JOURNAL OF GLOBAL ACCOUNTING
10 (2) July, 2024.
ISSN (Online): 1597–7641; ISSN (Print): 1597-8273
https://journals.unizik.edu.ng/joga

DISRUPTIVE TECHNOLOGIES AND ELECTRONIC INCOME OF LISTED DEPOSIT MONEY BANKS IN NIGERIA

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CITATION: Eze, E.O., Osisioma, B.C. & Okafor, G.O. (2024). Disruptive technologies and electronic income of listed deposit money banks in Nigeria, *Journal of Global Accounting*, 10(2), 386 - 405.

Available:https://journals.unizik.edu.ng/jo

Key words: *Automated teller machine, Disruptive technology, Electronic income, IT Expenditure, Technology based innovations.*

ABSTRACT

The study examined the effect of disruptive technology on electronic income of deposit money banks in Nigeria. The population of the study comprised all the twelve listed deposit money banks on Nigerian Exchange Group as at 31st December, 2023. The focus period was 2012 – 2023 which covers twelve years. Ex-post facto research design was adopted and a sample of seven deposit money banks was selected using the purposive sampling technique. Panel data regression technique and E-views 10 Econometric software were employed for the estimations and summary statistics respectively. The tests of hypotheses show that at 1% level of significance, IT Expenditure is positively related with electronic income from a synthesis of the base variables, it can be concluded that a significant relationship exists between technology based innovations' variables and electronic income of deposit money banks in Nigeria. The adjusted R^2 and F-Statistics value are 0.587 and 8.514 respectively, an indication of overall significant relationship between the independent and dependent variables. Based on the results of the study, it is recommended that the monetary authorities should provide appropriate regulations and rules that will help the banks to adapt, adopt or operate financial technology infrastructure in Nigeria.

1. INTRODUCTION

Disruptive technology refers to innovations that have brought a paradigm shift to an existing way of doing things in industry, economic sector or market with seamless, convenience, accessibility, affordability and simplicity in rendering services or in the production of output. In its variant, it also means creative destructions or disruptive innovations (Rima & Sweetline, 2022). Studies have shown that the unprecedented alteration in human activities in our contemporary time is linked to the phenomenon of disruptive technologies. In the banking

JOURNAL OF GLOBAL ACCOUNTING
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ISSN (Online): 1597–7641; ISSN (Print): 1597-8273
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industry of today, this wave of model automation is speedily bringing about a fusion of multiple technologies such as advanced analytics, clouds application, Block Chains, Machine learning among others, thereby compelling the financial institutions to shift from its traditional processing status quo (Vassallo, 2020; Mbagwu & Obonofiemro, 2023). This is therefore a new development that replaces the erstwhile bricks and mortar system or physical presence and its associated traditional interest income in the banking sector which have severely been hampered. Several studies have been conducted on this contemporary issue but they are foreign economies based. For instance, some of the foreign economies based studies in this area were from Kenya, Ghana, Rwanda, Malaysia and Indonesia respectively (Alubisia 2018; Ankrak 2019; Shyaka, 2021; Andy, 2019). Nigeria specific studies on distruptive technologies used financial performance as proxy for the dependent variable as against electronic income (Mbagwu & Obonofiemro, 2023); Adiga, Adigwe, Okonkwo, & Ogbonna 2022; Akani &Obiosa, 2020; Uzor, Nwanna, Echekoba & Ananwude, 2022; Okeke & Ezeala, 2023).

Therefore, the study investigated the effect of disruptive technologies on the banking sector with a focus on electronic income of listed deposit money banks in Nigeria. The rest of the paper is structured as follows: chapter two is on the review of related literature, chapter three is Methodology, chapter four is Data presentation, analysis and discussion of findings while chapter five is the conclusion and recommendations.

1.1 Objectives

The main objective of this study is to investigate the effect of disruptive technology on electronic income of listed deposit money banks money banks in Nigeria. The specific objectives of this study are:

1. to investigate the effect of information technology expenditure on the electronic income of listed deposit money banks in Nigeria.
2. to examine the effect of the number of automated teller machines on electronic income of listed deposit money banks in Nigeria.

1.2 Hypotheses

Based on the objectives of the research, the following hypotheses were developed:

H_{01} Information technology expenditure has no significant effect on the electronic income of listed deposit money banks in Nigeria.

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H_{02} The number of automated teller machines have no significant effect on the electronic I ncome of listed deposit money banks in Nigeria.

2. LITERATURE REVIEW

2.1 Conceptual Review

2.1.1. Disruptive Technology

The understanding of disruptive technology to the ordinary man from its phonetically perceived concept could be misunderstood. Digital disruptions refer to a combination of multiple state-of-the-art innovations which can affect the existing way of doing things (Li, Dai, & Cui, 2020). It is the influence of digital technologies on traditional industrial setting, business models and the way of behavior of a given society which among other things introduces new products and services, improved efficiency, improved customer knowledge, disruption of traditional industrial setting, job shift, cyber security threats and social and ethical implication. Disruptive technologies, disruptive recreation or disruptive innovations as variously used mean the process by which technology enables entrants to launch less expensive but more accessible products and services that gradually take over or replace those of existing or well established competitors. The post COVID 19 Pandemic intensely triggered off the effect of technologies disruption in the emerging markets IFC (2020). From the perspective of the banking industry, the dynamics associated with the current disruptive technologies have been the value chain which creates value for customers and generate revenue for the banks being threatened. This, by implication entails that the traditional banking is being gradually disinter mediated, it's worth chain cracked and plan of action drastically upset (Ehiedu, Onuorah & Chigbo, 2023). According to OECD (2018), all forms of devices within the class of electronic money, mobile financial services, online financial services, i-teller, and branchless banking, whether routed through banks or non-banks, are technologically disruptive advances. The current technology driven system has resulted to a new payment system and the option of asset to holding on to money and a close substitute to hard currency (Okonkwo , Obinozie & Echekoba 2015 in Ibekwe, 2021).

Terer and Gichure (2020), identify technology disruption as a strategy or innovation strategies used by banks to develop, implement innovative financial instruments and processes and formulation of creative solutions to problems in finance. This conception was corroborated by Huang et al. (2018) as an innovative process adopted by banks with the intent of increasing the width and depth of their revenue channels to ensure that customers' needs are satisfied. Okey, Samuel, Okoiarikpo and Bassey (2023), further ascribe disruptive technologies in

banks to process innovations financial innovations. Financial innovations are ways and means of promoting new financial instruments, markets, and institutions using new technologies and manifests in various forms. This paper however focuses on the process innovations form, which involves new ways of rendering financial services.

2.1.2 Automated Teller Machine (ATM)

ATM teller machine also known as cash machine or auto teller is an electronic computerized telecommunications device that allows bank customers to directly use a secure method of communication to access their bank accounts, order or make cash withdrawals and check their account balances without the need for a human bank teller or cashier (Oboke, Patrick & Daisy,2022). According to Akani and Obiosa (2020), automated teller machines are generally located outside of the banks' halls as well as filling stations, airports mall, supermarkets and remote areas. Apart from their principal function of generating or dispensing cash, ATMs offer other services such as cash transfers from one account to another and settlement of bill, making deposit and printing account statement, they are part of innovative products employed to achieve competitive advantage as well as image repositioning of the bank. This electronic device is beneficial because it eases congestion at the Banking Halls and offers 24 hours banking services to customers. This and other electronic payment platform widely used and have significantly influenced the demographics of the operations of deposit money banks globally.

2.1.3 Expenditure on Information Technology

One of the key components of the value chain that generates competitive advantage is information technology spending. Expenditure on information technology connotes a variety of meaning in finance and economic literature. It has been observed that over time, IT has been impacting fundamentally by changing firms' mode of operations which results to changing strategic impact (Ankrah, 2019). Prior studies have shown that expenditure in information technology is beneficial for financial inclusion given that they facilitate clients' online interaction with banks, allowing for greater reach to rural and poorer neighbourhoods (Berg, Fuster, & Puri, 2019; Pierri & Timmer, 2022; Kwan, Lin, Pursiainen, & Tai, 2021). Farliana (2019) states that expenditure in technology has a positive effect on return on asset and return on equity with a negative effect on operating cost. Prior studies in Indonesia show that expenditure on technology innovation has positive influence on electronic income of deposit money banks (Permadi, 2018)

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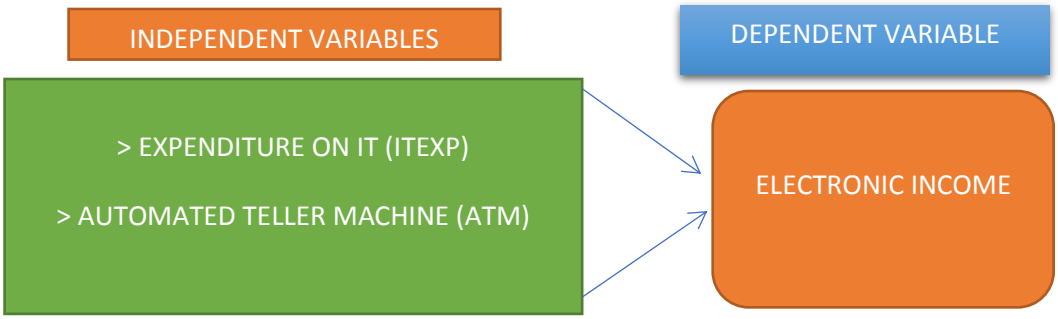

Figure 1: Conceptual framework
Source: Researchers' Concept, 2024.

2.2 Theoretical framework

This work is anchored on the disruptive innovation theory. The disruptive innovation theory is ascribed to Christensen in 1997 to explain how disruptive technologies occur. According to him, innovation is considered as a process where organizations transform labor, materials, capital, and information into more valuable products and services. The theory distinguishes two forms of innovations: the sustaining innovation and the disruptive innovation. The sustaining innovations hardly cause revolutionary transformation in the industry largely because the big firms in the existing market are established and exploit the radical or incremental innovations. However, the disruptive innovations refer to the technologies that offer different values from those offered by the main stream technologies. Disruptive innovation occurs in a process along the performance of a product and customer demand history. The theory predicts that product and service improve progressively while the customer demand history predict that customers' disposition to pay for improved performance is in direct relationship with improvement in the quality (Christensen, McDonald, Altman & Palmer,2018). Christensen, Ranyor and Macdonald (2015), state that established firms tend to ignore the needs of the low end market and concentrate on the high end market where the income and profit is high thereby creating opportunities for the new entrants to establish in the neglected low end market. The situation with the disruptive technologies is that it initially attracts the niche segment that tolerates the low-end market but as further development occurs, the technology level of performance would improve to a level that satisfies the mainstream market.

The model was originally designed in 1986 to explain the phenomenon by which an innovation transforms an existing market or sector by the introduction of a simple, convenience, affordable and accessible means of execution of activities at reduced cost and

speed of delivery and then causes a revolution leading to the abandonment of the old system. The theory thus stresses that technological disruptions brought new innovations and new windows for new products in the payment channels to ensure efficiency and effectiveness in service delivery in banking sector, thereby leading to improvement and performance of banks in Nigeria (Terry ,2020). Given that it enables banks to foresee, adjust to, and prosper in the face of revolutionary change thereby promoting growth, innovation, and customer satisfaction, this paper anchors on the theory.

2. 3 Empirical Review

Andi (2019) examined the concept of information technology investment and digitalization effect on profitability and electronic income of banks listed in Indonesian stock exchange from 2014 to 2018. The sample for the study was 30 banks that meet the criteria for selection out of the 44 banks that are quoted in the country's stock market. The secondary data for the study were generated from the financials of the banks which were analysed using E views 8 software. The result or findings revealed that information technology investment had a positive effect on fee based or electronic income and profitability. Digitalization also had a positive effect on fee based or electronic income but insignificant effect on profitability of the banks; an indication that digitalization increases electronic income though its operational income is comparatively high.

Bello (2023) examined the concept of information technology investment and digitalization of in increasing electronic income and profitability of deposit money banks, introducing company size as control variable. The population of the study consists of all banks listed on the Nigeria Exchange Group from 2017 - 2021. A sample of 10 banks was selected on the basis of predetermined sample selection criteria while the other 6 banks were outliers. The research is quantitative in nature using secondary data from the bank's financial statements, which were analysed using the EViews 8 software. The results of the study show that financial technology investment had a positive effect on profitability and electronic income, whereas, digitalisation positively affects electronic income but demonstrates an insignificant income on profitability. Following the results of the study, the author recommends that given increased income from technology investments and digital services, banks should be intelligent in managing strategies of developing the products.

Alubisia, Githii, and Mwangi (2018) examined the impact of technology based financial innovation on electronic income in Kenyan commercial banks. The study investigated how

the adoption of automated teller machine has influenced the electronic income of commercial banks in Kenya. Descriptive research design was utilized while a multiple regression analysis was carried out to illustrate the relationship between the independent and dependent variables. Results indicate that there is a strong positive relationship between electronic Income and amount of funds from automated teller machine cards as indicated by a correlation coefficient of 0.805 (p=0.001). A test to determine the possibility of the existence of multi-correlation shows a weak but positive relationship which obviates the possibility of multi-correlation. Findings from the study show that technology based innovation has significant effect on the electronic income earned by commercial banks in Kenya and recommends all stakeholders in commercial banks to take any investments made towards technology based financial innovation products as an approach to improve electronic income.

Harelimana (2018) investigated the contribution of the use of ATM to the profitability in bank of Kigali from 2010 to 2016. The study adopted the Quantitative and qualitative Methods including questionnaires in collecting primary data. The total population was 334,121 ATM users at BK using a sample of 200 respondents. The findings revealed that Bank of Kigali still faces an obstacle on lack of financial education of the customers on how to use ATM cards in general. Results confirmed that there is a significant relationship between ATM and profitability at the BK. It is recommended to invest in ATM usage for the accessibility of the services of Bank of Kigali to be competitive on the market and finally to be sustainable on the market

Oboke, et al. (2022) examined the effect of automated teller machine (ATM) on the financial performance of listed commercial banks in Kenya. A purposive sampling technique was adopted in the selection of 11 banks out of 42 commercial banks listed in Nairobi's Securities Exchange from 2014 to 2020. The ex-post facto research design obtained secondary data of panel nature using a structured data collection sheet. The Statistical Package for Social Sciences (SPSS) software was utilized to analyse the data with descriptive and inferential statistics. The findings of the analysis were shown in form of tables and graphs. From the results of the study, automated teller machine (ATM) correlated negatively with the independent variable which was statistically significant at 5%. The results of simple linear regression analysis equally shows that ATM is statistically significant at 5% (t=-4.991; p=0.04).

Idawati and Sayfputri (2022) carried out an investigation to ascertain the influence of digital finance, credit risk, overhead cost, and electronic income on the stability of banks from the banking industry included in conventional banks listed on the Indonesia Stock Exchange (IDX) in the period 2016 to 2020. The purposive sampling method was used to select 40 Conventional Banks registered IDX. The independent variable consists of Digital Finance measured using dummy variables, namely 1 if the bank launches a mobile banking application and 0 if vice versa. It was revealed that Digital Finance had a positive effect on electronic income.

Shyaka (2021) analysed the performance of electronic banking tools such as automated teller machine (ATM), mobile banking and internet banking on the revenue of commercial banks in Rwanda from 2016 to 2020. Descriptive survey and correlational design were adopted in the study involving a sample size of fifty two members of staff from the bank of Kigali. Information was gathered through a form survey and interviews and SPSS version 22 supported data analysis process. In addition, secondary information such as financial statements, statements of profit or loss account and executive reports were obtained from the bank of Kigali. Regression analysis was adopted to examine the relationship between electronic banking tools and revenue generation of bank of Kigali. Results show that automated teller machine (ATM) from the overall mean and standard deviation of 4.612 and 0.4882 respectively, contributed significantly to bank revenue, mobile banking with mean of 4.556 and standard deviation of 0.481 contributed to the revenue of bank of Kigali. From the angle of correlation, automated teller machine with a ratio of 0.700, mobile banking with a ratio of 1.00 and internet banking with a ratio of 0.422 respectively, indicated a positive degree of relationship between electronic banking tools and the bank performance.

Okonkwo and Ekwueme (2022) examined the effect of information communication technology and financial technology innovation on the performance of deposit money banks in Nigeria. Convenient sampling technique was used to select 11 deposit money banks for the study. Data for the study were collected from the annual report of the respective banks and from the Central Bank of Nigeria Fact Book from 2001 to 2013. The ordinary least square (OLS) regression technique was adopted in the analysis of the data. Result revealed that investment in electronic banking services does not actually improve banking services.

Takon, Nsofor, Ugwuegbe, Nwoye and Ekeh, (2019) examined the contributions of digital payment efficiency on the banking sector in Nigeria. The study employed quarterly data from

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10 (2) July, 2024.
ISSN (Online): 1597–7641; ISSN (Print): 1597-8273
https://journals.unizik.edu.ng/joga

2009 to 2018 obtained from the Central Bank of Nigeria Statistical Bulletin and the World Bank database. Both statistical and econometric tools were adopted in the analysis and test of stationarity and long run relationship. The dependent variables are the bank overhead cost represented by a percentage of total assets, bank electronic income represented by a percentage of total income and bank total cost as a ratio of income. Digital banking, the independent variables were represented by the well-known ATM, POS, MB and WP. Findings show that digital banking proxies- automated teller machine (ATM) transactions, point of sale (POS) transactions, mobile banking (MB) transactions and web payment (WP) transactions all indicated a negative and significant impact on electronic income, return on equity and return on assets of deposit money banks in Nigeria.

3. MATERIAL AND METHOD

The study adopted the *ex-post facto* research design which is appropriate for the study because the researcher has no influence over the already existing data. The population of the study consists of all the twelve (12) listed deposit money banks in the Nigeria Exchange Group as at 31st December 2023. They are: 12 DMBs (Access, FCMB, Fidelity, GTCO, Sterling, Stanbic IBTC, Union, UBA, Unity, Wema, First bank and Zenith). However, a sample of seven banks was chosen using purposive approach and on the basis of data availability as at 31st December 2023. The paper employed a panel dataset involving cross sectional and time series in which each of the variables was repeatedly collected for each bank for each of the years under study. The secondary data from the audited annual reports and sustainability reports covers 2012 -2023.

Table 1 Operationalization of Varables

Variables	**Definition**	**Measurement**
Independent variables (Disruptive technologies)		
ITEXP	Information Technology Expenditure	Amount Spent on IT Infrastructure
ATM	Automated Teller Machines	Number of Automated Teller Machines
Dependent Variable (Electronic Income)		
EINC	Electronic Income	Income from Electronic channels of transactions

Source: Researcher's Compilation (2024)

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ISSN (Online): 1597–7641; ISSN (Print): 1597-8273
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This study adopted the approaches of Trivedi (2015) to seek to explain the contributions of technology based factors to non-interest income of DMBs in Nigeria. The model is specified in functional form as:

$EINC = f(ITEXP, ATM) \ldots\ldots\ldots\ldots\ldots Eqn\ 1$

$Where$:

$EINC = Electronic\ income\ of\ the\ banks$

$ITEXP = Information\ technology\ expenditure$

$ATM = Automated\ teller\ machine$

This is specified in the econometric model as

$EINC = \beta_0 + \beta_1 ITEXP_{it} + \beta_2 ATM_{it} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots Eqn\ 2.$

$Where$:

$\beta_0 = Constant\ of\ the\ regression\ equation$

$\beta_1 - \beta_2 = Regression\ coefficients\ of\ the\ independent\ variables$

$\varepsilon = Stochastic\ error\ term\ of\ the\ regression\ model$

$i = 1,2,3,4,5 \ldots,7$

$t = number\ of\ years\ (2012 - 2023)$

4. RESULT AND DISCUSSIONS

4.1 Data Analysis

4.1.1 Descriptive Statistics

Table 2 Correlation Matrix

Variables	NINC	ATM	ITEXP	MOB	NLBN	POS	AGE	BSIZE
EINC	1							
ATM	0.32 (0.00)	1						
ITEXP	0.30 (0.00)	0.54 (0.00)	1					
SIZE	0.12 (0.26)	0.69 (0.00)	0.51 (0.00)	0.68 (0.00)	0.52 (0.00)	0.36 (0.00)	0.44 (0.00)	1

The initial level of relationship among the variables is examined by estimating the correlation matrix as shown in Table 2. The correlation analysis also provides relevant estimates for evaluating the possible presence or absence of multicollinearity in the estimated models. Multicollinearity is expected to exist in the model if any two explanatory variables have a

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correlation coefficient greater than 0.7. There is high and positive correlation between expenditure on IT and ATM. This shows that banks that spend more on IT infrastructure tend to have more number of ATM machines. In general, positive correlation exists between the technology variables, which clearly demonstrate that technology applications by banks tend to be interactive. In the correlation matrix, none of the two variables has a coefficient that is greater than 0.7. This implies that there is no risk of multicollinearity in the estimated models in the study.

4.1.2 Unit Root and Cointegration Tests

Bank-specific characteristics (or individual and heterogeneity) and common (or homogenous) characteristics of the banks included in the sample for the study reflect in the data employed for this study. This calls for the use of panel unit root tests to check for the stationarity of the data, in order to avoid incidence of "spurious" inference. In this study, the test developed by Levin, Lin and Chu (LLC) was used to examine the stationarity properties of the homogenous panel. These tests assume identical cointegration vectors among the banks. Moreover, in order to account for the differences exhibited by individual banks, the Im, Pesaran and Shin (IPS, 2003) and the Augmented Dickey-Fuller tests (which allow for heterogeneity in the panel's cross-section and assumes a null hypothesis of no cointegration in the panel data) are also conducted. All the unit root test results for the variables in levels are presented in table 3. In the result, none of the variables has a significant LLC coefficient (at the 5 percent level). This means that none of the variables is stationary in levels although the IMP test shows that ATM appears to be stationary. However, since the main focus is on LLC tests, the hypothesis of no stationarity is accepted for the variables.

Table 3 Panel Data Unit Root Tests Results in Levels

Variables	*Common unit process*	*individual unit root process*		
	LLC	**IMP**	**ADF**	**PP-Fisher**
EINC	0.71	1.91	8.82	9.46
ITEXP	1.14	2.32	9.24	13.71
ATM	-0.83	-4.68*	51.24	98.82*
BSIZE	0.77	-1.15	9.61	29.82

Source: Estimated by the Author. *Note: ** and * indicate significant at 1% and 5 % levels respectively; IPS = Im, Pesaran& Shin; LLC = Levin, Lin & Chu*

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Table 4: Panel Data Unit Root Tests Results in First Difference

Variables	*Common unit process*	*individual unit root process*		
	LLC	**IMP**	**ADF**	**PP-Fisher**
EINC	-4.64**	-2.94	38.38*	79.58**
ITEXP	-3.77**	-1.46	26.35*	38.71
ATM	-8.83**	-4.68	51.24**	98.82**
BSIZE	-93.99**	-22.54	40.08**	67.60**

Source: Estimated by the Author. *Note: ** and * indicate significant at 1% and 5 % levels respectively; IPS = Im, Pesaran& Shin; LLC = Levin, Lin & Chu*

Considering that unit root results strongly indicate that the stationarity status of the variables are equal with each of the variables being I[1]. The long run conditions of the variable interactions can however be established to present a stronger background for a dynamic relationship among the variables.

4.1.3 Test of Panel Estimation Framework

The econometric analysis performed for the empirical analysis is majorly focused on estimating the panel data-based relationship between electronic income and the hypothesized determinant factors. In the panel data-based relationship result, the null hypothesis of random effects was rejected for the fixed effects estimation procedure. For the panel data analysis procedure, there is need to select between the fixed effects or random effects models as the best representation of the relationships. The standard Hausman test for random/fixed effects test was therefore used for identifying the time-varying conditions of the panel data in order to determine the method of panel analysis to be adopted. The result of the Hausman tests for each of the equations of the study is reported in Table 5. For this test, the null hypothesis is that a random effect exists in the cross sections of the data. Thus, if the coefficient of the Chi-square is significant, the null hypothesis is rejected, and then the random effect estimates become inefficient in capturing the relationships in the Equations. In the results of the Hausman tests presented in Table 5, the Chi-Square values for each of the Equations pass the significance test at the 5 percent level. Thus, the null hypothesis of random effects is rejected in this case. This implies that the fixed effects estimation procedure is the most efficient procedure for estimating the relationships since misspecification cannot occur when the fixed effect procedures are employed in the estimation.

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Table 5 Hausman Test Result for Panel Data Analysis

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	30.91	7	0.00

Source: E View 10

4.1.4 Bank Technology and Electronic Income (Fixed Effect Estimation)

In this section the effects of technology on the electronic income of the sampled banks are estimated and reported. Based on the objectives of the study, two bank technology indicators are considered. The Hausman test reported above demonstrates that the fixed effect estimation procedure is the most appropriate method. However, in order to present the robustness of the estimations, both the fixed effects and the OLS estimates are reported. The estimates are similar only in terms of the signs of the coefficients, suggesting that the estimates for the study are robust in terms of different estimation techniques. Nonetheless, the fixed effect estimates consider the peculiarities unique to each bank when estimating. Furthermore, compared to the OLS, the fixed effects estimates' diagnostic tests are more reliable. These show that the fixed effects estimates are more efficient than those of the OLS. The focus of the analysis is therefore on the fixed effect results.

Table 6 Result of Model Estimation

Variable	*Fixed effect*			*Panel OLS*		
	Coeff.	**t-Statistic**	**Prob.**	**Coeff.**	**t-Statistic**	**Prob.**
ITEXP	0.763	7.25	0.00	0.458	3.91	0.00
ATM	0.046	0.18	0.86	-0.180	-0.64	0.53
BSIZE	0.343	3.09	0.00	-0.055	-0.49	0.63
Constant	14.536	6.67	0.00	3.553	2.49	0.01
Adj. R-sq.	0.587			0.405		
F-stat.	8.514			10.241		

Source: Researcher's Computation via E Views 10

From the fixed effect results in Table 6, it is seen that the adjusted R-squared is 0.587 which indicates that over 58 percent of the systematic variations in electronic income of the sampled banks is explained by the explanatory variables at any given period. The F-statistic value of 8.514 is also significant at the 1 percent level, which reveals that a significant relationship

exists between the dependent variables and the independent variable combined. Thus, there is evidence that the estimated model has a high overall performance in explaining the behaviour of electronic income of the banks. The relevance of the technology variables in explaining the inflow of the banks' electronic income is determined by considering the coefficients of each of the two explanatory variables. A close look at the coefficients of each of the two reveals that the coefficients of expenditure on IT by the banks (ITEXP) is significant at the 1 percent level, while the coefficient of ATM failed the test at the 5 percent level. These results indicate that bank IT expenditure significantly affect electronic income of banks.

ATM application technology does not have significant effect on electronic income. ITEXP significantly promotes electronic income among the banks. In the same vein, increasing IT expenditure by a bank significantly increases the electronic income of the banks. In particular, a 1 percent increase in IT expenditure of banks leads to a 0.73 percent rise in electronic income. This is a high elasticity of income for the banks with respect to IT expenditure. The coefficient of bank size is also significant in the result, indicating that larger banks are more likely to raise more electronic income. Thus, it appears that the size of a bank influences the inflow of electronic income.

The regression results in Table 6 indicate that overall expenditure on IT by banks positively drive bank electronic income in Nigeria. The findings also imply that bank sizes have an impact on electronic revenue, suggesting that there is a size bias in this category of income among banks. Thus, there is the need to factor out the role of bank size in order to know how the technology factors affect electronic income, irrespective of the size of the bank. In order to downplay and remove the effect of size, the variable is accounted for in the model using interactive estimation technique. In the analysis, the interaction terms show how the size of banks influences the role of technology in electronic income of the banks. The results are reported in Table 6. The focus is also on the fixed effects estimate, although the panel OLS estimates are also robust, especially in terms of the coefficients of the estimates. An impressive highly significant F-Statistic is demonstrated by the estimates. In terms of the size-determined effect of the technology variables, the result shows that even when the size of the bank is accounted for, the ITEXP variable significantly affect electronic income of banks.

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Table 7 Estimation of Result with Cognisance of Bank Size

Variable	*Fixed effect*			*Panel OLS*		
	Coeff.	**t-Statistic**	**Prob.**	**Coeff.**	**t-Statistic**	**Prob.**
ATM*SIZE	0.001	0.05	0.96	0.009	0.44	0.66
ITEXP*SIZE	0.028	3.26	0.00	0.050	5.50	0.00
BSIZE	-0.759	-3.52	0.00	0.617	1.81	0.07
Constant	12.953	8.45	0.00	8.366	4.83	0.00
Adj. R-sq.	0.42			0.50		
F-stat.	10.68			6.28		

Source: Researcher's Computation via E Views 10

4.2 Test of Hypotheses

4.2.1 Hypothesis One

H_o: Expenditure on information technology (IT) has no significant effect on electronic income of deposit money banks in Nigeria

The hypothesis is based on the fixed effect estimate of the coefficient of ITEXP in Table 5. In the result, the coefficient is 0.763 ($p < 0.01$). This result shows that the coefficient passes the significance test at the 1 percent level. Thus, ITEXP is a significant factor in explaining electronic income of deposit money banks in Nigeria. The null hypothesis is therefore rejected which implies that expenditure on information technology (IT) has a significant positive effect on electronic income of deposit money banks in Nigeria. The result reveals that even when the size of a bank is accounted for, the impact of IT expenditure by the banks on electronic income is still positive and significant. Thus, the study has demonstrated that banks that invest heavily in IT infrastructure reap direct rewards through increased electronic income over time. The result from this study corroborates results from studies like Liao (2023), Ogege and Boloupremo (2020) and Chong et al. (2019). Indeed Ajaya (2020) and Ankrah (2019) found that the benefit of increased IT infrastructure by banks extends to the profitability ratios of the banks.

JOURNAL OF GLOBAL ACCOUNTING
10 (2) July, 2024.
ISSN (Online): 1597–7641; ISSN (Print): 1597-8273
https://journals.unizik.edu.ng/joga

4.2.2 Hypothesis Two:

H_o: The number of automated teller machine (ATM) has no significant effect on electronic income of deposit money banks in Nigeria

In order to test this hypothesis, the focus is on the coefficient of ATM in the results in Table 5. The coefficient is 0.046 ($p > 0.05$). This shows that the coefficient fails the significance test at the 5 percent level. Based on this outcome, the null hypothesis cannot be rejected in this case. Thus, the results show that the number of automated teller machines (ATM) has no significant effect on electronic income of deposit money banks in Nigeria. Even after the size of banks is accounted for, ATM still does not influence the income of the banks. These results seem to align with findings by Okonkwo (2015 and Adiga (2022) that indicated that certain aspects of financial technology are yet to exert great impact on financial sector performance in Nigeria. The result is however at variance with findings by Guha, Hota, and Sahu, (2022); Shyaka (2020) and Yuskel (2018) that found positive effects of ATM on banks' income.

CONCLUSION AND RECOMMENDATION

This study investigated the effect of disruptive technologies on the banking sector with a focus on electronic income generation. In particular, the contribution of information technology to electronic income earnings was assessed. The study covered seven banks chosen because of their level of technology application and availability of data for the twelve years (2012-2023) studied. The estimating model adopted by the study is the fixed effect panel data on the grounds of heterogeneity across banks in Nigeria. The overall outcome of the study shows that disruptive technology has an impact on electronic income of deposit money banks in Nigeria. The findings from the study reveal that: IT has a significant positive effect on electronic income of deposit money banks in Nigeria even when the size of a bank is accounted for. Disruptive technology related to ATM does not have positive effect on electronic income of deposit money banks in Nigeria.

Based on the conclusion, the following recommendations were made

a. The study has shown that expenditure on IT by deposit money banks in Nigeria significantly and undeniably promotes electronic income for the banks. Consequently, it is advised that banks in Nigeria make strategic decisions about their IT investments, particularly in light of the fact that
b. ATM infrastructure was shown to have no significant effect on electronic income of banks in Nigeria. It shows the rapidly changing nature of banking innovation in Nigeria.

It also demonstrates the lesser priority placed on ATM banking in recent years. This approach needs to change since, even in advanced economies, the ATM has remained a major banking outlet. This can further increase electronic income by banks.

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