

# Digital Financing and Taxation in the 4<sup>th</sup> Industrial Revolution: Evidence from Nigeria

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**Abstract** The research investigates the consequences of digital financing on taxation in the fourth industrial revolution, with a focus on Nigeria. The primary goal of industry 4.0 characteristics is to increase income in both the municipal and private sectors. As a result, the government's embrace of digital finance is expected to increase tax revenue collection in Nigeria. In this study, we examine the effectiveness of digital financing instruments such as ATMs, point-of-sale terminals, and web-based or internet-based payments in increasing tax collection in Nigeria. Because the first statistics on digital finance recorded by CBN annual reports were published in 2006, the analysis spans the years from 2006 to 2019. We use multiple regression approaches to assess the effect of each digital financing tool and discover that only ATM has a substantial influence on tax income over the research period. Other digital finance gadgets have statistically negligible results. As a result, the study suggests that Nigeria's network be improved, as well as tax payers' knowledge and usage of digital finance instruments in order to comply with their tax responsibilities.

**Keywords** Industry 4.0, Digital Financing, Fintech, Taxation, Government Revenue

JEL Classification Codes: H20, L86, O14, O32, O33

## 1. Introduction

In the perspective of fintech and the Fourth Industrial Revolution, the banking sector throughout the world has rapidly developed mobile banking services to enhance economic performance [1]. On the issue of proficiency of banks, [2] asserts that digital finance has a long-term positive influence on bank efficiency. Digital finance refers to financial services that are currently offered by means of cell phones, private laptops, the internet, mobile banking, e-wallets, mobile wallets, and credit and debit cards [3-4]. Because financial technology is beneficial for storing data and reporting, digital finance may aid governments, pecuniary and fiscal scheme authorities in exerting control by providing earlier warnings on monetary policy concerns that may develop from time to time [5]. Similarly, digital financial services such as payments, remittances, and credits are accessed and communicated via digital channels such as mobile devices, debit and credit cards, and bank-issued cards [6]. On the other hand, [2] states that digital finance includes all products, services, technology, and/or infrastructure that allow individuals and businesses to access payments, savings, and credit facilities via the internet without having to visit bank branches or deal directly with monetary service suppliers. Electronic monetary know-how has transformed people's lifestyles and business models, making acquiring and delivering goods

through shops, business centres, or malls less enticing and ineffective. Because digital finance began and is rapidly developing in digital payment services, the focus of this research will be on digital disbursement facilities.

Digital banking is a physical banking revolution that currently allows consumers to use mobile phones and other electronic devices to transfer monies, make and receive payments without having to go to a bank and wait in a lengthy line [7]. The notion of digital finance continues to vary, both among researchers [8] and practitioners; different countries and monetary organizations [9-10] define digital funding in various ways, as does the collection of financial data, some of which is still associated with automated exchanges. Computerized commercial communications were initially used in advanced nations due to the accessibility of sufficient electronic tools and infrastructure. As a result, previous study concentrated on industrialized countries such as Germany [11] and the United States [12-17]. However, as technological developments become more broadly distributed and internet connections become more inexpensive in underdeveloped countries, digital financial transactions are becoming more commonly used and popular in emerging regions [8, 18]. There is also a switch away from conventional money and toward a digital founded present-day economy, with payment systems changing away from money (paper and metal) and paper-based (checks, bilyet giro, credit / debit notes) and toward card-based and internet-based [2, 19]. In growing nations with large areas and populations, there are numerous financial technology firms (fintech), start-ups, internet and mobile banking, smartphone centred imbursement apps (mobile payment), and e-commerce.

According to [20], digital finance and financial inclusion help financial service consumers, digital finance providers, governments, and the economy in a variety of ways. The adoption of digital finance instruments has boosted the Nigerian economy by allowing the government to collect tax money more easily. Taxpayers now have access to a number of digital platforms that allow them to comply with tax remittances without having to visit the necessary tax offices. Today, a tax payer in Nigeria may file his or her tax returns electronically and get a tax clearance certificate. The Federal Inland Revenue Service uses the current digital technology to transmit withholding tax certificates to a tax payer's email address. These are some of the numerous inventions that have occurred in order to increase government income and improve the economy.

This study aims at providing empirical evidence on the impact of digital finance tools on tax revenue in Nigeria. The usage of digital finances in payment of taxes to the government is part of the 4<sup>th</sup> Industrial Revolution focus. This is in line with Sustainable Development Goals (SDGs) Goal 9 which focuses on industry revolution, innovation and infrastructure. One of the purposes of

industry 4.0 is to increase revenues for the private and public sectors. The purpose is well pursued when the Nigerian government embraced digitalization of tax and VAT e-filing during the COVID-19 pandemic and till date it subsists.

The purpose of this research is to provide empirical data on the influence of digital financial technologies on tax income in Nigeria. The use of digital money to pay taxes to the government is a focus of the Fourth Industrial Revolution. This is consistent with Goal 9 of the Sustainable Development Goals (SDGs), which focuses on industrial revolution, innovation, and infrastructure. Increasing revenue for the commercial and governmental sectors is one of the goals of Industry 4.0. The goal was achieved when the Nigerian government adopted digitization of tax and VAT e-filing during the COVID-19 epidemic, and it continues to this day. Furthermore, in April 2012, the Federal Government of Nigeria began introducing Treasury Single Account (TSA) with an electronic payment component. It is a payment paid directly to an individual or organization via electronic transfer using digital financial networks. The TSA's E-Collection component became live in January 2015. It is a fully automated system for remitting, monitoring, and reporting entirely Federal Government proceeds (revenues, contributions, transfers, refunds, grants, fees, taxes, levies, tariffs, and so on) into the TSA and Sub-Accounts administered and regulated by the Central Bank of Nigeria. On that basis, there is a shortage of research demonstrating the efficacy of Industry 4.0's impact on country taxation. Many concerns have been addressed in studies on digital finances, but the influence of industry 4.0 digital financing on tax revenue has yet to get scholarly attention. As a result, this study has emerged as one of the pioneer research works to demonstrate the advantage of digital finance to the Nigerian government in the fourth industrial revolution. The study makes use of digital finance technologies such as Automated Teller Machines (ATMs), Point-of-Sale (POS) terminals, and Web-based or internet-based applications (WEB).

## 2. Collected Works Appraisal

### 2.1. Academic Underpinning

The theoretical underpinning for this learning is the Innovation Diffusion Theory (IDT). Rogers' [21] theory describes the practice of invention acceptance in a societal structure and sheds light on the mechanism behind social change. It explains why a certain technological accomplishment was picked as a prototypical for carrying out a given task. In a collective arrangement, behavioural issues are important for technical innovation. In the same manner, [22] explains revolution as a notion, activity, or purpose that a person or other units of adoption deems

unique. According to the concept, the novelty of an invention is not limited to the period of time from its principal detection or application, but also contains amendments to the present modernism that allows it to do new duties or implement the equivalent or accustomed job in a dissimilar method. In further arguments, an innovation is a fresh way of performing a longstanding assignment. It is only when a social system accepts an invention that it becomes useful. An invention must go through the diffusion process in order to be accepted by the social system. This is the route through which participants of a common arrangement get familiar with its qualities, plummeting implausibility regarding the modernization. According to [23], the following factors influence the rate of technology adoption: comparative benefit, appropriateness, complexity, dependability, and comparability. According to Rogers [22], people's perceptions of these traits are a critical driver of innovation adoption.

## 2.2. Empirical Review

Lan and Giang [1] examined the factors that influence purchasers' usage of mobile banking services in modern Vietnam. The study employed 420 surveys from the year 2020 as a sample. The findings revealed that brand and social influence had a significant impact on users' use of mobile banking services. Further research indicated that transaction risk influenced users' choice of mobile money services. Risman et al. [5] investigated how digital finance affects monetary sustainability. The study analysed panel data from 2010 to 2019 using multiple linear regression and moderating regression analysis. The study discovered that market risk might mitigate the impact of online banking on financial sustainability. In other words, an increase in systemic risk would mitigate the favourable impact of digital banking on financial stability. Meher et al. [7] examined the impact of digital banking on the growth of Micro, Small, and Medium Enterprises (MSMEs) in India using primary sources of data. According to the data, the convenience of making and receiving payments via digital banking showed a favourable association with the viability of MSMEs in India.

Wadesango and Magaya [24] investigated the influence of internet banking services on the functioning of Zimbabwean commercial banks. The Pearson Correlation coefficient and multiple regression analysis were used in the study. The findings revealed that digital banking services considerably increased business return on assets over the research period. Tengoh and Talom [25] used an exploratory method to investigate the variables that explain the adoption and use of digital financial services by Small and Medium-Sized Enterprises (SMEs). The study also used descriptive and inferential statistics to discover that accessibility, safety, and convenience

influenced the adoption and use of digital financial services in Cameroon. Irtyshcheva et al. [26] investigated the impact of electronic technological advancements on Ukraine's wealth creation from 2010 to 2018. The study employed correlation and regression analysis to demonstrate that digital technologies have not been widely used to boost Ukraine's GDP in comparison to other industrialized nations.

Isibor *et al.* [27] conducted study on the impact of electronic transfer innovations on satisfaction of customers and Nigeria's economic growth. The authors conducted a study of 100 bank customers from four DMBs in Ota, Ogun State, Nigeria. A non-probability purposive sampling method was used in the investigation. The findings of the paired-sample t-test show that electronic banking boosted customer happiness and GDP growth. Okoye, Omankhanlen, Okoh, and Isibor [28] investigated how technology affected customer satisfaction in the Nigerian banking sector. The data analysis was based on responses from 120 clients of three Deposit Money Banks in the Nigerian states of Ogun and Lagos. The study examined time savings, comfort, community safety, reliability, risk mitigation, and ease of use in banking services. All of the aforementioned service qualities had a significant positive impact on consumer pleasure, showing that electronic-based banking enhanced customer satisfaction in Nigeria. Hamid, Alabsy and Mukhtar, [29] conducted a similar study in Sudan to examine the impact of computerized banking services on consumer satisfaction. Questionnaires were utilized to gather data. The study discovered that internet banking has a statistically significant positive impact on bank clients.

Obikeze, Okolo, Mmamel, and Okonkwo [30] looked at the relationship between technology-based financial services and client perceptions of service quality. A total of 499 respondents were chosen from five DMBs for the study. The sample size was calculated using Freud and William's method. The study collected data on three aspects of service quality: usefulness, ease of use, and security. According to the data, electronic banking has a strong favourable relationship with consumer happiness. Li et al. [31] observed a positive relationship between increased funding and transactions in fintech businesses and stock returns in US retail banks. Because they used technology in reporting and data bases, monetary system authorities were able to impose control by issuing advance notice.

Scott, Van, and Zachariadis [12] discovered that installing network-based technological infrastructure and a set of network Tele-communication (SWIFT) protocols had a substantial influence on banking performance in 6848 institutions across 29 European and American nations. Worku, Tilahun, and Tafa [32] investigated the impact of electronic banking on customer satisfaction using a sample of 402 respondents from four branches of

two Ethiopian banks. Respondents were also polled. The gathered data was examined using the chi-square test. Electronic banking, according to the report, boosted consumer satisfaction. Kwarteng [33] examined the link between electronic banking and the quality of customer service delivery in Kumasi, Ghana. Purposive sampling was utilized to choose 69 bank clients and 29 bank staff from three distinct DMB locations. According to the poll, consumers are unsatisfied with electronic banking solutions since they are difficult to use.

### 3. Materials and Methods

The study employs expo facto research design. Expo facto research is based on existing data which exist through the outcome of events. The cumulative tax revenue is the dependent variable we used in this research. The data are collected from the Federal Inland Revenue Service (FIRS) website. The independent variables are the major e-money products introduced in Nigeria, which include: Automated Teller Machines (ATM), Point-of-Sale (POS) terminals, Web-based or internet (WEB) and Mobile Money (MMM). However, via data cleaning process, MMM was eliminated due to its inter-correlation with WEB. The data on these electronic payment channels are obtained from the various CBN Annual Reports. The period covered in this study is from 2006-2019. This is due to the availability of data as a result of the implementation of e-money usage. The data were tested for stability and normality and were found free from serial correlation. The analytical tool employed to analyze the data is the multiple regression techniques with e-views software. Table 1 describes the variables used in this study and provides information relating to the data sources.

**Table 1.** Variables description and sources

Variable	Description	Source
TRN	Collective Tax Revenue	Federal Inland Revenue Service (FIRS)
ATM	Automated Teller Machines	CBN Annual Reports 2006-2019
POS	Point-of-Sale (POS) terminals	CBN Annual Reports 2006-2019
WEB	Web-based or internet	CBN Annual Reports 2006-2019

Source: Compilation by Author, 2021

In this study, we specify the following regression model:

$$LOGTRN = \beta_0 + \beta_1 LOGATM + \beta_2 LOGPOS + \beta_3 LOGWEB + \epsilon \tag{1}$$

Where:

LOGTRN = Collective Tax Revenue; LOGATM = Automated Teller Machines

LOGPOS = Point-of-Sale (POS) terminals; LOGWEB = Web-based or internet

$\beta_0$  = Constant;  $\beta_1$ - $\beta_3$  = Regression coefficients;  $\epsilon$  = Error term. On the a priori, we expect;  $\beta_1 > 0$ ,  $\beta_2 > 0$ ,  $\beta_3 > 0$ .

### 4. Data Analysis and Interpretation

**Table 2.** Descriptive Statistics

	LOG_TRN	LOG_ATM	LOG_POS	LOG_WEB
Mean	3.547914	3.177149	2.064379	1.805059
Median	3.589097	3.374656	1.944034	1.898150
Maximum	3.725993	3.813754	3.505787	2.679519
Minimum	3.266467	1.800717	0.806180	0.478566
Std. Dev.	0.164059	0.648815	0.941862	0.584819
Skewness	-0.596898	-0.880094	0.200686	-0.630001
Kurtosis	1.976159	2.622072	1.549802	3.227883
Jarque-Bera	1.442816	1.890637	1.320768	0.956395
Probability	0.486067	0.388556	0.516653	0.619900
Sum	49.67080	44.48009	28.90131	25.27083
Sum Sq. Dev.	0.349898	5.472491	11.53236	4.446169
Observations	14	14	14	14

Source: Author's calculation, 2021

The descriptive statistics on Table 2, provides statistical information on the data applied in this study. The mean values for LOGTRN, LOGATM, LOGPOS and LOGWEB are 3.55, 3.18, 2.06 and 1.81 respectively. The Standard Deviation shows a lower spread while the Kurtosis implies normal distribution of data, though a negative skewness occurred. The normality of the data set and distribution if confirmed using the Jarque-Bera which has a p-value that is greater than 5%. The Histogram normality on Figure 1 authenticates this result.

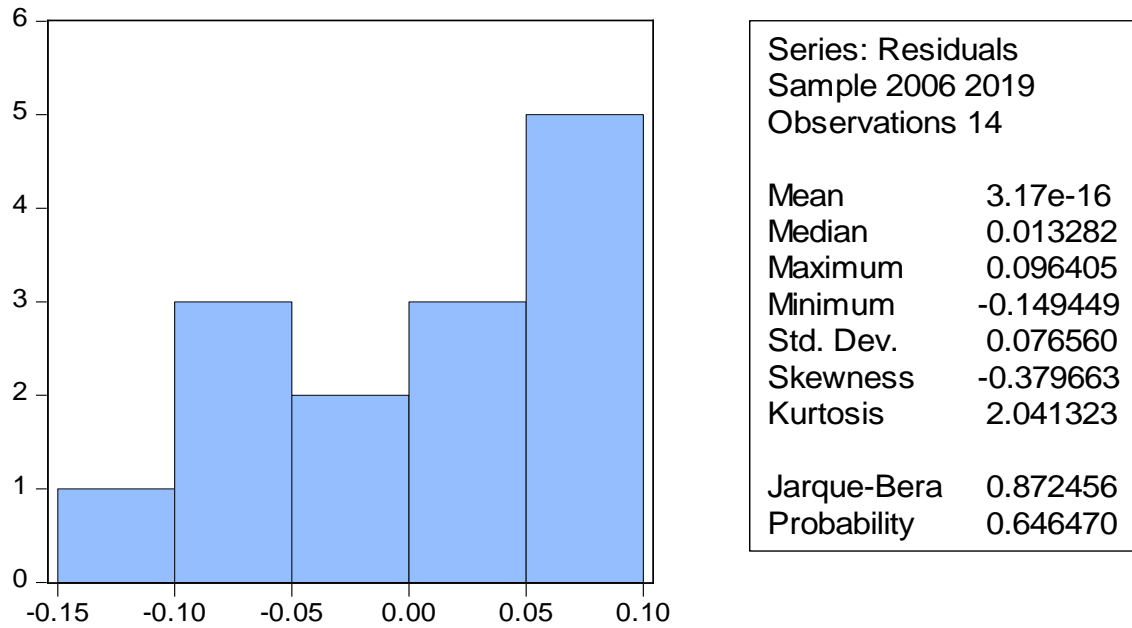


Figure 1. Histogram Normality

Table 3. Analytical assessments

TYPE DIAGNOSTIC TESTS	F-STATISTICS	P-VALUE	NARRATIVES
Breusch-Godfrey Serial Correlation LM Test	1.97	0.20	No serial correlation
Heteroskedasticity Test: Breusch-Pagan-Godfrey	1.07	0.41	No Heteroskedasticity
Histogram Normality Test	0.87	0.65	There is normality
Multi-Collinearity test:	Coefficient variance	VIF	
LOGATM	0.009	7.07	No interconnection of predictor variables
LOGPOS	0.002	3.64	No interconnection of predictor variables
LOGWEB	0.008	4.38	No interconnection of predictor variables

Author's computation, 2021

Table 4. Regression result

Dependent Variable: LOG\_TRN

Method: Least Squares

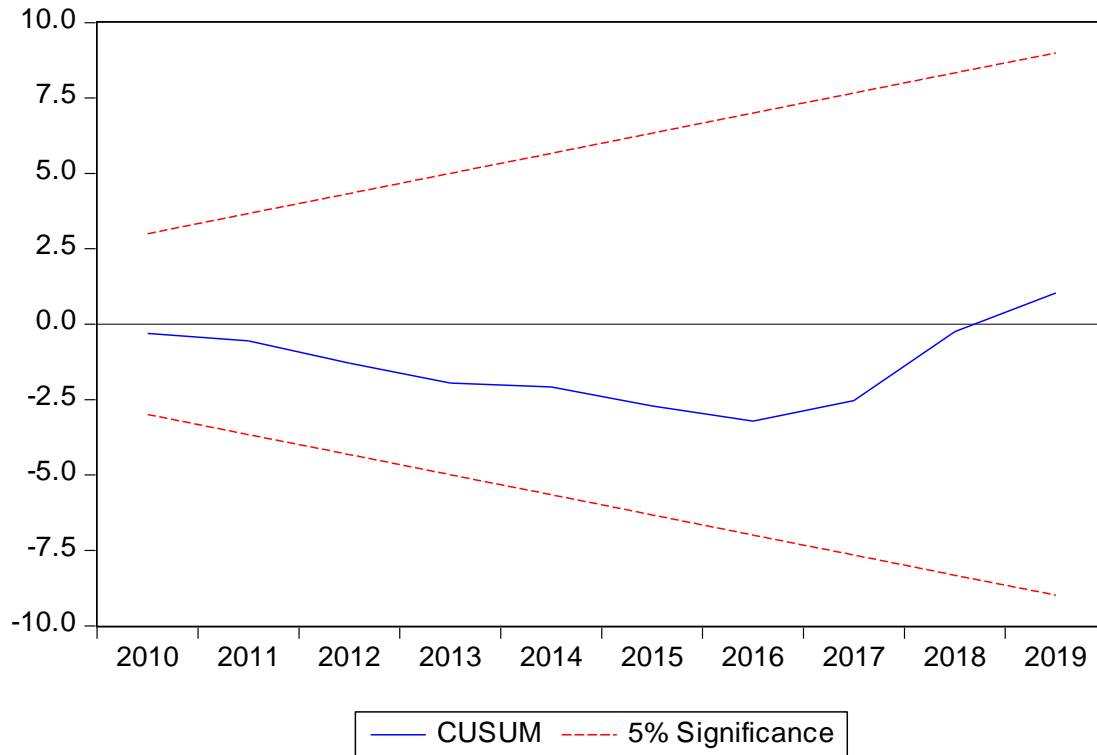
Sample: 2006 2019

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_ATM	0.360741	0.121551	2.967807	0.0179***
LOG_POS	-0.055385	0.046567	-1.189378	0.2684
LOG_WEB	-0.091118	0.137407	-0.663124	0.5259
C	2.674420	0.145307	18.40536	0.0000
R-squared	0.851069	Mean dependent var		3.547914
Adjusted R-squared	0.757986	S.D. dependent var		0.164059
S.E. of regression	0.080708	Akaike info criterion		-1.803556
Sum squared resid	0.052111	Schwarz criterion		-1.529674
Log likelihood	18.62489	Hannan-Quinn criter.		-1.828908
F-statistic	9.143200	Durbin-Watson stat		2.000029
Prob(F-statistic)	0.003671			

Author's computation, 2021

\*\*\*significant @ 1% level

**ROBUSTNESS AND STABILITY CHECK**



**Figure 2.** Recursive estimates of the CUSUM test. CUSUM = Cumulative Sum Control Chart

Table 3 contains complete diagnostic tests to prove absence of inter-relationship among independent variables, stability of model, and absence of Heteroskedasticity and normality of data set. The stability of the regression line is tested using recursive estimate of the cumulative sum control chart shown in figure 2. The result obtained from this test indicates the robustness of the regression result. The Durbin-Watson on Table 4 is exactly 2, thereby providing proof of absence of autocorrelation as confirmed with the result of the serial correlation test shown in Table 3. The digital financing tools applied in this study have 92.2% correlation with tax revenue in Nigeria. The implication is that the relationship is robust and positive. Similarly, the coefficient of determination is 85% which suggests that digital financing tools determine up to 85% increase and other changes in the tax revenue while the remaining 15% is associated with other factors. Our forecast is tested with the standard error of regression which is  $0.08 < 1$ . Thus, the prediction is correct. The result of the F-Statistics is also very significant at 1% which implies that digital financing tools are collectively affecting tax revenue. ATM t-statistic has a p-value of 0.0, the result is positive and significant. Therefore, payment of all taxes in Nigeria using ATM has proved to be profitable to the government by increasing tax revenue collection. However, the result of POS and WEB are the p-values of  $0.26 > 0.05$  and  $0.56 > 0.05$  respectively. The implication is that these two digital financing tools are not

yet affecting tax revenue collection significantly.

**5. Inference and Propositions**

The research looks at the influence of digital financing on tax revenue in the fourth industrial revolution from 2006 to 2019. Digital financing is a product of industry 4.0 and has been beneficial to governments and private sector activities to increase revenue. In the age of global digitization, businesses efficiently manage financial security with cutting-edge technology, reducing economic cyber-attacks [34]. The introduction of information technology and digital financing in 2006 provided a fresh leaf for tax payers who struggle to go the banking places for tax payment. According to [34] information technology distinguished by its equilibrium as well as the quality of financial instruments, technology, and services resilience in the face of internal and external challenges, as well as the capacity in order to secure the achievement of one's own financial interests, objectives and activities that have adequate financial resources. The use of digital financing such ATM, POS and Web or internet based payments is one mechanism that has taken away the burden of tax payers who keep postponing their civic responsibility of tax compliance due to the difficulty in making the payment as at when due. It has helped in guaranteeing financial security for the government and

closing the gap for frequent financial loss through cash handling. Although the digital tools tested showed that only ATM is profitable at the moment, but the adoption of Financial Technology in the Nigeria tax administration is a step in the right direction.

Therefore, the study recommends improvement on these devices and education of taxpayers on their proper usage. Further suggestion is that the government should endeavour to improve the network system in Nigeria as all of these digital financing tools require steady network to function effectively.

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