FINANCIAL INTERMEDIATION AND EMERGING TECNOLOGIES: AN EVALUATION OF NIGERIAN BANKING INDUSTRY

Abstract

Developments in the financial sector has put demand on financial intermediaries in order to keep pace with trends in global financial system and emerging technologies. The extent of adaptation to the emerging technologies within the Nigerian banking sector, remains unsettled among stakeholders: ~~a key to~~ *the banking sector, the economic planners and* ~~to~~ *academics.* ~~interest.~~ *This paper analyzed the output of financial intermediation,* ~~which is the major role~~ *of banking sector, and emerging financial technology in banking service delivery in Nigeria, for the period of 2005 to 2022.* Data were sourced from the ~~Source of data is~~ Central Bank of Nigeria (*CBN*) *Statistical Bulletin. The specific objective of the study* was ~~is~~ *to evaluate the effect of selected* emerging ~~evolving Financial~~financial *technology (Fintech) which include: Point of sale (POST), Automated Teller Machine (ATMT), Agency Banking (ABT) and Internet Banking (IBT), on financial intermediation banking performance (BISP) output in Nigeria. The study applied OLS, Unit root test, co-integration, and error correction model for the econometric analysis. The major results showed that ATMT, POST, ABT had significant positive impact on banking intermediation service performance output (BISP), while IBT had significant negative impact on BISP in Nigeria. Overall, the emerging technologies have made positive contributions to the banking sector service delivery in Nigeria with exception of IBT. The study therefore recommends that Policy makers should set strategies in tackling barriers such as insecurity/fraud,* and ~~avoidable glitches in the use of ATMT. They should create more awareness and formulate guidelines aimed at increasing availability of Fintech, especially ATMT in the rural areas and improve on its networking. In addition, a properly executed agency banking, with more capacities should be encouraged with incentives. This is necessary to include the financially excluded, and to create a sustainable confidence in banks which, have been lacking among these players.* Therefore to *improve internet banking usability, telecommunication providers should invest in network infrastructure upgrades, enhance network stability, and provide faster and more reliable internet connectivity.*~~Finally, more emphasis should be laid on resolving network problems by the providers so as to improve its networking for effective uses of internet banking.~~

Key ~~words~~Notes*:*
Financial Intermediation, Emerging Technologies, Agency Banking, Internet Banking, Point of Sale ~~Cointegration Model and Error Correction Model~~

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1.0 Introduction

1.1 Background of the Study:
Financial intermediation is a practice of linking up the deficit and surplus units- involved in banking business, by intermediary who– acts as a third party. Banks which are the main financial intermediaries require financial technology to effectively serve as a middleman amongst the investors who are the deficit units and the savers, who are the– surplus units within an economy. This process enhances financial transactions that meet the needs of both parties for mutual satisfaction. —Financial technology refers to the integration of technical know-how, tools and machinery which– offer– financial service –to improve service delivery to consumers. It primarily works by unbundling– and creating new markets for the Financial technology (Fintech) providers. Practically, it enables its users to do all financial transaction electronically. The service offers customers the opportunity to make payments services, including online shopping, insurance premium services, restaurants services (with delivery), ticket purchases and payment for general goods and services, using Internet banking, Debit and credit Card banking etc.

In various economies across the world, the financial system has played crucial roles in ensuring sound, comprehensive and sustained growth and development within such economies. Nlanga (2019) asserts that considering the rapid change in technology that is evident in the ever changing world, the financial system has not been left unaffected as it has been characterized with various changes with more focus on digital channels. According to Barasa and Mwirigi (2013), this digitalization that has led to disruptive innovation within the sphere of the financial system, can be referred to as financial technology or "Fintech". As a result of Fintech, various gaps within the sphere of the financial system have been filled as several solutions have been proffered to problems with the introduction of channels such as Remittal PayPal, Jumia Pay, and O'pay etc.

In Nigeria, with the recent establishment of the Fintech Association of Nigeria, there– is a drive towards the growth of Fintech in the financial system of Nigeria. According to PwC (2017), 40% of clients of businesses in Nigeria make use of mobile applications and 20% of those– clients use it once per month. Moreover, there was increase in the use of mobile banking channel for financial transaction following the outbreak of COVID-19. ,–According to the World Fintech report (2018), Fintech has a synergetic relationship with the traditional financial system in terms of improving customer loyalty, customer trust, incorporating infrastructure and aiding in regulation. However, Fintech has leveraged on the gaps left unattended to within the financial structure such as increased access to customers via online and mobile channels as this spurs financial incl usion,flexibilityofintroducinginnovativeproductsandservicesandassuch breaking the status quo.
 The Nigerian financial sector is, no doubt, the most technologically driven sector in the country. Over the years, the sector has witnessed tremendous changes owing to ever dynamic financial technological innovations.

Generally, Nigerian banks are adopting to new solutions to improve and simplify banking operations which foster a move away from traditional and physical channels towards digital /mobile delivery. Financial technological innovation has been established to improve banks performance and service delivery in the financial sector. Research studies on financial technology and banking service delivery in developing countries like Nigeria leaves opportunities for action with particular reference to its impact on inclusion with the financial intermediation process (EFinA (2020).

Hence, this study investigateds the effect of financial technology on delivery of financial intermediation services by Banks in Nigeria.

1.2 Statement of the Problem
Technology has evolved to take central stage in the everyday affairs of man and the financial system in Nigeria is not excluded. Consequently, the rise of Financial technology in the financial system, has aroused several issues in literature. There exists mixed response to the rise of financial technology. According to some scholars like Abaenewe, Ogbulu and and Ndugbu, (2013); Akhisar, Tunay a and &Tunay, (2015), there are controversies among some studies on the effect of financial technology on the intermediation service delivery of banks. For instance, studies with positive effect include : Carbo, Paso and Rodriguez (2022) , Hassan, Renzi and Schmiedel (2013); Motsatsi(2016), and Bara and Mudzingiri, (2016); while those with negative results include: Okoye, Nwisienyi and Obi (2019). Consequently, there is need to conduct a study into the subject matter to ascertain real time situation backed with empirical evidence in Nigeria.

Furthermore, Financial technology has operated in various countries with significant positive effect across the world but in Nigeria some customers of banks have complained of fraudulent acts in the provision of Fintech backed services and in effect, there seem to be no significant effect in improving service delivery and performance of the banking system. This could be attributed to .the fact that the rate of development of technology in Africa is still slow or because the challenges of financial technology are perceived to outweigh its benefits derived by banks. The foregoing makes it imperative to conduct an inquiry into the implications of financial technology on banking service delivery in Nigeria empirically in order to establish the real situation. .

Nlanga (2022) and (Emmanuel and & Adebayo, (2021) . have also asserted that financial technology has not been well-established in Nigeria due to poor internet network connection which usually render the banking technological service delivery ineffective with its attendant cost of delivery. This raises the question of how effective is financial technology impact on banking service delivery in Nigeria. There is therefore need for empirical investigation.

2.3 Objectives of the Study

The broad objective of this study is to determine the impact of financial technology on banks' provision of financial intermediation service in Nigeria from 2005 to 2022. while The specific objectives were toare:
i. To Determine the impact of Point-of-Sale technology on delivery of financial intermediation service by Banks in Nigeria. from 2005 to 2022.
ii. To Investigate the impact of Automatic Teller Machine technology on delivery of financial intermediation service by Banks in Nigeria between 2005 and 2022,
iii. To Examine the effect of Agency Banking technology transactions on delivery of financial intermediation service by Banks in Nigeria. from 2005 to 2022.
iv. To Evaluate the effect of Internet Banking technology on delivery of financial intermediation service by Banks in Nigeria. between 2005 and 2022..

1.4 Research Questions

The following questions ~~will~~ guided the achievement of the research objectives:

i. To what extent does Point-of-Sale technology (POST) ~~relationship ii~~mpact on bank financial intermediation service delivery in Nigeria? ~~between 2005 and 2022?~~

ii. To what extent does Automatic Teller Machine technology (ATMT) influence bank financial intermediation service delivery in Nigeria? ~~between 2005 and 2022.?~~

iii. To what extent does Agency banking technology (ABT) affect the performance of bank financial intermediation service delivery in Nigeria? ~~from 2005 to 2022?~~

iv. What weight does Internet Banking technology (IBT) bring to bear on bank financial intermediation service delivery in Nigeria? ~~from 2005 to 2022?~~

1.5 Research Hypothesis

The hypotheses were expressed in null form as follows: ~~shown below will help in answering the research questions:~~

H01: Point-of-Sale technology has no significant impact on financial intermediation banking service delivery in Nigeria. ~~from 2005 to 2022.~~

H02: ATM technology has no significant impact on financial intermediation banking service delivery in Nigeria. ~~between 2005 to 2022.~~

H03: Agency banking technology has no significant impact on financial intermediation banking service delivery in Nigeria. ~~between 2005 to 2022.~~

H04: Internet banking technology has no significant impact on banking service delivery in Nigeria. ~~between 2005 to 2022. financial intermediation.~~

1.6 Significance of the study

This study on Banks' delivery of the financial intermediation process and emerging technology in Nigeria will have profound significance for several key stakeholders in the financial sector. These stakeholders include: Savers/lenders; Domestic and foreign investors; Manufacturers; Regulators; The Federal Government of Nigeria; The economy in general; Academics; and Researchers.

The study will shed light on the impact of financial technologies on banks' service delivery and provide valuable insights for stakeholders to make informed decisions and implement appropriate strategies.

~~This study on Banks delivery of the financial intermediation process and emerging technology in Nigeria will have pronged significance on several pecuniary units and major actors in the financial sector by throwing light on whether the impact is negative or positive and the subsequent recommendations to apply , depending on the outcome. These units include: Savers/lenders, domestic and foreign investors ,manufacturers, regulators, the federal government in particular and~~

the economy in general, as well as academics and the researcher.

1.7 Scope of the Study

This study has both time and geographical scope. The geographical scope is the banking sector in Nigeria while the time scope is 2005-2022. The study concentrates only on the impact of the application of financial technology on the performance of the financial intermediation process by Banks in Nigeria.

2.00 Related Literature Review
Introduction

This section takes a critical look at the related literature of the study under conceptual, theoretical and empirical review of financial technology including its variants (point of sale terminal transactions, Automated teller machine transactions agency and internet banking), and how they bear on the Banks' intermediation process in the banking sector.

2.1. Conceptual Framework

Financial intermediation
Financial intermediation is a process by which financial intermediaries bring together the activities of the deficit and surplus spenders, mobilizing savings from the surplus spender in the form of money deposits and then transferring the deposit in the form of credit or loans to deficit spenders who need these funds most for investment or productive uses in the economy. (Franklin &and Santomero, (1996;) and Jonathan &and Mrinal, (2022).

According to Bara and Mudzingiri, (2016), financial intermediation process involves economic services provided by financial intermediaries, transferring money resources from economic agents with surplus funds to economic agents that would like to utilize those funds for investment. This encompasses a broad range of businesses that transfer, save, manage and spend monies as a medium of exchange. Financial intermediation and financial inclusion in sub-Saharan Africa remain low, despite progress in recent years.

The depth and coverage of financial institutions in sub-Saharan Africa, as measured by the standard indicators of financial development, such as the ratios of private sector credit to GDP and broad money to GDP, have significantly improved over the period 1995 to 2018 (Kasekende,2020). Financial intermediation has, as its core features, cost control, confidence and convenience of stakeholders. Financial intermediation is emerging as an engine of growth and technological enabler fostering inclusion in financial intermediation process.

Financial Technology
Financial technology describes the use of technology to deliver financial services and products to banking services consumers. In banking sector it involves mobile payments, money transfers, lending, raising capital for investment, asset and property management (Carlin, Olafesson &and Pagel, (2017).
Bank for International Settlements (BIS) (2018), posits that, financial technology (Fintech) is a term for using of technology to revolutionize how the world uses money in digital age. Fintech enhances and automates the delivery and use of financial services, making them more accessible, efficient and secure for businesses and consumers. Fintech uses new technology and innovation with other available businesses in order to compete in the marketplace of traditional financial institutions and intermediaries in the delivery of financial services. (Enang, (2012;) and Chishti &and Barberis, (2016).

The rapid advancement in technologies has made technology an important Information Communication Technology (ICT) tool for development due to its ability to easily leapfrog the infrastructure barriers in remote and rural areas in Africa (Enoma and Isedu, 2011). Financial technology companies consist of both start-ups and established financial and technology companies that are trying to replace or enhance the usage of financial services of individuals, firms and the government.

Financial technology has gained ground by the reason of its use by start-up firms gaining entry into the market as they try to change the traditional method of financial operations by leveraging on cutting edge technological channels in areas of asset management and money transfer (Truong, 2016). One remarkable feature of financial technology is its ability to ensure efficiency within the market and at same time keep transaction costs very low. Kim, Park, Choi and Yeon (2015) in Erman (2017), described financial technology as a platform which provides for the intersection of technology and finance.

2.2 Categories of Operational Financial Technology in Nigeria

Point of Sale Technology: A POS, or point of sale, is a device that enables merchants to process payments and log transactions. It is essentially a computer-based cash register with software capable of tallying up orders, taking payments, monitoring inventory and buying trends, creating invoices, and collecting marketing data. (Crouzet, Gupta, and Mezzanotti, (2019).
POS technology includes countertop terminals and apps that let people or businesses take payments with connected devices such as smart phones. A POS may be a physical device in a brick-and-mortar store or a checkout point in a web-based store

ATM Technology: Automated Teller Machine (ATM): A complex self service station for cash withdrawal, account information, credit transfers and cash deposits. (BIS) (2018). ATM and credit card networks are linked in such a way to enable credit card holders of any bank that operates with similar protocol to use it in any machine. One of the ways to grow and encourage the use of Automated Teller Machine (ATM) cards is for banks to form partnerships and jointly own a switch network which will electronically link all the banks' various ATMs (Bara and Mudzingiri, 2016). This has seriously influenced the recent establishment of inter- switch network by some Nigerian banks in collaboration with Accenture and Telnet. Smartcard is already operational in Nigeria under the brand name of Value card. The company (Smartcard Nigeria Plc) acts as settlement agent as well as Coordinator of hardware and software supply, while participating in banks services as card issuers. Its transactions are however not yet online. Nigeria could easily replicate the South African success story where tremendous progress has been made in the use of Smart Cards. This is very impressive and worthy of emulation. In South Africa, smart cards are being put to use in various areas like salaries, pensions, car parks, post offices, cinemas and stadia.

The revolving credit on the card allows repayment in installment. The credit that is granted is either settled in full by the end of a specified period or settled in part, with the remaining balance extended as credit. International credit cards such as Visa and Master cards are known to customers and accepted by merchants. Credit cards are also easy to use on the internet, as only the credit card details need to be sent to the beneficiary in order to effect payment. This is directly linked to savings or current accounts. The use of debit cards for purchases on the Internet is still limited. The benefits of e-payment systems can only be realized if sufficient measures are put in place to ensure that the Nigerian public has confidence in the system.

Agency Banking: Agency Banking is a banking model involving a business, bank or financial institution delivering permitted financial services outside their traditional places of business through third-party agents to last-mile end users. (Okoroafor, Adeniji, & Awe, 2018). "The last mile" here refers to why these businesses, banks and financial institutions would not traditionally reach. They had Vostro Setups with the banks. (Vostro setups indicating they keep settlement positions with certain Deposit Money Banks (DMBs) for faster transaction processing – this basically means that when their customers make funds transfers or merchant payments to beneficiaries with accounts in these DMBs, they are able to secure debits from their customers and settle those beneficiaries from their settlement positions at those banks which would basically be internal ledger updates at the bank. The Agency Banking model of delivering financial services has worked in Nigeria because banks and financial institutions were concentrated in urban centers, leaving many in semi-urban areas unattended.

These days, ~~it's an entirely different story. Now, instead of splashing huge cash on the cost of setting up brick-and-mortar branches,~~ banks have been able to serve and reach more customers across Nigeria with the help of agents. A look at 2020 report from the International Monetary Fund (IMF) revealed that commercial banks in Nigeria shut down more than 200 branches and more than 600 Automated Teller Machines (ATMs) in that year. The data suggests that banks are making more use of agents. Other factors, like the rise in digital and mobile banking solutions, have contributed to this. Aside from banks using this model to expand their retail banking operations, Fintech startups and businesses with distribution networks also use this model to offer financial services. Given the prodigious reach and convenience, banks in Nigeria are gradually embracing agency banking and changes are beginning to take place in the Nigerian financial landscape.
Customers are increasingly raising the stakes of expectations for quality customer services. To further give access to financial services across the country, infrastructure is needed to make it easier for people to build agent networks.

GSM/Mobile Banking (M-Payments): M-payments could be deployed either through the short messages service (SMS) or phone calls. (BIS, 2018). With the roll-out of GSM in Nigeria in August 2001, customers are beginning to relish this service delivery channel. The success story of the Mobile Banking technology has also been applied to Nigeria, where it has dominated the financial ecosystem
.

Internet/Online Banking services:
This development embroils account creation, transfers and payments online /across the web. Web Payments is an emerging web standard developed to simplify online payments and enable a broader set of players to participate easily in the payments ecosystem on the web. The standards are flexible, work with various types of payments systems and are intended to work on any browser, on any device, payment method, or payment service provider. This flexibility enables development simplicity, deployment consistency, and future compatibility with emerging payment technologies (Okoroafor, Adeniji, & Awe, 2018). In terms of benefits of web payments: for consumers, they simplify checkout flow, by making it a few taps instead of typing small characters many times on a virtual keyboard; for merchants, they make it easier to implement with a variety of payment options already filtered for the customer; For payment handlers like banks, they allow bringing any type of payment methods to the web with relatively easy integration; for payment service providers, they bring new payment methods and enhance the ability of businesses to serve more customers with a better developer experience and more secure solutions.

Application of financial technology to the financial inter mediation process

Financial intermediation effectively, mobilizes resources as well cannel same to productive areas. In attempt to make desired financial services available to as many people as possible, financial technology comes in to improve and make financial intermediation effective in mobilization of the savings from surplus spenders, reaching places physical distribution cannot reach as low cost as far as mobile network can reach such places .More so, financial technology takes the focus of services completely away from the source of supply to the customer, his comfort, convenience and access. As a result of this customer oriented approach, the provision of financial services will definitely receive a quantum leap. (Okoye, Nwisienyi &and Obi. (2019).

2.3 Theoretical Framework

Technology acceptance model is a relevant theory on the strength of the reasons or factors influencing the acceptance of technology, which its perceived usefulness and ease of use; necessitated the adoption of the Technology Acceptance Model (TAM) as the anchor of the study. Expectations are that the technology investing in would be easy to use, so that they can derive maximum benefits and competitive advantages from using the technology. This is hinged on the fact that financial institutions expect increased performance in all areas of their operations when they introduce financial technology into their services. Thus, an increase in financial technology is expected to increase financial institution performance.

Innovation or technological progress is the only determinant of economic progress and so, once the technology becomes constant, the process of growth stops Schumpeter (1934). Financial technology would ultimately mean technological innovation that seeks to improve and automate the delivery and use of financial services.

According to Motsatsi (2016), financial technological innovation has a positive impact on financial development which is used to improve the performance of the financial sector and subsequently the growth of the whole economy. Generally speaking, the level of technology is an important determinant of economic growth. With the emergence of new technology-driven applications and processes, new digital applications that facilitate easier payments, alternative processing of networks and increased use of electronic devices to transfer money, the banking and payment sub-sectors has experienced a high level of disruption (PWC Nigeria, (2017). This gives credence to Schumpeter's creative destruction theory of 1942. The creative destruction or what is known as the disruptive force, applies to the fact that the introduction of new products displaces the old ones. It results in the obsolescence or failure of these old products.

Research has shown that a shift from cash payments/traditional methods of banking to digital payments/financial technology will enhance financial inclusion, improve efficiency (increasing speed of payments and reducing cost), increased transparency and security of payments and have a long-term positive effect on bank performance (Demirguc-kunt, Klapper &and Singer, (2017); Scott, Reenen &and Zachariadis, (2017).

Financial technology would ultimately mean technological innovation that seeks to improve and automate the delivery and use of financial services. The theory captures the broad objective of the study which is the impact of financial technology on the performance of the financial sector. When the financial sector deepens its technological adoption, its service and products will also improve and hence, its total performance in terms of its contribution to the aggregate economic output of the

country. (Hasan, Renzi &and Schmiedel, (2013).

2.4. Empirical review

Carbo, Paso and Rodriguez (2022) estimated the impacts of financial innovation on banking system performance covering the period between 1990 and 2022 in 17 different regions in Spain, using the Generalized Methods of Moments (GMM). They used three different measures of financial technology (web payments, ATM channel and point of sale technology) which were estimated simultaneously with respect to banking— financial intermediation   service delivery (financial performance of the banking system). Their results showed that financial innovation has a positive influence on banking service delivery performance.

Okoye, Nwisienyi and Obi (2019) estimated the relationship between financial technological innovations and banking sector performance output using quarterly time series data for the period 2009 - 2019. The study used the Autoregressive Distributed Lag (ARDL) approach to identify the long- run and short-run dynamics between selected variables. The results show that mobile phone transfers are positively related to output in the long-run while the ATM and POS transfers are negatively related to output in the long-run. The study recommends, amongst others, that policies aimed at promoting and enhancing the availability and penetration of financial technological innovations should be implemented and made effective as this will also boost financial inclusion.

Bara and Mudzingiri, (2016) researched on the effect of financial technology on banking service delivery using the Autoregressive Distributed Lag (ARDL) method. The study finds that financial innovation has positive significant relationship with banking sector output performance at the long-run.

Jonathan Fund and Mrinal Mishra (2022), in their study found that the spread of COVID 19   and the related government lockdowns led   to a sizeable increase in the rate of finance applications downloads Factors analyzed that might have driven the effect on the demand side and better understand the "winners from the digital acceleration on the supply-side. Overall results suggest that traditional incumbents saw the largest growth in their digital offering during the initial period, but that "BigTech" companies and newer Fintech providers ultimately outperformed them over time. Finally, they drilled down further on the adoption of Fintech applications pertaining to both asset and liability side of the bank balance sheet, to explore the implications that the accelerated trends in digitization may have for the future landscape of financial intermediation
growth- driven financial innovation is confirmed, with causality running from financial innovation variables to the banking sector output.

Hasan, Renzi and Schmiedel (2013) estimated the relationship between retail payment technological innovation and the real economy using Generalized Methods of Moments (GMM), covering the period between 1995 and 2009 for 27 EU countries. The study concluded that there is a positive relationship output and technological innovation.

<div align="center">RESEARCH METHODOLOGY</div>

3.0 Methodology
3.1 Research Design

Ex-post facto research design was adopted for this study due to its suitability in forecasting time series variables. In this design, the use of past values to expla in future outcomes is made possible. The processes to be followed will begin with the unit root test of stationarity, followed by the test for co-integration using the Johansen approach and then the ordinary least squares analysis.

3.2 Sources of Data.

Reliability of the information resulting from this study was maintained as data, employed in this study are sourced from the Central Bank of Nigeria (CBN) Statistical bulletin (2022). The period under review is 2005 - 2022. Average value of banking sector output denoted by Banking Intermediation Service Performance (BISP) was applied as the dependent variable, while variations off financial technology applications are the explanatory variables.

3.3 Model Specification
Based on the theoretical framework, the model for this study is specified thus: The functional model is stated as:
BISP = f (POST, ATMT,ABT, IBT) ……… (1)

The econometric models can be specified as follows:
$BISP = \beta_0 + \beta_1 POST + \beta_2 ATMT + \beta_3 ABT + \beta_4 IBT + U_t$ …… (2)

Where:
BISP=Banking Intermediation Service Performance Output,
POST = point of sale technology,
ATMT = ATM technology,
ABT=Agency banking technology,
IBT = internet banking technology
U_t =White Noise Stochastic Error Term

Apriori Expectations: $\beta_1, \beta_2, \beta_3$ and $\beta_4 > 0$ Where:

3.4 Analytical Technique
The study applied descriptive statistics, Ordinary Least Regression, (OLS), Unit root test, Co-integration and Error Correction Model for econometric analysis of the study.

4.0 Descriptive Statistics
This refers to a set of methods used to summarize and describe the main features of a dataset. It provides an overview of the data and helps to identify patterns and relationship

The OLS regression was done to establish if there is long run relationship. But if the variables were found to be non- stationary, ADF unit root test will be applied.

Unit root test
This test is used to check for the stationarity of the time series data. This involves testing for the order of integration of the individual time series under consideration. It is performed at levels and then at first difference from. The Augmented Dickey Fuller test is employed at 5% level of significance. If the ADF test statistic is greater than the critical values, then the data is concluded to be stationary at the test order. The ADF relies on rejecting a null hypothesis of unit roots (the series are non-stationary) in favor of the alternative hypothesis of stationary. If the ADF test fails to reject in the levels but reject the test in first difference then, the series contain some unit root and it is

Data Presentation and Analysis
This section presents the data, the empirical results and discussions on the relevant findings from the model specifications tested in this study.

4.1 Descriptive Statistics
Table 1: Descriptive Statistics

	BISP	ABT	ATMT	IBT	POST
Mean	2223.002	532.6820	2623.895	143.5893	667.4213
Std. Dev.	1208.582	1242.289	2098.377	165.9809	889.5282
Skewness	0.341933	2.356127	0.753150	2.409277	1.696705
Kurtosis	2.027684	8.671481	2.180168	8.667695	5.148456
Observations	18	18	18	18	18

Source: Author's computation 2024 using Software E-views 10

~~4.1~~ The summary of the descriptive statistics from the data set is presented on table 1. ~~above~~. ~~Fr~~From~~om~~ the table, average value of Banking Intermediation Service Performance (BISP) output (proxy for banking sector performance) is about ₦2223. 22 billion for the period under review while that of Agency banking technology (ABT), automated teller machine technology (ATMT), the Internet banking technology(IBT) and the point of sale technology (POS) are ₦532.68billion, ₦2623.895 billion, ₦143.59 billion and ₦667.42 billion respectively, in terms of volume of transactions on those electronic channels.

Table 2 below shows the summary of empirical result when OLS multiple regression is run at the level series.

Table 2 Data Presentation on Long-run OLS Regression (Variables measured at Level)

lnBISP = f(lnABT ,lnATMT, lnIBT lnPOST, μt)
Dependent Variable:lnBISP
Method: Least Squares
Date: 10/06/2024   Time: 10:03
Sample(adjusted): 2005 - 2022
Included observations: 18 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.	
Ln ABT	0.150797	0.080432	1.874832	0.0642	
Ln ATMT	0.332548	−0.080039	4.154837	0.0001*	0.0642
LnIBT	0.051444	- 0.052462	0.980517	0.0842	
Ln POST	0.051789	- 0.163109	3.152537	0.0014*	0.0001*

R-squared	0.841234	Mean dependent var	12.8144	
Adj.R^2	0.7341			
S.E. of regression	0.215812	Akaike info criterion	0.00156	
Sum squared resid	0.878366	Schwarz criterion	0.37633	
Log likelihood	8.882122	F-statistic	102. 764	
Durbin-Watson stat	1.065123	Prob(F-statistic)	0.000000	

4.2 Analysis OLS Level Series Result

The Ordinary Least Square (OLS) level series result as presented on table 2 above, shows that the coefficient of determination (R-square) is 'a good fit' indicating that 84 per cent of the variations in BISP output growth are determined by the combined effect of changes in the explanatory variables –ABT ,ATMT, IBT   POST–. The F-statistics (102.07) confirms further that these explanatory variables are jointly and statistically important in explaining the variations in the growth process. The selected explanatory variables are rightly signed in accordance with the priori expectations. However, despite these results, a critical look at the diagnostics tests suggests possible spurious regression (low Durbin Watson (DW-) statistics ratio (1.06) and very high   R-squared (0.84) which implies time-dependency of these variables at this level. This therefore calls for unit root tests –by testing for stationarity or otherwise. The variables were therefore subjected to Augmented Dickey Fuller (ADF)- (1981) -unit root test.

Table 3 :

Summary of Unit Root Test Result Data Presentation

VARIABLES	AT LEVEL		FIRST ORDER DIFFERENCE		Remarks
	ADF Test Stat	Order of Integration	ADF Test Stat	Order of Integration	
LnBISP	-2.187932	-	-3.226143	/ (1)	**
LnABT	-1.860776	-	-3.899801	/ (1)	***
Ln ATMT	-2.451143	-	-3.378241	/ (1)	**
Ln POST	-2.254723	-	-4.170876	/ (1)	***
LnIBT	-1. 197782	-	-3. 99782	/ (1)	
Note:	Critical Value: 1% = -3.6852 5% = -2.9705 10% = -2.6242		Critical Value: 1% = -3.6959 5% = -2.9750 10% = -2.6265		

* = 10% level of Significance   ** = 5 % level of significance *** = 1 % level of significance .
Source: E-VIEW Econometric Computer Software application, Version 10

4.3 Analysis of Unit Root Test

Considering the suspected non- stationary feature of the data used   in the OLS level series , the ADF unit root test was applied separately on all the variables, at ordinary and first order levels of differencing. The purpose is to confirm whether the time series have a stationary trend, and if non-stationary, the number of times the variables have to be differenced to get to a stationary trend. The summary of the unit root test results as presented on Table 3 shows that the null hypothesis of non-stationarity is accepted, which implies that the variables are not stationary at level. It could only be rejected after the first order differencing / (1) for all the variables at one and 5 per cent levels of significance. This is evidenced by ADF test result at the ordinary level, which shows that the computed negative ADF test statistics for each variable is less than the Mackinnon critical values. (Mackinnon, (1991), Based on this outcome , Johansen co-integration was applied to test the long run relationships of the variables usdused for the research.

Table 4 :

Summary of Johansen Co-integration Test Results Data Presentation

Sample: 2005-2022
Included observations: 18
Test Assumption: linear deterministic Trend in the data
Series: ln,BISP,lnATMT, LnIBT, LnABT,LnPOST
Lags interval: 1 to 1

Eigen- Value	Likelihood Ratio	5% Critical value	1% Critical value	Hypothesized No of CE (s)

0.937151	301.6113	118.22	123.48	None**
0.906043	202.2121	93.05	102.16	At most 1**
0.8744345	198.232	82.06	98.23	At most 2**
0.7866534	188.6456	66.42	74.57	At most 3**
0.678661	176.8472	38.32	48.68	At most 4
0.278112	11.06121	14.21	19.16	At most 4

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 4 co-integrating equation(s) at 5% significance level

Source: E-View Econometric Computer Software application, (Version 10)

4.4 Analysis of Co-integration Tests Results

Engle and Granger (1987) has shown that even if individual variables are non-stationary, there can be linear combinations among them so that they can form a new series, which in the course of time will converge to equilibrium; that is, they will co-integrate. Applying the two maximal likelihood ratio tests (the maximal Eigen-value and the trace statistics), the number of co-integrating vectors were determined.

The summary of the results as presented on table 4 above indicates that there are four (4) co-integration relations at 5 per cent level of significance, with their values, greater than the critical values at 5 per cent significance. This leads to the confirmation that the test statistics rejected the null hypothesis which states that the variables are not co-integrated but accepted the alternative, implying that there is long-run relationship among the selected variables. Johansen test is preferred to Engle-Granger co-integration test in that it permits more than one integrating relationship so that it is more generally applicable than that of Engle-Granger test which is based on augmented or Dickey-Fuller test for unit roots in the residuals from single (estimated) co-integrating relationship.

Table 5: Parsimonious Error Correction Model Data Presentation

Series: lnBISP = f(lnATMT, ,LnIBT, LnABT, LnPOST,)
Dependent Variable: DLn (BISP)
Method: Least Squares
Date: 10/06/2024   Time: 12:56
Sample (adjusted): 2005 2022
Included observation: 18 after adjusting endpoints

Variable	Coefficient	Std Error	t- Statistics	Prob.
C	2.011142	0.298151	-6.721103	0.0001
Dln(BISP(-1)	0.404245	0.261621	1.545155	0.1352
DlnBISP(-2))	0.060011	0.014447	4.153872	0.0004*
DlnIBT(-1))	- 0.068681	0.024622	- 2.789415	0.0018*
Dln(ATMT(-1))	0.084869	0.024577	3.45318	0.0012*
Dln(ABT(-2))	0.246828	0.091030	2.711508	0.0080*
D(LnPOST(-1))	0.423037	0.318661	0.620036	0.5471
D(LnPOST(-2))	0.034430	0.013123	2.623637	0.0078*

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ECM02(-1)	- 0.144346	0.055848	- 2.569044		0.0082*
R-squared	0.782312		Mean dependent Var		0.04321
Adjusted R-squared	0.725462		S.D dependent var		0.201003
S.E of Regression	0.200243		Akaike info criterion		-2.20222
Sum squared resid	0.702366		Schwarz criterion		0.11231
Log likelihood	-14.43524		F-Statistics		12.414032
Durbin-Watson stat	2.41211		Prob. F statistics		0.00015

Source: E-VIEW Econometric Computer Software application, Version 10

4.5 Analysis of the Parsimonious Error Correction Model Result.
Table 5 presents the parsimonious Error Correction Model (ECM) result which gives a more reliable estimation result when compared with the OLS level series model. All the variables are rightly signed as predicted. The coefficient of determination ((R^2) was (0.78) which measures the overall goodness of fit is significantly high. This implies that 78 per cent of variation in BISP is determined by the aggregate variations in the selected explanatory variables in the long run. The F-statistics ratio of 12.4 significantly, indicates that the explanatory variables are collectively important in explaining the variations in IBST in banking industry Nigeria. The Durbin-Watson statistics test ratio of 2.4122 also strongly suggests absence of auto- correlation. This indicates that the unit root test has been effective in screening the variables to become stationary.
The positive and significant relationship of ATMT, ABT, POST and ABT with IBSP indicates that they are positively contributing to the growth of banking industry in Nigeria and ultimately to her economic growth.

Furthermore, internet banking technology (IBT) has negative and significant relationship with IBSP and therefore, they are not contributing to the growth of banking industry in Nigeria. This could be attributed to the improper administration which needs to highlight the customers' awareness both in the urban and rural areas.
The lag of the dependent variable (IBSPt-2) was equally significant in explaining the effect of the explanatory variables on IBSP.
The coefficient of the ECM term (--0.14435) which measures the speed of the adjustment at which equilibrium is restored, is significant and rightly signed (negative) at 5 percent level, and therefore confirms the earlier proposition that the variables are cointegrated. (Gujarati and Porters, (2009).

The ECM coefficient also gives the proportion of the short run disequilibrium in the explanatory variables accumulated in the previous period that is corrected in the current period. The speed implies that in the long run, 15 per cent of the short run disequilibrium of IBSP in Nigeria is corrected within a lag during the period under review. (One lag is one year in this study). It suggests that in the long-run, EBSP in Nigeria, adjusts slowly to short run disequilibrium changes in the selected explanatory variables since only 14 per cent of the accumulated disequilibrium in IBSPt is corrected within a lag. It implies lag effect. (Gujarati and Porters (2009).

5.0 Summary of Findings, Conclusion and Recommendations

5.1 Summary of Findings
This study entitled "Financial Intermediation and Emerging Technologies; An Evaluation of Nigerian Banking Industry" has the main objective of evaluating impact of financial technology on banks' provision of financial intermediation service in Nigeria over the period (2005-2022) .The summary of finding were thatare:

Automated Teller Machine technology (ATMT) , Point of Sale technology (POST), Agency banking technology (ABT) and Point of Sale technology, (POST) transactions, hads positive impact on bank performance in Nigeria which is represented by IBSP, at 5% level of significant. This means that an increase in the use of these selected explanatory variables bring about a corresponding increase in the performance of financial intermediation by Nigerian Banks.

However, Internet banking technology (IBT) transaction hads a negative impact on bank performance in Nigeria , at 5% level of significance

5.2 Conclusion
This sStudy including other related studies ies have found that the greater the development and use of the Technology (ATM, POS, and ABT) in banking operations and by customers of banks, the greater the performance of the financial intermediation function by banks. However, there is need for improvement by the banking authorities to create more awareness on IBT. Econometric models – OLS, Unit root test, co-integration and error correction models were applied and estimated via econometric techniques to ascertain the relationship between developing technology and performance of the financial intermediation by Banks in Nigeria. The study found that banks' financial intermediation performance, proxies by "Average Value of Banking Sector Output" and the selected technology indicators were used in the study within the period under study. The study therefore, concluded that technology variables induced financial intermediation performance of the banks in Nigeria during the period of this study; 2005 to 2022.

5.3 Recommendations
Based on the study findings above, the following recommendations are proffered for the study:
   i.   Policy/strategy to be formulated by authorities ensuring acceptability and increased awareness of internet banking technology. These should target accessibility, and ease of use particularly in the non-urban areas with high level of non-inclusiveness in financial intermediation process
   ii.   Stakeholders' confidence to be built through regulations to mitigate against fraud as trust issues equally contribute to financial disintermediation.
   iii. The policymakers should design a strategy toward enhancing the automated teller machines in term of its availability not only the cities also in the rural areas, improve on its networking and its ability to dispense different Naira denomination.
   iv.   Point of Sale instrument have been found to be significant on its positive effect to Banks

in Nigeria, the Central Bank of Nigeria should make it more accessible to all businesses in Nigeria,

v. Effort should be made by the government through the network provider to improve in its networking for effective uses of internet banking.

There should be a promotion by the banks to their customers to inform them on limitations of disintermediated finance as how to use leverage developing technological facilities.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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