

**EFFECT OF DIGITIZATION OF FINANCIAL SERVICES ON THE LIQUIDITY
MANAGEMENT OF COMMERCIAL BANKS IN KENYA**

BY

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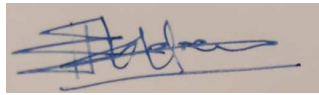
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DECLARATION

I declare this research project is my original work which has not been submitted to any other Institution for degree award.

Signed...



Date 25/11/2022

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The project has been submitted with my approval as the supervisor.

Signed.....



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DEDICATION

This project is dedicated to my parents and my teachers who supported me and contributed their full effort to make this project possible.

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ABBREVIATION

ATM- Automated Teller Machine

CBK- Central Bank of Kenya

GDP - Gross Domestic Product

KBA- Kenya Bankers Association

TAM- The Technology Acceptance Models

USSD-The Unstructured Supplementary Service Data

ROI- Returns on Investment

ABSTRACT

The objective of the study was to investigate how liquidity of Kenyan banks is impacted through electronic banking. The goal of the study was to ascertain how ATMs, internet banking, and mobile banking affected the banks' liquidity. The major source of income for the banks is loan interest. Liquidity is crucial to a bank's sustainability since commercial banks use short-term consumer deposits to support long-term loans. The availability of cash, a crucial operating instrument, affects how successfully banks function. Bank liquidity will be impacted by worries about how electronic banking is developing. In Kenya, 43 commercial banks were studied using a descriptive study method. The research was carried out during a five-year period, from 2015 to 2020. Secondary data was provided by the Kenyan Central Bank and the targeted banks. The explained variable was liquidity, and the explanatory variables were ATM banking, mobile and internet banking. Average values for total assets, average internet transaction values, average ATM transaction values, and average mobile banking transaction values were used to calculate these variables. The 43 commercial banks in Kenya were evaluated using their current ratios as a liquidity indicator. According to the study, there is a considerable positive association between liquidity and digital financial services in Kenyan commercial banks, with a 95% degree of confidence. Internet banking has the least impact on liquidity when compared to ATM banking. Mobile device accessibility benefit in terms of increasing transaction volume and value thanks to major financial investment in mobile banking technology. Many organizations are adopting electronic banking to profit from its efficiency, accessibility, flexibility, and lower costs.

CHAPTER ONE: INTRODUCTION

1.1 Background to the study

The monetary situation within banking industry has led to poor and ineffective liquidity management. Liquidity management is concerned with the economic systems' performance as it ensures growth of the assets, linked to the decision-making process through availing appropriate financial aids in increasing profitability (Kimutai and Ambrose, 2016). Effective Liquidity management reveals World Bank's objective to help different states with managing the public resources since 1984. The rising urge to apply any technology across the financial systems has since transformed the banking sector within the Kenyan context, with most banks having transitions from traditional banking forms to any modern system to manage finances which address customer needs. Global digital migration hence is not only evident within developed countries but also within developing countries. Kenya therefore has adopted the digital shift migration that allows commercial banks move from traditional forms of operations which they adopted before the upsurge of Fintech companies. Commercial banks have been trying to adopt the current operation to have effective liquidity management. Kimutai and Ambrose (2016) postulate that commercial banks' importance has been significant in promoting the funds flow from the surplus units to shortage levels while providing a wide range of monetary services. These describe some of the services, which define the economic development of both developed and developing countries. Different commercial banks in Kenya have been implementing some digital migration by use of computers, automation, and other recent technology in operation to have adequate liquidity management. Application of E-banking in the financial industry has been increasing the rate at which customers deposit and withdraw money from financial institutions. The study applied the TAM model as well as IDT theories to anchor the study.

The theories assist in understanding a number of issues associate to the acceptance of digital systems within the management of commercial banks within Kenya. Davis (1989) advance the theory to explain how users accept and make use of the rising technology. Alternatively, Diffusion Theory (IDT), as explained by Clarke (2003), provides a comprehensive understanding of the adoption patterns and predicting how a new set of innovation would be a success. This theory explains how e-banking innovation could be successfully adopted and incorporated into the operation of banking systems in Kenya. Commercial banks in Kenya have been taking a keen interest in upgrading their systems because of the significance technology on developing these

banks. Kenyan Commercial Banks have as well recorded an intense growth within the recent past. The increase has been resulting within a stable regulation of financial institutions as cited by Osoro (2015). In Kenya, numerous studies have been done on digitization ranging from its benefits to the banks. The digitization perspective includes the movement within a digital operation form. This universe has been undergoing a digital migration with all people changing lifestyles to adopt technology in operation. This then affects the social media interaction, as well as the business operation, and the digital model as they focus into the incorporation of digital skills in the banking industry. Different commercial banks in Kenya have been implementing the aspect of digital migration using computers, automation, and other recent technology in the operation of the banks. Study done by Osoro (2015) alludes that digital migration has been allowing the banks to meet consumers' needs, managing costs, enhancing productivity, and improving standards of products. Some of the Kenyan financial institutions that have adopted the digital migration agenda have thrived in the competitive environment as they have been remaining the most competitive banks in the country. The traditional ways of operation have been performing poorly. This study would be significant in informing commercial banks on the importance of applying digitization in managing liquidity.

1.1.1 Digitization

Muriithi and Waweru (2017) define digitization as the smooth, automated, and adequate provision delivery of both traditional and modern banking services through electronic communication networks. This includes the systems that customers apply in accessing their accounts and transacting their businesses through the network. Therefore, Zhang, Weng, and Zhu (2018) define the aspect of digitization gives customers the ability to transact their business without making a physical appearance at the bank. Oni, Adewoye, and Eweoya (2016) define digitization as the electronic operation of financial services. Besides, Wang, Cho, and Denton (2017) define digitization as delivering services via electronic banking. These definitions signify that their impact of technology in the financial system has been on the rise. Despite the sophisticated regulatory framework, commercial banks are aware of their role in serving their customers in the fast, technologically growing world. This study had different definition of digitization, where it would use digitization to mean electronic banking which will refer to mobile banking, online banking, and the ATM banking that has been increasing in commercial

banks.

In the recent days, Information technology has been a major tool towards transforming some commercial banks as well as the entire banking industry. Despite the unchanged necessary banks' economies, developments within IT drives commercial banks into changing the banking due to IT- driven cost measures. Hence, therefore, upon commercial banks to adjusting the services and match preference tastes, that is within the IT products. A number of changes are moving around within the banking industry as a result of the coming up of Fintech startups and IT firms within businesses in traditional banking aspects (Belás, Korauš, Kombo& Korauš, 2016). The government interventions have also been in the move to champion for the change by giving them time to adjust. Digitization has provided the commercials' banks' ability to foster the efficiency of services, make some saves on cost, to ensure faster processing of transactions both internally and externally, and lower errors within the banking industry. Nevertheless, the customers that has well improved within their experience towards the banking as they can do the transactions at any other time of the day through use of mobile and online banking. Efficiency of banking systems within Kenya allows customers adopt proper ways of management of cash while the commercial banks effectively manage the liquidity.

E-banking will be defined as any form of mobile banking, internet banking, and the ATM banking system in conducting transactions. Effective liquidity management of a financial institution will be defined from the rate of application of mobile banking, internet banking, and the ATM banking system in performing banking services. The levels of operation of the three components of E- banking will be applied in measuring liquidity in financial companies.

This research will use three variables to determine their effect on liquidity. These independent variables will include mobile banking, electronic banking, and the ATM banking system. However, bank size will be entailed as a control variable in finding out on the effect they have on the liquidity management of banking industry in Kenya.

1.1.2 Liquidity Management

Tehrani, Cornett, Marcus, and Saunders(2006) defines liquidity management as banks' capability to meet short-term financial responsibilities. Ineffective management of liquidity

emanates from mismatching liabilities and assets of the financial institutions. Banks would always feel the pinch of poor liquidity management as it has a negative effect on the profitable financial services that banks have been using to register proceeds. For instance, the provision of clients with the chances of operating their accounts at any time has an impact on the number of deposits and withdrawal that a customer would make each day. The number of times that a customer engages the bank. Majakusi (2016) explains that liquidity managing as the capability of a financial institution to ensure it meets its financial obligation through interests, deposits, funding activities, and managing capital. Muriithi and Waweru (2017) also define liquidity management as the financial performance of a financial organization. However, this study defines liquidity management as the number of monetary transactions done via online banking, mobile banking, and ATM banking.

Poor management of liquidity would be evident from a decrease in the asset prices, low assets, marketability and inadequate debts. Most commercial banks, depending on the clients' daily operations, would face a challenge in lowering their profitability as indicated by Molefe and Muzindutsi (2016). A reduction in the profitability of a banking institution has an impact on its services, as it would not be in a position to meet the needs of many clients. Unsatisfied customers would be moving to other banking institutions, which can offer their required services. A reduction of customers at the bank can be compared to any business that has lost buyers to another company. The sales, as well as profitability, would start declining while, in severe cases, such institutions might be forced to close their operation if they cannot solve their mentioned financial problems (Aryantini, S., & Jumono, S. 2021). Effective liquidity management is regarded as the back bone of the economy, as its absence would shrink financial markets, compelling them to cease their operations. Kenya has not been an exception in poor liquidity management because the liquidity constraints have been persistent, resulting in loss of public confidence in the banking industry. . Kenya's unstable financial system hurts both the economy and its citizens equally. However, a person is not given the choice of waiting for the financial crisis to pass before investing when it does. People are less likely to invest in banks due to the financial institution's declining reputation since they are concerned about receiving no interest or losing their money. To make informed decisions that would be significant in the current financial environment, it is necessary to have a sufficient understanding of the financial environment. The kind of protection that customers have in Kenya is on making the best advice regarding their financial choices. Deflation is coming at an

accelerated speed that will really affect the Kenyan economy. The reduced concern in liquidity management might cause significant harm to the Kenyan economy than it has done currently (Niu, Y., Yang, J., Wu, Y., & Zhao, S. 2022).

Different scholars use liquidity management in measuring the performance of a financial institution. Similarly, this study will also be using liquidity in measuring the performance of Commercial banks in Kenya. The digital application level in a company has been the main measure used by different researchers to examine the effectiveness of liquidity management. Most of the current Kenyan commercial banks have been keen to respond to liquidity management tied with the impact of other regulation changes that have been transforming the banking business models and the structure of the operation of commercial banks in Kenya as hinted by Alemayehu and Ndung'u (2012)

1.1.3 Digitization and Liquidity management

According to Muriithi and Waweru (2017), commercial banks operate in unstable environment such that any technological obsolescence tends to affect operation of banks. This means that the more a bank could respond within the technological variations; the more effective the banks would be able to adopt the operations within the technological era. However, the response towards technological variations may not only retain the consumers but also raise the number of clients. The technology within the banking has hence been raising the transactions, that do not only have an effect on the banks Profitability but also prove of being effective in liquidity managing. The application of the online and mobile banking as well as the ATM banking are creative in lowering the cost and speeding up the payments. The Electronic funds transfer enables instant global access to the financial information that allow clients in transacting at any time irrespective of the locations. Nevertheless within the study done by Kondabagil and Kondabagil (2007), in the efficiency undertaken through effects of digitization that were been on the rise deposits in the customers within the efficiency of within operations of the cash.

High level of liquidity is always required in virtual banks as compared to the traditional banks. This is because traditional banks believe that liquidity risk is high. The virtual commercial banks based on external parameters in evaluating the risk of any credit as compared to the branched counterpart with direct link consumers (Muriithi and Waweru, 2017). Indirect loan appraisal has

been exposing banks to higher risks as they sometimes give live loans to many customers who turn out to be defaulters. However, the ease of money access has been supplemented with electronic banking as the banks have the authority to access the financial status of the customers to identify the loan limit that a borrower would repay after sometime. Wang, Cho, and Denton (2017) mentions that online and mobile banking adopted by various banks in Kenya have increased the movement of cash to and from the customers as compared to the traditional method of banking operations. This has been ensuring that the commercial banks have sufficient collateral to be applied in achieving temporary support on liquidity.

Commercial banks have currently been able to grant their customers mobile loans, which a customer can apply without any collateral. Customers have varying loan limits depending on the activity that a client has been showing within period of time (Wang, Cho & Denton, 2017). These loans have been earning interests to the banks and making the companies more liquid. The loans have short maturity periods which increases the recovery rate of the loans. The risk within offering loan to clients which are low as a result of short life that commercial banks could easily be checked as regarded to long-term loans. Commercial Banks also checked internet banks where the collection accounts for electricity and other bills. The customer may transfer money to pay the bills directly from their accounts. An increased number of the collection accounts increases the number of payments that customers makes for various companies that further have an increase in liquidity advantage. The flexibility and accessibility of transactions done by customers opens ways for a bank to access the competitive prices and returns in the market as cited by Birch and Young (1997). Convenience is one of the factors that allows more customers to use internet banking. In the recent past, customers are not fond of visiting the bank lobby because they have narrowed down to internet banking in doing their transaction at their places of convenience. Besides, the increase in number of points of sale from the banks through the bank agents have been ensuring the formal banking popular in the remotes area with people getting the chance to deposit their cash within their localities.

1.1.4 Commercial Banks in Kenya

The banking sector has been under the control of the Central Bank since time immemorial. Banking Act, Company Act and Central Bank Act have been in direct link with the government of the banking industry since independence (CBK, 2021). The CBK is the banker in charge of other banking institutions because they regulate all banks in Kenya. The CBK operate under the Kenyan law to provide sensible guidelines that govern the banking Industry.

Ministry of Finance houses all the operations of CBK while they play a significant role on enacting monetary policies, controlling solvency, fostering liquidity and the financial performance of the country is stable. CBK, as the lender of last resort can regulate the cash flow of the banks which are unable to pull through because of heavy loans. The banks in Kenya also have an association called the KBA, the Kenya Bankers Association that creates a shade for all banks in Kenya (CBK, 2021). Besides, the associations look forward to protecting the interest of the bankers by addressing various issues affecting their members. Liberalization of Banking in Kenya was done in 1995 through lifting of exchange controls.

The challenges faced by the industry in the recent past have been devastating because of the numerous regulatory and financial in the past. In 2016, CBK gave a directive that all banks to conform to the interest capping law. These include some of the policies that has been affecting the industry. Besides, the global crisis has been affecting the banking industry especially on the reduction in trade, mobilization of deposits and the decline in the interest margins which most of the banks use in raising their profitability. Irungu (2013) relay more information on the crisis by mentioning that the reforms have been accelerating changes in the industry to adopt the modern trends that would aid the banks in increasing profitability.

Kenyan banking industry has 43 commercial banks. The total asset size has been increasing by 5% from 2012. By the end of 2020, the asset base in the industry had increased to Ksh. 1.3trillion (CBK, 2021). The commercial banks have been dominating the industry because of their key role in facilitating the flow of funds and offering wide range of financial services across the country. The majority function of the commercial banks has been to keep the customer's money safe and facilitate transfer of the client money from one account to the net upon client's request.

The competition within the banking sector has been on the incline in the recent past with the

number of commercial banks and FinTech companies in the industry. In keeping up with the competition, the banks have been forced to adopt E-banking and partnering with developed FinTech companies like Safaricom to gain a large market share. (Irungu, 2016) All banks in Kenya have partnered with Safaricom to allow customers access their accounts through the mobile banking. This has influenced the service delivery and changed business model in different banks in the country.

1.2 Research Problem

The concept of management of liquidity is a point of concern to all banks in Kenya. This brings in the question on the best ways that these banks can have effective management of liquidity. The banking sector is highly competitive with the banks development both internally and externally, model which could ensure that they thrive within the competitive market. The new trends and model developments within the banks are geared in improving the efficiency, coming up with a relationship with consumers, and coming up with products which align to the taste of the consumers. The banks have been embracing digital migration concept by adopting electronic banking that has been enabling the banks boost their revenues in the recent past (Mateka, Gogo & Omagwa, 2017). Among the advantages that banks gain from the digital idea are cost reduction and improved business administration. It has become necessary to leverage technological innovation to enable upgrading bank operations in order to address the issues that have been plaguing the sector.

Adoption of the modern technology in the operation of various banks within the country has been playing a significant role in transitioning the banks from the traditional ways of conducting business to the modern ways of operations. The need to revolutionize the commercial banks has made the banks to become more innovative, effective, responsive, and efficient in their business operations. The use of the new technology has given the banks opportunity to develop their products, reduce lead time in delivering services, expand and improve customer satisfaction levels (Mairura, Ngugi & Kanali, 2016). The use of technology has been appealing towards the service providers since it reduces the cost of labor, standardizes delivery of services, and expand the delivery option to the consumers. What about Kenyan commercial Banks? What is the contextual argument?

Numerous scholars have conducted different studies on digitization to determine the effect that it has on the operation of businesses in different industries. The study launched by Njogu (2016) on impact of digitalization commented that digitalization has an influence on currency. The focus of the study was to unveil developments in technology and challenges while focusing on digital migration to solve real problems in mining, shipping, and agricultural sectors. The study established out that digitalization has been changing every field that involves diagnosis, control, and measurement.

Leatherman (2016) established a survey on digitalization of the society in US where the study commented that internet based economy is transforming the traditional ways of operations with most of the designs adapting technological innovation such as use of cloud. The study concluded that the aspect of digitalization is a prerequisite for all companies wishing to thrive in the digital age. This has been compelling various companies to have the thinking on digitization to rethink about their future. The study done by Ahiadorme (2018) also conforms to the aspect that global technological migration has been transforming the labor market with most of the companies registering employees with steady technological skills that would make these companies thrive in the digital era. However, both studies agree on the fact that digital migration has been causing both positive and negative effect on industries and the society (Ahiadorme,2018). On the positive end, the need for digital migration has been increasing autonomy of workers while enhancing the balance of work in the industry. Besides, the negative impact has been on the strain on employment.

Mwangi (2018) undertook a study on the effect of digitalization on the future with an objective of determining how the changes in the business have been evolving with the digital era. He found out that digitalization innovates the entire system. The developing universe which has been rendering any traditional model of business in vain, as a brave world replaces the model of businesses in aligning the needs of consumers. The study expounds on the disruptive impact of digital migration on the banking value chain. The impact of E-Banking on bank liquidity management has not been identified by the studies mentioned above. This study will look for solutions to the questions of what impact electronic banking has on banking industry liquidity management. Therefore, the research will respond to the following question: What impact does digitization have on Kenyan commercial banks' liquidity management?

1.3 Research Objective

To identify the effect of Digitization of Financial Services towards the liquidity of the Kenyan Banking industry.

1.4 Value of the Study

The results of this research will be targeting all commercial banks in Kenya. The management will use the information in the implementation and making strategic decisions that would gear the banks to increasing profitability. The study will be equipping bank managers with necessary skills to manage liquidity and have adequate analysis on the factors affecting banks concerning digitization and technology that would enable them to innovate, maintain products, develop models and structures that would give banks a competitive advantage.

The policy makers will as well benefit from the results of the study by making major decisions that affect the banking industry. Bankers Association of Kenya will be having a better understanding of the industry by offering best advises to the members on the modern ways that would aid the banks in managing client's satisfaction and achieving effective liquidity management (Irungu, 2013).

Different scholars will depend on the outcome of this study, as they will praise the additional knowledge on link between Digitization and liquidity within Banking industry in Kenya. It will as well provide future reference for coming studies on the areas that need further research in the banking industry.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter shows that concept of Digitization as well as its effects on liquidity management of the commercial banks in Kenya. The chapter also reveals the relevant literature applied by scholars within the same field in Kenya and internationally. It shows the theories applied in explaining the results and reviewing of the empirical literature.

2.2 Theoretical Framework

This study considered the impact of digitization of Financial Services on liquidity management of the banking industry in Kenya. It considered IDT authored through Rogers (1995) and used TAM authored by Davis (1989) as two theories used by many researchers to influence the effect of digitization of financial Services on the liquidity management of financial institutions.

2.2.1 Innovation Diffusion Theory (IDT)

The IDT has been used in the past to offer a foundation towards diffusion of technology innovation. The theory offers an effective technology adoption technique that has been effective in examining technology (Rogers, 1995). Some of the major elements of the theory include communication channel, time, innovation and social system as cited by Rogers (1995). Kiplang'at and Ocholla (2005) further posit that the user should perceive innovation as a new thing influenced by different factors. These factors include complexity, Observability, Relative Advantage and Trial-ability. The mentioned affect the adoption of innovation of a system. Therefore, it will be studied on the digitization of financial services, which is a new system in the financial systems. However, some of the factors have additional expansion using the Internet of Things (IoT) with the introduction of perceived ease of use of digitization of financial services, which will also be explored in the study (Wani & Ali,2015).

Secondly, the theory has sections talking about communication, which the author describes as having a different role in innovation decision process. The study will be relevant in the study by adding in the examination of decision-making, variation of agents and training on communication structure that has been effective in the implementation and adoption of digitization of financial services in Kenya. Thirdly,the author further explained that each type of innovation has to include the time factor; for instance, the process of innovation, innovativeness

of a person and the rate of adoption experienced in an institution. Digitization of financial Services is a system that takes time to implement hence the study will seek to align to the three aspects of the time as noted by Rogers (1995). However, the theory has some limitations that limit scholars from adopting the approach. For instance, the theory does not foster a participatory approach to adoption of programs in an institution; the relative advantage of the theory in explaining effect of digitization on managing liquidity in commercial banks.

2.2.2 Technology Acceptance Model (TAM)

The theory entails two main frameworks known as the perceived usefulness (PU) of the system and perceived ease of use (PEOU) as cited by Scherer, Siddiq and Tondeur, (2019). Davis defines Perceived use as degree to which a user accepts that a particular technology would have a positive impact on the performance. Conversely, perceived ease of use refers to the degree of easiness that a person would have by applying a particular system that includes adoption, satisfaction, and an attitude towards technology.

Despite the usefulness of the theoretical model, other scholars have criticized the model to behaving numerous demerits. Hence, this study will also adopt it help in examining how individual factors can influence the implementation of digitization of financial services in commercial banks in Kenya, checking both the usefulness and the ease of use of the system. The theories explain how innovation in the commercial banks such as mobile banking as well as internet banking are been accepted by consumers and have been of great usefulness.

2.3 Determinants of Liquidity Management of Commercial Banks

According to Lucchetta's 2007 study, size of the financial institution and central bank regulation are two of the key factors affecting liquidity. According to Delechat et al. (2012), among the elements that influence a bank's liquidity are opportunity costs, macroeconomic fundamentals, and funding shocks

2.3.1 Digitization

Rouse and Verhoef (2016) conducted a research on the banking industry in African countries where they revealed any African country through the opportunity to change its systems to enable

compete with international systems in first world nations. Various scholars reveal that technology has effects on applications and acceptance of managing financial services. The globalization rise has expanded economy of nations beyond the borders. The narrative, thinking, and beliefs of places is changing within the society affecting the demands of a number people within the world to reveal towards coming up with operations. Castells (2010) reveal digitization as a major move that industrialized countries have on 21st century.

In Kenya, Mwangi,(2018)conducted a research and established effective application of liquidity managing information systems is critical to development of banks. The commercial banks have also has experienced a large digital migration within a major change from traditional towards the banking issues. Internet, mobile banking, and ATMs is a major adopting applied through the banks to champions its agenda. The ATMs opening within different locations has been affecting branch networks allowing several customers to get their funds from various locations. The Atm technology have changed the banking systems and raised the amount of people getting the services within the day.

The research done by Dabholkar (1994) shows the banks have been endorsing a greater control of their liquidity with the clients with direct with control. However, a client having internet banking may have a bit of control on cash. Nevertheless, the competitions within the banking sector has been showing towards a banking system which offers quality and proper banking services. A client may consider efficiency with speed as major factor which would describe their stay in a bank. They believe any reason behind starting the internet banking through a bank was to achieve efficiency. Shankar and Jebarajakirthy (2019) define digitization as the providing of the banking services over the internet communication channel. Digitization is an electronic consumer interface which acts as a bank.

2.3.2 CBK Regulations

Each commercial bank in Kenya is required to abide by these rules, which outline the monetary policies and minimal reserve requirements, in order to conduct business. Lucchett (2007) highlights that in Kenya, since CBK also controls prices, interests, inflation, and financial stability, the minimum statutory limit is 20%. Because commercial banks have a large lending

capacity, an increase in the monetary policy interest rate would therefore raise their risks.

2.3.3 Size of the Financial Institutions

The network of a financial institution is imperative in reacting towards the monetary policies set by the CBK. Inter-bank flows enable the smaller banks to have effective management of their loan portfolio after the monetary contraction. The size of the financial institution affects the banks liquidity position negatively. Large commercial banks can arrange funds from external sources while smaller would be trying to maintain liquidity. Therefore, as the size of the financial institution increases the liquidity buffer of the banks would decrease.

In the study done by Gambacorta (2009), he noted that in terms of lending, size did not have an effect on the banks' ability to respond to the policy impulse. This could be coming from the effective relationship with the customers that aids in smoothing the process. The Liquidity remains important factor which enables the commercial banks in reducing the impact of decreasing deposits due to lending.

2.4 Empirical Review

The primary focus of the Deyoung et al. (2007) study was the influence of the internet on the performance of several community banking industry in the US from 1999 to 2001. The findings demonstrated that banks' profitability increased as a result of their shift to digital operations. Similar to this, Ceylan et al. (2008) used 14 Turkish commercial and savings banks to conduct the same study in Turkey. In establishing the effect of digitization on profitability figures reported in 1996 and 2005, they employed particular economic indicators. According to the study's findings, Turkish commercial banks have been performing better as a result of electronic banking.

Sathye (2005) performed a research on effectiveness of internet banking on performances as well as the operating risk condition of credit union in Australia. This revealed that there was no relationship among internet banking and operating risk profiling of banks in Australia. Similarly, Hasan *et al.* (2002) carried out a study whether financial institutions operating on electronic banking were registering a higher performance compared to those that had not. They found out

that the latter was registering a better performance than the former groups.

Numerous studies have been carried out to determine the connection between electronic banking and liquidity control in different financial organizations. According to the study done by Gakure and Ngumi (2013) the profits made by a bank often depend on the adoption of digital technology in the operation of a particular financial institutions. The study proved that increase in earning and reduction of operation cost by the Kenyan banks is connected to the rise of digital technology of the internal and mobile banking. Researchers have also mentioned that investing highly on such incentives would trigger application of other better banking technology that would have a great impact on the banks. Besides, it would lead to an increase in the effectiveness of technology in various financial institutions. Mwanja and Muganda (2011) commented that financial innovation is one of the most significant contributions that would have an impact on the performance of the banks by allowing most banks to have an effective management of their liquidity. On the other hand study done by Kombe and Wafula agrees with the assertion of Mwanja and Muganda (2011) by noting that electronic banking results in faster delivery of the services and ensuring that the delivered services are of high quality. The need to deliver faster and quality services compelled most banks to adopt ICT as opposed to cost cutting policies.

An investigation on how electronic banking affect financial performance launched by Muyoka (2014) found a significant relationship between mobile banking and growth of the commercial banks in Kenya. The banks that have embraced ICT have the ability to gain larger market share in the industry. This implies that banks had higher chances of receiving high Returns on Investment (ROI) because of the increased profitability created by the digital migration.

2.5 Summary of literature review and Research gap

It is evident from the above discussions that there exists a connection between digitization of financial services and liquidity management of banks. However, this study will add assistances on digitization on liquidity management, which have been narrowly looked at by scholars. The empirical literature discussed in the study have majored on electronic banking, mobile banking and ATMs as some of the major applications of technology that banks have been using to measure performance and profitability. However, the link between liquidity management and electronic banking has narrowly being looked at, This study has tried to address this gap.

2.6 Conceptual model

This study is based on the following conceptual model.

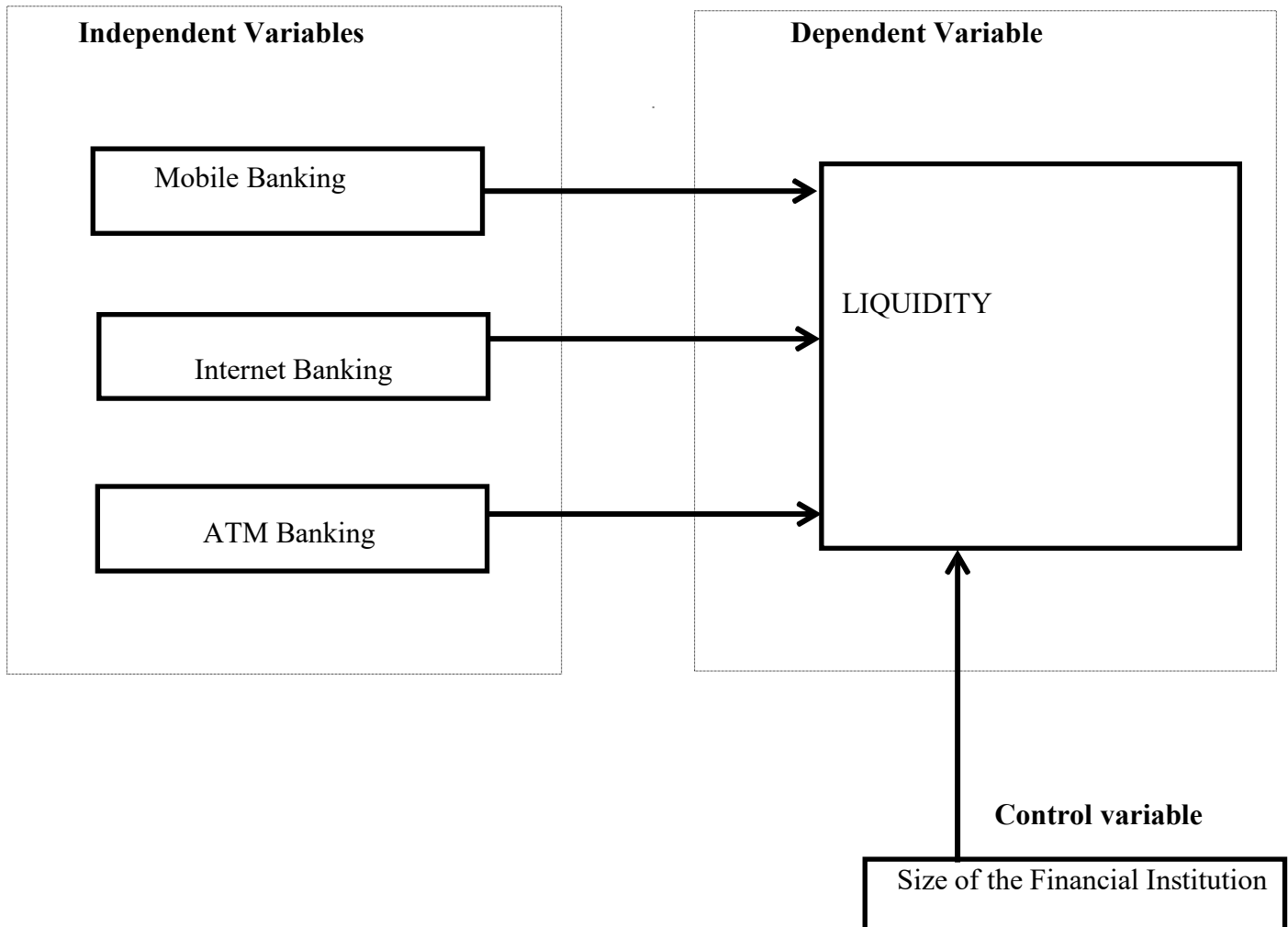


Figure 2.1 Source, Author (2022).

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The technique and study strategy that was used to address the research problem regarding effect of financial service digitalization on the liquidity management of banking industry in Kenya are highlighted in this part. The technique for design, sample, population, data collecting, and data analysis were considered in this part.

3.2 Research Design

The study applied a longitudinal design because it used the same data that has been used overtime. The study done by Morgan (2007), comments that the design involves description of relationship between different variables. The choice of the descriptive research design came from its ability to find out the way things are. The study used a census study depending on the information from data collected by the CBK regarding the liquidity of commercial Banks in Kenya.

3.3 Population of the study

The Kenya commercial banks was the population considered by the study. The information incorporated from CBK reveals that there were 43 institutions in the banking industry by 2016. The private institutions were 39 banks, 1 was a mortgage bank and three public owned banks. The study divided the banks into type 1, type 2 and type 3. The banks falling under the category of type 1 are those with balance sheet of more than 50 billion. About 6 banks qualified for this group with a collective control of 49.9 percent of the market. Type 2, are banks with 10-50 billion in total assets. The data from CBK showed that 16 of the banks qualified for type 2 category. The last category is the banks which had less than 10 billion in total assets and 21 banks qualify for this category.

3.4 Data Collection

The study gathered quantitative data from secondary sources. CBK database acted as the major source of information on liquidity of commercial banks recorded between 2015 and 2020. This data collection method was adopted in order to amass sufficient records and to help in facilitating

the evaluation of the issue under study.

3.5 Diagnostic Tests

The research endeavored non-violation of the assumptions of the LMR before estimation of the research questions. This aided to avoid the risk of obtaining biased, inefficient, and inconsistent parameters used in estimation. Therefore, the following diagnostic tests were conducted to be certain on accurate specification of research questions: The Test for normality, multicollinearity, Test for Autocorrelation and Test for Heteroskedasticity were used.

3.5.1 Test for normality

Independent or explanatory variables in a regression should satisfy the condition of normality. The Shapiro-wilk test and the Jacque-Bera test for normality were used to check whether this condition was satisfied.

3.5.2 Test for Multi-collinearity

Multi-collinearity was tested through the use of correlation matrix in the point of the reference involving the multi-collinearity could be 0.8 (Guajarel, 2003; Cooperand Schindler, 2008). Failure to account for perfect multicollinearity would have given inconsistent results, large standard errors would have affecting the decision of whether to accept or reject the null hypothesis.

3.5.3 Test for Autocorrelation

As a requirement for the ordinary least squares, regression there should be no serial correlation between the error terms. To consider this, a Durbin-Watson test for autocorrelation was used.

3.5.4 Test for Heteroskedasticity

Under ordinary least squares regression, the assumption is we have constant variance across all observation, failure to which is Heteroskedasticity. When there is a problem of Heteroskedasticity in the data, the estimated parameters are likely to be inconsistent. The Breush-Pagan test was applied to test for the presence of Heteroskedasticity in the data as a requirement for regression model.

3.6 Data analysis

The secondary data adopted from the CBK was effective in calculating the mean of average rate of internet banking transactions that different banks have been recording in the past. Mean on bank size, mobile transactions and liquidity would as well be incorporated from the secondary data.

The study used the regression equation through regression analysis to predict the contributing factors that needed to be considered in the effective management of liquidity at significance level at $P > 0.05$.

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4$$

Where

Y = the predicted or expected value of the dependent variable (Liquidity management),

X_1 = The Average value of Internet Banking transactions

X_2 = The Average value of Mobile Banking transactions

X_3 = The Average value of ATM Banking transactions

X_4 = Bank Size

b_0 = Y-intercept

b_1 through b_3 = regression Coefficients

3.6.1 Operationalization of the Variables

Y-intercept, which within the liquidity management of the commercial banks, were evaluated in the current ratio involved within the 43 banks. The ratio was given by the current assets given as a proportion of the current liabilities. The ratio showed ability of the commercial banks to meet the current obligations from the existing assets.

X_1 = Total value of all the Internet Banking Transactions

Total value of all transactions

X_2 = Total value of Mobile Banking Transaction

Total value of all transactions

X3= $\frac{\text{Total value of ATM bank transaction}}{\text{Total value of all transactions}}$

X4= Size of Banks

The natural logarithm of total assets of the commercial bank provided the measure for the use of the bank where the assets as well involved the total loans. A commercial Bank could be allowed to lend through CBK regulates the reserve and its operational requirements. This implies that assets were appropriate measure that this study adopted.

3.6.2 Test of Significance

The F-test was applied in testing significance of current model within 95% confidence interval as well as the 5% level of significance.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the research's findings on how Kenya's commercial banks' liquidity has been affected by the digitization of financial services. The data was provided by Kenyan commercial banks and the Central Bank of Kenya. Regression analysis was used to assess how digitizing financial services banking has affected Kenya's commercial banks' ability to manage their liquidity. 2015 to 2020 was the study's five-year time range.

4.2 Digitization of Financial services

The goal of the study was to determine how the digitization of financial services has an impact on the liquidity management of Kenyan commercial banks. The study considered digitization platforms like Internet, mobile, and Automated Teller Machine (ATM) banking. We gathered and looked at the overall number of transactions and their total dollar amount.

4.2.1 ATM Banking

Table 4.1: ATM Banking

Year	Number of Transactions (000)	Value of Transactions (000)	Mean (000)
2015	5507	117627	21.36
2016	6827	140825	20.63
2017	7283	156892	21.54
2018	9040	171930	19.01
2019	6666	38094	5.71
2020	2123	10279	4.84

Source: The Central Bank of Kenya

It is evident from above that the number of transactions gradually decreased over time. There were close to the 5507 ATM transactions in the year 2015, with a total transaction amount of

\$117627 and an average transaction value of 21.36. The banks logged 6827 transaction in total, worth \$140825 in total, with an average transaction values of 20.63 in 2016. The second-highest number of ATM transactions 7283 with a total value of \$156892 and an average value of \$21.54 were made by banks in 2017. In 2018, we had 9040 ATM transaction with a total value of \$171930, nevertheless average values of the ATMs decreased to 19.01 transactions. The numbers continued to decline, and in 2019 there were 6666 transactions with total values of 38094 and an average value of 5.71. In 2020, there were 2123 total transactions, a further decline of higher than 60% from the previous year, with a total transaction value of 10279 and an average value of 4.84.

According to the data, ATM usage climbed, up to 2018, and the total amount of transactions followed a similar trend. Since 2018, the average ATM transaction value has been declining.

4.2.2 Mobile Banking

Table 4.2: Mobile Banking

Year	Number of Transactions		Value of Transactions	
	(000)		(000)	Mean(000)
2015	311		732	2.35
2016	433		1169	2.70
2017	577		1544	2.67
2018	732		1901	2.59
2019	911		2371	2.60
2020	1114		2816	2.52

Source: The Central Bank of Kenya

As volume of transaction increase over time, value of transactions increases. There were close to 311 mobile banking transactions in year 2015, with aggregate value of 732 and an average value of 2.35 for the transactions. The total value of mobile banking transaction increased to 433 in 2016, and the value of those transactions increased to 1169. In the year 2017, saw the banks

report 577 transactions totaling 1544 dollars, making the average transaction value 2.67. There were 732 transactions nationwide in 2018, with a total transaction value of \$1,013. The banks reported an increase in transactions in 2019 to 911, with a total transaction value of 2371 and an average value of 2.60. The most mobile banking transactions ever were made in 2020 compared to earlier years. The 1114 mobile banking transactions in total, with a value of 2816 registered by banks. As a result, the average transaction value for that year was 2.52.

According to the data, mobile banking transactions were growing in both quantity and value every year. Mobile banking is a time-dependent phenomenon in that it changes throughout time in response to inventions and technological advancements (Kamukama & Tumwine, 2012).

Table 4.3: Internet banking

Year	Number of Transactions	Value of Transactions	
	(000)	(000)	Mean (000)
2015	240	9450	39.38
2016	460	13870	30.15
2017	580	15900	27.41
2018	670	17780	26.54
2019	760	18980	24.97
2020	980	19670	20.07

Source: Central Bank of Kenya

According to the table, both the quantity and value of internet banking transactions are rising annually. Despite a rise in both the quantity and total dollar amount of transactions, the average transaction value is falling year after year. The banks tracked 240 internet banking transactions totaling 9450 dollars in 2015, with an average transaction value of 39.38 dollars.

The number of internet banking transactions increased to 980 that year, and their total value increased to 19670 as compared to figures from the year 2020. The average transaction value decreased to 20.07, which is a 48.06% decline, despite a very significant growth in both transaction value and overall transaction volume. This demonstrates that a boost in online

banking led to an increase in the overall value of transactions but a fall in the average transaction value.

4.2.3 Size of the Bank

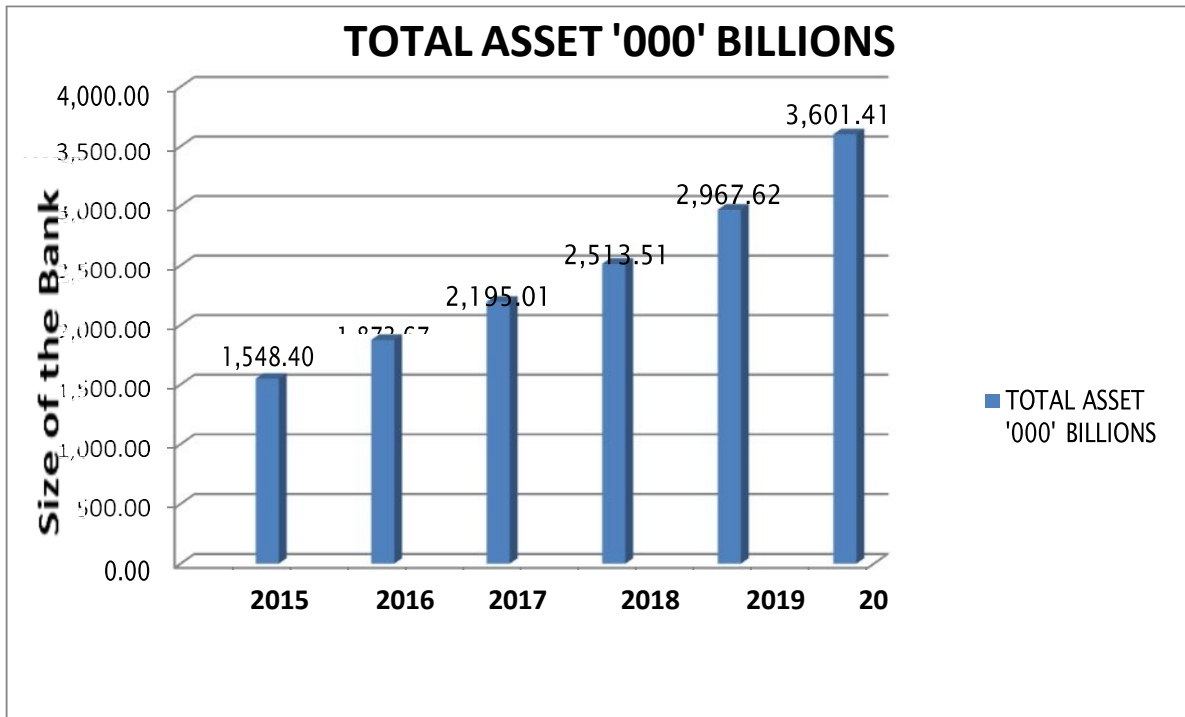


Figure 4.1: Size of the Bank

Source: Central Bank of Kenya

it is clear from the accompanying graph that banks have grown in size year after year. The total assets of the banks in 2015 were \$1548.40. In 2016, the banks' total assets climbed by 21%, reaching a new high of 1873.67. When compared to 2015, the banks' total assets climbed by more than 100% in 2020.

4.3 Regression analysis

The objective of the study was to examine how the independent variables Internet banking, mobile banking and ATM banking affected how Kenyan commercial banks managed their liquidity.

Table 4.4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.875 ^a	.765	.821	.17412

Source: Research Data (2022)

According to the R findings, commercial banks' liquidity management and the digitization of financial services have a very beneficial link. Evidently, banks that have adopted financial service digitization have greater liquidity than those that have not. Digitization of financial services has made banking more effective, convenient, reachable, and adaptable with 24-hour availability, which is advantageous for mobilizing cash deposits.

According to the aforementioned data, adjusted R squared was 0.821, which at a 95% confidence level indicates that there was a difference of 82.1% in the liquidity of commercial banks in Kenya as a result variation in ATM banking, mobile banking, internet banking, and bank size. This demonstrates that changes in internet banking, ATM banking, mobile banking, and bank size could account for 82.1% of variations in the liquidity of commercial banks.

Table 4.5 Test of Significance (F-Test)

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	24.321	4	4.864	10.652	0.000 ^b
Within Groups	17.146	37	0.463		
Total	41.467	42			

The F-Test table above shows the regression models ideal significance level of 0% and a low probability of making unreasonable predictions. The model is useful for referring to a

conclusion from data since the level of significance (p-value) is less than 5%.

4.4 The Regression Model

Table 4.6: Coefficients of the regression model

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.582	.221		2.633	.000
ATM banking (X ₁)	0.478	.077	0.514	6.207	.003
Internet banking (X ₂)	0.355	.102	.352	3.481	.028
Mobile banking (X ₃)	0.322	.142	.425	2.267	.045
Size of the bank (X ₄)	0.256	.113	.301	2.274	.040

Source: Research Data (2022)

The model was developed to be;

$$Y = 0.582 + 0.478X_1 + 0.355X_2 + 0.322X_3 + 0.256X_4$$

The liquidity of the banks will be 0.582 when all other factors, such as bank size, Internet banking, mobile banking, and ATM banking, are held constant. A unit ATM banking growth boosts commercial banks' liquidity by 0.478. The convenience of cash deposit as opposed to the conventional queue method can be attributed to the high effect. The liquidity of commercial

banks is increased by 0.355 for every unit rise in internet banking. This is relevant given the widespread use of the internet, which gives banks access to a larger market for creating new accounts and receiving monetary deposits. The liquidity of commercial banks is increased by 0.322 for every unit rise in mobile banking. The current surge of mobile banking can be linked to an increase in bank liquidity caused by mobile banking. A unit increase in size of the bank increases liquidity of commercial banks by 0.256.

4.5 Interpretation of the Findings

The findings indicate that the growth of electronic banking, including internet banking, ATM banking, and mobile banking, has a major impact on the liquidity of commercial banks in Kenya, with a 95% confidence level. The coefficient analysis reveals a significant correlation between ATM banking and commercial banks' liquidity. Along with the banks' expanding usage of ATMs, the value of the transactions rose considerably. The usage of ATM banking increases with bank liquidity, maybe in part because automated cash deposits are more efficient than standing in line in banking halls. The study also found a strong association between Internet banking and the liquidity of Kenyan commercial banks. as the number of transactions made online rises as well as the sum total of the transactions increased. Cash deposits have increased as a result of improved internet connectivity and banks' capacity to promote and mobilize new accounts. Most adults now consider having a mobile phone to be a necessity from which they can quickly access banking services and applications. Transactions in mobile banking rose over time, much as those in internet banking, and this might be related to the increased accessibility of mobile phones over time and institutions' significant investment in mobile banking technology. This type of banking is primarily conducted through bank representatives and merchants in urban areas and cities where deposits and withdrawals are practically cancelled. Growth of banks permits the extension of banking services to remote locations where money is transferred from mattresses to accounts, which may account for the increase in size.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In order to determine how the digitization of financial services affects the liquidity of Kenyan commercial banks, this chapter provides the study's findings, conclusions, and recommendations. Conclusions are drawn from the study's data analysis and data collection findings. Recommendations and possible study areas were determined from the conclusion. The latter will fill in knowledge gaps on subjects pertaining to studies.

5.2 Summary of Findings

The goal of the study was to ascertain how Kenya's commercial banks' capacity to manage their liquidity was impacted by the digitization of financial services. Its guiding concepts were independent variables like ATM banks, mobile banks, Internet bank, and bank size. The result made ensure it is evident each of independent variables show positive relationship with liquidity of the commercial bank. ATM usage show the most effect; for a unit increase in ATM banking, banks' liquidity rose by 0.478. As more people use mobile banking, bank liquidity climbs. The accessibility of mobile phones, the preference for digital accounts over real currency, as well as banks' investments in mobile banking, can all be credited with the rising number and value of mobile banking transactions.

The management of commercial banks' liquidity in Kenya was statistically associated with the digitalization of financial services, according to data. The advantages of efficiency, adaptability, comfort, effectiveness, accessibility, accuracy, variety of products, and automation The digitization of financial services, which draws more clients, especially the young and productive, is linked to data with value-added banking services. The digitization of financial services has made formal banking possible rather than the time-consuming and more difficult-to-access branches.

5.3 Conclusion

The goal of the study was to discover how the liquidity of Kenyan commercial banks was impacted by ATM, internet, and mobile banking. The study discovered a statistically significant link between digitizing financial services and maintaining the liquidity of Kenyan commercial banks. The study found a significant positive correlation.

The liquidity of commercial banks increases in tandem with an increase in bank size. A bank's procedures and products' level of automation affects 82.1% of changes in liquidity. Thanks to ATMs, mobile devices, and the internet, banks today have the technological foundation for rapid, simple, and flexible banking. They have made it easier for a wide range of clients to examine them and are frequently affordable, a development that has encouraged unbanked people to open accounts. The digitalization of financial services has been embraced by several banks as a performance strategy, particularly to onboard as many people as possible and draw in cash deposits. Interest on loans makes up the majority of a bank's income. How effectively customer deposits are used to fund loans is one crucial consideration. banks perform is their liquidity.

5.4 Recommendations

Banks should digitize financial services in order to benefit from the accessibility of banking products, cheaper costs, more efficiency, and flexibility. Digitization has great impact on banks liquidity, Therefore, banks should invest more on these digitization channels.

With increased bank size comes increased liquidity. As brick and mortar banking is progressively being supplanted by technology, banks may choose to market digitization rather than constructing new branches in order to draw in more customers and increase the loan asset.

5.5 Limitations of the study

The study's focus was on how the digitization of financial services has an impact on the liquidity of Kenya's commercial banks. Commercial banks' competitiveness, monetary policies, CBK liquidity ratio, unemployment, banking crises, CBK rules, other products they offer, the volume and variety of their clients, and their market share are additional factors that affect their liquidity. For instance, the customer of a bank may influence its cash situation. If a significant section of a bank's customer base is comprised of low-income individuals, it may be less liquid than a

competitor with more clients but significant deposits.

The study made extensive use of secondary data from CBK and commercial banks. These reports' level of precision and accuracy depended on the data. Only a 5-year period, between 2015 and 2020, was used for the study. In addition, only the 43 commercial banks in Kenya were included in the poll. Other non-bank institutions that use electronic banking, like mobile phone money transfers, were not considered in the study.

5.6 Areas of Further Research

The study's objective was to ascertain how the digitization of financial services had an impact on the liquidity management of Kenyan commercial banks. However, the digitization of financial services, liquidity management, and other factors have an impact on how well banks perform. Future research on the impact of liquidity on the financial performance of Kenyan commercial banks may be essential in shedding light on why liquidity is such a vital element in determining the banks' financial success. Once more, some firms are profitable but fail. Others are more profitable yet less liquid. To ascertain whether this is true for banks, it is crucial to do study.

Further study should be conducted to discover these other incentives because banks digitize financial services for reasons other than liquidity, such as to increase market share and gain competitive advantage. The study's exclusive focus on Kenyan commercial banks raises the need for further investigation into the factors affecting the liquidity of other financial institutions, including micro-lending institutions, telecommunication companies, financial markets, and insurance companies.

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APPENDICES

APPENDIX I: Research Data 2022

	ATM BANKING	MOBILE BANKING	INTERNET BANKING
NO. OF BANKS CONSIDERED - 43			
2015			
NUMBER OF TXNS '000' MILLIONS	5507.32	311.05	0.24
VALUE OF TXNS '000'MILLIONS	117627	732.52	9.45
2016			
NUMBER OF TXN '000'MILLIONS	6827.41	433.00	0.46
VALUE OF TXNS '000' MILLIONS	140825	1169.15	13.87
2017			
NUMBER OF TXNS '000'MILLIONS	7283.75	577.3742	0.58
VALUE OF TXN '000'	156892.00	1544.81	15.90

MILLIONS			
2018			
NUMBER OF TXN			
'000'MILLIONS	9040.82	732.5971	0.67
VALUE OF TXN '000'	171,930.00	1901.559	17.78
MILLIONS			
2019			
NUMBER OF TXN	6666.99		
'000'MILLIONS		911.31	0.76
VALUE OF TXN '000'	38094.00	2371.79	18.98
MILLIONS			
2020			
NUMBER OF TXN '000'			
MILLIONS	2123.82	1114.18	0.98
VALUE OF TXN '000'	10279.00	2816.1	19.67
MILLIONS			

APPENDIX II: List of Commercial Banks

A. Foreign Owned Institutions

1. Foreign owned not Locally Incorporated

- i. Bank of India
- ii. Citibank N.A.Kenya
- iii. Habib Bank A.G.Zurich
- iv. Habib Bank Ltd.

2. Foreign Owned but Locally Incorporated Institutions (Partly owned by locals)

- i. Bank of Baroda(K)Ltd.
- ii. ABSA Bank Kenya Plc
- iii. Diamond Trust Bank Kenya Ltd.
- iv. K-Rep Bank Ltd.
- v. Standard Chartered Bank(K) Ltd.
- vi. Eco bank Ltd
- vii. Gulf Africa Bank(K)Ltd
- viii. First Community Bank.

3. Foreign owned but Locally Incorporated Institutions

- i. Bank of Africa(K)Ltd
- ii. UBA Kenya Bank Limited

B. Institutions with Government Participation

- i. Consolidated Bank of Kenya Ltd.
- ii. Development Bank of Kenya Ltd.
- iii. Kenya Commercial Bank Ltd.
- iv. National Bank of Kenya.
- v. Stanbic Bank Ltd.

C. Institutions Locally Owned

- i. African Banking Corporation Ltd.
- ii. Jamii Bora Bank Ltd.
- iii. Co-operative Bank of Kenya Ltd.
- iv. Credit Bank Ltd.
- v. Charter house Bank Ltd.
- vi. Chase Bank(K) Ltd.
- vii. Equatorial Commercial Bank Ltd.
- viii. Equity Bank Ltd.
- ix. Family Bank Ltd.
- x. Fidelity Commercial Bank Ltd.
- xi. Fina Bank Ltd.
- xii. Giro Commercial Bank Ltd.
- xiii. Guardian Bank Ltd.

- xiv. Imperial Bank Ltd.
- xv. Investment & Mortgages Bank Ltd.
- xvi. Middle East Bank(K)Ltd.
- xvii. Oriental Commercial Bank Ltd.
- xviii. Paramount Universal Bank Ltd.
- xix. Prime Bank Ltd.
- xx. Trans-National Bank Ltd.
- xxi. Victoria Commercial Bank Ltd.

D. Institutions listed on the NSE

- i. Absa Bank Kenya Plc
- ii. Stanbic Bank Ltd.
- iii. Equity Bank Ltd.
- iv. Housing Finance Ltd.
- v. Kenya Commercial Bank Ltd.
- vi. NCBA Bank.
- vii. Standard Chartered Bank(K) Ltd.
- viii. Diamond Trust Bank Kenya Ltd
- ix. National Bank of Kenya
- x. Co-operative Bank of Kenya Ltd.