Is Financial Technology Doing More Good than Harm? The Role of Mobile Banking in Enhancing Ghanaians Commercial Banks Earning Power

Eric Tieku Agyemang[a], Frank Yeboah Agyare[b]

[a]Department of Banking and Finance, Faculty of Economics and Administrative Sciences,
European University of Lefke, Lefke 99770, Turkey
[b]Akenten Appiah-Minka university of Skills Training and Entrepreneurial Development.
Faculty of Business Education, Kumasi, Ghana

Abstract: The purpose of this study is to provide information on Ghana's commercial banks present state of adopting mobile banking and the role it plays in the sector. The study objectivealsoexamine the effect of mobile banking services on the earning power of Ghanaian commercial banks. The study test the following hypothesis, H_1: Active mobile banking customers promotes positive and significant effect on profitability of Ghanaian commercial banks, H_2: Total Mobile Banking Transaction Value positively and significantly affects profitability of Ghanaian commercial banks, H_3: Mobile Banking Transaction volume increaseearning power of commercial banks in Ghana. This study adopts a descriptive research design engaging quantitative research approaches for empirical analysis of the commercial banks in Ghana. The data for the study is mainly secondary data, sourced from the central bank of Ghana from the year 2015 to 2022 on commercial banks. Quantitative data were presented via tables and graphs, with textual explanations provided. This study in particular was based on time series analysis and used Nonlinear Least squares regression models (NLS and ARMA) in finding out how independent variables affects the dependent variable. Result from the study base on the hypothesis indicated that mobile banking active customers, mobile banking transaction volume and mobile banking transaction value increase earning power of commercial banks in Ghana. The study suggested that Ghanaian commercial banks should persist in their efforts to expand the use of mobile banking, since it has been shown to improve their financial performance.

Keywords: technology, fintech, mobile banking, performance, earning power, mobile banking transaction volume, active customers

1.0 Introduction

Business establishments do not function in a vacuity, but in an environment controlled by several factors and forces which has the potential to affect how business organizations operate in one way or the other. One of these forces affecting businesses of our days is technology and that managers of businesses cannot afford to ignore or undermine it, if they do they pay dearly for that. The banking sectors over the years have employed financial technology in their operations to serve their customers better and put them on competitive edge.

Without a doubt, innovation and technology have a significant influence on the area of finance in the Fourth Business Revolution (Wang et al., 2021). The advent of large data, block chain, non-natural intelligence, and other cutting-edge tools in financial firms has partaken a tremendous sway on global financial markets. Financial technology modernism, or FinTech, has both challenged and benefitted the industry.

In Ghana, Mobile banking is seen as one of the widely used banking technological advancement nowadays. Banks customers can now at the comfort of their house or any place operate their bank account. Mobile banking offers a wide range of services, such as mini-statements, account history checks, access to loan and card statements, check status, the ability to stop check payments, the ability to order check books, and statutory payments like powerbills, water bills, taxes, insurance, pensions and many more through using mobile phone facilitated by mobile banking software applications (Donovan, 2012).The security of the applications is crucial since they deal with sensitive personal data, which is why a mobile user is connected to a mobile network via a SIM card.

In 2021, according to the central bank of Ghana, there were 17,948,480 registered users of mobile banking, and in 2022 that figure rose to 20,380,716. The Ghanaians central bank's data, the value of mobile banking transactions is evidence that commercial banks in Ghana benefits from mobile banking. The figure below illustrate registered mobile banking customers and active mobile banking customers.
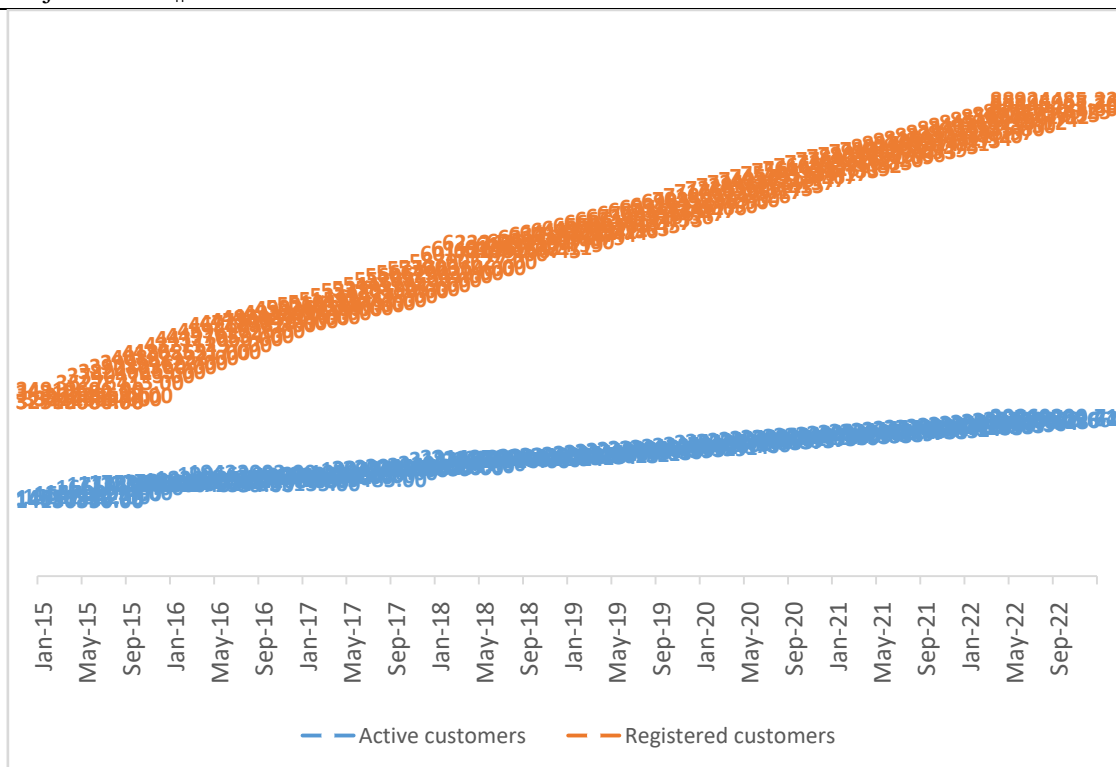
Figure 1. Mobile Bankingregistered and active customers
Source: Authors construction based onBank of Ghana dataset on mobile banking

A distribution channel must properly arrange company activities in order to lower distribution costs due to greater competition (Stern and Sturdivant 2006). By simplifying organizational structures to boost production, this demand can be managed. By using this method, mobile banking can assist in achieving this goal. At branch offices, automated processes replace manual data collecting, processing, transmission, and archiving by bank staff. This is similar to internet-based banking. There are several software platforms that constitute the foundation for the delivery of banking services in mobile business.

One of these is Mobile banking over mobile application, Simply put, a mobile banking application is an app you may download to your phone. It provides you with the tool you require to manage your finances, all from the comfort of your smartphone. If a bank or alternative to banking offers a banking app, it will be specific to that business, so care must be taken to download the right one. Finding the link on their website is the easiest approach to make sure you do this. Some of the services provided on mobile app include changing a password, paying a utility bill or credit card, finding account information, such as the interest rate, transaction enquiry, viewing the most recent transactions, obtaining account information, obtaining a transaction statement, getting a check book, tracking the status of a check number, moving money between accounts, etc

Mobile banking over short messages services (SMS). Individuals use a system called short messages services (SMS) to receive information by SMS about their bank deposits' balances and any transactions made using their deposit account numbers. On a specific date of each month, usually at the end of the month, the depositor receives information on the deposit balance through text message. Also, an SMS message is sent to the depositor the same day when transactions involving the savings account number are completed, such as when monthly interest is computed, when money is withdrawn from the deposit, or when money is received in the deposit. The bank offers the usage of this service completely free of charge.

 Customers of a financial institution can conduct banking transactions on their mobile phones using SMS. Checking account, debit, or credit card balances, transferring money between accounts, and paying bills are all transactions that can be performed using a bank SMS format. Customers can easily access financial services via SMS, especially if they don't frequently have access to internet. A text message known as an SMS alert is delivered to a user's mobile device to inform them of a specific incident. Several businesses, including banking, employ SMS alerts. With SMS notifications, bank customers can be informed of a range of events, including account balance changes. The figures below shows a screen shot of some of the activities of mobile banking over SMS.

Interactive Voice Response (IVR) is another platform used for mobile banking.Incoming clients can utilize Interactive Voice Response (IVR), an automatic phone arrangement technology, to have their calls directed to an exact divisions or specialists without speaking to an agent. This is done with the use of menu choices via touch screen, keypad selection, or speech recognition.. Improved contact center operations and KPIs can be attained with the aid of a well-designed IVR software solution. A good interactive voice response system can reduce hold times by assisting consumers in self-serve task completion and answering simple questions, especially during periods of heavy call volume. IVR technology can aid in rapidly and effectively routing calls when a consumer needs or wishes to talk with a person.

Mobile banking has not yet been fully accepted and recognized by Ghanaians in a suitable manner despite its impressive advantages and banks' significant expenditure. Adoption is not happening as quickly as expected. It fascinates researchers and practitioners why certain factors hinder or even exclude its widespread implementation(Cobla and Osei-Assibey, 2018). Potential barriers to adoption include customer perceptions of the value, ease of use, cost, e-literacy, and culture of mobile banking. Adoption issues are also influenced by security, privacy, trust, and risk. Not all mobile phones support mobile banking platforms, the fact that frequent use of the service may result in additional fees assessed by the bank for providing it, and government levy on electronic banking play a significant role in adoption behavior (Glavee-Geo et al.,2019)

Sometimes, completing a bank transaction requires hours of travel; in such instances, the cost of the transaction equaled the amount being deposited or withdrawn. Customers can perform financial transactions through mobile banking on a safe mobile banking platforms. Even though several studies has been conducted on how mobile banking affects financial performance of Ghanaian banks, few studies has looked at the risk associated with mobile banking and almost all of them use return on asset and equity as independent variables to assess mobile banking impact on financial performance. The gap is filled by using mobile banking transaction value,mobile banking transaction volume and mobile banking active customers as independent variable to assess performance of banks.

The study will be guided by the following specific objectives: to assessing the impact of active mobile banking customers on earning power of commercial banks in Ghana, to determine the impact of mobile banking transaction value on profitability of Ghanaian's commercial banks and lastly to assess the effects of mobile banking transaction volume on profitability of Ghanaian commercial banks.

The research's conclusions would be very significant to financial sector stakeholders. The study's findings would be used by bank management to alert them of the extent to which mobile banking may have an impact on their financial situation and how it affects organizational performance. Leadership of these institutions would develop plans based on the study's findings to enable them to enjoy the greatest benefits of mobile banking.This study will be of use to academies and researchers who are making contributionto finance and banking areas since it will expand the body of knowledge in the subject by including the existing literature on mobile banking and earning power of banks. The study will be used as a basis of reference documents and will also recommend areas for likely upcoming research.

The policymakers in charge of the banking sector units at the Central Bank of Ghana would find this study's conclusions particularly useful as they work to establish regulations for mobile banking in Ghana. This study's findings will give a new perspective on how mobile banking services affect Ghana's commercial banks' financial performance, which might serve to alter policy direction and enhance regulations to promote economic growth in the nation.

2.0 Literature Review
2.1 Theoretical Review
The Theory of Financial Intermediation
Financial institutions acquire funds from excess units, which are eventually utilized to make loans to shortfall units through a procedure termed financial mediation. Financial intermediaries can be distinguished by four factors, according to (Bisignano, 1999). First, for their core classifications of deposits or liabilities, a static sum is defined that make portfolio independent from the performance. Deposits are frequently temporary and have significantly smaller periods than their assets.Third, a significant amount of their obligations are in the form of demand-withdrawal checks, and fourth, the majority of their assets and liabilities are not transferrable. The main benefit that intermediaries provide is a consistent flow of money from excess to shortage units.

Innovation Diffusion Theory
According to this theory, which Bradley and Stewart formally formulated in 2002, companies disseminate innovations to obtain a competitive edge, save expenses, and safeguard their strategic positions.The transmission of innovation theory is a renowned theory that explains how an innovation gradually spreads among consumers, which Rogers proposed(Wang et al., 2020). Understanding customer behavior in relation to

the acceptance or rejection of an innovation is also helpful (Leeet al., 2007). According to the theory, users can be categorized according to how innovative they are using a bell-shaped distribution curve which can be separated into five different parts (Liu et al., 2020).

In the works of Rogers Liu and Li(2009),Users fall into one of the following groups: slow learners, pioneers, creators, earlier majority, or latter majority. The development and use of mobile banking is capable of expanding the formal financial structure's current limitations and reach to Africa's impoverished and countryside inhabitants. A few scientific studies are beginning to emerge, although most of the extant research is from the practitioners sector (Mas and Morawczynski, 2009).

Transaction Cost Innovation Theory
TheTheory of Transaction Cost Innovation, introduced by Hicks and Niehans in 1983, contends that profits increases and transaction cost reductions are the main drivers of financial innovation. The theory investigates the connection between technical advancements and the decline in transaction costs. Theoretically, technological advancements that result in lower transaction costs and improved financial performance are what spur financial innovation. A cost incurred during the exchange of an item or service is known as a transaction cost. Hicks and Niehans (1983) assert that transaction costs are variable. These include dependability, contact fees, legal fees, price research information, and travel expenses. This theory holds that the overriding aspect in financial innovation is the solution to technical improvements.Cost savings as a result of this lower transaction costs encourage financial innovation as well as service delivery efficiency, according to Juhakam (2003), who outlines the theory of cost reduction as a driver of financial innovation.

2.2 Empirical Review
Banks Agreeing to the European Banking Authority (2019), "FinTech" means financial modernization that banks create for their goods or services without collaborating with start-ups or non-bank Financial Technology companies. Financial innovation has three stages in the banking industry, it is important to note (Cheng andQu, 2020). Preceding to 2010, online banking was the most emblematic product of innovative banking. Mobile banking was added to internet banking in-between 2011 and 2015. Furthermore, emerging technologies like distributed computing and big data have become more and more popular since 2015. (Wang et al., 2021).

Innovative FinTech businesses have been emerging over the past few years.Despite the global spread of FinTech innovations and the rising interest in them, not much is known about how they will affect the financial sector and old-fashioned banking business approaches (Chen et al., 2019). The "innovation-growth" concept and the "innovation-fragility" theory are two divergent views about the effects of financial technology.in the work of (Lee et al., 2021) the "innovation-growth" standpoint claims that Financial Technology companies have a constructive impact on banksperformancesince innovation can rise banks' capability for sharing risk and increase the effectiveness of resource allocation.

Additionally, by limiting operation costs and attending to the information asymmetry problems brought on by physical distance restrictions, FinTech has benefited (Grennan and Michaely, 2021).Likewise, the "innovation-fragility" hypothesis contends that financial modernization can raise the risk of banks causing an over-crediting of all financial securities and an increase in the frequency of financial emergencies. In the theory, banksperformance is inversely affected by financial technology. Due to strict regulation, old-fashioned banks typically are not able to meet loaning request (Zhao et al., 2022). As a result,advanced banks and Financial Technology creditors have developed and decreased the market share of old-fashioned financial institutions (Buchak et al., 2018). The actual evidence on how FinTech is affecting banks is conflicting.

Earning power indicate the ability of financial institution to make profit out of their assets. To keep their market share, banks use mobile banking to search for ways to improve. According to the "innovation-growth" perspective, evolving technology is of help to banks by reducing operatingexpenses and enhancing service speed (Wang et al., 2021). But when compared to FinTech companies, banks have a major competitive edge because of client trust. Modern technology used in the midst of uncertain results might bring about consumers losing faith in banks, which mightreduce banks profit. Research indicates that the expansion of Financial Technology businesses may have a destructive impact on bank profit (Nguyen et al., 2021; Phan et al., 2020; Zhao et al., 2022). Bank profits will decline if FinTech firms take market share away from banks. DeYoung (2005) finds that the profitability of internet-only banks increases rapidly due to economies of scale and the learning effect. Another method that banks benefit from the modernization of banking operations is through the creation of fresh value chains and business approach Elsaid (2021). The technological spillover theory states that commercial banks can encourage financial innovation to improve services and transform sectors, resulting in higher productivity and profitability. The paper makes the case that mobile banking can increase the profitability (earning power) of Ghanaian commercial banks.

The conventional "innovation-growth" approach states that by utilizing cutting-edge technologies, old-fashioned banks would decrease their operational expenses and enhance the efficiency of their allocations. For instance, banks can provide loans through mobile banking automatically and without human involvement, processing requests twenty percent faster than old-fashioned banks (Fuster et al., 2019; Wang et al., 2021). Additionally, using technologies andinternet banking as well as digital payments reduce the expenses of infrastructure, such as ATMs, and also process payments and clearance extra faster and securely. (Baker and Wurgler, 2015).

(Lee et al., 2021), stated that the growing of the mobile banking business improve banks' expenditure efficiency, also upgrading the technology they utilize, provide empirical support for this. To support the idea that financial modernization can lessen information lopsidedness, Wang et al. (2021) and (Le et al., 2021), empirically show that the emergence of mobile banking has boosted bank effectiveness in the setting of China and globally.

Researchers (Dineshaw and Munien, 2013) looked into the intricate barriers that keep users in Mauritius from embracing and using mobile banking services. To further comprehend how mobile banking is considered in Mauritius, the writers employed a quantitative technique and merged perceived risk and cost constructs. The study's results indicated that adoption of banking was not driven by factors such as age, gender, or income, but rather by compatibility, convenience, and banking demands.

Nevertheless, it was shown that a key barriers to the acceptance of mobile banking were supposed security risk and trustworthiness, and that there is no correlation between m-banking usage and age, gender, or pay. The study done by (Kuisma et al., 2007) aimed to investigate the reasons behind customers' reluctance to adopt mobile banking, online purchasing, and internet banking, respectively. The study's findings revealed ten significant correlations between consumers' resistance to adoption and the use barrier. Based on the above literature the following hypothesis will serve as the primary focus of this investigation

H_1: Active mobile banking customers promote increase in earning power of commercial banks in Ghana.
H_2: Mobile banking transaction value positively and significantly affect financial performance of Ghanaian's commercial banks.
H_3: Mobile banking transaction volume increase financial performance of Ghanaian commercial banks.

3.0 Methodology
Research Design
The studyfocused on descriptive research design using quantitative research approaches for empirical analysis of the Ghanaians commercial banks. Cooper and Schindler (2003) state that descriptive design, gathereddata from a complete population or a subset of it in order to address research questions and characterize the variables' current state at the time of data collection.

Source of Data
The study data was mainly secondary obtained from reports of the central bank of Ghana from the year 2015 to 2022 on commercial banks, Return on Assets, Active Mobile Banking Customers, Mobile Banking Transaction Value and Mobile Banking Transaction volume. Validity is defined by (Cooper and Schindler, 2008) as the significance and precision of a study instrument. It is the tool's ability to measure its target accurately. In this study, the reliability of the information sources and the information's validity were both evaluated. The data source is reliable to increase validity.
Phelan et al. (2005) defined reliability as the extent to which the research tool utilized delivers outcomes that are steady and consistent. It is a review of an instrument's consistency and repeatability.

Variable and Description
Active mobile banking customers (ACC)
Active mobile banking customers is used as independent variables and one of the proxies for mobile banking.Instead of only counting the number of individuals having mobile banking accounts, this study uses data from the Bank of Ghana to estimate the number of regular users on the mobile banking service. Possession of such accounts does not reflect actual financial participation unless they are functional (Etim, 2014). Accordingly, the growth of the financial sector would be aided by an engaged user base. How frequently individuals use their mobile banking platforms at least once a month is a simple way for determining the total number of active mobile banking users. Figure below illustrate the trend in the variable for the selected years
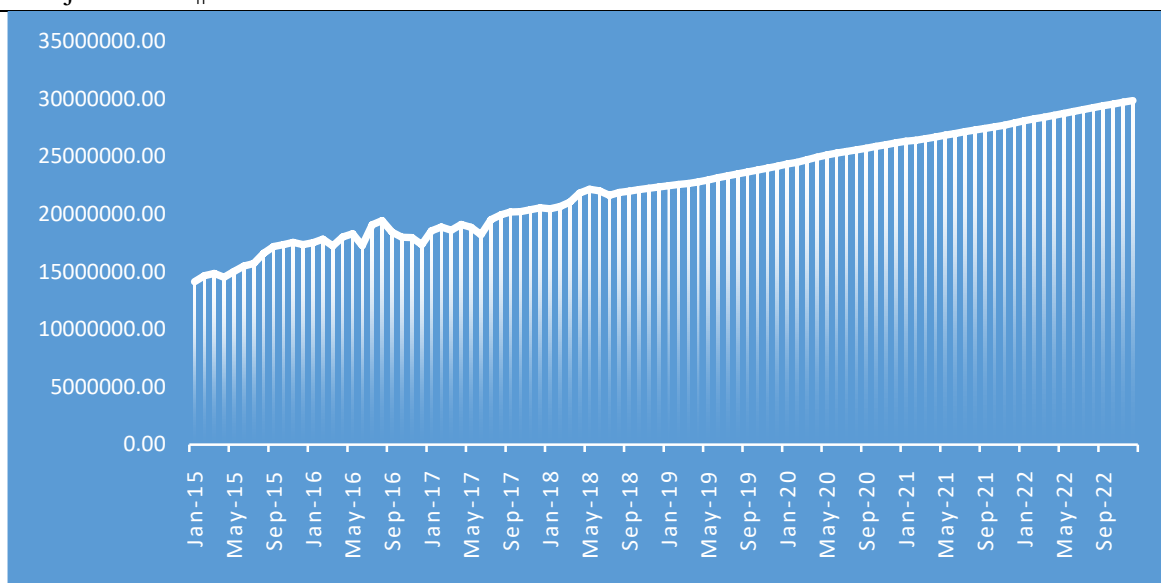
Figure 2: Trend of active mobile banking customers for the selected years (2015-2022)
Source: Authors construction based on Bank on Ghana data on active mobile banking users
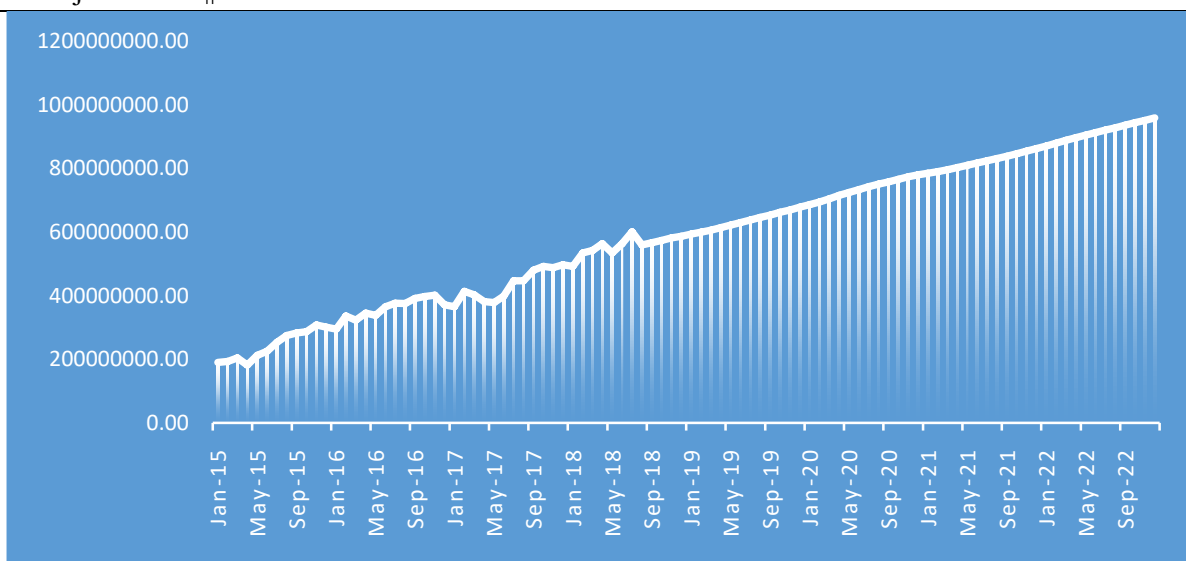
Mobile Banking Transaction Value (TVA)

Mobile banking transaction value is another independent variable used as proxy for mobile bank. All of the money that goes into and out of mobile banking accounts is known as the mobile banking transaction value. The sum of all mobile banking transactions in a given month, expressed in millions of US dollars, is the total transaction value. The value of mobile banking transactions is determined by dividing the total income for a specific period by the total number of transactions that occurred within that time. See figure 4 for trends in mobile banking transaction value from 2015 to 2022 on monthly bases.
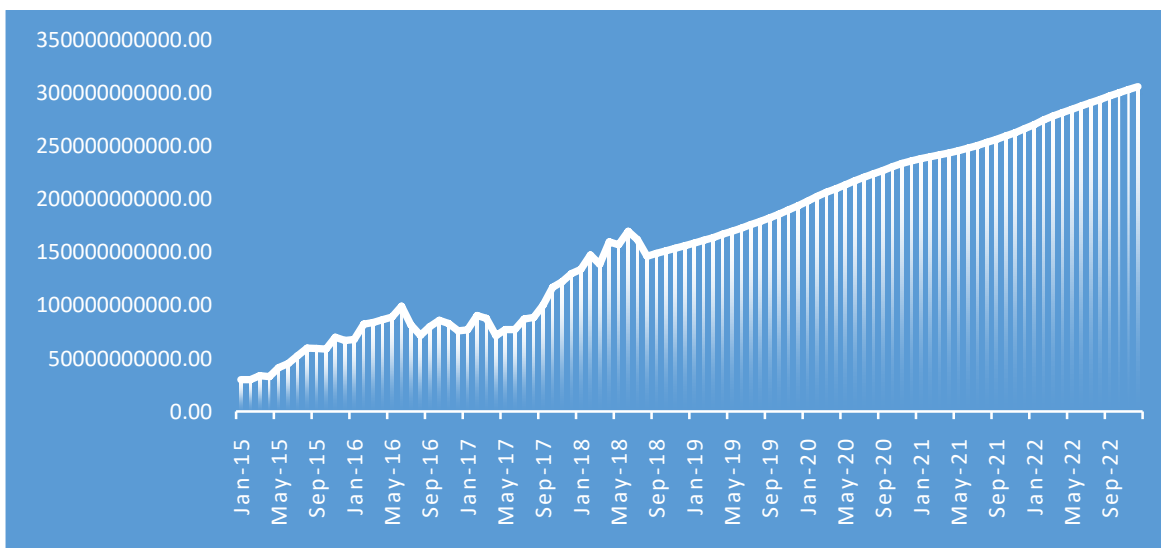
Figure 3: Trend in mobile banking transaction value for the selected years (2015-2022)
Source: Authors construction based on Bank on Ghana data on mobile bankingtransaction value

Mobile Banking Transaction Volume(TVO)

This is also used as independent variable for mobile banking.The total volume of transactions that were handled successfully through a mobile banking platform within a specific time period is known as the mobile banking transaction volume. Things like financial stability, efficiency, and competitiveness can be better understood by comparing this statistic to similar payment processed.One way to measure the performance of mobile banking is by looking at the volume of transactions performed within a specific time frame.Figure below illustrate the trend in mobile banking transaction volume for the selected years.

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Figure 4: Trend in mobile banking transaction volume for the selected years (2015-2022)
Source: Authors construction based on Bank on Ghana data on mobile banking transaction volume.

Return on Asset

Return on asset is used as dependent variable in the study and proxy for earning power. The efficiency with which a business turns its total assets into profit is quantified by its Return on Assets (ROA). ROA is expressed as a percentage, and a greater value indicates that the management of the company is doing a good job of generating profits from its balance sheet. To be good, a return on assets (ROA) should be more than 5%, and great, more than 20%. Divide net income by average total assets to get return on assets (ROA).
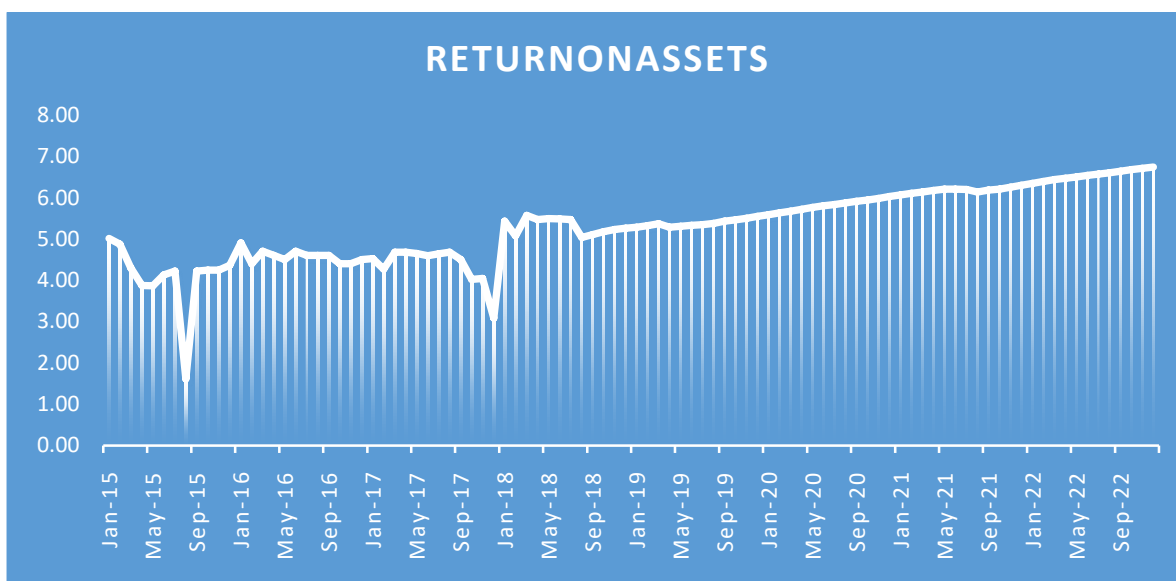
Figure 5: Trend in Return on Assets for the selected years (2015-2022)
**Source**: Authors construction based on Bank on Ghana data on Commercial banks return on asset

Data Presentation Procedures

E-Views was be used to analyze the data. The data were transformed into their natural logarithm The research uses measurements of central tendency and dispersion, such as standard deviation, mean, and percentage frequencies, in descriptive statistics. Quantitative data and text-based explanations will be presented via tables and graphs. To analyse the relationships and or effects betweenvariables that are independent and the dependent variables, this study specifically used Non-linear Least Square Regression models (NLS and ARMA). Wald Test coefficient restriction was used to examine the fitness of the regression coefficients, a unit root test was used to test for stationarity, serial correlation LM test and heteroskedacity test was used to diagnose the

residuals, cumulative sum recursive test (CUSUM) was used to examine the stability of the model. The following is the model specification:

$$ROA_t = β0 + β1ACC_t + β2TVO_t + β3TVA_t + ε_t \qquad (1)$$

Where ROA represent Return on Asset, β0 denotes constant or intercept, ACC represent Active mobile banking customers, TVO indicate total mobile banking transaction volume, TVA represent mobile banking transaction value, t denotes time, ε represent error term and β1,β2, β3 represent the parameters of the variable. A systematic flow of the study methodology is illustrated below.
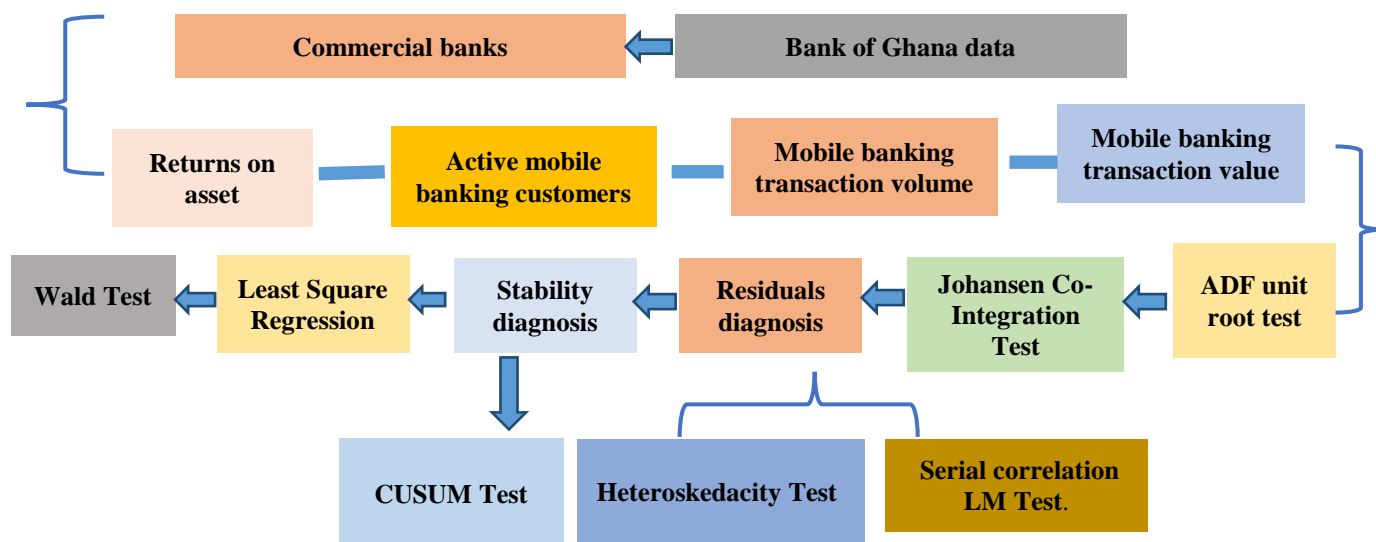
Source: author's construction
Figure 6: Data Analysis flow chart.

The ADF unit root tests are used in this study to evaluate the integration order of the relevant variables. The unit root's null hypothesis is stated as follows for the purpose of estimating the unit roots:

$$X_t = α + px_t - 1 + e_t \qquad (2)$$

Where X_t denotes the variables under consideration, $α$ represent the constant term, and e_t is the error term, for lagged variables, p represents the parameter slopes. By checking first differential order the equation is then represented by:

$$ΔX_t = α + e_t \qquad (3)$$

Where $Δ = (1 - B)$, B is the parameter of the slope.

4.0 Empirical Analysis
4.1 Introduction
The empirical study on the impact of mobile banking on Ghanaians commercial banks earning power is the primary focus of this chapter. This part displays the studied outcome for the variables in the analysis, together with the stability and residual diagnostics. The results include the effects and relationship between the variables and their respective significance. The chapter starts with a descriptive statistic and moves on to a systematic test for unit roots test, co-integration test, residual test, stability test, regression results, coefficient diagnostic.

4.2 Descriptive Statistics.
Averagely, the various variables from table 2 indicate, total transaction value, total transaction volume, active customers and return on assets has values of 25.54, 20.04, 23.21 and 5.10 respectively. From 2015 to 2022, the highest and lowest transaction value that occurred is26.28 and 24.13 respectively, total transactionvolume recorded 20.62 as highest and 19.02 as least during the selected years, highest number of people who were active on mobile banking were 23.84 and 22.00 being lowest from 2015 to 2022. 6.29

represent the greatest profit banks made and 1.61 as least profit during selected years. From the table, Total transaction Value, Total transaction Volume, Active Customers and Return on Assets deviate from the sample mean by 0.58, 0.43, 0.49 and 0.83 respectively.

In measures of normality, regarding asymmetric of series, it is seen from the table 2 that all the variables have negative skewdness from the average mean.The Kurtosis indicating the peakness or the flatness of the distribution show that all the variables except Return on Assets are platykurtic in nature, (< 3), which means that their dataset or points has more values that are less than their mean values. Return on Asset has Kurtosis of 5.241 greater than three (>3) indicating leptokurtic curve, and that the dataset has more values greater than its mean value of 5.10

Table 1: Descriptive Statistics Results.

	LROA	LACC	LTVA	LTVO
Mean	5.103007	23.20627	25.54200	20.03796
Maximum	6.294575	23.84092	26.28254	20.61931
Minimum	1.610000	22.00366	24.12786	19.01869
Std. Dev.	0.833308	0.487958	0.577814	0.432679
Skewness	-0.925138	-0.700587	-0.651032	-0.591755
Kurtosis	5.241294	2.643006	2.539747	2.413808
Jarque-Bera	28.86033	7.143333	6.516284	5.959741
Probability	0.000001	0.092100	0.058543	0.091817
Note: Active mobile banking customers (LACC), Total Mobile BankingTransaction Value (LTVA) and Total Mobile banking Transaction Volume (LTVO),Returns on Assets (LROA)				

Source: Author's compilation from Eviews.

For Jarque-Bera, H_0: Distribution is normal and H_1: Distribution is not normal. From the table the Jarque-Bera probability for the variables are Total Transaction Value 0.058543, Total Transaction Volume 0.091817,Active Customers 0.092100 and Return on Asset 0.0001. All these probability values are greater than 0.05 significant level except return on assets, therefore we partially accept the H_0: Distribution is normal

4.3 Unit Root Test

According to (Moon and Perron, 2004). There is a unit root in the model is the null hypothesis. Table 3 presents the series unit root's outcomes. Once the statistical value is less than the critical value for ADF, the variable is considered stationary, according to a comparison of the ADF statistical data and the statistical value. It can be seen from the table 2 that all the variables LACC, LROA, LTVO, LTVAare mixed-order differential series

Table 2: Resultsof Unit Root Test: Augmented Dickey-Fuller (ADF)

At Level					
		LACC	LTVA	LTVO	LROA
With Constant	t-Statistic	-4.0428	-2.6186	-2.8397	-1.552
	Prob.	**0.0020**	**0.0934**	**0.0574**	**0.503**
		***	*	*	n0
With Constant & Trend	t-Statistic	-2.9394	-2.9043	-2.7180	-5.3014
	Prob.	**0.1560**	**0.1667**	**0.2324**	**0.0002**
		n0	n0	n0	***
Without Constant & Trend	t-Statistic	5.8231	3.2508	3.972	0.2285
	Prob.	**1.0000**	**0.9997**	**1.0000**	**0.7501**
		n0	n0	n0	n0
At First Difference					
		d(LAC)	d(LTVA)	d(LTVO)	d(LROA)
With Constant	t-Statistic	-7.1572	-8.8939	-10.8791	-14.536
	Prob.	**0.0000**	**0.0000**	**0.0001**	**0.0001**
		***	***	***	***
With Constant & Trend	t-Statistic	-8.2090	-9.2777	-11.4270	-14.488
	Prob.	**0.0000**	**0.0000**	**0.0001**	**0.0001**
		***	***	***	***

Without Constant & Trend	t-Statistic	-5.3952	-7.9059	-2.2624	-14.601
	Prob.	*0.0000*	*0.0000*	*0.0237*	*0.0000*
		***	***	**	***

Source: Author's collation from E-views.

4.4 Johansen Co-Integration Test

To ensure that there is a lasting correlation among the variables LACC, LTVA, LTVO, and LROA, Johansen and Juselius Co-integration Method was used to assess long time correlations. It is evidenced from Table 4 that Trace Statistics values of 136.81and 60.85 are higher than their corresponding Critical Values of 63.88 and 42.92 giving probability of 0.000 and 0.0003 respectively.Moreover, Max-Eigen Statistics prove that its value of 75.96 and 39.07 are higher than the critical value of 32.12 and 25.82 resulting in probability of 0.0000 and 0.0005 respectively. Conclusion can therefore be made that there is a prolonged and more stable relationship among the variables.

Table 3: Result of Johansen Co-Integration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.617697	136.8074	63.87610	0.0000
At most 1 *	0.390163	60.84560	42.91525	0.0003
At most 2	0.170644	21.77510	25.87211	0.1488
At most 3	0.084723	6.993745	12.51798	0.3452
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.617697	75.96181	32.11832	0.0000
At most 1 *	0.390163	39.07050	25.82321	0.0005
At most 2	0.170644	14.78136	19.38704	0.2058
At most 3	0.084723	6.993745	12.51798	0.3452

Source: Author's collation from E-views

4.5 Nonlinear Least Square Regression Estimation

The Nonlinear Least Squares (NLS) and ARMA Regression is used to investigate and model the impactof the variables that are independent and that of the dependent.Estimating the regression equation's coefficients, which depict the effect between variables that are independent and that of the dependent, is a necessary step in regression analysis. The table below is the output of the estimation.

Table 4: Nonlinear Least Square Regression Estimation Output.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LACC	0.073847	1.252673	0.057074	0.0416
LTVA	0.017295	0.727060	0.023788	0.0241
LTVO	2.832873	1.391931	2.035210	0.0452
C	-24.86313	2.923966	-8.503221	0.0000
R-squared	0.642617	Mean dependent var		5.103007
Adjusted R-squared	0.628872	S.D. dependent var		0.833308
S.E. of regression	0.507653	Akaike info criterion		1.529515
Sum squared resid	20.10154	Schwarz criterion		1.646916
Log likelihood	-58.71012	Hannan-Quinn criter.		1.576650
F-statistic	46.75118	Durbin-Watson stat		1.266549
Prob(F-statistic)	0.000000			

Source: Author's compilation from Eviews

Table 5: Wald coefficient diagnosis test

Test Statistic	Value	Df	Probability
F-statistic	46.75118	(3, 78)	0.0000
Chi-square	140.2535	3	0.0000
Null Hypothesis: C(1)=0, C(2)=0, C(3)=0			

Source: Author's compilation from Eviews

The study used Wald test coefficient restriction to examine the coefficients for the various variables.it can be seen from table 10 that the coefficients of the various variables are not equal to zero, thereby rejecting the null hypothesis that the various variable's coefficient are equal to zero . The probability of both F-statistics and Chi – square are less than 0.05 indicating the model coefficients are good for analysis.

Mobile banking transaction volume (LTVO) is significant at 0.045 and positively affects earning power (LROA) at 2.832 coefficient value as observed in table 3. This means that a profit of 2.832 by commercial banks in Ghana is explained by a unit change in Mobile banking transaction volume (LTVO). The independent variables: Active mobile banking customers (LACC), Total Mobile BankingTransaction Value (LTVA) and Total Mobile banking Transaction Volume (LTVO) causes 64% change in the dependent variable Return on Asset (LROA) Since R- square is 0.6426. The remaining 36% isrepresented by other elements that may influence Return on Asset. Both Durbin-Watson stat and F- statistics probability support the model at values of 1.266 and 0.0000 respectively.

H_1: Active mobile banking customers (ACC) positivelyand significantly affect earning power of commercial banks in Ghana.

The regression table has revealed that the regression coefficient of Active mobile banking customers (LACC) is 0.074 which is of 0.042 significant level. The meaning is that Active mobile banking customers (LACC) increasethe Ghanaian's commercial banks profitability and that a unit change in Active mobile banking customers (LACC) causes 0.074 rise in commercial banks profitability (LROA). Hypothesis $H_1$is therefore accepted that Active mobile banking customers positively and significantly affect earning power of commercial banks in Ghana.

H_2: Mobile banking transaction value exert a positive and significant effect on financial performance of Ghanaian's commercial banks.

The coefficient of regression for Mobile banking transaction value (LTVA) is 0.018 and significant at 0.024. This meaning there exist a positive and significant effect of Mobile Banking Transaction Value on Ghanaian's commercial banks earning power, and that a profit of 0.017 is as a result of a unit change in Mobile banking transaction value (LTVA). This finding is similar to (Olayungbo and Quadri, 2019) who used annual time series from monthly time series from 2010 to 2020 to assess the association between the amount of mobile money transactions and financial development. After using ARDL estimating methodologies, the authors came to the conclusion that there is a positive effect of the amount of mobile money transactions and financial development. Hypothesis $H_2$is therefore accepted.

In determining the association among the variable and a lagged version of itself over different time, Breusch-Godfrey LM serial correlation Test was used. It calculates the correlation between a variable's previous values and current value. The Breusch-Pagan-Godfrey Heteroskedastic test examine the variance of the residual term, or error term, in a regression model ensuring that they did not vary significantly.

Table 6: serial correlation test results

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	2.014993	Prob. F(2,76)	0.1404
Obs*R-squared	4.129187	Prob. Chi-Square(2)	0.1269

Table 7: Heteroskedasticity Test Results

| Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.547389	Prob. F(3,78)	0.2089
Obs*R-squared	4.606096	Prob. Chi-Square(3)	0.2030
Scaled explained SS	42.85381	Prob. Chi-Square(3)	0.0000

Source: Author's compilation from E-views

The results show that serial correlation and heteroscedasticitydoes not exist in the model, indicating stability. The p-values of both serial correlation andHeteroskedasticity Test are 0.1404 and 0.2089 respectively,

Chi-squares is also 0.2030 which is higher than 0.05 significant level .Both test did not reject the null hypothesis that state that there is no serial correlation and Breusch-Pagan-Godfrey Heteroskedasticity test also failed to reject H_0 that there is no presence of Heteroskedasticity meaning there is a presence of homogeneity.

4.6 CUSUM Test

For the purpose of stability in the model, the bases of CUSUM testis the accumulative sum of the recursive residuals. In this option, the accumulative total and the five percent crucial lines are presented together. If the accumulative sum crosses outer the region between the two crucial lines, parameter instability is identified by the test.The following statistic is the basis of the CUSUM test:
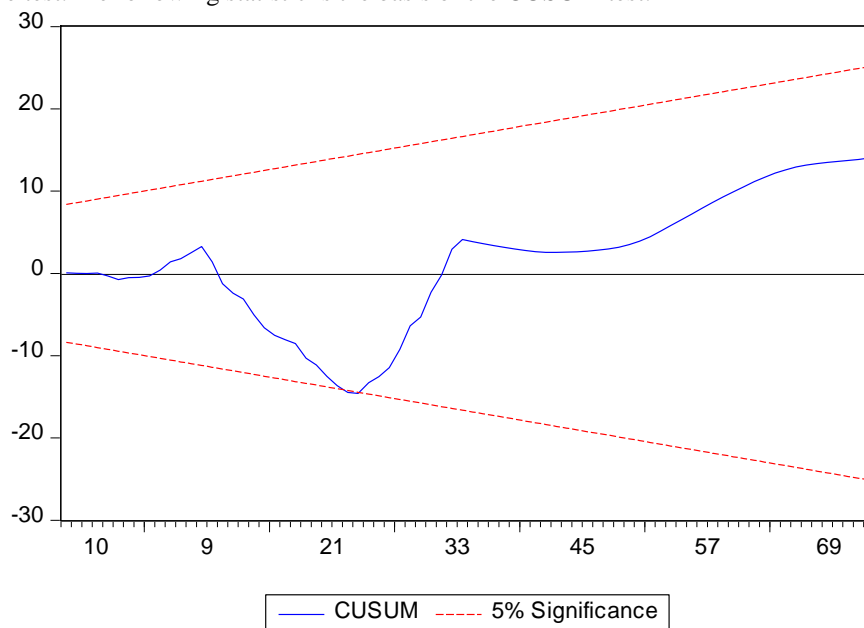
Source: Author's collation from Eviews
Figure: 7 graph of CUSUM test Results

At 0.05 significant level, the test of cumulative sum of the recursive residuals clearly indicate stability in the parameters of the equation from the figure 3.the cumulative sum are in the interior area of the critical lines.

4.7 Summary of Key Findings

The purpose of the study was to ascertain how Ghanaian commercial banks' earning power was impacted by mobile banking. The following is a summary of the main conclusions drawn from the study's conceptual framework.

The R-Square of the regression findings indicated that the model explained 64.2 % of the variance in commercial banks profitability in Ghana and that it was statistically significant at 0.000, This demonstrates that the model fit the data and explained the link between the independent variables and Ghana's commercial banks' financial performance.

One of the purpose of the study was to determine whether a commercial bank's earning power is correlated with the volume of transactions it conducted via mobile banking. The findings show that, Mobile Banking Transactions Volume significantly and positively correlated with Return on Assets that is earning power of Ghana's commercial banks.

The study also sought to examine the effect of Mobile Banking Transaction Value. It was found that there is a positive and significant effect of Mobile Banking Transaction Value on Ghanaian's commercial banks earning power.The study again found that Active Mobile Banking Customers negatively and significantly impact Ghanaian's commercial banks earning power.

5.0 Conclusion and Policy Recommendations

5.1 Conclusion

Since its inception, mobile banking has in fact improved the bank's profitability. By providing useful services, it has also enhanced the bank's relationship with its customers. Customers utilizing mobile banking solutions face the challenge of internet connection failure and malfunctions. The findings show that Ghanaian

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commercial banks' financial performance was positively impacted by mobile banking activities. Thus, this study comes to the conclusion that when a commercial bank expands the reach of its mobile banking services, more transactions occur through such platforms, which boosts the bank's financial performance.

5.2 Recommendations of the Study

The study's conclusions lead to several recommendations. The study suggests that Ghanaian commercial banks should persist in their efforts to expand the use of mobile banking, since it has been shown to improve their financial performance. The report advises commercial banks that now offer mobile banking services and products to devise strategies for enhancing the transactions made on these platforms, since this will boost their profits and, consequently, their financial performance.

Active mobile banking customers is seen to improve banks profit. Therefore banks should do well to attract more customers into the mobile banking platforms. Mobile banking transaction volume also improve banks performance, managers of banks should make possible effort to reduce transaction barriers.The report concludes by advising commercial banks to look for strategies to increase the size of their asset base, which will enable them to invest in mobile banking and provide effective platform support. The analysis indicates that this will lead to enhanced financial performance.

5.3 Limitations of Study

The study is conducted in Ghana, on the impact of mobile banking as financial technology tool on the Ghanaian commercial banks performance. Therefore I cannot make generalization that mobile banking impact positively or negatively on financial soundness of banks in other countries. Again, I cannot make conclusion that mobile banking affect every bank in Ghana as the study was limited to commercial banks and not micro-finance and rural banks in Ghana. Moreover, banks performance is assessed based on the CAMEL(capital adequacy, asset quality, management efficiency, liquidity management, earning power) rating system, I cannot make generalization that only earning power is affected by mobile banking as other factors may also be affected by mobile banking services.

Data Availability Statement: The variables used in this paper are collected from the database of the central bank of Ghana.

Conflicts of interest: The authors declare no conflict of interest.

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