Journal of Finance and Accounting

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ISSN: 2616-4965

Stratford Peer Reviewed Journals and Book Publishing
Journal of Finance and Accounting
Volume 6||Issue 2 ||Page 121-132 ||June||2022|
Email: info@stratfordjournals.org ISSN: 2616-4965

Digital Transformation and Liquidity Risk of Commercial Banks in Kenya

Salome Musau

Department of Accounting and Finance, Kenyatta University, PO BOX 43844-00100, Nairobi, Kenya. Email: musau.salome@ku.ac.ke

How to cite this article: **Musau, S. (2022). Digital Transformation and Liquidity Risk of Commercial Banks in Kenya.** ***Journal of Finance and Accounting,*** **6(2), 121-132.** https://doi.org/10.53819/81018102t5079

Abstract

There are important trade-offs and synergies between digital transformation and financial stability. Poorly implemented digital transformation policies can impair bank liquidity. Also, there may be essential synergies brought by the broad use of digital services which help financial institutions diversify risk and aid financial stability. This study analyzed the effect of digital transformation on the liquidity risk of commercial banks, intending to establish a significant relationship between them. The specific objectives were to analyze the effect of Branch networks, ATMs, Agents and Mobile banking on the liquidity risk of commercial banks in Kenya. The research design was explanatory non–experimental. The target population included 42 commercial banks in Kenya and the study used secondary data. Descriptive statistics were used to establish the trend of digital services and liquidity risk of commercial banks while inferential statistics were used for testing the hypotheses. The results revealed that digital services had a statistically significant effect on the liquidity risk of commercial banks in Kenya during the study period between2007-2015. Increase in Branches, ATMs, Agents and Mobile banking were found to support liquidity levels (synergy) due to increased deposit mobilization and access to credit. Therefore, the study recommends increasing the banking customers, advancing affordable and accessible banking services to disadvantaged groups in different regions in the country. Reforms in financial sector should aim at increasing financial access through digital finance which is a cost cutting measure.

Keywords: *Digital services, Financial Inclusion, Unbankable Stability, Synergy, Trade-off*

Stratford Peer Reviewed Journals and Book Publishing
Journal of Finance and Accounting
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1.0 Introduction

Commercial banks are important financial intermediaries in the economy who perform the basic functions of accepting deposits, lending the money and offering transfer services. The commercial banks represent a vital link in the transmission of government's economic policies particularly monetary policy to the rest of the economy (Ongore& Kusa,2013). In emerging market economies like Kenya, commercial banks remain the dominant channel of financial intermediation. Bank deposits represent the most significant component of money supply used by the public and changes in money growth are highly correlated with changes in prices of goods and services in the economy. For the commercial banks to efficiently perform their intermediation role of providing liquidity, they have be stable. Bank stability has been a key international agenda by policy makers since the Global Financial Crisis of 2007-2009. The financial Stability Board and Basel Accord have been key in enhancing financial stability. One of the mandates of the Central Bank of Kenya (CBK) is to foster financial stability through regulation. The CBK has ensured stability by adopting the Basel II Accord and ensuring compliance by the commercial banks.

Increasing financial access through digital services changes the composition of the customers in terms of saving and borrowing behavior. These compositional changes support financial stability through risk diversification (Hannings & Jansen, 2010). However, if financial access is expanded to unfamiliar areas and uncreditworthy clients through digital transformation, this poses an increase in liquidity risk and hence a threat to stability. Mohrotra and Yetman, (2014) observed that financial stability can enhance trust in the financial system and therefore improve financial accessibility. Conversely, excessive emphasis on financial stability can prolong involuntary financial exclusion. Especially in times of regulatory tightening in an attempt to boost profits and cut off risky segment which may lead to tradeoffs.

1.1 Bank Liquidity Risk

Liquidity risk is used to measure the risk associated with a mismatch between assets and liabilities. This study will adopt the loan-to-deposits ratio as the indicator for liquidity risk. It is argued that the liquidity of a bank is usually evaluated by using a host of tools and techniques, but the traditional loan-to-deposits ratio is a measure that often receives the most attention by analysts and regulators. This is because it captures the bank's ability to repay depositors and other creditors without incurring excessive costs and while continuing to fund its expansion (Aggerer & Fieldman, 1998).

Loans are the major assets of commercial banks and their most important single and largest source of income. The quality of loan portfolio determines the profitability of banks (Ongoro & Kusa, 2013). The highest risk facing a bank is the losses derived from delinquent loans. Delis *et al*. (2014) observed that NPL ratio is the best to measure credit risk exposure. A major concern of all commercial banks is to keep the amount of NLP low as this is indicative of good health of the bank portfolio and high level of NPL affects profitability negatively. NPL is computed as the ratio of the volume of non-performing loans to total loans of a bank. A default occurs when the bank considers that a borrower is unlikely to repay his credit obligations in full, without recourse to collateral (Morgan & Poutines, 2014).

https://doi.org/10.53819/81018102t5079

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1.2 Digital Transformation

Financial sector in Kenya has been characterized by rapid digital transformation changes that has led to the development of financial innovations, new products and new forms of payment. According to the CBK (2012) the banking sector has undergone substantive transformation particularly from the year 2007. The invention of the mobile phone payment platform *M-pesa* dramatically changed the financial landscape by offering a simple efficient and cost-effective method to transfer money and make payments.

Through agency banking, bank clients have been enabled access to basic financial services by allowing small businesses to operate as satellite branches (Musau, 2013). In 2012, Safaricom ltd in conjunction with Commercial Bank of Africa (CBA), one of the Kenya's registered commercial banks, launched a service dubbed *M-shwari* that automatically opens a bank account for *M-pesa* registered customer and operates fully like a bank account. This has ensured that more people are able to access financial services. According to Allen *et al*. (2013), the level of a banks penetration in key in deepening its services within the population. Digital services are ke in enhancing bank availability, bank accessibility and bank usage. Bank availability dimension accounts for the level of penetration and presence of a bank physical outlet. The physical distance between bank points of touch and the customers is an important impediment to financial accessibility. This study used penetration of bank branches, ATMs and agents to represent bank availability dimension (Mostak & Sushanta, 2015). For the bank accessibility, the number of bank deposits, loan and mobile accounts per 1000 adult population was used to account for the financial inclusion deepen within the country. The bank usage dimension is measured using a combination of the total volume of credits and the total volume of deposits in comparison to the level of GDP (Sarma & Pias, 2011; Beck *et al.*, 2013).

The objective of the study was to determine whether increased digital transformation is good for the liquidity risk of commercial banks in Kenya. The study was guided by the following null hypothesis:

H_{01}: Digital transformation has no significant relationship with the liquidity risk of commercial banks in Kenya.

2.0 Literature Review

2.1 Theoretical Literature

Rodgers developed the innovation diffusion theory in the year 1962. Mahajan and Peterson (1985) highlight that innovation is a new idea practice, while diffusion denotes a process where information about an idea is spread over time. According to Nzayisenga (2017), new technology is vital in innovation. However, it is influenced by compatibility, usefulness and complexity of the idea and resources available. Digital transformation in Kenya is an innovation that was introduced and subsequently embraced to expand the provision of financial services such as lending by using of mobile phones and the internet. This new technology has increased the transactions undertaken by people regarding taking and repaying loans (Jagtiani & Lemieux, 2017).

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The connection between financial deepening through digital transformation can be understood in the context of the finance growth theory. The crux of the finance growth theory (Bagehot, 1973) is that financial deepening creates a productive environment for economic growth. This theory supports financial stability which is a condition where the financial intermediation process functions smoothly. Spatt (2013) indicates that, the success of economic growth depends on the level of financial penetration, composition and stability of the financial institutions. Thus, the existence of an energetic financial sector has growth enhancing effects. Schumpter (1911) posted that bank enable an economy to grow by providing efficient markets for funds. Goldsmith (1969), Mckinnon, (1973), Levin and Zervos (1996) emphasized the positive role of financial systems in economic growth as cited by Ndebbio (2004). Financial markets evolve in response to increased demand for financial services from an already budding economy. Therefore, the deepening of financial inclusion is a reflection of growth in other sectors of the economy and for financial institutions to support financial inclusion, they must be financially stable.

The financial intermediation theory. another theory which offers an explanation for the possible relationship between digital transformation and bank liquidity. The theory by Diamond in 1984 explains how banks act as intermediaries between borrowers and savers. As financial intermediaries, banks provide access, financial diversification and financial utilization. The extent of digital transformation has an influence on the level of penetration and access to financial services as confirmed by literature. Financial intermediation is seen as the extent to which financial institutions bring deficit spending units and surplus spending units together (Ndebbio, 2004). Diamond (1984) pointed out that banks are able to effectively monitor borrowers and thus play the role of delegated monitoring. Reduced monitoring costs are a source of comparative advantage. Diamond and Dybrig (1983) analyzed the position of liquidity that is transformation of illiquid assets into liquid liabilities by banks. In their model, identical investors or depositors are risk averse and uncertain about the timely of their future consumption need. Without an intermediary all investors are locked into illiquid long-term investments that yield high pay offs to those who consume later.

2.2 Empirical Review

In Kenya, the concept of digital financial transformation has been fused with the goals of poverty alleviation and general economic growth as envisaged in the vision 2030, the country's economic blueprint (Government of Kenya, 2007). This has seen the banking system undergo numerous important reforms and structural changes. Key among those changes include: increased bank and branch network, shift from brick and mortal outlets, agency banking commissioned in 2010, innovations in product development, use of information communication and technology (ICT) and emergence of non-bank financial institutions. According to CBK (2013) the country's banking sector has undergone substantial transformation between 2006 and 2013 was the number of deposit accounts went up from 2 million to 18 million while loan accounts increased from 1 million to 3 million. Also, the population of adult population totally excluded from financial services declined from 39.3% in 2006 to 25.4% in 2013 (FSD, 2013). It's therefore important to analyze the influence these changes have had on the stability of the commercial banks in Kenya.

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The Kenya government has embraced the concept of financial digital transformation through the economic pillar contained in the vision 2030. Commercial banks in Kenya responded to the initiative by opening doors and developed products and services that improves access and penetration including agency banking and mobile banking. For the banks to fully appreciate the concept of financial digital transformation there is need to understand its effect on the banks that engage in it. This is because financial digital services clientele are considered opaque, numerous and characterized by frequent small value transactions with high operating costs (Hannig & Jansen, 2010) and this can pose potential threat to stability. According to Kipesha and Zhang (2013) commercial banks which are mainly profit seeking have engaged in financial digital transformation. Due to the change in financial landscape by commercial banks, it's important to understand the implication digital transformation on their liquidity and stability.

3.0 Research Methodology

The research design was explanatory non-experimental. The target population was 42 commercial banks in Kenya and the study used secondary data. Descriptive statistics were used to establish the trend of digital services and liquidity risk of commercial banks while inferential statistics were used for testing the hypotheses. Descriptive and trends analysis model was used to analyze the relationship between digital transformation and liquidity risk of commercial banks in Kenya

4.0 Results and Discussions

Trends provided a graphical representation of changes in variables across the study period while multinomial logit model was used to establish the relationship between Bank branches, ATMs, Agents, (independent variables) and Bank liquidity (dependent variables)

4.1 Descriptive Results

The descriptive results of the indicators of commercial banks stability were computed across the study period and the findings are presented in Table 1.

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Table 1: **Descriptive Statistics for Commercial Banks liquidity Indicators**

Category	Statistics	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Loans	Mean	11758.91	13735.56	17250.03	15492.79	18111.29	26747.11	24610.36	45894.34	54746.28
	Std. Deviation	19423.93	18203.57	24645.58	21207.68	25449.9	35578.03	37704.13	59907.11	73253.81
	Min	517	868	1144	1050.5	1097.25	1308.63	1328.5	785	2790
	Max	105346	79343	96558	87950.5	105789.8	123629	190514	257399	324284
Total Deposits	Mean	16167.03	21517.02	23170.46	38047.19	39662.46	40758.98	46112.83	55692.99	63924.5
	Std. Deviation	24616.02	30518	33841.19	50872.88	51538.74	52042.13	56902.94	70313.02	82438.64
	Min	231	164	155	1723	1468	1213	1418	3310	4099
	Max	109097	126408	137968	223025	223259	223493	237213	292457.5	347702
Profitability (ROA)	Mean	0.02839	0.02096	0.01531	0.0298	0.0269	0.02581	0.02426	0.02256	0.02183
	Std. Deviation	0.016506	0.032677	0.040438	0.0287	0.029622	0.037666	0.03073	0.023199	0.027063
	Min	0.004	-0.096	-0.175	-0.059	-0.097	-0.136	0.001	-0.023	-0.045
	Max	0.088	0.07	0.059	0.07	0.072	0.104	0.128	0.075	0.066
NPL	Mean	839.254	903.305	1087.477	988.182	1155.797	1973.132	1741.881	2549.788	3781.971
	Std. Deviation	1178.854	1279.846	1515.932	1377.005	1537.869	3063.688	2514.466	2992.176	4515.702
	Min	17.6	22.2	27.2	24.7	26	43.5	34.7	52	58
	Max	4200.5	5452.2	5563.2	5496.7	5519	14403.3	9810.6	13368	19289
Operating Cost	Mean	5.71	6.69	7.59	10.73	14.25	9.52	2.12	5.33	2.60
	Std. Deviation	15.33	17.42	20.23	25.37	32.85	20.73	5.31	8.96	5.70
	Min	-1.13	-2.82	-2.22	0.02	-0.49	-1.56	-0.74	-0.84	-1.35
	Max	87.69	97.55	113.54	126.67	161.85	94.62	31.30	35.59	29.12
Deposit accounts	Mean	130545.8	158824.7	204889.9	274808.6	336665.1	385007.6	529705.7	258378.2	273277.1
	Std. Deviation	323121.5	497443.1	656058.7	889495.7	1036680	1166495	1476235	1310733	1363847
	Min	735	811	832	1194	1375	1556	1800	1977	1904
	Max	1840332	3018356	4037504	5405732	6215497	7025262	7392481	8437018	8780150
Loan accounts	Mean	45335.67	45488.42	53149.35	38962.64	46899.81	60488.3	72909.92	126167.7	172188.5
	Std. Deviation	114524.6	115024.8	129576.5	104048.3	129167	149954.8	193845.6	346783.8	508708
	Min	301.1	311.3	343	213	342	438	534	493.5	1.6
	Max	617628.6	648802.4	684392.3	519691	742324	791162	897000	1794000	2691000

https://doi.org/10.53819/81018102t5079

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The results in Table 1 indicate that total loans, total deposits, NPL, profitability and number of loans account have increased during the study period. The results show that operating costs have been marginally reducing as shown by the mean presented in Table 2.

Table 2: **Descriptive Statistics for Commercial Banks digital transformation Indicators**

Category	Statistics	2007	2008	2009	2010	2011	2012	2013	2014	2015
Branch Networks	Mean	16.11	20.65	23.34	24.86	25.67	28.6	30.9	33.78	37.1
	Std. Deviation	27.06	31.362	33.31	35.49	35.378	38.488	41.56	43.209	51.177
	Min	1	1	1	1	2	3	3	3	3
	Max	135	144	149	165	161	166	182	187	260
ATMS	Mean	18.11	22.65	25.34	26.86	27.67	30.6	32.9	35.78	39.1
	Std. Deviation	27.06	31.362	33.31	35.49	35.378	38.48	41.53	43.209	51.177
	Min	3	3	3	3	4	5	5	5	5
	Max	137	146	151	167	163	168	184	189	262
Agents	Mean	826	3520.6	16570	32270.3	42115.0	63069	102471	120472	133952
	Min	826	3521	16570	32270	42115	63069	102471	120472	133952
	Max	826	3521	16570	32270	42115	63069	102471	120472	133952
Mobile Accounts	Mean	1.861	3.163	7.074	12.431	17.949	19.588	23.36	25.805	26.71
	Std. Deviation	3.984	0.4353	0.863	1.1693	1.1904	0.3114	0.838	0.5112	0.1793
	Min	1.2	1.2	3.3	7.3	12.7	18.2	19.7	23.5	25.9
	Max	26.7	3.3	7.3	12.7	18.2	19.7	23.5	25.9	26.7

Table 2 on the other hand show that bank penetration through digital transformation increased during the study period. This can be shown by increase in branch network, ATM network, number of agents and finally increase in the number of mobile money accounts as shown in table 2 above.

4.2 Trends Analysis

This section provides analysis of the trends of digital transformation variables and liquidity risk measures. The findings are presented in subsections below.

4.2.1 Trend Analysis for digital transformation and liquidity

The results in Figure 1 show the trend analysis for branch network and stability for commercial banks in Kenya.

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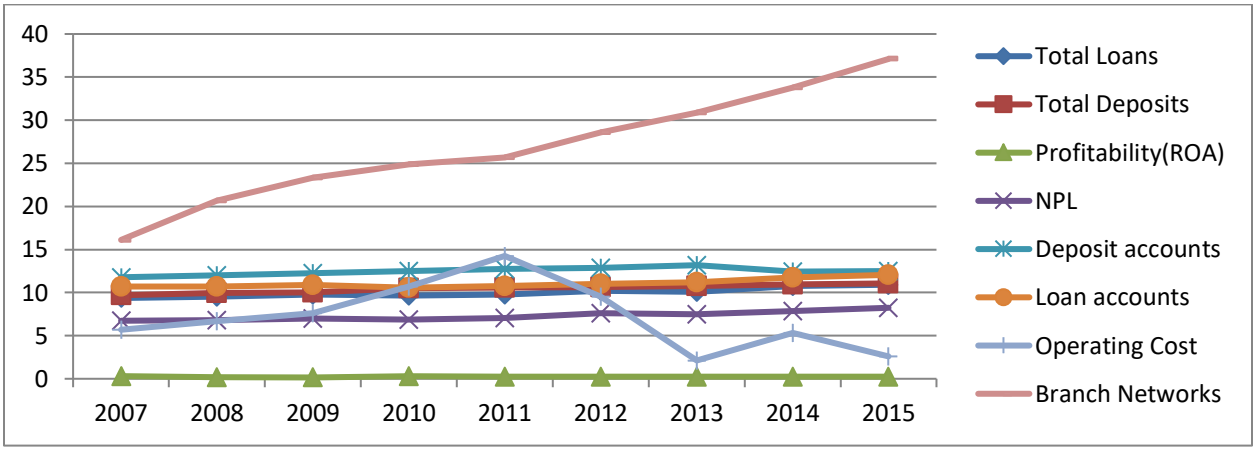

Figure 1: **Trends for Branch Network and Stability for Commercial Banks in Kenya.**

The results in Figure 1 clearly show commercial banks in Kenya have significantly increased their branch network between 2007 and 2015. Increase in branch network was accompanied by marginal increase in total loans, NPL, deposits accounts and loan accounts. On the other hand, increase in branch was accompanied by increase in operating costs until 2011. Beyond 2011 increase in branch network led to a decrease in operating costs. These findings imply that increasing digital transformation will cause an increase in loans, deposits, deposits accounts and ROA which consequently imply better bank liquidity position.

4.2.2 Trend Analysis for ATM Network and liquidity of commercial Banks in Kenya

Figure 2 provides trends analysis for number of ATMs networks for commercial banks between 2007 and 2015.

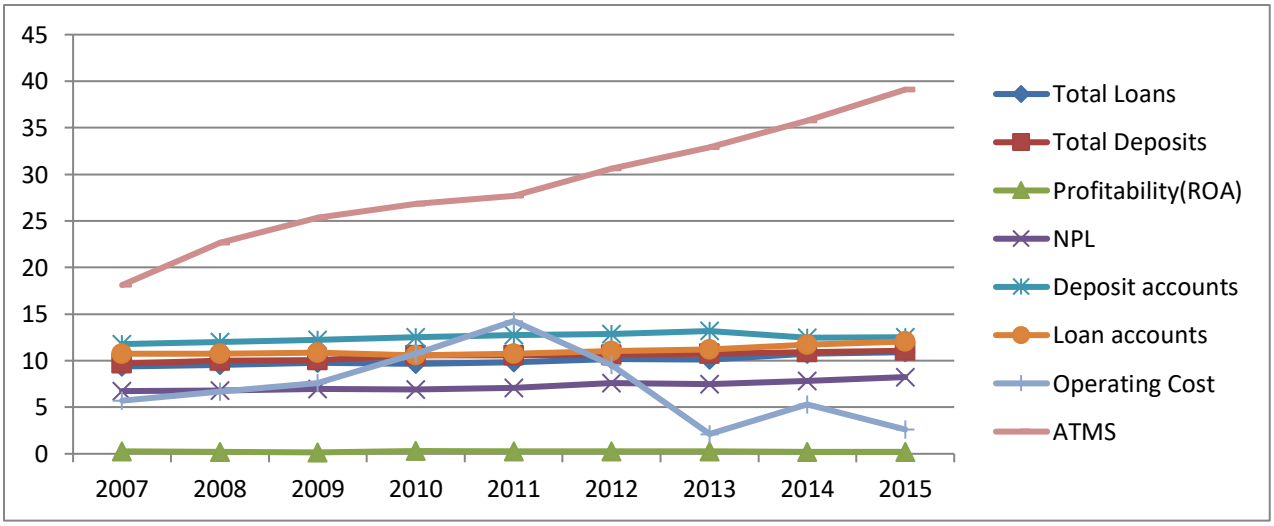

Figure 2: **Trends for ATMs Network and liquidity for Commercial Banks in Kenya.**

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The findings presented in Figure 2 indicate during the study period, the number of ATM networks has been increasing at a high rate. This is an indication of increase in financial inclusion by commercial banks in Kenya. The findings also show that increase in ATM network corresponded to increase in loans, deposits, and NPLs but led to a decrease in operating costs as shown in figure 2. This is an indication that increasing bank accessibility could lead to high commercial banks liquidity.

4.2.3 Trend Analysis for Mobile banking and liquidity of Commercial Banks in Kenya

The finding in Figure 3 indicates the usage of mobile money by all the commercial banks in Kenya. The study used the number of mobile accounts during the period of the study.

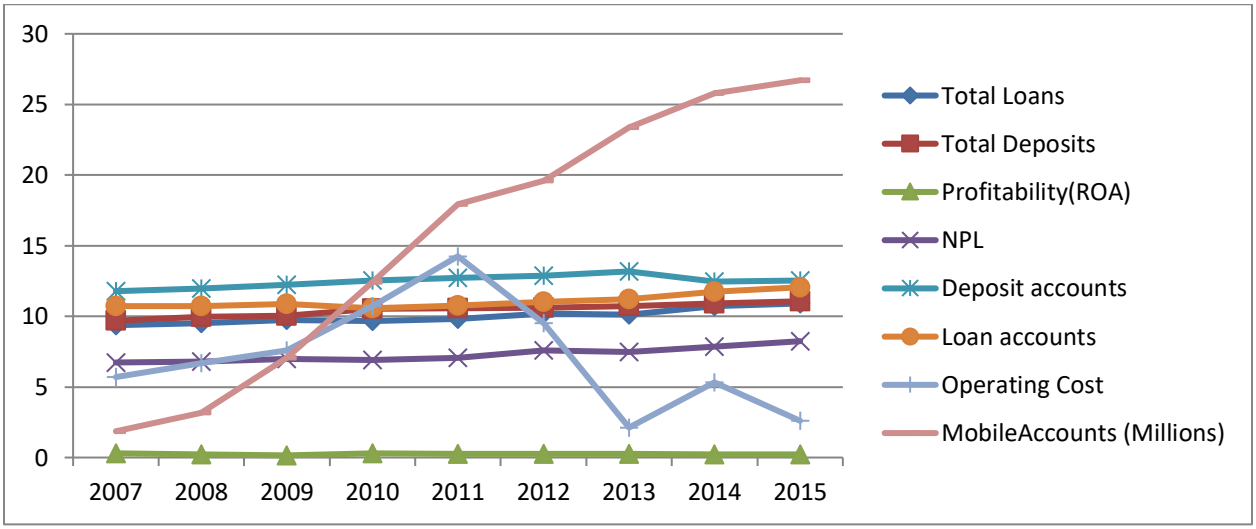

Figure 3: **Trends for Mobile Money and liquidity of Commercial Banks in Kenya**.

The high rate of increase in number of accounts during the period of the study indicates high level of adoption of mobile banking among the commercial banks in Kenya. The results imply that mobile banking has increased the level of financial inclusion by commercial banks in Kenya. Although the increase in mobile accounts coincided with increase in loans, deposits and ROA, the rate of increase was however different as shown in figure 3 above. These findings further implied that increasing financial inclusion resulted to better financial liquidity by commercial banks in Kenya.

4.2.4 Trend Analysis for Agency banking and Stability Commercial Banks in Kenya

The results presented in Figure 4 show the trend analysis for agency banking and stability of commercial banks in Kenya.

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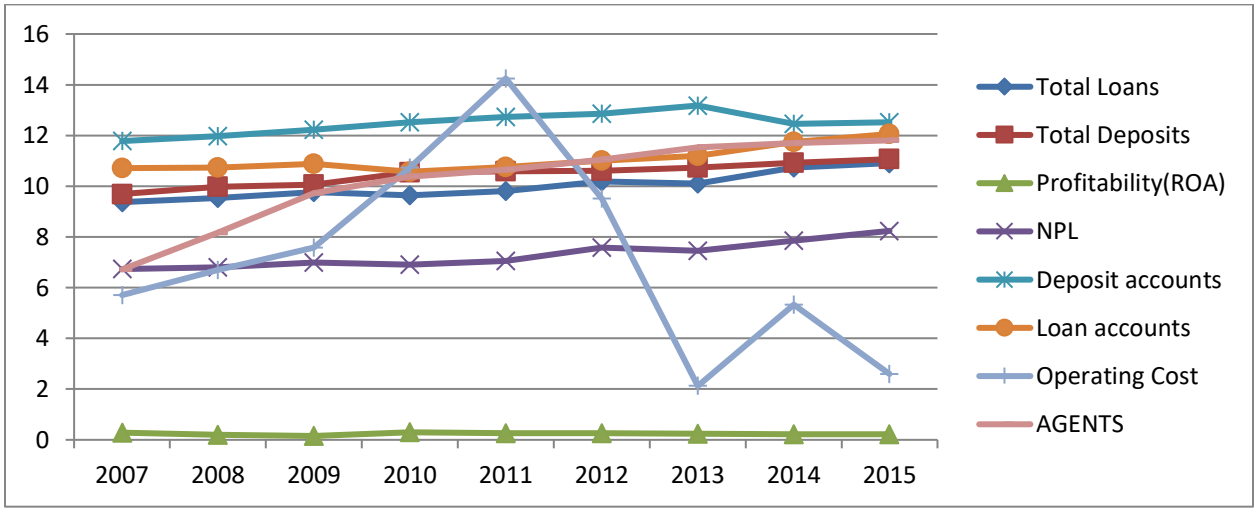

Figure 4: Trends for Agency and Liquidity of Commercial Banks in Kenya

The findings show that the number of commercial banks agents increased during the study period. The results further showed that increase in the number of agents coincided with a reduction in operating costs. However, loans and deposits increased as shown above. These findings imply that as commercial banks increase digital transformation so does the liquidity.

5.0 Conclusions and Policy Recommendations

Based on the findings, the study concluded that most commercial banks in Kenya had adopted various ways of ensuring digital financial transformation. Commercial banks pursue financial deepening with the main aim of increasing the numbers of their customer base and consequently boosting their deposits and loans accounts. However, increasing financial inclusivity leads to an increase in NPLs which jeopardize the stability of commercial banks by increasing liquidity risk of commercial banks. The study further concluded that commercial banks in Kenya that have enhanced digital transformation through increasing the number of branches, ATMs, Agents and mobile accounts have also performed well in terms of liquidity indicators. An increase in branch networks increases operating cost to a certain point, which reduces once the new branches break even. However, ATMs, Agents and Mobile banking were found to support liquidity (synergy) due to increased deposit mobilization. These results support previous evidence that digital transformation improves liquidity (Kalunda, 2015, Mostak & Sushanta, 2015, Cihaki *et al*, 2016)

Based on the findings the following recommendations were made to the commercial banks and other financial institutions. First the study recommended that commercial banks in Kenya should pursue digital transformation to increase the banking population, to advance affordable and accessible banking services to disadvantaged groups in different regions in the country. This can be achieved through increasing branches, ATMs, and adoption of other mobile money technologies such as mobile and agency banking.

Secondly, commercial banks should formulate policy to ensure they remain financially stable while accommodating their activities to ensure financial inclusion through digital transformation.

https://doi.org/10.53819/81018102t5079

The reforms in financial sector should aim at increasing commercial banks deepening through digital finance which is a cost cutting measure and to ensure that bank liquidity indicators commensurate in the role of deepening financial intermediation and hence forming an all- inclusive and stable financial sector over time.

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