http://journals.uonbi.ac.ke/index.php/adfj
ISSN 2522-3186

ADFJ ISSN 2522 - 3186.

African Development Finance Journal

VOLUME 5 (V)

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Date Received: July, 16, 2023

Date Published: August, 28,2023

http://journals.uonbi.ac.ke/index.php/adfj
ISSN 2522-3186

Digital Banking and Economic Growth: A Comparative Analysis of Nigeria and Kenya

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Abstract

Every economy aims to achieve the important goal of enhancing economic growth. There has been a long-standing debate regarding the correlation between financial development and economic growth. The banking sub-sector plays a significant role in the financial sector as it connects the deficit and surplus areas of the economy. The banking systems in Kenya and Nigeria still have room for improvement, as there are noticeable issues in the daily operations of digital banking in both countries. These issues include delays in transaction processing and remittance time for failed transactions. Using quarterly time series data from 2011 to 2021, this study investigated the influence of digital banking on economic growth in Kenya and Nigeria. Digital banking was proxied by mobile banking, automated teller machines, and point-of-sales terminal, while economic growth was measured by gross domestic product. The study utilised the autoregressive distributed lag (ARDL) model to analyse data samples from Kenya and Nigeria. In addition, the panel ARDL model was employed to analyse the combined data sample. The findings show that mobile banking (combined, Nigerian and Kenyan), point of sale terminals (combined and Kenyan), and automated teller machines (combined and Kenyan) have an insignificant impact on economic growth in the long run. The automated teller machine (Nigeria) negatively affected economic growth in the long run. This study recommends that the central banks of Kenya and Nigeria implement public enlightenment and awareness programs on digital banking to enhance familiarity with the system. This approach will raise awareness and encourage those without banking access to join the banking system, ultimately enhancing financial inclusion in both nations.

Keywords: digital banking, mobile banking, automated teller machines, point of sale terminals

Introduction

Information and communication technology advancements have significantly impacted how businesses operate, especially in banking, and digital banking, in particular, has completely transformed how banking services are provided (Adubakar & Rasmaini, 2012; Ojokuku & Sajuyigbe, 2012). Digital banking refers to using electronic and telecommunication networks to offer bank customers additional products and services. This is also known as the use of information technology in banking operations (Aduda & Kingoo, 2012; Haabazoka, 2019). According to Ovia (2011) and Abaenewe et al. (2013), digital banking results

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http://journals.uonbi.ac.ke/index.php/adfj
ISSN 2522-3186

from integrating e-commerce into the banking and financial services sector. Firms in this sector now offer traditional banking services in a business-to-consumer format, such as balance inquiries, chequebook requests, stop payment instructions, account-to-account transfers, cash withdrawal, cash/cheque deposit and account opening via the Internet, while also providing payment services for customers who shop at various online stores.

Banking services have become more efficient with the use of digital banking (Demaki et al., 2021). The quality of services provided by financial institutions has significantly improved due to technological advancements. Customers can carry out transactions outside of traditional banking hours by using automated teller machines (ATMs) and deposit machines. Through online banking, customers can monitor the status of their accounts and make payments without going to a financial institution physically. Customers now have convenient options to pay for plane tickets, subscribe to initial public offerings, and transfer money straight from their accounts. Additionally, they can make payments for various products and services by electronically transferring credit to the vendor's account (Aduda & Kingoo, 2012; Dzombo et al., 2017).

Digital banking has revolutionized how financial services are accessed and delivered, significantly impacting economic growth. The availability of digital banking has made it easier for people in underserved areas to access financial services. It has also made it easier for individuals and businesses to participate in the formal economy by reducing entry barriers. Thanks to digital banking services like online banking, mobile payments, and digital wallets, people who were previously unbanked or under banked can now access financial services. This increased financial inclusion helps boost economic activity and promote growth (Auta, 2010; Wang et al., 2020).

By eliminating the need for physical branches, digital banking reduces the operational costs associated with traditional banking services. This cost reduction enables financial institutions to offer more affordable services, including lower transaction fees, and provide access to financial products to a broader customer base. Moreover, lower costs stimulate entrepreneurial activity and promote economic growth (Otieno & Ndede, 2020). According to Filip (2017), digital banking has made accessing and managing financial services easier and more convenient. Customers can use their smartphones or computers to perform banking transactions anytime and from anywhere, thereby increasing financial activities. People and businesses now

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ISSN 2522-3186

use digital platforms for payments, transfers, and investments. This convenience has resulted in improved resource allocation and economic growth because the timesaving and productivity benefits of digital banking are significant.

Research Problem

According to Ogbeide-Osaretin and Ishiuwu (2016) and Ramos and Olweny (2021), the economy's growth is a major concern for many, as it significantly impacts a country's progress and the well-being of its citizens. It is commonly believed that a country with an advanced digital financial system should experience high economic growth. However, statistics reveal that the economic growth rate in Kenya and Nigeria has been fluctuating and inconsistent despite various policy interventions. Ene et al. (2019), CBN (2020), and Gbanador (2023) posited that over the years, the Central Bank of Nigeria (CBN) has made several reforms to enhance the payment system in Nigeria. These changes were implemented to boost the country's economic performance, align with global trends, and steer it in the right direction. One such reform was the cashless policy in January 2012; it penalized individuals who withdraw more than 500,000 Naira daily and corporate organizations who withdraw more than 3,000,000 Naira. The policy's main goal was to provide a secure and efficient way of making and receiving payments from any location using different electronic channels.

Banks are now prioritizing electronic delivery channels due to the increasing popularity of Internet services. Online banking is projected to have the fastest growth in information technology costs, with an expected 5.3% increase in spending (Dapp et al., 2012; Krishnamohan & Srinivas, 2022). However, there are still long queues in some banking halls, customers handling too much cash, frequent network failures, and inadequate awareness of available e-banking products and services. Customers may also get frustrated with ATM centers due to slow or non-dispensing automated teller machines.

Previous studies on the impact of digital banking on economic growth have produced conflicting results. Additionally, these studies were based on a single country. To the best of our knowledge, no cross-country study has been done on the effect of digital banking on economic development in Africa. The study aims to examine the influence of digital banking on economic growth in Kenya and Nigeria.

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ISSN 2522-3186

Research Objectives

The study's primary goal is to investigate the influence of digital banking on Kenyan and Nigerian economic growth. The specific objectives are as follows:

(i) Determine the impact of mobile banking on Kenyan and Nigerian economic growth.

(ii) To evaluate the influence of point-of-sale terminals on Kenyan and Nigerian economic growth.

(iii) To investigate the impact of automated teller machines on Kenyan and Nigerian economic growth.

Theoretical Review

The study is based on the technology acceptance model. In 1989, Davis introduced the Technology Acceptance Model (TAM), a theoretical approach that explains and predicts how users adopt and embrace new information technology (IT) systems. TAM was designed to track how external factors impact internal beliefs, attitudes, and intentions. Its goal is to identify key variables influencing internet acceptance based on previous research on cognitive and emotional determinants (Davis, 1989; Otieno & Ndede, 2020).

The TAM theory suggests that the acceptance of technology by users depends on two main factors: perceived usefulness (PU) and perceived ease of use (PEOU). Perceived usefulness (PU) describes how much a user thinks technology will improve their work or make their tasks quicker and more effective. Users are more willing to utilise and embrace technology if they feel it will help them accomplish their objectives. The perceived ease of use (PEOU) describes how easily users think they can operate and understand technology without too much effort. Users who perceive technology as straightforward and uncomplicated are more likely to use and adopt it. The TAM suggests that an individual's attitude towards using technology is affected by PU and PEOU, which influence their intention to use it. The intention to use technology is the most important factor in its adoption (Kirui, 2014).

Empirical Review

Andabai and Bina (2019) used ordinary least squares (OLS) to examine the effect of e-banking on economic growth in Nigeria between 2000 and 2018. The study measured e-banking using mobile electronic payments and automated teller machines. The results revealed that mobile electronic payments and automated teller machines significantly impacted the gross domestic product.

http://journals.uonbi.ac.ke/index.php/adfj
ISSN 2522-3186

Mulee (2019) used quarterly time series data from 2009 to 2018 to examine the influence of electronic financial innovation on Kenya's economic growth using ordinary least squares (OLS). Electronic financial innovation was measured by the volume of mobile money transfers, the value of mobile electronic transfers, and the volume of Internet banking transactions. The findings showed that the volume of mobile money transfers, the value of mobile electronic transfers, and the volume of Internet banking transactions significantly positively affected Kenya's economic growth.

Using quarterly time series data covering 2012 to 2021, Chepngeno (2022) examined the impact of financial technology on the growth of Kenya's economy using the ordinary least squares (OLS) statistical method. Financial technology was measured by the number of mobile banking, internet banking, agency banking, and Mpesa transactions. The findings showed that mobile banking, internet banking, and Mpesa had significant positive impacts on economic growth, while agency banking had no significant effect.

Using quarterly time series data from 2012 to 2021, Gbanador (2023) investigated the influence of the cashless policy on Nigeria's economic growth using auto-regressive distributed lag (ARDL). The findings reveal that Cheque (CQ) had a significant positive impact on gross domestic product, while internet banking (IB) had a significant negative impact on gross domestic product. Furthermore, automated teller machines did not affect the gross domestic product.

Methodology

The research approach used is ex-post facto design. The study used secondary and quarterly time-series data from the statistical bulletin published by the central banks of Kenya and Nigeria from 2011 to 2021. The study adapted Dabo (2019) 's model to evaluate the impact of digital banking on economic growth in Kenya and Nigeria. The model is specified as follows:

$GGR_t = \beta 0 + \beta 1MOB_t + \beta 2POS_t + \beta 3ATM_t + \beta 4INT_t + \beta 5INF_t + et$ .... (1)

Where:

GGR = Gross Domestic Product

MOB = Mobile banking

POS = Point of Sale

ATM = Automated Teller Machine

INT = Interest Rate (control variable)

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ISSN 2522-3186

INF = Inflation rate (control variable)

et = Error term

β0, β1, β2, β3 β4, and β5 = Parameters

Measurement of Variables

Variable	Measurement	Sources
Dependent Variable		
GDP	Gross Domestic Product	Dabo (2019) and Mamudu and Gayovwi (2019)
Independent Variables		
ATM Transactions	The volume of ATM transactions	Dabo (2019) and Misati et al. (2022)
POS Transactions	The volume of POS Transactions	(Dabo, 2019) and Mulee (2019)
MOB	The volume of MOB Transactions	Mulee (2019) and Chepngeno (2022)
Control Variables		
Interest rates	Savings Deposit	Babajide et al. (2015) and Ribaj and Mexhuani (2021)
Inflation rates	Consumer price index	Chepngeno (2022) and Misati et al. (2022)

Data Analysis

The descriptive statistics for the combined Kenyan and Nigerian samples are presented in the table above. According to the table, the mean gross domestic product for the combined sample is 37 billion USD. However, the mean gross domestic product for the Kenyan sample is 1 billion USD, while that of the Nigerian sample is 73.5 billion USD.

The combined sample's mean volume of ATM transactions was 111 million. However, the mean volume of ATM transactions for the Kenyan sample is 25.4 million, while the Nigerian sample has an average volume of 197 million. The mean volume of POS transactions in the combined sample was 55 million. Specifically, the Kenyan sample had a mean of 54 million, while the Nigerian sample had a mean of 104 million. The mean volume of MOB transactions in the combined sample was 130 million. Specifically, the Kenyan sample had a mean of 3 million, while the Nigerian sample had a mean of 55 million.

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ISSN 2522-3186

Table 1: Descriptive statistics of variables

	Variables	Mean	Minimum	Maximum	OBS
Combined	GGR	3.72e+10	8.01e+08	1.13e+11	80
	ATM	1.11e+08	8282359	5.30e+08	80
	POS	5.50e+07	118620	7.55e+08	80
	MOB	1.30e+08	374409	2.23e+09	80
	INT	3.1201	4.2233	0.6067	80
	INF	9.366417	1.38	18.45333	80
Kenya	GGR	1.00e+09	8.01e+08	2.96e+09	40
	ATM	2.54e+07	8282359	7.55e+07	40
	POS	5703423	1299686	1.20e+07	40
	MOB	3019369	818315	3924787	40
	INT	3.0913	0.6067	4.2233	40
	INF	6.359833	1.38	16.87	40
Nigeria	GGR	7.35e+10	4.27e+10	1.13e+11	40
	ATM	1.97e+08	6.48e+07	5.30e+08	40
	POS	1.04e+08	118620	7.55e+08	40
	MOB	5.48e+07	212195	2.42e+08	40
	INT	3.1489	1.4533	4.2233	40
	INF	12.373	7.8333	18.4533	40

Correlation Analysis

The Spearman correlation coefficient (correlation matrix) and variance inflation factor (VIF) were used to determine if there is a correlation between variables. Multicollinearity can lead to misleading regression results. Additionally, the correlation between dependent and independent variables is examined in this section.

http://journals.uonbi.ac.ke/index.php/adfj
ISSN 2522-3186

Table 2: Correlation matrix

Combined		GGR	ATM	POS	MOB	INT	INF
	GGR	1.0000					
	ATM	0.8489	1.0000				
	POS	0.3497	0.6666	1.0000			
	MOB	0.2264	0.6177	0.8856	1.0000		
	INT	-0.0019	0.0693	0.1939	0.0249	1.0000	
	INF	0.6612	0.8058	0.5301	0.4904	0.0039	1.0000
Kenya	GGR	1.0000					
	ATM	-0.5608	1.0000				
	POS	-0.1508	0.2134	1.0000			
	MOB	-0.5913	0.0904	0.8100	1.0000		
	INT	-0.3511	-0.0151	0.1913	0.4654	1.0000	
	INF	-0.4261	0.3585	-0.3144	0.0220	-0.0609	1.0000
Nigeria	GGR	1.0000					
	ATM	-0.8910	1.0000				
	POS	-0.8609	0.8901	1.0000			
	MOB	-0.7551	0.8536	0.9548	1.0000		
	INT	-0.2129	0.1797	0.2522	0.2234	1.0000	
	INF	-0.7573	0.6004	0.5130	0.3445	0.0040	1.0000

Based on the data in Table 2 above, the Nigerian sample shows a strong correlation of 0.9548 between POS and MOB, with POS and ATM having the second highest correlation of 0.8901. Due to the high correlation between MOB and ATM, POS was excluded from the Nigerian sample.

Furthermore, the study employed variance inflation factors (VIF) to evaluate multicollinearity between the independent variables (table 3 below). The VIF values for all independent variables were below the specified threshold of 10 (Wooldridge, 2015), indicating no significant multicollinearity among the independent variables.

http://journals.uonbi.ac.ke/index.php/adfj
ISSN 2522-3186

Table 3: Variance Inflation Factors

Combined	Variable	VIF	1/VIF
	POS	6.01	0.1663
	MOB	5.20	0.1925
	ATM	3.71	0.2699
	INF	2.88	0.3476
	INT	1.17	0.8519
	Mean	3.79	
Kenya	MOB	7.88	0.1269
	POS	7.09	0.1410
	INT	1.83	0.5457
	INF	1.70	0.5865
	ATM	1.46	0.6871
	Mean	3.99	
Nigeria	ATM	6.07	0.1647
	MOB	4.44	0.2253
	INF	1.88	0.5316
	INT	1.06	0.9428
	Mean	3.36	

Unit Root Test

The ADF test statistics for each variable are shown in Table 4 below. The table shows that all variables are integrated at the level or the first difference.

Table 4.4: ADF Unit Root Test (ADF Regression with Intercept and a Linear Trend)

	Variables	Order of Integration	T- Statistics ADF	Critical ADF Statistics	Probability
Combined	GGR	first difference	-2.9529	2.9390	0.0485
	ATM	I(0)	-5.0548	-3.5403	0.0012
	MOB	I(1)	-3.6105	-2.9529	0.0485
	INT	I(0)	-4.1749	-2.9411	0.0023
	INF	I(0)	-2.9546	-2.9434	0.0488
Kenya	GGR	I(0)	-6.2855	-3.5298	0.0000
	ATM	I(0)	-3.4695	-2.9390	0.0143
	MOB	I(0)	-3.3083	-3.6105	0.0213
	POS	I(0)	-5.0577	-3.5298	0.0011
	INT	I(1)	-3.1786	-2.94584	0.0296
	INF	I(0)	-5.8355	-2.9390	0.0000
Nigeria	GGR	I(0)	-1.9815	-1.9507	0.0468
	ATM	I(0)	-5.0548	-3.5403	0.0012
	MOB	I(0)	-2.9529	-2.9390	0.0485
	INT	I(1)	-4.1749	-2.9411	0.0023
	INF	I(0)	-2.9546	-2.9434	0.0488

http://journals.uonbi.ac.ke/index.php/adfj
ISSN 2522-3186

Bounds Test

According to Table 5 below, the F-statistic for the Kenya sample is 4.8663, which is significantly higher than the upper limit of 4.15 at the 1% critical threshold. This implies that there is a long-run cointegration association between the variables. Furthermore, the F-statistic for the Nigerian sample is 9.0228, which is higher than the 1% significance level upper limit of 4.37. This implies that there is a long-run cointegration association between the variables. Consequently, we will estimate the ARDL regression models for both the short-run and the long term.

Table 5: ARDL Bound Test Result

	F-STATISTICS	**CRITICAL VALUES BOUNDS**		
Kenya	4.8663	Significant Level	I(0)	I(1)
		10%	2.08	3.3
		5%	2.39	3.38
		1%	3.06	4.15
Nigeria	9.0228	Significant Level	I(0)	I(1)
		10%	2.2	3.09
		5%	2.56	3.49
		1%	3.29	4.37

Econometric Analysis

This segment discusses the short- and long-run associations between digital banking and economic growth. Kenyan and Nigerian samples were analyzed using the autoregressive distributed lag (ARDL) model, while the combined sample was analyzed using the panel ARDL model.

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ISSN 2522-3186

The Long Run ARDL

Table 6: Long Run ARDL

Combine	Variable	Coefficient	T-Stat	P-value
	LMOB	-0.0239	-0.9891	0.3267
	LPOS	0.1093	1.8128	0.0750
	LATM	-0.1033	-0.9874	0.3275
	INF	-0.0345	-6.3290	0.0000
	INT	-0.0623	-3.4890	0.0009
Kenya	C	18.9857	17.0972	0.0000
	LMOB	0.0345	0.35775	0.7233
	LATM	0.0012	0.0260	0.9795
	LPOS	0.0912	1.3045	0.2031
	lNF	-0.0123	-1.3488	0.1886
	INT	-0.0080	-0.6094	0.5474
	R-squared	0.9446		
	F-Statistics Prob.	51.1230 0.0000		
Nigeria	C	17.7299	2.9056	0.0074
	LMOB	0.0252	0.3414	0.7356
	LATM	-0.1338	-1.8838	0.0708
	lNF	-0.0398	-2.9386	0.0068
	INT	-0.0343	-1.9192	0.0660
	R-squared	0.9507		
	F-Statistics Prob.	50.1830 0.00000		

The R^2 values for the Kenyan and Nigerian samples are 94% and 95%, respectively. This means that the independent variables explain at least 94% of the variability in economic growth in Kenya and 95% in economic growth in Nigeria.

http://journals.uonbi.ac.ke/index.php/adfj
ISSN 2522-3186

Mobile Banking: The findings show that mobile banking has no long-term influence on economic growth for the combined sample (chi^2 = -0.0239, P-value = 0.3267 > 0.05), the Nigerian sample (chi^2 = 0.0252, P-value = 0.7356 > 0.05), (chi^2 = -0.1434, P-value = 0.1716 > 0.05), and (chi^2 = 0.0951, P-value = 0.1634 > 0.05), the Kenyan sample (chi^2 = 0.0345, P-value = 0.7233 > 0.05). This implies that an increase in the volume of mobile banking has no long-term effect on Nigeria's gross domestic product. The findings are consistent with those of Ikpefan et al. (2018), who found no significant correlation between mobile banking and the gross domestic product. However, the findings contradict those of Chepngeno (2022), who found that mobile banking significantly positively influences gross domestic product.

Point of Sale: Based on the results, the point of sale has an insignificant long-run impact on the economic growth of the Kenyan sample (chi^2 = 0.0912, P-value = 0.2031 > 0.05). This implies that an increase in the volume of POS transactions has no impact on Kenya's long-term gross domestic product. The findings are consistent with those of Ikpefan et al. (2018), who found no significant correlation between the point of sale and the gross domestic product. However, the findings contradict those of Ibe and Odi (2018), who found a significant positive relationship between point of sale and gross domestic product. However, for the combined sample, point of sale has significantly positive long-run effects on economic growth (chi^2 = 0.1093, P-value = 0.0750 < 0.10).

Automated Teller Machine: The results show that automated teller machines have no long-term effect on economic growth for the combined sample (chi^2 = -0.1033, P-value = 0.3275 > 0.05) and the Kenyan sample (chi^2 = 0.0012, P-value = 0.9795 > 0.05). This implies that an increase in the volume of ATM transactions does not influence long-term gross domestic product. The findings are consistent with those of Misati et al. (2022), who found that automated teller machines do not impact the gross domestic product. However, the findings contradict those of Gbanador (2023), who found that automated teller machines significantly negatively influence gross domestic product. For the Nigerian sample, automated teller machines significantly negatively affect long-term economic growth (chi^2 = -0.1338, P-value = 0.0708 < 0.10).

http://journals.uonbi.ac.ke/index.php/adfj
ISSN 2522-3186

The Short Run ARDL (Error Correction Model)

Table 4.7 Short Run ARDL

Combine	**Variable**	**Coefficient**	**T-Stat**	**P-value**
	COINTEQ01	-0.6827	-7.8931	0.0000
	d(LMOB)	-0.2974	-1.0091	0.3170
	d(LPOS)	-0.1575	-1.3124	0.1945
	d(LATM)	0.1839	40.0934	0.0000
	d(INF)	0.0153	2.6400	0.0106
	d(INT)	-0.0544	-0.6827	0.4975
	C	16.7266	4.4139	0.0000
	Log-likelihood	100.0023		
Kenya	C	-0.0563	-2.6312	0.0141
	d(lMOB)	0.6690	2.5191	0.0183
	d(lATM)	0.7775	-9.3854	0.0000
	d(LPOS)	0.6769	3.2550	0.0031
	d(lPOS(-1))	0.1575	1.6159	0.1182
	d(INF)	-0.0176	-1.0040	0.3247
	d(INF(-1))	-0.0061	-0.4270	0.6730
	d(INF(-2))	0.0159	1.2666	0.2165
	d(INT)	-0.0581	-0.8318	0.4131
	Ecm(-1)	-0.8333	-1.7316	0.0952
	R-squared	0.8697		
	F-Statistics Prob.	19.2823 0.0001		
Nigeria	C	-0.0098	-0.5828	0.5657
	d(LGDP(-1))	0.6317	2.8553	0.0090
	d(LGDP(-2))	-0.4632	-4.8514	0.0001
	d(LGDP(-3))	-0.0080	-0.0655	0.9483
	d(LMOB)	0.0233	0.5091	0.6155
	d(LMOB(-1))	-0.2324	-4.6770	0.0001
	d(LMOB(-2))	0.1556	3.4856	0.0020
	d(LATM)	-0.1107	-2.5373	0.0184
	d(INF)	-0.0413	-4.4270	0.0002
	d(INF(-1))	0.0105	0.81176	0.4253
	d(INT)	-0.0374	-1.1876	0.2471
	Ecm(-1)	-1.5155	-5.5575	0.0000
	R-squared	0.8600		
	F-Statistics Prob.	11.7668 0.0001		

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ISSN 2522-3186

The R^2 values for the Nigerian and Kenyan samples are 86% and 87%, respectively. This means that the independent variables explain at least 86% of the variability in economic growth in Nigeria and 87% in economic growth in Kenya.

The Error Correction Model (ECM) aims to verify the existence of a long-run connection and include short-run dynamics into the long-run equilibrium relationship. Table 4.7 provides evidence that the ECM coefficient is appropriately signed and significant. The coefficient's value is -0.8333. This adjustment rate implies that digital banking proxies such as mobile banking, point of sale, and automated teller machines are correct around 83% of the preceding period's disequilibrium in the gross domestic product.

Mobile Banking: The results show that mobile banking does not influence short-term economic growth for the combined sample (chi^2 = -0.2974, P-value = 0.3170 > 0.05) and the Nigerian sample (chi^2 = 0.0233, P-value = 0.6155 > 0.05). For the Nigerian sample, mobile banking lagged by one period, significantly negatively impacting short-term economic growth (chi^2 = -0.2324, P-value = 0.0001 < 0.05), while mobile banking lagged by two periods had a significant positive effect on economic growth in the short-run for the Nigerian sample (chi^2 = 0.1556, P-value = 0.0.020 < 0.05). In the case of Kenya, mobile banking significantly positively affects short-run economic growth (chi^2 = 0.6690, P-value = 0.0141 < 0.05). This implies that an increase in mobile banking transaction volume will increase Kenya's short-run gross domestic product. The Kenyan results conform with the findings of Osuigwe (2022), who found that the volume of mobile banking transactions significantly positively influences gross domestic product. However, the results contradict the findings of Mamudu and Gayovwi (2019), who found that the volume of mobile banking transactions significantly negatively affects the gross domestic product.

Point of Sale: According to the results, point of sale has no short-run influence on economic growth for the combined sample (chi^2 = -0.1575, P-value = 0.1945 > 0.05) and for the Kenyan sample, point of sale lagged by one period (chi^2 = 0.1575, P-value = 0.1182 > 0.05). However, for the Kenya sample, the point of sale significantly positively affects short-run economic growth (chi^2 = 0.6769, P-value = 0.0031 < 0.05). This implies that an increase in the volume of POS transactions will increase Kenya's short-run gross domestic product. The Kenya results are consistent with the findings of Agu and Agu (2020), who found a significant positive correlation between the volume of POS transactions and gross domestic product. However, the

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results contradict the findings of Yusuf (2016), who found a significant negative correlation between the volume of POS transactions and gross domestic product.

Automated Teller Machine: The results show that automated teller machine has a significant positive effect on economic growth in the short-run for the combined sample (chi^2 = 0.1839, P-value = 0.0000 < 0.05) and the Kenyan sample (chi^2 =0.7775, P-value = 0.000 < 0.05). However, for the Nigerian sample, automated teller machines significantly negatively affect short-run economic growth (chi^2 = -0.1107, P-value = 0.0184 < 0.05). This implies that an increase in the volume of ATM transactions will reduce Nigeria's short-run gross domestic product. The findings are consistent with those of Gbanador (2023), who discovered a significant negative correlation between the volume of ATM transactions and gross domestic product. However, the results contradict the findings of Mamudu and Gayovwi (2019), who found a significant positive correlation between the volume of ATM transactions and gross domestic product.

Diagnostic Test

Table 8: Results of diagnostic tests

	Test	X^2 -statistic	Probability
Combine	Jarque-Bera test	1.3619	0.5061
Nigeria	Breusch-Godfrey Serial Correlation LM Test	0.0430	0.9580
	Heteroskedasticity Test: Breusch-Pagan-Godfrey	0.1468	0.9292
	Jarque-Bera test	0.9027	0.6368
Kenya	Breusch-Godfrey Serial Correlation LM Test	0.7185	0.4977
	Heteroskedasticity Test: Breusch-Pagan-Godfrey	10.9818	0.2770
	Jarque-Bera test	2.0595	0.3571

The model was tested for serial correlation; the results indicated no serial correlation for the Nigeria sample (p-value = 0.9580 > 0.05) and the Kenyan sample (p-value = 0.4977 > 0.05). The model was subjected to a heteroscedasticity test, and the results indicated that the residual variance is constant for the Nigeria sample (p-value = 0.9292 > 0.05) and the Kenyan sample (p-value = 0.2770 > 0.05). The Jarque-Bera test is a normality test for the combined sample (p-value = 0.5061 > 0.05), the Nigeria sample (p-value = 0.6368 >

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0.05) and the Kenyan sample (p-value = 0.3571 > 0.05). We conclude that the population is normally distributed.

Conclusions and Recommendations

Thanks to technological advancements, we now have a more efficient and effective payment system that does not rely on the traditional 'cash and carry' method. Digital banking allows economic exchanges without the need for physical visits to traditional banks or for the transacting parties to be physically present. The convenience of e-payment systems offering faster and more secure transactions has made them more popular than traditional cash-based systems (Ene et al., 2019).

The study examined the effect of digital banking on economic growth in Kenya and Nigeria using quarterly time series data from 2011 to 2021. Digital banking was proxied by mobile banking, automated teller machines, and point of sale, while economic growth was measured by gross domestic product. The study utilised the autoregressive distributed lag (ARDL) model to analyse data samples from Kenya and Nigeria. In addition, the panel ARDL model was employed to analyse the combined data sample. The findings showed that mobile banking (Combined, Nigerian and Kenyan), points of sale (combined and Kenyan) and automated teller machines (combined and Kenyan) have no long-term impact on economic growth. In contrast, automated teller machines (Nigeria) significantly negatively affect Nigeria's long-term economic growth.

The findings showed that mobile banking (Combined and Nigerian) and point of sale (Combined) do not affect short-run economic growth. Furthermore, mobile banking (Kenya) has significantly negative effects on economic growth in the short run, while point of sale (Kenya) significantly positively affects Kenya's short-run economic growth. Moreover, the results show that automated teller machines (Combined and Kenya) significantly positively affect short-run economic growth. However, for the Nigerian sample, the automated teller machine significantly negatively affects Nigeria's short-run economic growth. This study recommends that the central banks of Kenya and Nigeria implement public enlightenment and awareness programs on digital banking systems to boost familiarity with the system. This will raise awareness and persuade those who do not have bank accounts to join the financial system. Moreover, the central banks of Kenya and Nigeria should implement regulations encouraging businesses to conduct online transactions, and improving e-banking products can simplify electronic payments. This can be achieved by enhancing

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popular products such as point-of-sale machines, web/online banking and mobile banking and making them more appealing to the citizens of Kenya and Nigeria.

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