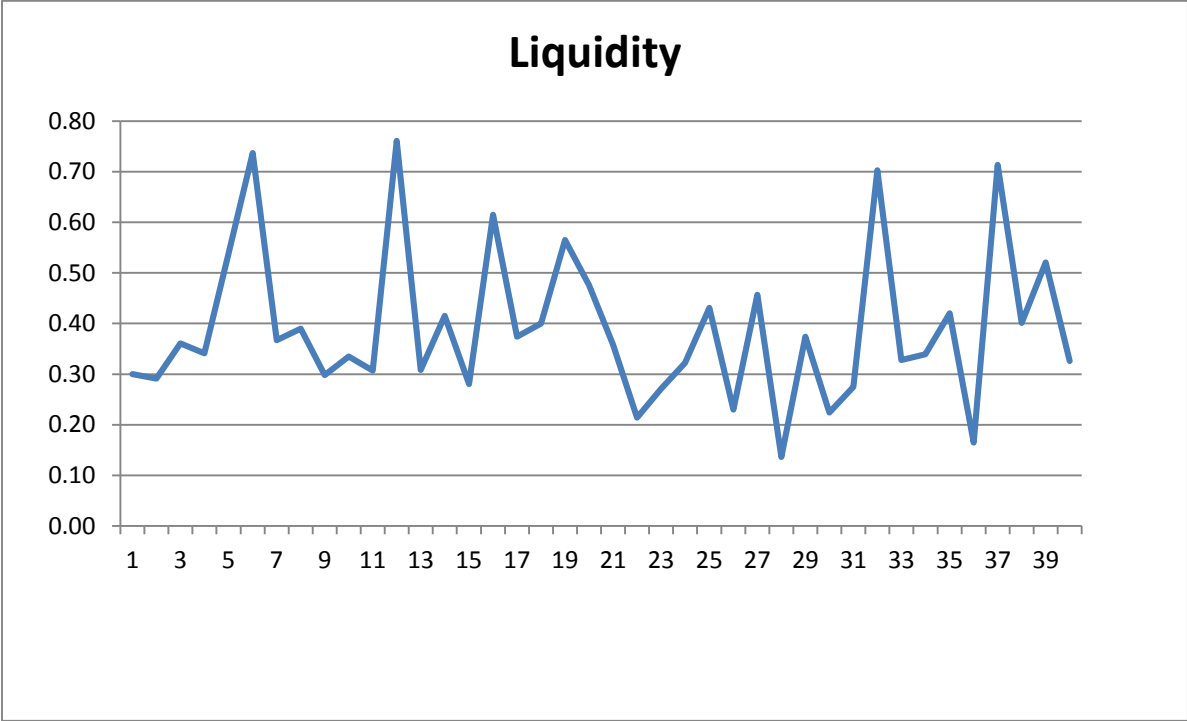
Source: Research Findings

Figure 4.3 shows the asset quality of the banks. The trend line shows that asset quality varied across all the commercial banks.

Figure 4.3 Trend line - Asset quality across banks
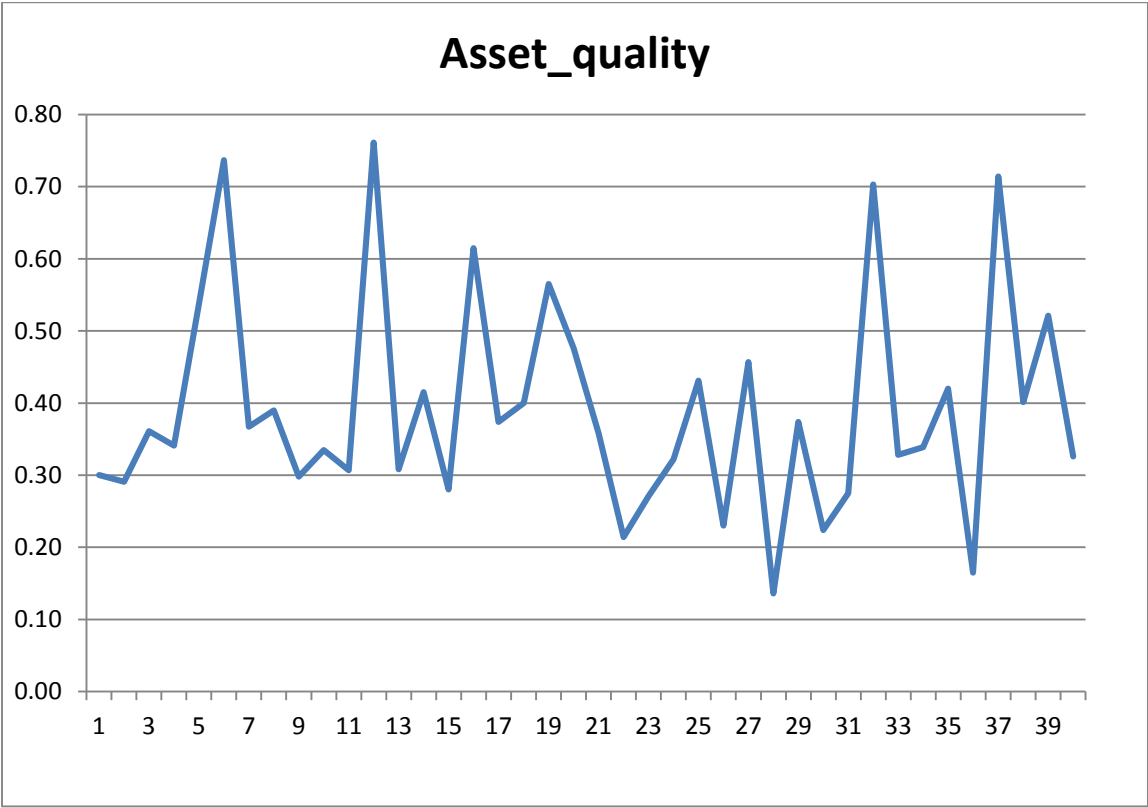
Source: Research Findings

Figure 4.4 indicated capital adequacy of the banks studied. The trend line showed that capital adequacy was varying across all the banks.

Figure 4.4 Trend line - Capital adequacy across banks
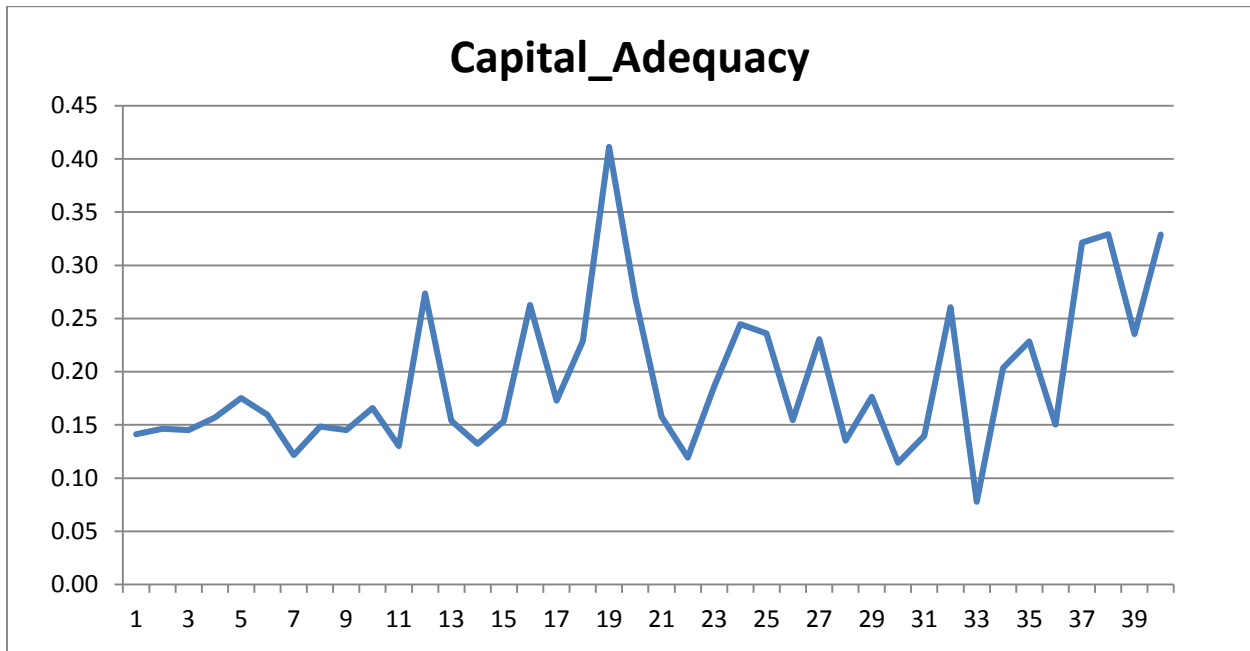
Source: Research Findings

4.4 Inferential statistics

4.4.1 Correlation Analysis

The study sought to establish the association among the study variables. The results are as presented in Table 4.2

Table 4.2: Correlation matrix of research variables

Variable		Operational Risk	Asset quality	Liquidity	Capital Adequacy	Bank size (Log assets)
Operational Risk	Pearson Correlation	1	.			
	Sig. (2-tailed)					
Asset quality	Pearson Correlation	.599**	1			
	Sig. (2-tailed)	0.000				
Liquidity	Pearson Correlation	-.491**	-0.191	1		
	Sig. (2-tailed)	0.001	0.238			
Capital Adequacy	Pearson Correlation	-.492**	-.377*	0.233	1	
	Sig. (2-tailed)	0.001	0.017	0.148		
Bank size (Log assets)	Pearson Correlation	.577**	0.311	-.421**	-.493**	1
	Sig. (2-tailed)	0.000	0.051	0.007	0.001	

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

* Correlation is significant at the 0.05 level (2-tailed).

Source: Research Findings

The results in Table 4.2 indicated that asset quality and bank size are positively related with operational risks of commercial banks. Results indicated that asset quality (r= .599, p=0.000) and

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bank size (r= .577, p=0.000) are significantly and positively related to operational risks of commercial banks. An increase in either of the above variable (asset quality or bank size) leads to increased operational risks of commercial banks. Further, result findings showed that liquidity and capital adequacy are negatively related with operational risks of commercial banks. Results indicated that liquidity (r= -.491, p=0.001) and bank size (r= -.492, p=0.001) are significantly and negatively related to operational risks of commercial banks. A decrease of liquidity or capital adequacy of the bank leads to increased operational risks of the bank.

4.4.2 Model summary

The results presented in table 4.3 present the fitness of model used of the regression model in explaining the study phenomena. Bank size, asset quality, liquidity and capital adequacy were found to be satisfactory variables in explaining operational risks of commercial banks in Kenya. This is supported by coefficient of determination also known as the R square of 60.1%.

Table 4.3 Model Fitness

Indicator	Coefficient
R	0.775
R Square	0.601

Source: Research Findings

This means that bank size, asset quality, liquidity, capital adequacy and ownership type explains 60.1% of the variations in the dependent variable which is the operational risks measured in terms of frauds reported in commercial banks. This means that we have other factors which affect

operations of commercial banks that are not included in the model. The results further indicate that the model applied to link the relationship of the variables was satisfactory.

4.4.3 Analysis of Variance

Table 4.4 provides the results on the analysis of the variance (ANOVA). This was to establish whether there was any significant difference among the variables means. Independent variables were explored to determine whether there existed any significance difference with the dependent variable (operational risks of commercial banks).

Table 4.4 Analysis of Variance

Indicator	Sum of Squares	df	Mean Square	F	Sig.
Regression	793.039	4	198.26	13.178	.000
Residual	526.561	35	15.045		
Total	1319.6	39			

Source: Research Findings

The results indicate that the overall model was statistically significant. Further, the results imply that the independent variables are good predictors of commercial bank operational risks. This was supported by an F statistic of 13.178 and the reported p value (0.000) which was less than the conventional 0.05 significance level. Therefore, the result findings from the ANOVA showed that there exist a significant difference between the independent variables and the dependent variable.

4.4.4 Regression of Coefficients

Regression of coefficients results in table 4.5 shows asset quality and operational risks of commercial banks are positively and significantly related (r=13.042, p=0.001), liquidity and operational risks of commercial banks are negatively and significantly related (r= -7.025, p=0.030), capital adequacy and operational risks are negatively and significantly related (-15.4, 0.025), bank size was positively and significantly related to operational risks of the commercial banks (2.802, 0.053).

Table 4.5 Regression of Coefficients

Variable	B	Std. Error	Beta	t	Sig.
(Constant)	0.39	3.457		0.113	0.911
Asset quality	13.042	3.706	0.411	3.519	0.001
Liquidity	-7.025	3.107	-0.267	-2.261	0.030
Capital Adequacy	-15.4	6.555	-0.278	-2.349	0.025
Bank size (Log assets)	2.802	1.402	0.265	1.998	0.053

Source: Research Findings

Results findings show that there is a positive and significant relationship between asset quality and operational risks of the bank. These results show that an increase in the unit change of asset quality would result to an increase in operational risks of the bank by 13.042units. These results also show that an increase in the unit change of bank size would result to an increase in operational risks of the bank by 2.802 units. Further, these results show that an increase in the unit change of liquidity

would result to a decrease in operational risks of the bank by -7.025 units while a unit increase in capital adequacy will result to -15.4 units decrease in the operational risks of the bank.

Thus, the optimal model for the study is;

Operational risk of a bank = 0.39+ 13.042Asset Quality - 7.025Liquidity - 15.4Capital Adequacy + 2.802 Bank size.

4.5 Binary logistic regressions

Binary logistic regressions were developed to illustrate the effect of ownership type of commercial banks studied.

4.5.1 Correlation table Operational risks and Ownership type

A binary logistic correlation matrix of operational risks against ownership type was developed. Results findings were presented in tale 4.6

Table 4.6 Correlation table Operational risks and Ownership type

Variable		Operational categorical	Ownership
Operational categorical	Pearson Correlation	1	0.018
	Sig. (2-tailed)		0.914
Ownership	Pearson Correlation	-0.018	1
	Sig. (2-tailed)	0.014	

Source: Research Findings

The study showed that ownership type was statistically significant indicated by p value of 0.014 which was less than the conventional 0.05 significance level. This implies that ownership type did

influences the operational risks of commercial banks measured in terms of the number of frauds reported.

Table 4.7 Regression coefficients

Variable	B	S.E.	Wald	df	Sig.	Exp (B)
Ownership(1)	-0.082	0.739	0.012	1	0.011	1.086
Constant	0.916	0.442	5.1	1	0.024	0.368

Source: Research Findings

Table 4.7 showed that ownership type was negatively and significant predictor of operational risks ($r = -0.082$, $p=0.011$). Ownership type influences the operational risk encountered by the commercial banks.

Table 4.8 Classification table

Observed		Predicted		Percentage Correct
		Operational categorical Low operational risk	High operational risk	
Operational categorical	Low operational risk	29	0	100
	High operational risk	11	1	0
Overall Percentage				72.5

Source: Research Findings

Table 4.8 indicated the number of observed 0s and 1s observed in the dependent variable. These are the predicted values of the dependent variable based on the full logistic regression model. This

table shows how many cases are correctly predicted. The overall percentage was 72.5% which gives the overall percent of cases that are correctly predicted by the model.

4.6 Interpretation of the Findings

Results findings show that there is a positive and significant relationship between asset quality and operational risk of the bank. These results show that an increase in the unit change of asset quality would result to an increase in operational risk of the bank by 13.042units. These results also show that an increase in the unit change of bank size would result to an increase in operational risk of the bank by 2.802 units. Further, these results show that an increase in the unit change of liquidity would result to a decrease in operational risk of the bank by -7.025 units while a unit increase in capital adequacy will result to -15.4 units decrease in the operational risk of the bank. Further, the study showed that ownership type was statistically significant indicated by p value of 0.014 which was less than the conventional 0.05 significance level. This implies that ownership type influences the operational risk of commercial banks measured in terms of the number of frauds reported.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter consists of the discussions drawn from the data findings analyzed and presented in the chapter four. The chapter is structured into summary of findings, conclusions, recommendations and areas for further research.

5.2 Summary

The purpose of this study was to determine the relationship between liquidity and operational risk of commercial banks in Kenya. The study objective was to establish the influence liquidity, asset quality, bank size, capital adequacy and ownership type on the operational risk of commercial banks. This study adopted a descriptive survey design. The target population was the 40 fully operational commercial banks in Kenya as at December 2015. A survey of 40 commercial banks that had complete data was selected. Three (3) commercial banks were excluded from the study since they were under receivership.

The Statistical Package for Social Sciences (SPSS) software version 20.0 was used to carry data analysis. The study revealed that bank size, asset quality, liquidity and capital adequacy were satisfactory variables in explaining operational risk of commercial banks in Kenya. This is supported by coefficient of determination of 60.1%.

The first determinant was to establish the influence of bank size on the operational risk of a commercial bank. Result findings revealed that bank size was positively and significantly related to operational risk of the commercial banks (2.802, 0.053). These results also show that an increase in the unit change of bank size would result to an increase in operational risk of the bank by 2.802 units.

The second determinant was to establish the influence of asset quality on the operational risk of a commercial bank. Result findings revealed that asset quality and operational risk of commercial banks are positively and significantly related (r=13.042, p=0.001). These results show that an increase in the unit change of asset quality would result to an increase in operational risk of the bank by 13.042 units.

The third determinant was to establish the influence of liquidity on the operational risk of a commercial bank. Result findings revealed that liquidity and operational risk of commercial banks are negatively and significantly related (r= -7.025, p=0.030). These results showed that an increase in the unit change of liquidity would result to a decrease in operational risk of the bank by -7.025 units.

The forth determinant was to establish the influence of capital adequacy on the operational risk of commercial banks. Result findings revealed that capital adequacy and operational risk are

negatively and significantly related (-15.4, 0.025). A unit increase in capital adequacy will result to -15.4 units decrease in the operational risk of the bank.

The fifth determinant of liquidity on operational risk was ownership and the study sought to establish the influence of ownership type on the operational risk of commercial banks. Binary logistic results showed that ownership type was statistically significant indicated by p value of 0.014. This implies that ownership type did influences the operational risk of commercial banks measured in terms of the number of frauds reported. Ownership type was negatively and significant predictor of operational risk (r= -0.082, p=0.011).

5.3 Conclusions

Based on the findings the study concluded that bank size, asset quality, liquidity, capital adequacy and ownership type affect operational risk of commercial banks. Liquidity, capital adequacy and ownership were found to have an inverse relationship with operational risk of the bank.

5.4 Recommendations for Policy and Practice

This study found that bank size, capital adequacy, ownership, liquidity and asset quality have an effect on the normal operations of the bank. It is therefore recommended that commercial banks focus on maintaining high level of liquidity and capital adequacy to enhance their performance by cushioning themselves against operational risk.

Mixed ownership can be adopted by banks to back up their financial sustainability so that normal bank operations are not affected in case of frauds. The study also recommends upgrading of

internal control systems to detect attempted frauds and so cushion the banks against financial loss by fraudsters.

5.5 Limitations of the Study

The reliability of the results depends on the accuracy of the data collected from the financial statements. Some commercial banks were not willing to disclose some information regarding their financial performance. Long procedures followed to get permission of on collection of number of fraud cases from commercial banks.

5.6 Suggestions for further study

The study used secondary data. Primary data should also be used to see if the same result findings still hold. This study targeted commercial banks. Further research should be done targeting to establish the effect of liquidity on microfinance institutions (MFIs).

Finally, further research should involve a panel data that cuts across years. The current study only focused 2015 financial statement.

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APPENDICES

Appendix 1: Letter of Introduction

University of Nairobi

School of Business

P. O. Box 30197

Nairobi

Dear Sir/ Madam,

RE: REQUEST FOR PARTICIPATION IN RESEARCH

I am post graduate student from University of Nairobi pursuing Masters of Science in Finance. I am carrying out a study on the relationship between liquidity and operational risk of commercial banks in Kenya.

I kindly request you to assist me gather information on the number of fraud cases reported by the banking sector in 2015. The information provided will only be used for the purpose of this study and will be held in strict confidence.

Yours faithfully,

James Mulandi

Appendix II: List of Banks in Kenya as at 31 December. 2015

1. African Banking Corporation Ltd

2. Bank of Africa Kenya Ltd

3. Bank of Baroda (K) Ltd

4. Bank of India

5. Barclays Bank of Kenya Ltd.

6. CFC Stanbic Bank Ltd

7. Chase Bank (K) Ltd

8. Citibank N.A Kenya

9. Commercial Bank of Africa Ltd.

10. Consolidated Bank of Kenya Ltd.

11. Co-operative Bank of Kenya Ltd

12. Credit Bank Ltd.

13. Development Bank of Kenya Ltd.

14. Diamond Trust Bank Kenya Ltd

15. Dubai Bank Kenya Ltd.

16. Eco Bank Kenya Ltd

17. Equatorial Commercial Bank Ltd.

18. Equity Bank Ltd

19. Family Bank Limited

20. Fidelity Commercial Bank Ltd

21. Fina Bank Ltd

22. First community Bank Limited

23. Giro Commercial Bank Ltd

24. Guardian Bank Ltd

25. Gulf African Bank Limited

26. Habib Bank A.G Zurich

27. Habib Bank Ltd

28. Housing Finance Company of Kenya Ltd

29. Imperial Bank Ltd

30. I &M Bank Ltd

31. Jamii Bora Bank Limited.

32. Kenya Commercial Bank Ltd

33. K-Rep Bank Ltd

34. Middle East Bank (K) Ltd

35. National Bank of Kenya Ltd

36. NIC Bank Ltd

37. Oriental Commercial Bank Ltd

38. Paramount Universal Bank Ltd

39. Prime Bank Ltd

40. Standard Chartered Bank Kenya Ltd

41. Trans-National Bank Ltd

42. UBA Kenya Limited

43. Victoria Commercial Bank Ltd

(Source: CBK, 2015 https://www.centralbank.go.ke)

Appendix III: Data Collection Form

Bank	Operational risk (Total fraud)	Bank size (asset size)	Asset quality (Gross non-performing loans to Gross Loans	Liquidity ratio (Liquid assets to deposits)	Capital adequacy (Core capital ratio)	Ownership (Foreign or Local)