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# DIGITAL FINANCE TECHNOLOGIES AND AGRICBUSINESS DEVELOPMENT IN NIGERIA

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**Abstract**:
*The main objective of this study was to investigate the impact of digital finance technologies on agricbusiness development in Nigeria between 2001 and 2019. The design adopted for this study was ex-post-facto; data used for analysis were elicited from Central Bank Statistical Bulletin. To achieve this objective, a model was formulated based on empirical and theoretical reviews. The model used credit to agric sector in Nigeria as proxy for agricbusiness (dependent variable), while the various digital finance technology platforms such as point of sales payment system, mobile money payment system and automated teller machine payment system as proxy for digital finance technologies (independent variables). This study employed Auto Regressive Distributed Lag (ARDL) Model to analyze data, other diagnostic tests such as; test of Normality, Serial correlation, Auto correlation test, Ramsey reset test and Heteroskedasticity test and they confirmed the validity and reliability of the model employed; the inferential results suggested that both point of sales payment system and mobile money payment systems had positives impact on agricbusinesses in Nigeria, while automated teller machine payment system had a negative impact on agric businesses in Nigeria. The study recommended that more financial inclusiveness in the rural and agricultural dominated areas in Nigeria should be encouraged and enhanced for sustainable impact of digital finance technologies on agricbusiness in Nigeria.*

**Keywords:** digital finance services, agricbusiness, point of sales, automated teller machine, mobile money, payment systems and credit to agric sector.

## INTRODUCTION

### Background to the Study

It is important for a country like Nigeria which is almost totally dependent on oil and gas as her major source of revenue to seek out alternative sources of revenue and diversify the economy from being oil and gas dependent. Agriculture can be a veritable source of revenue to Nigeria, if farmers are given access to enabling

business environment, support, grants and other assistance to aid the growth of agric business in Nigeria. The answer to this problem may be resolved by utilizing digital financing technologies in facilitating agricbusiness development in Nigeria.

Digital financial services (DFS) are primarily saving money, access to credit facilities and other financial services through several digital mediums such as mobile phones, computers and credit and debit cards and many others. Digital financial services (DFS) can help be a veritable avenue to check the issues in the value chain—especially those issues that are financial services related that little or no attention has paid to by financial institutions, especially in the rural areas where the presence of bank and other financial institutions are lacking. The reason for jettisoning these rural communities by financial intermediaries could be as a result of high cost of taking their services there as a result of high cost of facilities, human capital and other relevant infrastructures, coupled with low patronage and lack of incentives to provide products capable of serving the farmers in the rural communities. Digital finance provides alternative avenues to having access to financial services without using the traditional banking outlets and having to visit the banking hall in order to enjoy banking services. With the increased presence of digital finance, farmers will have access to several banking services at close proximity. This will enhance their productivity and boost agricbusiness development.

Digital finance is financial services delivered through electronic platforms and internet access such as mobile phones of different categories and access to internet with limited use of paper money and limited visit to the banking halls. The use of several digital financing platforms such as computers, cards of different types, point -of-sale (POS) devices, automated teller machines (ATMs), internet transfers and so on helps brings individuals and businesses together for the purpose of financial transactions through a digitalized channel which makes payments and receipts easy, quick and accessible at close proximity.
Digital financial services is said to be very pertinent to agricbusiness because it does not only guarantee smooth, quick and easy financial transactions via digitalized medium, it's also provides maximum security of ones money and guarantee safe transaction anytime anywhere with several options to choose from. However, it is important to note that there are other key players involved in the complete cycle of using and having access to digital financing services such as mobile network operators, banks/financial institutions, regulators, agents, financial technology providers, chains of retailers and the clients. (Asian Development Bank, 2016).

**Statement of the Problem**

Digital finance is critical to the digitalization of the financial system here in Nigeria, with significant amount of advantages ranging from financial inclusion, amenity in carrying out financial transactions to security of these transactions in a digital rostrum which would cap off to economic development of the economy.
One of the major problems plaguing agric related business in poor funding and lack of financial and credit facilities, especially in the more rural areas where agriculture is carried out in commercial quantity. With the evolution of technology in the financial system, transactions related to banking activities such as payments, withdrawals, funding, loans and advances have metamorphosed in to a digital platform. As such, it is challenging for farmers in the rural areas to have access to theses services because of lack of financial inclusiveness in the rural areas. Banks and financial services providers dwell mostly in the urban areas and transact there, very few of these agents venture into the rural areas to carry out their financial services. This is the challenge faced by agricbusiness owners in the rural part of Nigeria. From the foregoing, it is imperative to evaluate the impact that digital finance have on agricbusinesses in Nigeria owing to the challenges highlighted above and proffer remedies to theses problems.

Another spectrum of the problem affiliated with digital finance is that the providers of digital finance services are profit-seeking corporations that utilize the digital finance in order to amplify their profitability or to increase the profitable opportunities of businesses affiliated with digital finance providers namely, financial and non-financial institutions and also banks. Corporate providers of digital finance services can demarcate

use of a more vigorous marketing scheme to convince high-and middle income customers to use a new or existing digital finance podium or infrastructure and use a less-aggressive marketing approach to coax low-income and poor customers to use new or existing digital platforms or infrastructure if they believe the latter cannot afford the associated fees, thereby leading to lower financial involvement in poor and low-income customers since the net monetary pay-off to digital finance providers is slightly elevated with high-and-middle income customers than with low-income and poor customers.

Also, prejudiced in the provision of digital finance can be geographical due to digital finance providers, based on their own internal risk analysis which is subject to change, can choose to retire or terminate the provision of specific digital finance services to high-risk rural areas or communities that do not have the supporting infrastructure to sustain specific digital finance services, thereby leading to a reduced level of financial inclusion. Some supporting infrastructure needed to make digital finance work efficient include mobile phones that have modern (and up-to-date) operating software systems and applications that support digital finance services.

**Objectives of the Study**

The main objective of this research is to investigate the impact of digital finance technologies on agricbusiness development in Nigeria, while the specific objectives are:

1. To examine the impact of point of sale payment system (PPS) on credit to agric sector in Nigeria.
2. To ascertain the impact of mobile money payment system (MPS) on credit to agric sector in Nigeria.
3. To investigate the impact of automated teller machine payment system (APS) on credit to agric sector in Nigeria.

**Research Hypotheses**

1. $H0_1$: Point of Sales Payment System has no significant impact on credit to agric sector in Nigeria.
2. $H0_2$: There is no significant impact of Mobile Money Payment System on credit to agric sector in Nigeria.
3. $H0_3$: Automated Teller Machine Payment System has no significant impact on credit to agric sector in Nigeria.

**Review of Related Literature**

**Concepts of Digital Finance**

Digital finance is a financial service conveyed through personal computers, mobile phones, the internet or bank cards affiliated to a dependable digital payment system. In relation, a McKinsey report identified digital finance as "financial services carried out via the internet, mobile phones or cards" (Manyika, Lund, Singer, White & Berry 2016). According to (Gomber, Koch & Siering, 2017), digital finance covers a lot of new financial businesses, finance-related software, financial products and novel forms of customer communication and interaction - delivered by Financial Technology (FinTech) companies and ingenious financial service providers. While there is no adequate depict with approved permission to use them) and funds should be available (or overdraft) in their accounts to be able to make cash payments (outflows) or revenue collection (cash inflow) via digital platforms including the internet, mobile phones or personal computers.

**Innovations in Digital Payments**

There are four major novelties in digital payments.

**1. Wrappers** create a digital area with traditional payment systems such as bank accounts or credit cards. Nontraditional providers are provided by many, including internet mediators such as Google Wallet and Apple Pay.

**2. Mobile money systems** put away money in the national currency as credit on a system provider's books or smart cards and enable payments online or through mobile phones. A Typical example is M-Pesa, run by Safaricom. These systems can give efficiently lower fees and easier use than traditional payment systems, even for that e void of a bank account.

**3. Credits and local digital currencies** are conventional units of account (not in national currency) designed to elevate spending in a local economy or as a means of exchange in computer games.
**4. Digital currencies** are both a new way of distribution of payment scheme and a new currency. Such plots record transactions in a publicly visible ledger. Most digital currencies, including Bitcoin, are crypto currencies because of the use of cryptographic approach to enable secure validation of transactions. (Bank of England 2018; https://blockchain.info; company reports).

**Benefits of Digital Finance**
**Digital Finance Promotes Financial Inclusion**
Financial services are not accessed by more than 2 billion people. Overall, only about 59 percent of men and 50 percent of women in developing countries have an account at a governed financial institution The poor, and small businesses even women often count on informal financial services, even when public transfers or remuneration are received.
Barriers are dispatched with digital payment systems which help in accessing financial services. Mobile money schemes, solely allow people who own a phone but do not have a bank account to make and receive payments. In the right areas these systems can take off and reach massive size swiftly.
Costs to recipients can be reduced efficiently using digital payments c. In an investigation, farmers in Niger realized time savings for each payment equivalent to an amount that would feed a family of five for a week.
Digital payments increase control, since senders of remuneration can have a greater impact on how recipients utilize money, inclusive of savings.
Digital finance increases the ability to save, through automatic deposits via mobile applications, text reminders, or default options. Studies showed that texted reminders increased savings in Bolivia, Peru, and the Philippines by up to 16 percent.
Digital payments help enhance risk management by making it easier to receive support from social networks that can act as a safe spot. M-Pesa users were better able to sustain income shocks in relation to nonusers.
Digital payments help speed up delivery, which is essential in the case of emergencies such as natural disasters. And they also promote security compared to mobility with large amounts of cash, as is almost evasive in low- and middle-income countries. (World Bank Various years, Findex database).

**Theoretical Review**
This study opens up on the various relevant theories affiliated with digital finance technologies. However, this study is based on the financial innovations theory.

**Theory of Financial Innovations**
The theory of financial innovations was propounded by Silber (1983) staged on the opinion that expansion benefit of money related foundations is the sole reason of financial indulgence (Li and Zeng, 2010). The theory articulates that the most relevant thoughts backing the new innovations are the weaknesses of the money related business sector, mostly the aberrant data, exchange costs and office expenses (Błach, 2011).
According to the theory, financial, related innovations can be very new resolutions or simply customary means where latest constituent of development has been proposed, promoting firms' liquidity as well as amplifying in quantity new applicants, due to their capacity on the situation (Ionescu, 2012).
According to the theory, the motivating force of the financial system, financial innovation is critical which leads to better economic competence and enhanced economic advantage derived from the new and frequent changes (Sekhar, 2013). Financial innovations define financial developments by developing new ways of production, creating better return rates hence boosting the country's economy in general and technological solutions. The theory states that the innovativeness enhances the firms' competitive edge of a corporate and produces more earnings to the investors (Błach, 2011). Innovation is a tool used to manage, solve and transfer the entire extra load. The growth of financial entities through improved allocation, efficiency and a reduction of financial and administration costs is enhanced through the effectiveness of the application of financial innovation(Sekhar, 2013).

Financial innovations enable financial markets liquidity; making sure the distribution of resources to areas of lack as well as improving the availability to forthcoming prospects (Błach, 2011) hence enabling financial inclusion deepening. The theory of financial innovations states that some barriers including external handicaps assist corporations in looking for their objective which gives rise to an increasing of revenues (Li & Zeng, 2010) hence commercial banks come up with productive ways to reach more people to increase their profits. The emerging innovative financial inclusion models through mobile and other digital financial services essentially in many African countries which are aiding in closing the gap of financial instruments which exists in these countries (Omwansa & Waema, 2014).

**Technology Acceptance Model**

This model was originally proposed by Davis (1986) to enunciate on attitude behind the competence to employ technological knowhow (Monyoncho, 2015). Technology Acceptance Model (TAM) deals with discernment not systems real usage and argues when new technological advancement is introduced to the customers, either one of this occurs that is, Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) to impact their decision (Lule, Omwansa & Waema,
2012). PEOU is the level of assurance that people put on a system and if the users ascertain a new technology to be helpful in support of both short and long-run, there is that boost to use the system. Further, the level by which an individual considers a system will elevate performance in the short and long-run is the PU (Mojtahed, Nunes & Peng, 2011).

The TAM ascertained that the systems real use is established by each user's behavioral internment for usage and is inspired by an individual's view to the system. The theory also explains that the perception towards new technology has a correlation to its effectiveness as well as the simplicity of the system (Lim & Ting, 2012). TAM considers that acceptance of technology and functionality is affected by consumer's intentions that push the customer's perception towards system (Mojtahed, Nunes & Peng, 2011). The theory also supports that the pros and cons about the advancement are instrumental in the improvement of states of mind that will in the long run result in system usage conduct (Lim & Ting, 2012).

TAM also probes the attitude of individuals towards a particular system (Lule, Omwansa & Waema, 2012). The TAM gives clarifies and portrays the reasons why clients consider or dismiss an advancement or data framework. TAM is important both as a prescient strategy, considering the aim to evaluate the probability of individuals and associations to receive a specific innovation (Mojtahed, Nunes & Peng, 2011). TAM can be used to explain the digital financial services which can be applied in clarifying the existence of variations in consumer behaviors especially when it comes to the use of related digital financial services (Lim & Ting, 2012).

**Empirical Review**

Ugwuanyi, Efanga and Anene (2020) probed the influence of digital finance on the supply of money in Nigeria between the years 2008 and 2019. The study engaged the use of descriptive statistics, correlation analysis and Auto Regressive Distributed Lag (ARDL) Model to draw conclusion. Unit root test (diagnostic test) was carried out on the data and the results showed what the variables were a mixture of (IO) and (I1), as such; the arrogate estimation technique to be employed was the (ARDL) Model. This study showed the use of automated teller machine (ATM) payment system, point of sales (POS) and web payment system as prerequisites for digital finance (independent variables), while money supply (M2) was used as a means of money supply (dependent variable). Data were gotten from Central Bank of Nigeria (CBN) Statistical Bulletin of 2018, under payment system statistics. The result of the ARDL Model disclosed that deficit finance had a positive influence on money supply in Nigeria.

Dabla-Norris, Yan and Filiz (2015) looked into three measurements of money related incorporation to be specific access, profundity and intermediation productivity. The study made use of a firm-level information from the World Bank Enterprise Survey for six nations at different levels of financial improvement—three low-wage nations (Uganda, Kenya, Mozambique), and three developing business sector nations (Malaysia, the Philippines, and Egypt). The outcome of the study that lightening diverse monetary contact had an effect

crosswise over nations, with nation particular attributes assuming a focal part in deciding the linkages and tradeoffs between consideration, GDP, imbalance, and the disbanding of additions and misfortunes.

Akhisar, Tunay and Tunay (2015) researched the effects of the bank's efficiency in the execution of electronic-based managing an account administrations in 23 created and building up nations' electronic keeping money administrations through 2005 utilizing dynamic board information techniques. The outcomes of the study put up that bank potency of created and creating nations was influenced by the proportion of the quantity of branches to the quantity of ATMs and were profoundly critical and electronic managing an account administrations in huge. The focus likewise found that a few variables had a negative indulgence, due to differing in calibers in the level of ascent of the nations, the socio-social structure and electronic managing an account base.

Ranjani and Bapat (2015) anatomized whether individuals who have ledgers alongside access to different wellsprings of credit use financial balances the right way and whether possessing financial balances enables managing an account propensities in these individuals. This examination undertaking was led crosswise over 550 respondents for the most part borrowers of microfinance organizations to ascertain whether they had financial balances and what they had observed about banks. This study opinionated that simply having a record with a bank did not bring about the borrowers employ saving money administrations and that they preferred to manage organizations that allowed more versatile administrations than the bank. The discovery additionally found that to be able to accomplish incorporation, it is inadequate if ledgers are opened.

Monyoncho (2015) scrutinized the relationship between E-Banking advances and money related execution of business banks in Kenya utilizing optional information for a time of five years. The outcomes of the study revealed that ATM developments, Mastercards, portable managing an account and web keeping money give the comfort of directing a large portion of the saving money exchanges at the time that best fits the client. The study assumed that selection of E-Banking advances inclined the execution of business banks in Kenya and dictated that business banks ought to keep putting resources into saving money innovations.

Terfa (2015) probed the impact of budgetary creative procedures on neediness decrease in provincial northern Nigeria to build up whether the poorest wage quintile availed the most from such techniques in various situations. The study discoveries set up that conventional product protection benefits for the most part rich ranchers, and poor agriculturists hardly value the use microfinance organizations quickened formal access to credit. The concentrate likewise settled that loaning to rustic ranch family units sorted out into funds clubs profited the poorest of poor people. The concentrate additionally found that changing from conventional yield protection to option protection would help poor ranchers adapt or adjust to covariate and unconventional agrarian stuns in creating nations.

Njenga, Kiragu and Opiyo (2015) inspected the impact of money related developments on budgetary execution of SACCO's in Nyeri County, Kenya. The study utilized a cross sectional overview research plan utilizing a specimen of 30 SACCO's and a semi-organized poll to gather information for the study. The study discoveries showed that phone keeping money and web saving money were seemingly considered. The study stated that there is a spectacular relationship between monetary advancements and the money related execution of SACCOs and that phone managing an account and web keeping money are the essential drivers of the budgetary execution of SACCOs.

Bakang (2015) inspected the effects of financial deepening on economic growth in the Kenyan banking sector using quarterly time series data from 2000 to 2013. Financial deepening, this was captured through Liquid Liabilities as ratio to nominal Gross Domestic Product; Credit to the Private Sector as ratio to ostensible GDP; Commercial Bank Assets as proportion to business bank resources in addition to Central Bank Assets and Commercial Bank Deposits as proportion to ostensible GDP. Genuine GDP was measured by Economic development. The study confirmed that keeping money segment in Kenya has a necessary impact during the time spent financial development. The discoveries additionally settled that fluid liabilities,

limited credit to the private area, business national bank resources and business bank stores have positive and documented consequences for GDP.

Muiruri and Ngari (2014) inspected the impact of monetary advancements on the money related of business banks in Kenya with spotlight on Mastercards, portable keeping money, web managing an account and organization saving money. The study utilized a specimen of sixteen banks and gathered information from four individuals from the administration group utilizing surveys. The study confirmed that a few banks in Kenya had received some monetary advancements, for example, charge cards, versatile, web and organization managing an account. The concentrate likewise found that budgetary advancements greatly affected the money related execution of the business banks.

Mbutor and Uba (2013) analyzed the effect of money related consideration on fiscal strategy in Nigeria somewhere around 1980 and 2012. The discoveries of the study built up that developing money related consideration enhances the accomplishments of viability of the fiscal strategy.

The concentrate likewise noted that the coefficient of the quantity of bank offices has the wrong sign. This is on account of opening branches, banks for the most part go after advantages however not money related incorporation, which is an avenue, so that there are bunches of branches, which are under-used while various areas, which are calculated not good for asset reports, are under-expanded.

## METHODOLOGY

### Research Design

This study adopts the *ex-post facto* research design as it deals with event that had taken place and secondary data were readily available for collection. Since we are making use of annualized time-series data and the study cover a long sample period (19 years). We made sure our data set were not impaired by unit root; hence we tested for stationarity of the series by employing the Augmented Dickey-Fuller (ADF).

### Source of Data Collection

Data for this study are elicited from Central Bank of Nigeria Statistical Bulletin of 2019 under payment systems. The study period covers 2001 through 2019.

### Method of Data Analysis

This study used descriptive statistics, correlation analysis and Auto Regressive Distributed Lag (ARDL) Model in testing the hypothesis of the study. E-view 9.0 econometric statistical software package was used for the analysis.

### Model specification

This research adapted the economic model previously used by Ugwuanyi, et al (2020) that empirically investigated the impact of digital finance on money supply in Nigeria from 2009 to 2018. The econometric model of this study, which had earlier been reviewed in the preceding section, is specified below:

The econometric model for this study was specified as;

$$\Delta MSP_t = \beta_0 + \sum_{1=1}^{p} \beta_1 \Delta MSP_{t-1} + \sum_{1=1}^{p} \beta_2 \Delta APS_{t-1} + \sum_{1=1}^{p} \beta_3 \Delta PPS_{t-1} + \sum_{1=1}^{p} \beta_4 \Delta WPS_{t-1+y} + ECM_{t-1} \dots \text{equ (1)}$$

Where:

MSP= Money Supply

APS = Automated Teller Machine Payment System

PPS = Point of Sales Payment System

WPS = Web Payment System

$\varepsilon_t$ = Stochastic Error Term;

$\beta_0$= Intercept for Estimation.

$\beta_1 - \beta_3$ = Coefficient of Independent Variables

$\Delta$ = change

$\sum$ = summation

P = Optimal lag

However, this study adapted the scholars' work by replacing Money Supply (MSP) with Credit to Agric Sector (CAS) in Nigeria as the regressand. Also, Web Payment System (WPS) was replaced with another digital finance payment system, Mobile Money Payment System (MPS). Also, this study adopted a double log model. These were done to give this model variation from its adapted model and make this study more original.

The econometric model for this study is specified as:

$LOGCAS=\beta_0+\beta_1LOGPPS+\beta_2LOGMPS+\beta_3LOGAPS+\varepsilon_i$..... (2)

Where; CAS = Credit to Agric Sector

MPS = Mobile Money Payment System

LOG = Logarithm

Other acronyms in the model remain as explained above.

**A Priori Expectation**

All the independent variables are expected to have a positive relationship with the independent variables in the model.

**DATA ANALYSIS AND INTERPRETATION OF RESULTS**

**Pre-estimation test result (Unit Root Test)**

**Table 4.1 Unit Root Test**

| Variables | Augmented Dickey-Fuller test statistic | Probability Value | ADF Critical at 5% | Inference |
|---|---|---|---|---|
| CAS | -4.912724 | -3.052169 | 0.0013 | I(1) |
| PPS | -3.246407 | 0.0337 | -3.040391 | I(0) |
| MPS | -3.911175 | 0.0090 | -3.040391 | I(0) |
| APS | -5.107795 | 0.0009 | -3.052169 | I(1) |

***Source: Authors' analysis using e-view 9 output with data in Appendix***

The unit root test from table 4.1 above shows that the stationarity of the variables were a combination of I(1) and I(0). As such, the appropriate estimation technique to employ for inference is the Auto Regressive Distributed Lag (ARDL) Model.

**Descriptive Statistics**

**Table 4.2 Descriptive statistics**

| | CAS | APS | PPS | MPS |
|---|---|---|---|---|
| Mean | 261.7234 | 2757.099 | 756.2593 | 802.8119 |
| Median | 149.5789 | 1699.160 | 633.8100 | 442.3538 |
| Maximum | 680.0330 | 6512.600 | 3204.760 | 4371.550 |
| Minimum | 48.56150 | 399.7100 | 399.7100 | 1.270000 |
| Std. Dev. | 211.3001 | 1994.063 | 818.4310 | 1039.474 |
| Skewness | 0.531950 | 0.938234 | 1.806391 | 2.266733 |
| Kurtosis | 1.819165 | 2.494852 | 5.810395 | 8.349600 |
| Jarque-Bera | 1.999954 | 2.989575 | 16.58583 | 38.92667 |
| Probability | 0.367888 | 0.224296 | 0.000250 | 0.000000 |
| Sum | 4972.745 | 52384.88 | 14368.93 | 15253.43 |
| Sum Sq. Dev. | 803658.9 | 71573205 | 12056926 | 19449103 |
| Observations | 19 | 19 | 19 | 19 |

***Source: Authors' analysis using e-view 9 output with data in Appendix***

Table 4.2 describes the variables employed for this study. The descriptive statistics results shows that the mean of Credit to Agric Sector, Automated Teller Machine Payment System, Point of Sales Payment System

and Mobile Money Payment System were N261.7234 billion, N2757.099 billion, N756.2593billion and N802.8119billion respectively. The minimum of the variables for Credit to Agric Sector, Automated Teller Machine Payment System, Point of Sales Payment System and Mobile Money Payment System were N48.5615billion, N399.7100billion, N399.7100billion and N1.270000 respectively. While their maximum were N680.0330billion, N6512.600billion, N3204.760billion and N4371.550 for Credit to Agric Sector, Automated Teller Machine Payment System, Point of Sales Payment System and Mobile Money Payment System respectively. The standard deviation of N211.3001, N1994.063, N818.4310 and N1039.474 for Credit to Agric Sector, Automated Teller Machine Payment System, Point of Sales Payment System and Mobile Money Payment System respectively shows that deviations from the averages of these variables signify that the variables were not fix or static, but varies year in year out. The table further reveals that all the variables are skewed a little to the right.

Kurtosis measures the peakness or flatness of the distribution of a series. The kurtosis of a normal distribution is 3. If it exceeds 3, it means that the distribution is peaked or leptokurtic relative to the normal. Conversely, if it is less than 3, it shows that the distribution is flat or platykurtic relative to the normal. Table 4.2 further reveals that CAS and APS with Kurtosis values of 1.819165 and 2.494852 respectively are fat or platykurtic. While PPS and MPS with Kurtosis values of 5.810395 and 8.349600 respectively are peak or leptokurtic.
Jarque-Bera (JB) tests whether the series is normally distributed or not. The test statistic measures the difference of the skewness and kurtosis of the series with those from a normal distribution. In JB statistic, the null hypothesis which states that the distribution is normal is rejected at 5% level of significance. From the results of the analysis presented in Table 4.2 above, CAS and APS with Jarque-Bera statistic of 1.999954 and 2.989575respectively with Probabilities of 0.367888 and 0.224296 are accepted as being a normal distribution since their p-values are greater than 5% level of significance, while the other variables are said to be not normally distributed since their p-values are lesser than 5% level of significance. The years under consideration was 19, hence the number of observation being 19.

**Correlation Analysis**
**Table 4.3 Correlation Matrix**

| | CAS | PPS | APS | MPS |
|---|---|---|---|---|
| CAS | 1.000000 | | | |
| PPS | 0.339318 | 1.000000 | | |
| APS | -0.182170 | 0.756022 | 1.000000 | |
| MPS | 0.449407 | 0.927601 | 0.613394 | 1.000000 |

***Source: Authors' analysis using e-view 9 output with data in Appendix***

From the result of correlation analysis in table 4.3 above, all the variables were positively correlated amongst themselves except CAS that had a negative correlation with APS.

**Inferential Result**
**Results of ARDL Model**
**Table 4.4 Results of ARDL Model**

| Variable | Coefficient | Std. Error | t-Statistic | Prob.* |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| LOG(CAS(-1)) | 0.419651 | 0.204459 | 2.052491 | 0.0647 |
| LOG(PPS(-1)) | 0.646562 | 0.254569 | 2.539832 | 0.0275 |
| LOG(MPS) | 0.093630 | 0.174069 | 0.537889 | 0.6014 |
| LOG(APS(-1)) | -0.622924 | 0.294090 | -2.118143 | 0.0578 |
| C | 5.189335 | 2.294719 | 2.261425 | 0.0450 |
| R-squared | 0.948864 | Mean dependent var | | 5.244844 |
| Adjusted R-squared | 0.920972 | S.D. dependent var | | 0.940754 |
| S.E. of regression | 0.264464 | Akaike info criterion | | 0.463074 |
| Sum squared resid | 0.769350 | Schwarz criterion | | 0.809330 |
| Log likelihood | 2.832331 | Hannan-Quinn criter. | | 0.510818 |
| F-statistic | 34.01909 | Durbin-Watson stat | | 2.980441 |
| Prob(F-statistic) | 0.000002 | | | |

***Source: Authors' analysis using e-view 9 output with data in Appendix***

The result in table 4.4 above revealed that the R-squared was approximately 95%, this means that the independent variables accounted for about 95% variations in the dependent variable while the remaining 5% may be attributed to variables not included in the model. Put differently, digital finance indicators accounted for about 95% changes in credit to agric sector in Nigeria, while the remaining 5% could be attributed to stochastic variables.

The result revealed that all the independent variables had positive except APS which recorded a negative impact on CAS such that a percentage increase in PPS would bring about a 64 percent increase in CAS, while a percentage increase in MPS would bring about a 9 percent increase in CAS. Conversely, a percentage increase in APS would bring about a 62 percent decrease in CAS.

The result further revealed that the overall model was a good fit owing to the f-statistic value of 34.01909 and its corresponding p-value of 0.000 which shows that the model is significant at 5% level of significance. Durbin Watson Statistic of 2.9 showed that the variables were free from auto-correlation since its value of 2.9 is close to the region of 2.

**Diagnostic Tests**
**Test for Auto Correlation**
**Table 4.5.1 Correlogram Q-statistic**
Q-statistic probabilities adjusted for 1 dynamic regressor

| Autocorrelation | Partial Correlation | | AC | PAC | Q-Stat | Prob* |
|---|---|---|---|---|---|---|
| ****\| . \| | ****\| . \| | 1 | -0.496 | -0.496 | 5.2090 | 0.022 |
| . \|* . \| | . *\| . \| | 2 | 0.106 | -0.185 | 5.4626 | 0.065 |
| . \|* . \| | . \|* . \| | 3 | 0.120 | 0.124 | 5.8090 | 0.121 |
| .**\| . \| | . *\| . \| | 4 | -0.266 | -0.174 | 7.6326 | 0.106 |
| . \|* . \| | . *\| . \| | 5 | 0.105 | -0.163 | 7.9369 | 0.160 |
| . *\| . \| | .**\| . \| | 6 | -0.170 | -0.291 | 8.8007 | 0.185 |
| . \|* . \| | . *\| . \| | 7 | 0.093 | -0.101 | 9.0853 | 0.247 |
| . \| . \| | . \| . \| | 8 | 0.028 | 0.001 | 9.1134 | 0.333 |
| . \| . \| | . \| . \| | 9 | -0.013 | 0.025 | 9.1197 | 0.426 |
| . \| . \| | . *\| . \| | 10 | -0.037 | -0.201 | 9.1822 | 0.515 |
| . \| . \| | . *\| . \| | 11 | 0.033 | -0.164 | 9.2396 | 0.600 |
| . \| . \| | . \| . \| | 12 | 0.055 | 0.031 | 9.4239 | 0.666 |

*Probabilities may not be valid for this equation specification.
***Source: Authors' analysis using e-view 9 output with data in Appendix***

This test is carried out to further test for auto correlation and to consolidate on the result of Durbin Watson Stat in table 4.4. The result of Correlogram Q-Statistic in table 4.5.1 above, suggest that the variables are free from auto correlation, since the correlogram Q- Stat. table indicates that all p-values were >5% hence, the conclusion that the model was free from auto correlation.

**Test for Heteroskedasticity**
**Table 4.5.2 Test for Heteroskedasticity**
Heteroskedasticity Test: Breusch-Pagan-Godfrey

| | | | |
|---|---|---|---|
| F-statistic | 1.279215 | Prob. F(6,11) | 0.3417 |
| Obs*R-squared | 7.397756 | Prob. Chi-Square(6) | 0.2856 |
| Scaled explained SS | 5.393654 | Prob. Chi-Square(6) | 0.4944 |

***Source: Authors' analysis using e-view 9 output with data in Appendix***
The Heteroskedasticity test in table 4.5.2 above suggests that the variables are free from the problem of Heteroskedasticity since the p-values of F-stat. and Obs*R-squared of 0.3417 and 0.2856 respectively are > 5% significance level. This outcome is further strengthened by the p-value of approximately 0.4944 for the Scaled explained SS which also suggest the absence of Heteroskedasticity.

**Test for Serial Correlation**
**Table 4.5.3 Serial Correlation**
Breusch-Godfrey Serial Correlation LM Test:

| | | | |
|---|---|---|---|
| F-statistic | 4.064227 | Prob. F(2,9) | 0.0553 |
| Obs*R-squared | 8.542054 | Prob. Chi-Square(2) | 0.0140 |

***Source: Authors' analysis using e-view 9 output with data in Appendix***

In line with the rule, the Breusch-Godfrey Serial Correlation LM Test table above shows that the probability value of 0.0553 for F-statistic is statistically insignificant at 5% level of significance. Hence, the null hypothesis that there is serial correlation in the model is rejected. Thus, the model is said to be free from serial correlation.

**Stability Diagnostic Test**

**Table 4.5.4 Ramsey RESET Test**

Equation: UNTITLED
Specification: LOG(CREDIT_TO_AGRIC__SEC_ ) LOG(CREDIT_TO_AGRIC__SEC_(-1)) LOG(POS) LOG(POS(-1)) LOG(MOBIE_MONEY) LOG(ATM) LOG(ATM(-1)) C
Omitted Variables: Squares of fitted values

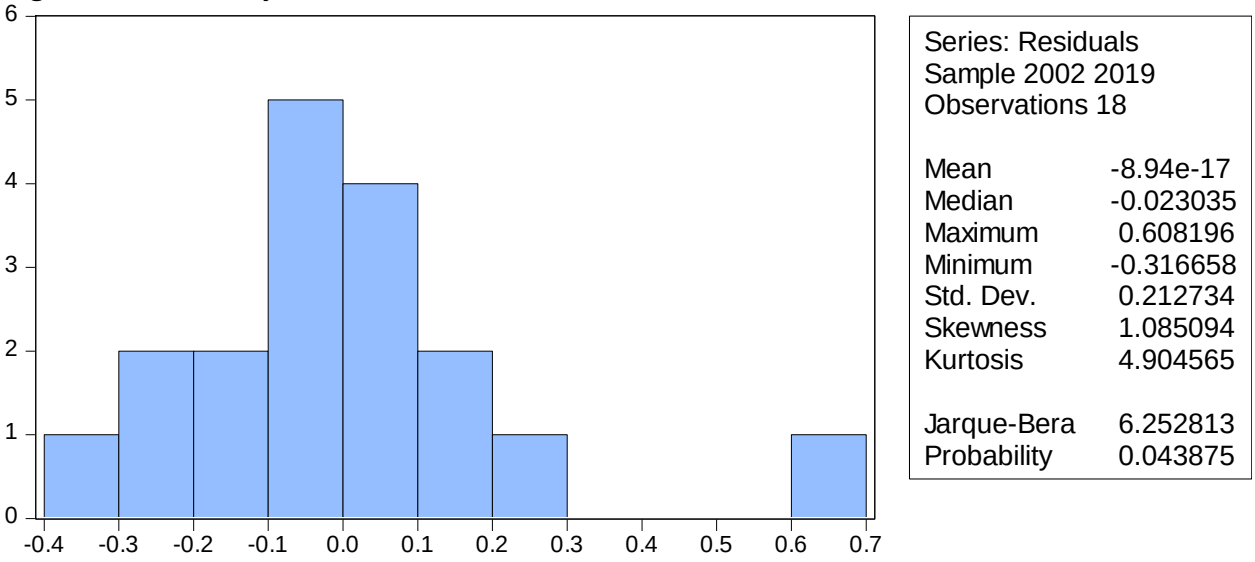
| | Value | df | Probability |
|---|---|---|---|
| t-statistic | 1.498214 | 10 | 0.1650 |
| F-statistic | 2.244646 | (1, 10) | 0.1650 |

***Source: Authors' analysis using e-view 9 output with data in Appendix***

From the Ramsey reset test result in table 4.5.4 above, the t-statistic of 1.498214 and its corresponding p-value of 0.1650 suggest that the model is correctly specified, so null hypothesis of linear specification not rejected at 5% level of significance, since the p-value is >5%.

**Test of Normality**

**Figure 4.5.5 Normality Chart**




***Source: Authors' analysis using e-view 9 output with data in Appendix***

This test is conducted to ensure that the data employed in this study are normally distributed. Observing from the normality diagram in the figure above, as well as the Jarque-Bera value of 6.25 and its corresponding p-value of 4.3% which is <5% significant level reveals that the data are not normally distributed.

**Test of Hypotheses**

**Test of Hypothesis One**

$H0_1$: Point of Sales Payment System has no significant impact on credit to agric sector in Nigeria.

Since the p-value of company income tax (PPS) of 0.0275 (2.75%) is <5% level of significance, the null hypothesis that Point of Sales Payment System has no significant impact on credit to agric sector in Nigeria is rejected. (See table 4.4).

**Test of Hypothesis Two**

$H0_2$: There is no significant impact of Mobile Money Payment System on credit to agric sector in Nigeria.

Since the p-value for Mobile Money Payment System (MPS) of 0.6014 (60%) is >5% significant level, the null hypothesis is not rejected. So therefore, the null hypothesis that there is no significant impact of Mobile Money Payment System on credit to agric sector in Nigeria is accepted. (See table 4.4).

**Test of Hypothesis Three**

$H0_3$: Automated Teller Machine Payment System has no significant impact on credit to agric sector in Nigeria.

Since the p-value for Automated Teller Machine Payment System (APS) of 0.0578 (5.8%) is >5% significant level, the null hypothesis is not rejected. So therefore, the null hypothesis that there is no significant impact of Automated Teller Machine Payment System on credit to agric sector in Nigeria is accepted. (See table 4.4).

**A priori Expectation Result**

The result is evaluated based on economic theories and literatures inline with what is applicable all over the world.

**Table 4.7 A priori Expectation**

| Variables | Expected Signs | Actual Signs | Remark |
|---|---|---|---|
| PPS | Positive ( + ) | Positive ( + ) | Conform |
| MPS | Positive ( + ) | Positive ( + ) | Conform |
| APS | Positive ( + ) | Negative ( - ) | Do not Conform |

***Source: Authors' Analysis***

**Discussion of Findings**

This study was carried out to investigate the impact of digital finance technologies on agric business development in Nigeria between 2001 and 2019. The result of data analysis suggests the following inferences: Point of Sales Payment System had a positive significant impact on credit to agric sector in Nigeria, Mobile Money Payment System had a positive an insignificant impact on credit to agric sector in Nigeria, while Automated Teller Machine Payment System had a negative and insignificant impact on credit to agric sector in Nigeria.

Point of Sales Payment System having a positive and significant impact on credit to agric sector shows that point of sales payment channels contributed significantly to the growth of agric business in Nigeria. However, Mobile Money Payment System also contributed significantly to the enhancement of agric business in Nigeria, its impact was not significant. Monetary authorities in Nigeria like the central bank of Nigeria needs to come up with regulatory policies that would encourage the use of mobile money payment system to transact as far as agric business in concern.

Conversely, Automated Teller Machine Payment System had a negative and insignificant impact on credit to agric sector in Nigeria. This may be attributed to lack of usage or motivation towards this payment channel when it comes to financial transactions in agric businesses in Nigeria. It is important to note that the outcome of the impact of Automated Teller Machine Payment System on agric business in Nigeria conforms to the

result on the correlation analysis in table 4.3 which reported a negative impact of Automated Teller Machine Payment System on credit to agric sector in Nigeria. It is also important to note that Mobile Money Payment System and Point of Sales Payment System conformed to a priori expectations in 3.5, but the result of Automated Teller Machine Payment System did not conform. The findings of this study were in consonance with some past studies on this subject matter earlier reviewed, such as; Ugwuanyi et al. (2020) and Monyoncho (2015).

## SUMMARY, CONCLUCION AND RECOMMENDATIONS

### Summary of Findings

The findings elicited from this study are summarized thus:

1. Point of Sales Payment System had a positive and significant impact on credit to agric sector in Nigeria.
2. Mobile Money Payment System had a positive yet insignificant impact on credit to agric sector in Nigeria.
3. Among the three independent variables, Automated Teller Machine Payment System recorded the only negative impact on credit to agric sector in Nigeria.

### Conclusion

This study was undertaken to analyze the impact of digital finance technologies on agricbusiness development in Nigeria between 2001 and 2019. This study employed credit to agric sector in Nigeria as proxy for agricbusiness in Nigeria, while the various digital finance technology payment systems in Nigeria such as point of sales payment system, mobile money payment system and automated teller machine payment system were employed as independent variables. The results of ARDL model revealed that point of sales payment system had significant and positive impact on agricbusiness in Nigeria, while mobile money payment system also had a positive impact on agricbusiness in Nigeria, its impact was insignificant. However, automated teller machine payment system was found to record a negative and insignificant impact on agricbusiness in Nigeria. If the government and monetary authorities in Nigeria are serious about increasing and enhancing agricbusiness development via digital finance technologies platform, more awareness orientation, and sensitization and in some cases, incentive should be given for transactions on agricbusinesses in Nigeria through the use of these payment channels especially in the rural areas where agriculture is sustained.

### Recommendations

**1.** From the results elicited from the ARDL Model, point of sales payment system had a positive impact on agricbusiness in Nigeria. This is so in the sense that point of sales vendors are scattered all over the rural and urban areas in Nigeria and aids in bringing bank services to the people, especially, people in the rural areas and agricbusiness dominated areas. It is important for banks to issue out more point of sales licenses to vendors and also encourages those vendors in the rural areas since they bring banking close to their doorsteps and enhance financial inclusiveness in such areas.

**2.** I the same vein, the Central Bank of Nigeria should create more awareness on the use of mobile money payment system, if possible, issue out incentives for transactions through this platform. This is evident in the positive yet insignificant impact that mobile money payment system had on agric business in Nigeria. If incentives are offered and awareness created, mobile money payment system would yield significant impact on agricbusiness in the long run.

**3.** Automated teller machine payment system was found to exert a negative and insignificant impact on agricbusiness in Nigeria. As stated earlier, this could be as a result of lack of usage of this payment channel or the unavailability of this payment channel, owing to the fact that majority of farmers in Nigeria practice in rural areas and as such do not have access to banking facilities not to mention having access to digital finance technology of this type. From the foregoing, this study advocates for more financial inclusiveness in the rural and agricultural dominated areas in Nigeria.

### Suggestion for Further Study

The authors of this study suggest that more study or research should be conducted on the impact of digital finance technologies on agric businesses in Nigeria utilizing different proxies for agricbusiness in Nigeria such as level of engagement in agricbusiness development in Nigeria, registration of agricbusiness firms with corporate affairs commission and proportion of agriculture gross domestic product(GDP) in total GDP so as to give a balanced view of the impact that digital finance technologies have on agricbusinesses in Nigeria.

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