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ICT INVESTMENT AND BANKS' FINANCIAL PERFORMANCE IN NIGERIA

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Abstract

Industrialization has brought about innovations for better efficiency in business. One of such innovations is Information and Communications Technology. The study sought to identify the effect of ICT investment on performance metrics of banks. Specific objectives of the study were ascertaining the effect of ICT investment on deposit base, net interest margin, total assets size as well as loan-deposit ratio. Data were sourced from CBN statistical bulletins in 2019. The data were analysed using measures of central tendencies as well as least squares statistics. Results of three of the objectives conformed to apriori expectations that ICT investment has positive and significant effect on deposit base, profitability and total assets size. Only loan-deposit ratio was not found to be affected by the independent variable of the study. It was recommended that management in the strategic cadre of commercial banks should take up more viable ICT investments for improved performance.

Introduction

As popularly stated, the world we live in is a global village- bound by technological advancements that constantly promote improvement and efficiency of human operations. Talegeta (2014) opines that the dynamics and complexities of present business environment have caused swift alterations in creativity, innovation, information, communications and technological advancement. Nevertheless, these alterations are bi-directional in that they also cause the business dynamics and complexities. In response, business organisations must ensure that they are constantly updated with trends and most necessarily, maintain proactive measures to

remain afloat in such risky conditions. On a local perspective, Nigeria has several companies in the ICT industry comprising media houses, computer software firms, computer hardware firms, mobile communications firms, app developing firms as well as those in the informal ICT sector such as stand-alone software developers, web designers and digital marketers. These players in the industry provide support services in the midst of fierce business conditions.

Banks are not exempted from this fierce environment and monopolistic competitive market. They strive to embrace Information and Communications Technology (hereafter referred to as ICT) to enhance efficiency and boost performance while maintaining good customer services and corporate image in the eyes of stakeholders (Luka and Frank, 2012). The International Monetary Fund (2017) affirmed that the financial services industry is being transformed with rapid technology advancements. Furthermore, banks carry on investments for earnings aside the regular loans and savings operations and a number of them include those tailored to the ICT sector which poses a high return-rate prospects in this era of digitalisation with owners of apps making millions of dollars from ICT.

Statistics from the Federal Deposit Insurance Corporation in the United States showed that for 13 banks in 2020, 83 per cent of new deposits were a result of significant investment in ICT. For assets as well, over 250 billion dollars is also attributable to this form of investment. This has piqued the researcher's interest to investigate ICT investment and its impact on performance in Nigeria. Previous studies have examined ICT investment in relation to banks as the expenses on technology such as the mobile banking apps, online transactions, internet banking and the Automated Teller Machines for improved operational efficiency (Dandago & Farouk, 2012; Akani and Tony-Obiosa, 2020; Chukwukaelo, Onyeiwu & Amah, 2020).

This study however takes a different approach to the relationship between ICT investment and Bank performance by examining in macroeconomic perspectives, investment in ICT as a whole nationwide and how banks are affected by these digital-inclined investments.

Literature Review

Conceptual Review ICT Investment

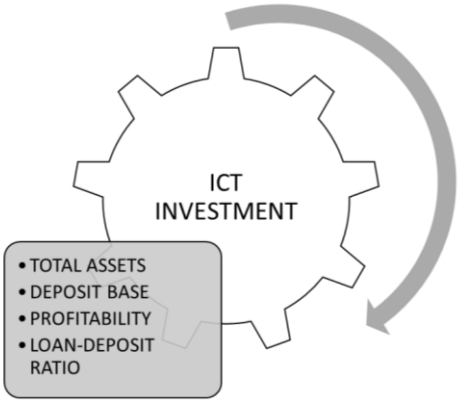
ICT is the automation of controls, processes, communications and information with the use of equipment such as computers, ancillaries and other telecommunication devices (Johnson, 2005). Investment in ICT is the amount/capital that financial institutions spend on ICT. While spending on ICT is considered expensive and risky, financial institutions are one of the largest investors in ICT. Schniederjans (2010) further outlined the things that could be included in ICT investment such as application software, personnel, programming languages, system software, and hardware. Software investment consists of an organisation's total spending on software packages, database systems, utility software and programming tools while hardware investment is the amount spent on physical computer components by the organisation (Kim, Kang, Saunders & Lee, 2008). Internal spending on the other hand includes total expenditure on software customization, human capital development and other miscellaneous ICT related expenses. Saleem, Salim, Al-Ghamdi and Allah (2015) noted that investment in ICT is

not limited to investment in hardware and software but also on human resources.

Okogun, Awoleye and Siyanbola (2012) described the tremendous role of Information and Communications Technologies (ICT) in contributing immensely to the growth of the developed economies of the world and other emerging economies. This is evidenced by the improving contribution of the Information and Communications (ICT) sector to GDP (+ a 6% growth from 2019 to 15.5% in 2020) despite the global pandemic (Onaleye, 2020). Historically, it should be noted that the advancement of ICT was given a boost in 2000 with the formulation of the National Telecommunication Policy, 2001 that saw different technological innovations. The policy focused on the need to establish a conducive environment for deregulation, rapid investment in ICT and rapid expansion of the telecommunication services in the country It helps to show how well an organization has improved in terms of its profitability as a result of its services delivery.

The adoption of information communication technology facilitates the process of mobilization of cash from surplus units to deficit units. This is achieved easily today through the use of mobile and internet banking services, POS and ATM terminals among others. Credit facilities can be easily obtained from online operators without necessarily meeting physically. This will no doubt ensure availability of funds for investment into factors of production thereby and end up promoting economic growth.

Ugwuanyi and Ugwuanyi (2013) suggest that banks' profitability ratios are likely to dwindle in the short run due to investment costs at year 0 due to large outflows. They however emphasise that in the long run, these investments create almost abnormal profits both by returns and reduction in operating costs.



Conceptual Diagram: ICT Investment and Banks' Performance (Researcher's Concept, 2021)

Theoretical Framework

Socio-Technical Systems Theory

The work was anchored on the socio-technical systems theory. The socio-technical systems theory was popularised by Emery

and Trist (1960) to explain systems with the ability to carry out complex communication between humans, machines and the environmental aspects of the work system as is evident in most ICT systems in the financial sector today. The theory has become significant in understanding the impact of information technology on different forms of organizations. It sees these organisations as an open system that consists of interdependent sub-components that processes inputs to a desirable outcome. Socio-technical systems theory has also established the basis for technology to improve development.

Empirical Review

Okogun, Awoleye and Siyanbola (2012) took a macroeconomic approach to determine the impact of ICT investment on the Nigeria's GDP. ICT investment proxied with ICT contribution to GDP, Private investment in ICT and number of subscribers. Empirical findings showed that ICT significantly impacts economic growth a significant impact on Nigeria's economic growth for the period reviewed.

Oyewole, Abba, El-Maude, and Gambo (2013) examined ICT investment in terms of e-banking and the impact on Net interest margin, return on assets, return on equity using firm-specific data from 2000 till 2010. They found that ICT investment has a positive impact on ROA and NIM after the first year.

Chibueze, Maxwell and Osundu (2013) found that ICT investment has positive and no relationship with ROE and ROA respectively after using multiple regression on data from four sampled banks.

Saifullahi and Abubakar (2013) used panel data to determine what impact ICT exerts on performance of banks. Results depicted that ICT exerts a direct impact on the performance indicators.

Nkama (2014) conducted a study to investigate the effect of ICT investment on productivity in Cameroon. No effect was found after using the Cobb-Douglas function for analysis.

Mensah (2016) studied rural banks in Ghana examining the impact of ICT investment on their performances between 2011 and 2014. After panel regression, it was discovered that there is a weak relationship between ICT investments and performance. The study in turn proffered efficient usage of ICT equipment available and reduced re-investments for rural banks.

Bukar and Tahir (2019) found through panel regression analyses of data from 10 banks that ICT investment had a significant effect on the growth of deposits in commercial banks in Nigeria.

Nwala, Abubakar and Onibiyo (2020) ascertained how ICT investment influences the financial performance of listed Nigerian insurance companies using data that spanned 2012 to 2018. They concluded that ICT investment has significant positive effect on the financial performance of sampled listed firms in the insurance sector.

Aggreh, Malgwi and Aggreh (2020) utilized a longitudinal research design in examining the return on ICT investment in the banking industry in Nigeria. The results from data got from annual reports of fifteen listed banks revealed that ICT investment does not affect financial performance in the short term. It could be different in the long run.

Akinrinade (2020) employed correlations, regression and paired samples t-test to analyse primary data to determine the impact of ICT investment on the financial performance of manufacturing firms situated in Lagos. A positive relationship was found

between ICT investment and financial performance cutting across profit before and after taxes as well as turnover.

Akani and Tony-Obiosa (2020) found that electronic fund transfer and the use of ATMs negatively influenced return on equity while internet banking, ICT investment and mobile banking had direct relationship with the profitability ratio. These, they found after analysing panel data from 2009 to 2017 sourced from respective annual reports of fourteen firms.

Chukwukaelo *et al* (2020) examined different types of e-channels and how their use affects reported profits by return on equity (ROE) of DMBs in Nigeria. Panel regression and generalized method of moment approach results revealed that the use of electronic channels by banks has positive and significant effect on profitability of studied DMBs.

Gap in Literature

A review of past literature showed that most studies examined the effect of ICT investment on profitability and deposits. Studies also used panel data from sampled banks. This created a gap in research on the effect of ICT investment on other performance indicators.

Methodology

Population of Study

The population of the study consists all the deposit money banks in Nigeria from 2009 to 2019. These consist of all private and public listed commercial and merchant banks. Sampling was not necessary since the study made use of time series data.

Sources of Data

Data used for the study were obtained from the Financial Sector- Schedule A and Real Sector- Schedule C of the 2019 CBN statistical bulletins and spanned from 1990 to 2019.

Tools for Data Analysis

Collated data were analyzed using descriptive statistics and Ordinary Least Squares Regression to test formulated hypotheses with the aid of E-views version 9 software. Diagnostic tests- homoscedasticity tests were run to determine suitability of the data for regression.

Table 1: Operationalisation of Study Variables

S/N	Variable Type	Variable Name	Proxy	
1	Independent Variable	ICT Investment	Total cost of output contribution of ICT industry to GDP	
2	Dependent Variable	Bank performance	Deposit Base	Total Deposits
			Liquidity	Liquidity ratio
			Total Assets	
			Profitability	Net Interest Margin (Lending Rate- Savings Rate)

Model Specification

Bank performance formed the dependent variable while foreign direct investment formed the independent variable:

Below are the regression models for this study:

NIM = $\beta o + \beta_1 ICT + e$

DEP = $\beta o + \beta_1 ICT + e$

TAS= $\beta o + \beta_1 ICT + e$

LDR = $\beta o + \beta_1 ICT + e$

Where:

DEP = Deposit Base; LR = Liquidity Ratio; TAS= Total Asset Size; NIM=Net interest margin; ICT= ICT Investment; β_1 = Coefficient of ICT Investment; e= Error term; β_0 = Intercept

Results

Data Presentation

Study data comprised bank performance indices outlined in the methodology section as well as the value of investment in ICT proxied by total value of ICT sector contribution to GDP 1990 to 2019 (the most recent CBN statistical bulletins available).

Data Analysis

Table 3: Descriptive Statistics

	ICT_INVESTMENT	DEPOSITS	PROFITABILITY	TOTAL_ASSETS	L_D_RATIO
Mean	3865.442	6605.668	18.06395	11807.13	64.47159
Median	1002.654	1848.786	18.64500	4134.198	64.98380
Maximum	15402.79	22597.69	27.07666	39904.55	85.66147
Minimum	38.65717	38.77730	6.510000	82.95780	37.96500
Std. Dev.	4821.019	7653.496	5.863755	13136.81	12.09737
Observations	30	30	30	30	30

Source: E-views 9

Net interest margin for all commercial banks averaged 18 per cent for the period of study with maximum being 27 per cent. Total assets of commercial banks over 30 years averaged 11.8 trillion naira annually while loans averaged 64 per cent proportion of deposits yearly. The investment in ICT products (goods and services) averaged 3.86 trillion naira from 1990 to 2019 with maximum as high as 15.4 trillion naira.

Correlations

Table 4: Correlations Table

Date: 07/07/21 Time: 13:23
Sample: 1990 2019
Included observations: 30

Correlation Probability	ICT_INVESTMENT	DEPOSITS	PROFITABILITY	TOTAL_ASSETS	L_D_RATIO
ICT_INVESTMENT	1.000000				

DEPOSITS	0.993512	1.000000			
	0.0000	-----			

PROFITABILITY	0.727571	0.728983	1.000000		
	0.0000	0.0000	-----		
TOTAL_ASSETS	0.989808	0.997159	0.731813	1.000000	
	0.0000	0.0000	0.0000	-----	
L_D_RATIO	0.019922	0.036561	-0.114069	0.064303	1.000000
	0.9168	0.8479	0.5484	0.7357	-----

Source: E-Views 9

The Pearson Correlation values and the Prob. value as indicated in the correlation matrix shows that the independent variable, ICT investment has strong positive relationship with all examined performance metrics (p<.05) except for loan-deposit ratio (p>.05).

Diagnostic tests

Table 5: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	3.402269	Prob. F(1,28)	0.0757
Obs*R-squared	3.250340	Prob. Chi-Square(1)	0.0714
Scaled explained SS	3.459985	Prob. Chi-Square(1)	0.0995

Source: E-views 9

Results of equal variances of residuals test showed that that assumption that satisfies regression adequacy to avoid spurious regression is met (p>.05).

Hypothesis Testing

H_{O1}: ICT investment does not affect the net interest margin of commercial banks in Nigeria.

Table 6: ICT Investment and Profitability

Dependent Variable: NET INTEREST MARGIN
Method: Least Squares
Date: 07/07/21 Time: 13:17
Sample: 1990 2019
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	14.64327	0.964476	15.18261	0.0000
ICT_INVESTMENT	0.000885	0.000158	5.611891	0.0000

R-squared	0.529359	Mean dependent var	18.06395
Adjusted R-squared	0.512550	S.D. dependent var	5.863755
S.E. of regression	4.093933	Akaike info criterion	5.721230
Sum squared resid	469.2880	Schwarz criterion	5.814643
Log likelihood	-83.81845	Hannan-Quinn criter.	5.751113
F-statistic	31.49332	Durbin-Watson stat	1.265722
Prob(F-statistic)	0.000005		

Source: E-views 9

The constant value, 14.64 depicts that net interest margin recorded by the bank is 14.64% when there is no investment in ICT opposed to the 18% average value. ICT investment had a coefficient of 0.00088 found to be significant (p<.05).

The value of R squared in this research model is equal to 0.529, which indicates that the model has an explanatory power of 52.9% in predicting the deposit base of commercial banks in Nigeria.

The value of significance for Probability (Prob. (t-statistic)) is 0.00 and less than the alpha (0.05), concluding that ICT investment significantly affects the net interest margin of commercial banks in Nigeria.

H_{O2}: ICT investment does not have significant effect on the deposit base of commercial banks in Nigeria

Table 7: ICT Investment and Deposits

Dependent Variable: DEPOSITS
Method: Least Squares
Date: 07/07/21 Time: 13:15
Sample: 1990 2019
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	508.9907	208.6895	2.438986	0.0213
ICT_INVESTMENT	1.577226	0.034120	46.22557	0.0000

R-squared	0.987066	Mean dependent var	6605.668
Adjusted R-squared	0.986604	S.D. dependent var	7653.496
S.E. of regression	885.8284	Akaike info criterion	16.47526
Sum squared resid	21971374	Schwarz criterion	16.56868
Log likelihood	-245.1290	Hannan-Quinn criter.	16.50515
F-statistic	2136.804	Durbin-Watson stat	1.831485
Prob(F-statistic)	0.000000		

Source: E-views 9

The constant value, 508.99 depicts that bank deposits without investment in ICT will be 508.99 billion naira as opposed to the 11 trillion averages that was found in the descriptive statistics. ICT investment had a coefficient of 1.577 implying that for every additional naira invested in ICT, bank deposits rise by 1.58 naira and vice versa is 1 naira is withdrawn from such investment. This is also found to be significant as probability of t statistic, 46.2256 is less than 0.05.

The value of R squared in this research model is equal to 0.987, which indicates that the model has an explanatory power of 98% in predicting the deposit base of commercial banks in Nigeria.

The value of significance for Probability (Prob. (t-statistic)) is 0.00 and less than the alpha (0.05), concluding that ICT investment has significant effect on the deposit base of commercial banks in Nigeria.

H_{O3}: ICT investment exerts no influence on the total assets of commercial banks in Nigeria.

Table 8: ICT Investment and Total Assets

Dependent Variable: TOTAL_ASSETS
Method: Least Squares
Date: 07/07/21 Time: 13:19
Sample: 1990 2019
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1381.525	448.5299	3.080117	0.0046
ICT_INVESTMENT	2.697132	0.073334	36.77897	0.0000

R-squared	0.979720	Mean dependent var	11807.13
Adjusted R-squared	0.978996	S.D. dependent var	13136.81
S.E. of regression	1903.884	Akaike info criterion	18.00552
Sum squared resid	1.01E+08	Schwarz criterion	18.09893
Log likelihood	-268.0828	Hannan-Quinn criter.	18.03540
F-statistic	1352.693	Durbin-Watson stat	1.618441
Prob(F-statistic)	0.000000		

Source: E-views 9

The constant value, 508.99 depicts that bank deposits without investment in ICT will be 508.99 billion naira as opposed to the 11 trillion average that was found in the descriptive statistics. ICT investment had a coefficient of 1.577 implying that for every additional naira invested in ICT, bank deposits rise by 1.58 naira and vice versa is 1 naira is withdrawn from such investment. This is also found to be significant as probability of t statistic, 46.2256 is less than 0.05.

The value of R squared in this research model is equal to 0.987, which indicates that the model has an explanatory power of 98% in predicting the deposit base of commercial banks in Nigeria.

The value of significance for Probability (Prob. (t-statistic)) is 0.00 and less than the alpha (0.05), concluding that ICT investment exerts a significant influence on the total assets of commercial banks in Nigeria.

H_{O4}: ICT investment has no impact the loan-deposit ratio of commercial banks in Nigeria.

Table 9: ICT Investment and Loan-Deposit Ratio

Dependent Variable: L_D_RATIO
Method: Least Squares
Date: 07/07/21 Time: 13:20
Sample: 1990 2019
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	64.27835	2.899851	22.16609	0.0000
ICT_INVESTMENT	0.000050	0.000474	0.105440	0.9168

R-squared	0.000397	Mean dependent var	64.47159

Adjusted R-squared	-0.035303	S.D. dependent var	12.09737
S.E. of regression	12.30906	Akaike info criterion	7.922888
Sum squared resid	4242.361	Schwarz criterion	8.016301
Log likelihood	-116.8433	Hannan-Quinn criter.	7.952772
F-statistic	0.011118	Durbin-Watson stat	1.868583
Prob(F-statistic)	0.916778		

Source: E-views 9

The independent variable, ICT investment has a coefficient of 0.00005 and a probability value of 0.91, of which this value is greater than the value of significance (α= 0.05). This showed that ICT investment had no predictive power on loans given in relation to deposits of studied banks.

The value of R-squared in this research model is equal to 0.00039. It depicts that only 0.03% of the variation in the loan-deposit ratios of commercial banks can be explained by the changes in ICT investment of Nigeria.

The value of significance for Probability (Prob. (t-statistic)) is 0.91 and higher than the alpha (0.05), concluding that ICT investment has no impact the loan-deposit ratio of commercial banks in Nigeria.

Discussion of Findings

Banks' profitability in the study was found to be affected by ICT investment. Banks margin on gross earnings is directly related to ICT investment. More investment in ICT leads to increased margin and vice versa. This is expected as a result of the high profits and efficiency that comes with ICT investments. The studies of Akinrinade (2020), Chukwukaelo et al (2020) and Akani and Tony-Obiosa (2020) also found significant positive effects. Nkama (2014) however had contrary findings as ICT investment was found to be insignificant in influencing productivity in Cameroon.

On the deposit-base of commercial banks, ICT investment was found to be a positive and significant predictor. Transactions are made by commercial banks that serve as intermediaries both in local and foreign currencies causing a rise in deposit base of these banks. These findings are consistent with that of Bukar and Tahir (2019) who found that there is a positive and significant impact of ICT investment on the growth of deposits in commercial banks in Nigeria.

ICT investment was also found to affect total assets of Nigerian banks that signifies the size of these banks. ICT investment cause increased profits which are ploughed back to increase shareholders' equity and invest in assets concurrently for improved performance. The findings agree with those of Nwala et al (2020).

Results revealed that ICT investment had a positive effect on the loan-deposit ratio of commercial banks but this effect was found to be insignificant. In other words, investment in ICT does not influence the proportion of deposits that banks give as loans. Rather, it is influenced by factors external to this study such as minimum ratios set by regulators, risk appetite and interest rates. Aggreh et al (2020) also found that ICT investment contributed nothing significant to performance of banks in Nigeria though the researchers blamed it on the capital-intensive nature of such investments. However, Mensah (2016) also found that ICT investment had weak relationship with performance of rural banks.

Conclusion

The study examined ICT investment and its effect on the performance of commercial banks in Nigeria. Specifically, banks' performances in terms of profitability, deposit base and size of assets are significantly influenced by ICT investment. The study findings conform to the socio-technical systems theory that ICT makes for more productivity and efficiency. This paper has contributed to ICT investment and banking literature, by providing empirical evidence that banks in Nigeria directly benefit from investment in ICT.

Recommendations

Based on the findings of this study, it is recommended that banks take up more viable ICT investments for improved performance.

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