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Effect of Technological Financial Innovations on Financial Performance of Commercial Banks in Kenya

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Abstract:

Adoption of technological innovations has enabled businesses operations to be undertaken more effectively and efficiently. The banking sector in Kenya has adopted these technological innovations in offering banking services to its customers. These innovations include use of Automated Teller Machines, Agency Banking, Electronic Funds Transfers, Real Time Gross Settlements and Mobile Banking. The objective of this study was to assess the effect of technological financial innovations on financial performance of commercial banks in Kenya. The study was anchored on Financial Intermediation theory, Innovation Diffusion theory and Silber Constraints theory of Financial Innovations. The study adopted a descriptive research design with a target population of all commercial banks in Kenya, where a sample of 15 commercial banks was reached for data collection. Secondary data for a period of 2012 to 2016 was collected from respective commercial banks, banks annual reports, website and Central Bank of Kenya reports. Descriptive and inferential statistics was used to analyze data. The results indicate that, Agency Banking and use of Automated Teller Machines had positive effect on financial performance of banks. The control variable, credit risk had a negative and insignificant effect on financial performance of banks. Bank liquidity had a negative but significant effect on financial performance of banks. The study conclusion was that technological financial innovations had positive effect (R^2 of 0.681) on financial performance of commercial banks. Equally, the study recommended that it is important for commercial banks to establish robust risk identification, assessment and control measure and adhere to the liquidity guidelines that is issued by the Industry regulator- Central Bank of Kenya, in order to improve their financial wellness.

Keywords: Technological Financial Innovations, Financial Performance, Commercial Banks.

1. Introduction

Banking sector has experienced remarkable changes in the last few decades which majorly has been due to deregulations and adoption of technological tools (Lawrence, 2010). Technology has enabled the undertaking of banking transactions in a variety of mediums. According to Hasan, Schimiedel and Song (2010) technology has provided banks with several channels of delivering products and services to their customers. This is because, innovations seek to establish new ways of delivering services more efficiently than before, for instance, agency banking ensures that customers have access to banking services closer to their homes. Gorton and Metrick (2010) notes that innovations in the banking sector are led by the need to offer customized services, enhance accountability, eliminate those costs associated with traditional banking systems and develop markets. Banking innovations are crucial because they foster competitiveness of banks in a given economy (Lawrence, 2010). In Kenya, among the financial innovations that are adopted are agency banking, internet banking, use of ATMS, debit cards and electronic funds transfers. Use of these technologies in service delivery increases customer satisfaction, saves costs for the banks, improves convenience and facilitates fast and secure money transfers (Mwania and Muganda, 2011).

1.1. Technological Financial Innovations

There are several definitions of what really constitutes technological financial innovations. According to Gardeva and Rhyne (2011) technological financial innovations is the process through which financial institutions harness the capabilities of Information and Communication Technology (ICT) in establishing new products and services and new ways of rendering banking services. As such, the term denotes to establishment of new products and service by financial services. Equally, Jack and Suri (2010) notes that financial innovations in the banking sector aim at enhancing service delivery thereby enlarging the market share of the specific financial institutions. An innovation is a new product, service or channel of production. It could also mean an improved version of an existing product or method of production. According

to Lawrence (2010) innovations seeks to establish more efficient systems than the previous systems. It therefore means that innovations are only beneficial if they lead to cost savings, reduction of time for carrying out activities, enhanced service delivery, improved stakeholders' relations and improved access to products and services.

1.2. Financial Performance of Firms

Performance entails the analysis of outputs with regards to the inputs (Pandey, 2010). In this respect, performance denotes the reporting of how input materials are utilized in the process of achieving organizational goals. It is important to note that performance may be high or low depending on the actual results in comparison to the expected results. Performance seeks to ascertain whether entities are efficient in resource use and can be measured in terms of financial results or using non-financial parameters (Bagorogoza & Waal, 2010). According to Tavitiyaman, Zhang and Qu (2012) financial performance entails measures that depict the profitability of organizations, productivity and growth. This implies that financial performance provides information on how efficient resources are used in income generation, how the resources lead to sustained performance or how a firm increases in size. Thus, financial performance indicates if financial goals are being met or not (Bakar & Ahmad 2010).

Therefore, financial performance would be of much interest to the shareholders than it is for any other stakeholders of the firm. Shareholders are keen on the ability of firms in making revenue which is sufficient to cover costs and leave enough residual that can be distributed as dividends to them (Mabrouk & Mamoghli 2010). Several methods have been used to measure financial performance. For instance, Bagorogoza and Waal (2010) views that the profitability and profits are a good measure of financial performance. According to Al-Hussein and Johnson (2009) the efficiency of how financial goals are being achieved is what constitutes financial performance. In other words, financial performance is the measure of how entities achieve their financial goals. In this respect, their measured financial performance of commercial banks in Saudi Arabia in terms of Return on Assets. This study measured financial performance in terms of Return on Assets. Return on Assets (ROA) seeks to measure financial performance as the amount of income over total assets. In other words, it is a profitability measure that shows how the firm utilizes its assets in generating income.

1.3. Technological Financial Innovations and Financial Performance of Firms

Performance of banks is crucial since the entities exist to make profits for the shareholders through efficient resource utilization. Thus, management of banks are motivated to adopt new technologies with the aim of streamlining activities, leading to costs reduction and ultimately improving profitability (Nader, 2011). McKay and Pickens (2010) argue that through adoption of branchless banking platforms, banks are able to acquire competitive advantage and improve performance. Perhaps, this can be related to the aspect that branchless platforms are cheaper to maintain since there are not labour intensive as in the case of traditional banking halls. In particular, agency banking reduces the establishment expenses for banks since they are owned by other investors and not the banks. According to Gutu (2014) use of technologically enabled tools in the Romanian banking sector has helped reduce costs of doing business. This means that adoption of innovative service delivery channels is a cost saving measure for banks. It is important to note that cost cutting measures aim at increasing the profitability of entities. Innovations tend to reduce overreliance on manual labour but establish platform that accounts holders can transact in self-service capacities.

The banking sector is highly competitive since the banks offer similar products. As a result, the best form of realizing competitive advantage is through providing superior customer service and service delivery. Nader (2011) views that in Saudi Arabia, innovations among banks were inclined towards enhancing service delivery but did not result into improved profitability. Therefore, innovations ought to be critically considered before being adopted by financial institutions. This is because the systems are costly and would lead to massive losses if not successful. Hassan, Maman and Farouk (2013) revealed that in Nigeria, electronic banking enhanced performance of banks due to improved customer satisfaction. This is because, innovations ensure that less time taken to perform banking transactions and this saves money for both accounts' holders and the financial institutions. Innovations such as internet banking, use of Automated Tellers Machines and agency banks reduce overheads for banks (Khrawish & Al-Sadi, 2011). Thus, innovations foster customer satisfactions and at the same time can potentially improve performance of banks.

1.4. Commercial Banks in Kenya

Commercial banks in Kenya operate in the financial markets and institutions which is regulated by the Central Bank of Kenya. According to the CBK (2017) there are 44 fully fledged commercial banks in Kenya. Majority of the commercial banks in Kenya are private owned. The regulator also indicates that 27 are local banks while 13 are foreign owned. The Imperial Bank Limited, Chase Bank Limited, Charterhouse Bank Limited are under receivership. Commercial banks are an important impetus towards economic growth in the country. To this end, the role and stability of the sector has been included in the Vision 2030-an economic blue print, which has a pillar of ensuring that the banking industry is sustainable for economic development through savings mobilizations (GoK, 2016). Commercial banks in Kenya operate under regulation of the Companies Act 487, Central Bank of Kenya Act 491 and the Banking Act 488. These Acts ensure that the banking sector is stabilized and that there is no unscrupulous dealing which may compromise the safety custody of deposits. Further, the Central Bank of Kenya issues prudential guidelines that ensure that individual banks are safeguarded from risks. The guidelines issue specific requirements of capital adequacy, liquidity management, asset quality, licensing requirements and all products must be sanctioned by the CBK. It is thus important that commercial banks curtail their operations within the law while maximizing return on investments. According to Beck, Demirguc-Kunt and Levine (2009), the Kenyan banking sector is the largest in East and Central Africa in terms of size of market served and diversification of financial services. The CBK Act is meant to ensure that depositors are protected and that the risk of

instability in the banking industry is eliminated. Further, CBK regulations aims at taming such illegal activities like corruption and money laundering. For instance, the CBK demands declaration and source of any money transacted to the tune of Kenya Shillings one million and above. The CBK also is mandated in licensing financial innovations that are proposed by the respective banks in Kenya.

1.5. Research Problem

Being innovative can potentially establish a competitive edge for financial institutions such as banks. This is because, innovative banks can expand their market through establishment of new channels of product distribution, new products and new markets. Due to stiff competition in the financial sector, banks need to be innovative in order to remain profitable (Mabrouk & Mamoghli 2010). In this respect, banks engage in financial innovations to improve service delivery which is believed to foster the chances of making profits by the firms. Malhotra and Singh (2009) state that financial innovations aid in cost management but when empirically tested in India, financial innovations did not offer much financial benefits. Therefore, banks adopt financial innovations to improve organizational performance and remain competitive.

Despite commercial banks in Kenya adopting financial innovations, some banks have reported deteriorating financial performance. For instance, in the last five years Imperial Bank and Chase bank were put under statutory management due to malpractices (CBK, 2014). According to Financial Services Department (2018) the number of agency banking has increased from 8,809 agents in 2009 to 35,789 agents in 2014. Technology has led to emergence of innovations in the way that banks deliver services, for example Stanbic has "Digibank", Equity Bank has "Eazzy pay", CBA has partnership with Safaricom to provide "M-Shwari" - a digital bank branch, Commercial Bank of Africa also has "Loop" which is an online banking platform. However, there is no exhaustive evidence all these financial innovations improve bank's profits and shareholders wealth. It is true that financial innovations have been adopted by banks with the intention of fostering performance. Among the innovations are use of ATMs, EFTs, RTGS, cheque transaction systems, agency banking, mobile banking and internet banking. Most commercial banks have at least a single of these innovations. Few studies have been done in this regard. Gakure and Ngumi (2014) in their study on the influence of bank innovations on profitability of commercial banks in Kenya, evaluated the consequence of financial innovations in the financial markets and revealed that financial innovations were of value to banks. On the contrary, Muiruri and Ngari (2014) in their study on the effects of financial innovations on the financial performance of commercial banks in Kenya. The study revealed that some aspects of financial innovations; mobile transactions, transacting through agents and performing banking transactions by use of cards was not effective in fostering banks' profits. This study therefore fills the gap by establishing the effect of technological financial innovations on financial performance of commercial banks in Kenya.

1.6. Research Objective

The objective of this study was to assess the effect of technological financial innovations on financial performance of commercial banks in Kenya.

2. Literature Review

2.1. Theoretical Framework

2.1.1. Financial Intermediation Theory

Financial Intermediation theory is a theory that depicts how a financial sector facilitates savings and borrowings in an economy. Gurley and Shaw (1960) identified that financial intermediation is the process that ensures those with excess funds can save them and those with deficits have somewhere to borrow from. In this respect, the theory views that savings and borrowing forms the fundamental operation of financial institutions. This is to mean that there is need to ensure that people can access financial services when they require them. Ndebbio (2004) notes that financial intermediation brings the surplus units and deficit units together ensuring that they can save and borrow respectively.

According to Diamond (1984) there are financial market frictions that results due to existence of information asymmetry and transaction costs. In this respect, where the frictions are hazardous to a certain class of people, accessing such services becomes elusive due to high costs or due to lack of information. It is for this reason that financial intermediaries exist to solve these problems. Demirgüç-Kunt, Asli, Beck and Honohan (2008) state that financial intermediations seek to explain how those with negative spending can access finances from those with positive spending. As a result, due to information asymmetry, financial institutions exist to cover the gap. It is true to suffice that it is not possible for individual to lend individual borrowers easily. The theory posits that individual's loan financial institutions since it is an effective mechanism for savings as opposed to loaning to individual borrowers. This theory is crucial to this study because it provides information on how financial systems operates.

2.1.2. Innovation Diffusion Theory

This theory was first proposed by Rogers (1962) with the aim of explaining what subtle factors lead to spread of innovations across industries. The theory intended to explain the process involved in new technology and ideas spread among organizations. Rogers viewed that new technological adoption was a time-based process which involves decision making situations among members of a social setup. He characterized that diffusion of innovation followed five factors which were awareness, interest, evaluation, trial and lastly adoption. Innovation Diffusion Theory (IDT) focuses on the new item characteristics. In this regard, the theory views that acceptability of new technologies are triability, complexity

compatibility, observability and relative advantage are prerequisite features that determines successful spread of innovations (Mas & Morawczynski,2009). This means that technological tools should fulfil those features before they are adopted. Innovations must have benefits for them to be successfully adopted by the intended users. In connection to this study, technological innovations should be characterized with ease of use in order to be adopted in the market. Liu (2008) cites that IDT is a good hypothesis that provides valuable information on the how innovations spread and adopted by consumers in an economy.IDT is pertinent to this study because it shows the process of new technological innovations adoptions in a social set up. The adoption of technological innovations is meant to widen the market base of financial institutions. Therefore, adoption of innovations has a potential of enhancing financial performance due to increased markets. Such tools such as use of ATMS and mobile banking makes carrying out banking transactions convenient and cheaper as opposed to visiting the traditional banking halls.

2.1.3. Silber's Constraint Theory of Innovation

This theory was coined by Silber (1975) with the aim of describing why financial institutions engaged in financial innovations. In his observations, Silber noted that adoption of financial innovations was an attempt to enhance the profitability of firms through efficiency delivery of services. The theory views that firms have both internal and external initiated challengers which can be managed through adoption of technologically enabled processes. Through harnessing the power of technology, firms can enhance efficiency, and this increase their profits due to cost savings.According to Silber (1983) financial innovations tends to attract more customers to firms' products also saves the bank a huge deal of administrative costs. This means that the benefits of innovations are in two folds: one it is a cost saving mean for the financial institutions and second is a tool for market and product development. The author viewed that those firms that were not innovative had poor performance when compared to those firms that engaged in product developed through innovative means.This theory is important to this study because it provides information on financial innovations. This study seeks to assess the effect of financial innovation on financial performance in Kenya. It is important to note that agency banking, internet banking, mobile banking use of RTGS and ATMS are all tools of financial innovations. The theory further indicates that financial innovations improves profitability of firms.

2.2. Conceptual Framework

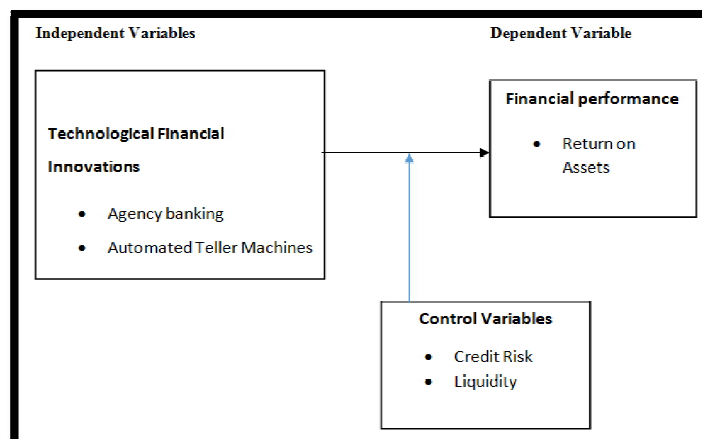


Figure 1: Conceptual Framework

2.3. Empirical Review

Akhisar, Tunay and Tunay (2015) study on effect of innovations on bank's performance in Turkey, adopted a descriptive research design where secondary data was collected from twenty-three nations. The study sought to assess the effect of credit cards and debit cards, point of sales, ATMs and internet banking. It was revealed that both POS and internet banking had a negative effect on performance of banks. On the contrary the ratio of ATMs to bank branches had positive effect on performance. The study concluded that ATMS are beneficial to banks since they improve performance. In addition, Fu-Qiang and Sajid (2014) undertook to assess whether profitability of banks was affected by use of debit cards. Bank performance was measured in terms of Return on Assets. Their study collected data for a period of ten years and used descriptive statistics in reporting the findings. It was revealed that a positive relationship existed between adoption of debit cards and profitability. This reveals that technologies are beneficial to commercial banks. Moreover, Dauda and Akingbade (2011) undertook a study on banks' performance in Nigeria. The study assessed the effect of the role of financial innovation and its impact on performance. Primary data was collected through issuance of questionnaires. The study also sought to evaluate the extent to which financial innovations influenced customer satisfaction and profitability. A sample of fifteen banks were picked in order to evaluate the hypothesis. The study revealed that innovations impact was three folds in that it fostered the motivation of staff, improved service delivery which consequently bettered profitability of the lenders.

Cherotich, Sang, Shisia, and Mutungu (2015) assessed the role of innovations on banks' performance, a descriptive research design was adopted and data was collected from records of the Central Bank of Kenya. The period of analysis was five years up to 2013. The Regression model revealed that cheques, EFTs and RTGS significantly influence variations in

Return on Assets. More so, all these variables had positive and statistically significant impact on performance of the banks. In another study Muiruri and Ngari (2014) did a study to evaluate the effect of financial innovations on financial performance of commercial banks in Kenya. The researchers aimed at assessing effect of credit cards, mobile banking, internet banking and agency banking on performance of banks. The study adopted both first hand data that was collected through issuance of questionnaires and secondary data. The period of analysis was four years from 2008. It was revealed that all the variables affected performance in a positive manner. Further all the aspects tested has significant influence on profits of banks in Kenya. Nevertheless, Gichungu and Oloko (2015) study aimed at establishing whether banks performance was affected by bank innovations. The study purposed to assess of agency banking, use of ATMs, online banking and mobile banking had effect on bank's performance. Secondary data was mined from bank's annual reports. Descriptive statistics were used to report the findings. The regression model revealed that these variables significantly influenced performance. All the variable was statistically significant in influencing performance of the institutions and were significant determinants of financial results of the entities. Finally, Monyoncho (2015) purposed to determine whether financial performance of banks in Kenya was affected by banking technologies. His study followed descriptive analysis where all forty-four banks were considered. The ANOVA test revealed that use of ATMS, debit cards and credit cards, mobile banking and internet banking affected performance of banks in a significant manner. Further, the model revealed that all the variables positively and significantly affected banks' performance.

3. Methodology

This study adopted a descriptive research design. The target population was all commercial banks in Kenya which included 42 commercial that were in operation between the years 2012 to 2016. The study had a sample size of 15 commercial banks which represented 36 % of the fully licensed commercial banks in Kenya. The study collected data from the Central Bank of Kenya supervisory reports, the respective Bank websites and Annual financial statements of banks. From the CBK bank supervisory reports, the study obtained values for Return on Assets of each bank. The Annual Financial statements and Reports gave data on credit risk and Bank liquidity. Nevertheless, online data was used in determining the number of agency banking outlets and ATM distribution. These sources are credible and thus allowed generalization of findings. Data was analyzed using descriptive statistics such as mean and standard deviation. The study also used inferential statistics in which a multiple regression model was developed in order to assess the effect of technological financial innovation on financial performance of the banking institutions.

4. Findings

4.1. Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
ROA	75	0.034	0.027	(0.061)	0.077
AB	75	1,395.893	2,640.922	-	10,190.000
ATM	75	232.467	161.031	49.000	580.000
CR	75	0.069	0.065	-	0.437
BL	75	0.364	0.093	0.144	0.569

Table 1: Descriptive Statistics

Results on table 4.1, indicate the mean of ROA was 0.034 with a standard deviation of 0.027, the minimum was -0.061 with the maximum ROA being 0.077. These results indicate that financial performance of banks was low as evidenced by the fact that some banks recorded losses during the period.

Agency banking recorded a mean of 1395.893 with a standard deviation of 2640.922, the minimum agency banking transactions were nil and the maximum was 10,109. The results indicate that agency banking was growing over the time data was collected. More importantly it is vital to mention that agency banking started in the 2008 and only a few banks have adopted the platform. ATMs had a mean of 232.467 with a standard deviation of 161.031, the minimum was 49.00 and the maximum was 580. Therefore, it means that ATMs were not common for most banks which can be attributed to the fact that most ATM are found in the urban areas in Kenya.

The results further show that credit risk had a mean of 0.069 with a standard deviation of 0.065, the best rate for the non-performing loans was 0.00 while the worst rate was recorded at 0.437. This showed that banks were efficient in credit risk management since the rate was low. The study found out that bank liquidity had mean of 0.364 with a standard deviation of 0.093, the minimum was 0.144 and the maximum was 0.569. These results indicate that liquidity of banks was low. However, some of the banks kept a high liquidity ratio. Liquidity management entails taking deliberate measures to ensure that financial obligations can be cleared when the time of payment arise.

4.2. Exploratory Data Analysis

Panel data analysis requires the carrying out of exploratory data analysis with respect to the dependent variable in order to establish whether there exist time related fixed effects. This study used graphical methods in carrying out exploratory data analysis. The STATA command for this statistic was *xtline, var* for the individual growth plot and *xtline variable, overlay* for the overlain graph. The findings are presented on Figure 4.1 and Figure 4.2

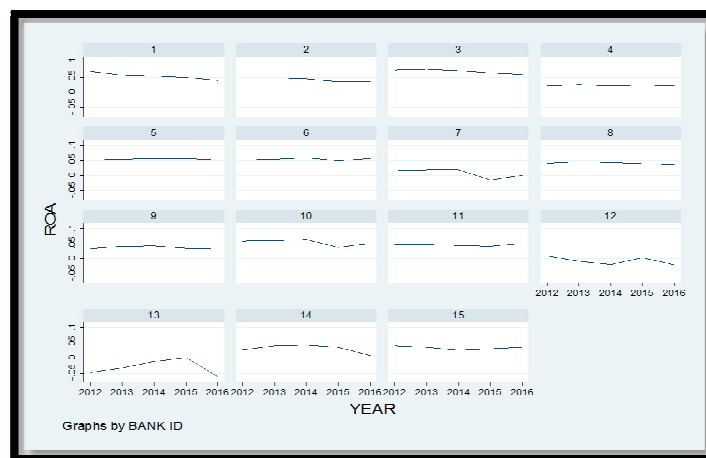


Figure 2: Individual Bank's ROA Growth Plot

The individual growth plot indicates that most of commercial banks followed a similar trend except for Bank 5 and bank 12. Equally, the overlain plot revealed that the y-intercept for ROA of the banks was different but not very significant. Therefore, the data set was found good enough for panel data analysis as opposed to the use a simple pooled regression model.

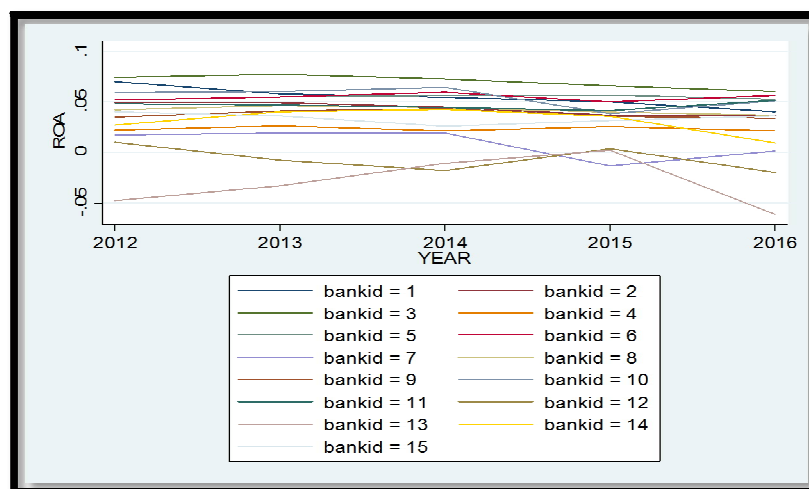


Figure 3: Overlain Growth Plot

4.2. Correlation Analysis

The study computed a correlation matrix in order to ascertain that the independent variables were not perfectly correlated. An assumption of regression modelling is that none of the independent variables should be correlated with each. In case two variables are in perfect correlation, then one variable should be dropped. The results for this test are presented on Table 4.2

Variables	(1)	(2)	(3)	(4)	(5)
(1) ROA	1.000				
(2) AB	0.366	1.000			
(3) ATM	0.387	0.836	1.000		
(4) CR	-0.528	-0.107	-0.011	1.000	
(5) BL	0.423	0.175	0.058	-0.214	1.000

Table 2 Correlation Matrix

Table 2 shows that ROA had a positive correlation with agency banking, ATMS and Bank liquidity at 0.366,0.678 and 0.423 respectively. ROA and credit risk had negative correlation at -0.528. Agency Banking had a positive correlation

with ATMs and Bank Liquidity at 0.836 and 0.175 respectively. Credit and Agency banking had a negative correlation at -0.107. ATMs and Credit risk had a negative correlation at -0.011 and positive correlation with bank liquidity at 0.058. Credit risk and bank liquidity were negatively corrected at 0.214. The study found that none of the independent variables were perfectly correlated. In this respect all variables were used in data analysis.

4.3. Analytical Model

4.3.1. Diagnostic Tests

This study carried out the following diagnostic tests in order to ensure that assumptions of linear regression were not violated.

4.3.1.1. Autocorrelation

Autocorrelation exists where variable measures are influenced by its historical values which makes modelling complex. Autocorrelation is equally referred to as first order serial correlation. This study used the Wooldridge test of autocorrelation in evaluation of autocorrelation. The results are indicated on Table 3

Panel data -Wooldridge test for autocorrelation	
H0: no first-order autocorrelation	
F (1, 14) =	18.271
Prob > F =	0.0008

Table 3: Test of Autocorrelation

The study found a Wooldridge statistic of 0.0008 which was less than 0.05 and this indicates that the set of data had autocorrelation problem. Therefore, the measures of a variables potentially had some similarity due existence of time lag for the same variables. This is a common problem with panel data corrected over time and thus the findings had to be reported using autocorrelation corrected panel standard errors using Prais Winstein regression Model.

4.3.1.2. Multicollinearity

Multicollinearity exists when the independent variables relates to another independent variable. The study used the VIF test in order to establish the existence of multicollinearity. The results are presented on Table 4

	VIF	1/VIF
AB	3.57	.28
ATM	3.454	.29
BL	1.095	.913
CR	1.068	.937
Mean VIF	2.297	.

Table 4: Test of Multicollinearity

The study revealed that agency banking had a VIF of 3.57 with tolerance of 0.28, ATMs had 3.454 with a tolerance of 0.29, bank liquidity had a VIF of 1.095 with a tolerance of 0.913 and credit risk had a VIF of 1.068 with a tolerance of 0.937. The mean VIF was 2.297. These results indicate that the data set did not have multicollinearity problem.

4.3.1.3. Testing for Heteroscedasticity

Homoscedasticity implies a situation where the error terms in the regression model have constant variance and that they cannot influence each other. This study used the Breusch-Pagan test to detect Heteroscedasticity. The results are presented on Table 5

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity	
Ho: Constant variance	
Variables: ab atm cr bl	
chi2(4) =	12.82
Prob > chi2 =	0.0122

Table 5: Breusch-Pagan Test for Heteroscedasticity

Table 5 shows a P-value of 0.0122 which is less than 0.05 indicating that the data was not homoscedastic. Therefore, it was important to fit a robust standard errors model as a remedy to the heteroscedasticity problem.

4.3.1.4. Measures of Normality

Normality test seeks to evaluate if data has normal characteristics. This was done using the skewness and Kurtosis. The results are presented on Table 6

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj_chi2(2)	Prob>chi2
ROA	75	-	0.01	17.83	0.00
AB	75	-	0.01	24.98	-
ATM	75	0.01	0.11	8.72	0.01
CR	75	-	-	51.97	-
BL	75	0.64	0.90	0.24	0.89

Table 6: Skewness/Kurtosis Tests for Normality

Table 6, shows that all the variables exhibited a skewness of between the range of -3 and 3 and kurtosis of between the range of -10 to 10 indicating that the data exhibited normal characteristic.

4.3.1.5. Analytical Regression Model Coefficients

The study used the Hausman specification test in order to establish whether to adopt the Fixed Effect Model or Random Effect Models. The Hausman test seeks to validate that the error term does not affect the predictor variables which would otherwise invalidate the results of the regression model. The existence of time relates effects in order to decide on whether to adopt the Random Effects (RE) model or Fixed Effect (FE) model. A P-value of 0.055 indicating that the suitable model for reporting was the fixed effects model. However, data had heteroscedasticity indicating that the appropriate model was the robust standard errors model. The study used the robust standard errors model in reporting the model. The results are indicated on Table 7

ROA	Coef.	St.Err	t-value	p-value	Sig.
Ab	0.000	0.000	-0.77	0.442	
Atm	0.000	0.000	2.72	0.006	***
Cr	-0.174	0.042	-4.11	0.000	***
Bl	0.071	0.022	3.24	0.001	***
_cons	0.001	0.012	0.07	0.940	
Mean dependent var	0.034	SD dependent var		0.027	
R-squared	0.681	Number of obs		75.000	
Chi-square	84.307	Prob > chi2		0.000	
*** p<0.01, ** p<0.05, * p<0.1					

Table 7: Prais-Winsten Regression, Heteroskedastic Panels Corrected Standard Errors

The regression model was established as follows

$$FI_t = 0.001 + 0.000AB_t + 0.000ATM_t - 0.174CR_t + 0.071BL_t$$

Where 0.001 is ROA in absence of the study variables

-0.174 is the decrease in ROA in response to a one unit increase in credit risk

+0.071 is the increase in ROA in response to a one unit increase in bank liquidity

Agency banking, ATMS had minimal but positive effect on financial performance of commercial banks in Kenya. The study found an R² of 0.681 indicating that the independent variables accounted for 68.1 % of variations in financial performance of commercial banks which was measured in terms of ROA. A P-value of 0.000 indicating that the model was substantially fit in to predict performance. It was found out that agency banking and use of ATMS had minimal but positive effect on performance. Bank liquidity has positive and significant effect on the financial performance of commercial banks. Credit risk had negative and significant effect on the financial performance of commercial banks in Kenya.

5. Discussion

This study sought to establish the effect of technological financial innovations on commercial banks performance in Kenya. The model developed was fit for explaining the effect of the selected predictors on financial performance of commercial banks in Kenya. The overall model had a P-Value of 0.000 as showed by probability of the Chi-square. This indicates that the model was fit in predicting financial performance of commercial banks. The Prais Winsten regression with robust standard errors was used since data was found not homoscedastic. An R² of 0.681 was found which indicates that an extent of 68.1 % of variations in ROA of banks was influenced by changes in agency banking, use of ATMS, credit risk and Bank liquidity. This means that 31.9% of variations in ROA was influenced by other factors that were not within the scope of this study. The study revealed that financial innovations had an effect on financial performance of commercial banks.

In addition, results show that agency banking has a positive and non-significant effect on performance. This is as indicated by the coefficient of 0.000 at three decimals place with P-value of 0.442. The P-Value was greater than 0.05 indicating that the relationship between agency banking and ROA was not statistically significant. Agency banking improves efficiency of service delivery since the banks' clients can access banking services. In this respect, it attracts more

customers who may earn the bank transactional fees which can hence improve profitability. These results agree with Muiruri and Ngari (2014) who did a study evaluating the effect of financial innovations on financial performance of commercial banks in Kenya and revealed that mobile banking, credit cards, agency banking and internet banking on performance of banks affected performance in a positive manner.

On the second variable, use of ATMs, it was found out that there was a positive, minimal but statistically significant effect on ROA of commercial banks in Kenya. This inference is supported by the coefficient of 0.000 and P-value of 0.006 respectively. It therefore means that adoption of ATMs is beneficial to banks as it improves profitability. Perhaps, this can be attributed to the fact that ATMs are located close to the customers and this can potentially increase transactional income for commercial banks. Similar findings were revealed by Akhisar, Tunay and Tunay (2015) who undertook a study on effect of innovations on bank's performance in Turkey.

The study also found out that credit risk significantly and negatively affects performance of commercial banks in Kenya. Credit risk is the chance that the loans awarded to customers won't be repaid. In this respect, an increasing in non-performing loans tends to lower interest income for banks. These findings agree with those of Sangmi and Nazir (2010) who views that credit risk is one of the major determinants of profitability of commercial banks in Pakistan. The consequence is when credit risk management of banks is not effective in mitigating credit risk, non-performing loans would increase and this is not profitable for banks. Credit risk management seeks to establish a risk management framework that is robust not to lower loans uptake but still that which can lower the level of non-performing loans.

Lastly, the study found out that bank liquidity affects performance of banks in a positive way. More so the relationship between bank liquidity and financial performance was statistically significant. Liquidity is the ability of a business to pay off debts as they mature. This finding disagrees with those of Ifeacho and Ngalawa (2014) who established that bank liquidity has a negative effect on financial performance of banks in Nigeria. Perhaps, this is because too much liquidity can reduce income that would have been earned should the assets been invested for long term basis. In the event that the banks in Nigeria banks maintained too much liquidity, this can be led to a negative relationship between liquidity and financial performance.

6. Conclusion

The study made the following conclusion on the findings. The study concluded that there is a weak effect of technological innovations on financial performance of commercial banks in Kenya. Agency banking positively impacts on bank's profitability. Agency banking brings banking services closer the customers and this facilitates the access of such services conveniently and also for longer hours. Agency banking outlets operate for longer hours than the traditional banking halls.

Secondly, adoption of ATMs positively and significantly influenced bank's financial wellness. ATMs provide banking services conveniently in a wide scale. Customers can make deposits, both cash and cheques through the drop boxes and can also withdrawal cash at cheaper rates than at the banking halls. With increased transactions due to convenient access, transactional fees are bound to increase and this may enhance performance of banks. In addition, a bank with many ATMs may attract new customers thus leading to market leadership in terms of customer base.

The third conclusion is that credit risk negatively and significantly impacts performance of banks. Credit risk if not effectively handled can result to financial crisis particularly when loans are not being serviced. Credit risk is conventionally measured by the rate of non-performing loans of lenders. Low percentage is an indication of an effective risk management framework. Conversely, it shows that risk management is not helpful in terms of risk identification, assessment and control. Credit risk is a major concern for all financial institutions whose main business is lending.

The fourth conclusion is that banks liquidity has a positive effect on financial wellness of banks. In addition, the relationship existing between the two variables is significant. Bank liquidity is a critical aspect that is actually enforced by the Central Bank of Kenya. Perhaps, this can be attributed to the fact that liquidity enables banks to settle call deposits and regular deposits and other financial obligations when required to do so. To this end, liquidity of banks is an important ingredient towards ensuring that the stability of the individual bank and entire sector is maintained.

7. Recommendations

The study recommends that banks should adopt technological financial innovations because they positively impact on banks' financial wellness. In as much as the impact was minimal, the relationship was positive and therefore use of such tools should be promoted. The top management of commercial banks should increase the number of ATMs and agency banking outlets around the country since this would reduce the operational costs associated with running the traditional banking halls. For instance, most agency banking outlets are manned by vendors and thus the banks do not pay for such overheads like rent, power and security expenses. The vendors are contractors whose returns are commissions based on volume of transactions recorded in a certain month.

The study also recommends that commercial banks should establish an effective risk management framework in order to reduce the negative effect of credit risk. In this light, appropriate credit risk management would aid in reduction in non-performing loans. Non-performing leads to loss of interest income. This is because loans are the major income earning assets of commercial banks.

Lastly, the study recommends that banks need to adhere to the liquidity guidelines that is issued by the industry regulator, that is, Central Bank of Kenya. Through maintaining the minimum liquidity of 20 % as required by the CBK, it improves stability of the entire sector. The banking sector is quite volatile and it is for this reason that this study advocates for the CBK to enhance regulation and enforcement with respect to the banking Act stipulations.

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