21ST Century Payment Channels and the Nigerian Ict Sector's Performance

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Abstract---This study seeks to empirically investigate the effect of the 21st Century Payment Channels on the internet and Communication Technology (ICT) Sector's performance in Nigeria from 2012 to 2019. Variables used to measure 21st Century Payment Channels include the volume of automated teller machines, mobile banking, electronic banking, point of sales, and real-time gross settlement while ICT Sector's performance was measured by Contribution of the ICT sector to Gross Domestic Product (GDP). Data were sourced from the CBN Statistical bulletin for the various years under study. The hypotheses of the study were tested using SPSS 23.0 to regress the dependent variable against the independent variables. On the whole, the study discovered that the 21st Century Payment Channels did exert any significant impact on the ICT Sector's performance in Nigeria. Specifically, the result revealed that both the volume of Automated Teller Machines and mobile banking have a negative insignificant impact on ICT Sector's performance. Further, Electronic Banking, Point of Sales, Real-Time Gross Settlements have a positive insignificant impact on ICT Sector's performance in Nigeria.
Keywords---21st century payment channels, gross domestic product (GDP), ICT sector's performance, Nigeria

Introduction

Following the global trend of gradually shifting from paper-based transactions to electronic payment systems, Nigeria initiated this payment system in 2007. As of June 2017, the number of internet users in Nigeria increased to 91,598,757 million. In the same period, paper-based transactions fell from 80 percent to 55 percent. Indeed, financial innovations have extended global acceptance and provided new financial instruments, processes, services, institutions, and market segments. Of these several financial innovations, the effect of each innovation may be different depending on its role in the financial system (As, 2014; Shabbir et al., 2016).

It is in no doubt; the ICT sector has contributed immensely both to Nigerian and African economy. Notably, the sector has contributed 14% to the GDP as of 2019 against 13.32% recorded in 2018. This impressive growth is traceable to several years of policy implementation and investment drive in the sector. At the moment, the Nigerian ICT sector is regarded as the major ICT powerhouse on the whole African continent in that its market covers over 82% of the continent's telecoms subscribers and 29% of Internet usage. Still, the Nigerian economy is faced with currency devaluation and foreign exchange scarcity. This in turn has hampered investments and resulted in increased procurement costs (Betancourt et al., 2016; Wood, 2002). Furthermore, only a few studies have been conducted before which now incorporates all the 21st Century Payment Channels about the Nigerian ICT Sector's Performance. Hence, the current study fills the gap found in the literature and presents novelty in the area, particularly for Nigerian's ICT sector. It will also help policymakers, and with managerial implications. Succinctly, this study sought to examine the effect of 21st Century Payment Channels on the Nigerian ICT Sector's Performance (Kumar et al., 2004; Mielnik & Goldemberg, 2002).

Literature Reviews
Conceptual clarifications

The term '21st Century Payment System is a modern approach to payments in Nigeria. it may also involve the inclusion of new financial instruments in financial institutions and markets through new technologies. In other

words, it involves exploiting the benefits presented by advanced technology in developing new products and means of delivering these products. Further, it may involve new ways of operating business and implementing information technology. Various 21st Century Payment Channels include process (Automated Teller Machine (ATM), mobile banking, online banking), product, and institutional innovation. All these payments modes aforementioned play essential roles in the smooth functioning of the finances. Nkem & Akujinma (2017), stated that for the banking sector to perform maximally, they must be associated with modern payment channels. Again, it has increased competition in the banking sector. Again, it has improved administrative efficiency and also reduced cost both from the bank and customers' perspectives (Prabha et al., 2013).

21st Century Payment System (Regressor)	⟷	ICT Sector's Performance (Regressed)

1. Automated Teller Machines (ATM)
2. Electronic Banking (ELB)
3. Mobile banking (MOB)
4. Point of Sale (POS)
5. Real Time Gross Settlement
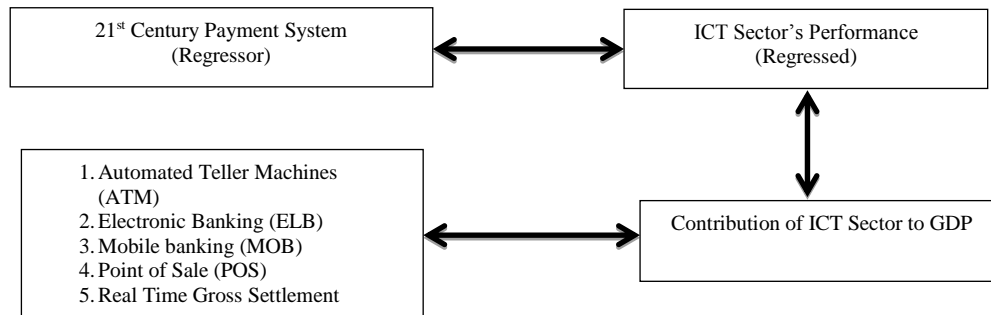
⟷ Contribution of ICT Sector to GDP

Figure 1. 21st century payment system and ICT sector's performance
Source: Researcher's model, 2021

The argument here is that if the payment channels outlined above are well utilized, it will contribute immensely to the growth of the ICT Sector.

Theoretical underpinning

This study is anchored on the transactions Cost Innovative Theory. This theory was introduced (Niehans, 1989). The more profound argues that the set-up of Internet-related Information Technology (IT) lessens a company's exchange costs since it delivers effective coordination, administration, and utilization of data. By implication, the adoption of modern payment channels improves a company's efficiency. This in turn leads to a high rate of return (Pao & Tsai, 2011; England, 1998).

Empirical studies

Muotolu & Nwadialor (2019), investigated the effect of the Central Bank of Nigeria Cashless Policy and the Financial Performance of Deposit Money Banks in Nigeria. A panel of data was collected from a sample of 14 banks covering 6 years spanning from 2012 when the policy was introduced in Nigeria to 2017. The study used return on Assets as a proxy for bank performance while the value transactions are done through the ATM, POS, Internet Banking, NIP, and NEFT platforms (E-banking Products) were used to proxy cashless policy. In other to ensure the validity and the reliability of our data. The study concluded that E-banking products as a proxy for cashless policy have a positive effect on the financial performance of Deposit Money Banks in Nigeria. It was thus recommended among others that bank management should pay more attention to the activities that will improve the ATM services if they wish to increase the ROA.

Muhoro & Mungai (2015), investigated if there is a correlation between the dependent variable of financial performance as measured by return on assets (ROA), with the independent variable real-time gross settlement which was measured by the percentage of adoption of service and percentage of transactions. Census research was done on all Banks in Kenya as regulated by CBK. The study used secondary data from 43 profitable banks operational in Kenya. The research used both inferential and descriptive statistics. The study found out that, RTGS has a significant impact on firm performance Based on the conclusion, the research recommends that Commercial banks use RTGS to achieve profitability and at the same time revamp mobile and internet banking platforms for customer service and loyalty.

Kashmari et al. (2016), examined the influence of financial innovation on the share of each bank in attaining deposits as one of the most critical goals and competitive tools of a bank. Secondary data were collected from

twenty-three banks from the period 2007-2013. The Panel Data- Vector Autoregressive methods (Panel-VAR) and Granger Causality Test were applied to the data. The study concluded that the SWIFT system, Point of Sale terminal, mobile banking, ATMs, and personal identification number (PIN), and other banking facilities provided by each bank, showed that a causal relation in improving the share was caused by innovation. A bilateral relationship among the share of deposits and facilities provided by the bank was also found.

Ali (2016), evaluated the impact of ATM on the banking service delivery in Nigeria using descriptive and regression analyses on the value of ATM transactions and customer deposit series for the sample period ranging from 2009 to 2013. The results of descriptive statistics show that private sector saving deposits and private sector demand deposit series are normally distributed but the private sector time deposits and the value of ATM transactions are not normally distributed. The results of the ADF unit root tests show that the levels of the variables contain unit roots whereas their first differences do not contain unit-roots. The regression results indicate that ATM transactions affect private sector demand deposits positively. It is recommended that the monetary authorities and commercial banks enlighten the depositors on the usage of ATMs through mass media such as television, billboard, and radio as well as paste directive posters at every ATM center across the country.

Muia (2017), investigated the effect of financial innovation on the financial performance of commercial banks in Kenya. This study had a target population of an aggregate of all the commercial banks that are licensed and regulated by the Central Bank of Kenya with a sample of twelve commercial banks. This study used secondary data from Central Bank of Kenya National payments Statistics supervisory reports and bank annual reports. This study collected data for seven years. Data were analyzed using STATA. A multiple regression model was used to establish the relationship between electronic banking, mobile banking, and internet banking on the Return on Assets of the commercial banks. The study has found that financial innovations influence the performance of commercial banks in Kenya. The study found out that variations in Return on Assets could be explained by electronic funds transfers, mobile banking, and internet banking. The study further established that all variables, that is, electronic funds transfers, mobile banking, and internet banking affect Return on Assets positively. The study thus recommends that it is important for commercial banks to prudently adopt financial innovations as it has both positive effects on the performance of commercial banks in Kenya.

Morufu (2016), in their study examined the impact of four (ATM, POS, web/Internet, and mobile) e-payments adoption and banks specific variables on the profitability of the Nigerian Deposits Money Banks (DMBs). Secondary data were obtained from the annual report and accounts often quoted (DMBs) between 2005 and 2012. Data were analyzed using panel logistic regression. The overall result from data analysis shows that when bank adopts e-payment systems, their performance level, such as gross margin, profits after tax, return on assets and return on equity changes. This is reflected in the positive association between adoption and gross earnings of banks. Further, adoption of the four e-payment instruments like ATM, WEB, POS, and Mobile banking influenced performance indices measured by return on assets (ROA), gross margin, and profits after tax (PAT) of the sampled banks.

Ugwueze & Nwezeaku (2016), studied the relationship between electronic banking and the performance of Nigerian commercial banks. The study became necessary due to the increased adoption of electronic banking which has redefined the banking service both in Nigeria and internationally. Electronic banking was proxies by the value of Point-of-Sale transactions while commercial banking performance was proxies by customers' deposits. Engle-Granger co-integration model was used to analyze data for the sample period January 2009 to December 2013. The results show that POS is not co-integrated with both the savings and time deposits but is co-integrated with demand deposits.

In their study investigated the effect of Electronic Payment Methods (EPM) on the profitability of commercial banks in Nigeria. To achieve the broad objective, the study specifically investigated the effect of Automated Teller Machine (ATM), Point of Sale (POS), and Mobile Payment (MPAY) on the profitability of commercial banks in Nigeria. A total sample of five (5) banks was considered for the period 2009 to 2015 and the study adopted the Panel Least Squares (PLS) estimation technique as the analytical tool. Data were collected from the Central Bank of Nigeria (CBN) Statistical Bulletin and Annual Reports and Statements of Accounts of the five banks used in the study. Findings revealed that Automated Teller machines (ATM) and Mobile Phone payments have a significant effect on the profitability of commercial banks in Nigeria. However, Point of Sale (POS) has an insignificant effect on commercial banks' profitability in Nigeria (Konchitchki & Patatoukas, 2014; Tarutė & Gatautis, 2014).

Muchemi et al. (2015), examined the effect of RTGS on the financial performance of Public Universities in Kenya. The study used Questionnaires as the main research instrument while data analysis was done through regression analysis. The study findings showed that there was no significant difference between the effects of RTGS on the financial performance of Public Universities. However, the study did not focus on the banking industry. From reviewed relevant literature, the results are mixed. None of the findings reviewed are unifying. They are mixed. This has resulted in different views and arguments from different scholars and researchers from different countries hence

resulting in an unclear and complete analysis of multiple innovations and financial performance pointers. Again, most of them were done in other countries. Such studies may not be applicable in the Nigerian content due to differences in terms of climate and regulatory conditions. However, those studies served as input to the present study. Again, none of them focused on the ICT Sector.

Methodology

Research design and data collection source

The Ex-Post Facto research design was used in this study to obtain information concerning the current status of the phenomena and to describe 'what exists concerning variables or conditions in a situation which explicitly suits the topic under study. The study was domiciled in the Nigerian ICT Sector. The study spanned from 2012 to 2019. Data was also collected from CBN Statistical Bulletin (2019) accordingly (Bunse et al., 2011; Beck et al., 2005).

Techniques of data analysis

The data on the financial innovation proxies (automated teller machines (ATM), Mobile banking, electronic banking, Point of Sale (POS), Real Time Gross Settlement (RTGS), and ICT Sector's performance proxy (contribution of the ICT SEctor to GDP) were analyzed using SPSS. The choice of this statistical package is based on the fact that it is b user-friendly and easy to compute. Again, the Ordinary Least Square (OLS) is the Best Linear Unbiased Estimator (BLUE) and has a minimum error. Consistent with previous studies, this model modified and extended the model tested (Muhoro & Mungai 2015; Muia, 2017; Morufu, 2016; Makur, 2014). Econometrically,

$$ICTP = \beta 0 + \beta_1 ATM + \beta_2 MOB + \beta_3 POS + \beta_4 RTGS + \varepsilon it \ldots\ldots\ldots\ldots..\ldots\ldots\ldots. (3)$$

Where:
ROE   = ICT Sector's Performance (Contribution of ICT to GDP)
ATM   = Volume of Transactions done through the Automated Teller Machine
MOB   = Volume of Transactions done through the Mobile Pay
ELB   = Volume of Transactions done through the Electronic Pay
POS   = Volume of Transactions done through the Point of Sale machine
RTGS   = Real Time Gross Settlement (a proxy for Volume of Transactions done   through NIBSS Instant Payment
ε = Error term of the model
$\beta 0$ = Constant value
$\beta 1, \beta 2, \beta 3, \beta 4$ = Regression model coefficients.

$$\beta_1 ATM, \beta_2 MOB, \beta_3 POS, \beta_4 RTGS > 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

To ensure that the model for the study is not spurious, we logged all the study variables to avoid scaling problems during regression analysis.

Results and Discussions

Before discussing the regression result, a trend analysis was conducted on the variables of interest. The result is presented in figure 2 below:
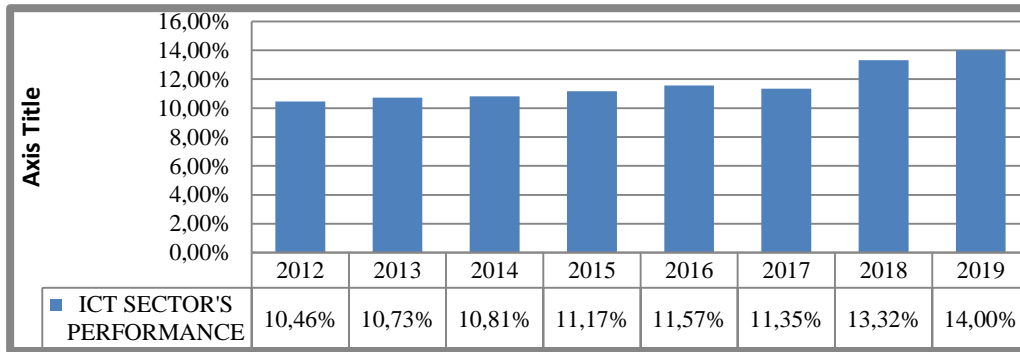
Figure 2. Stylized (trend) analysis of ICT sector's performance from 2012 to 2019
Source: researcher's compilation based on CBN statistical bulletin (2019)

It is obvious from the analysis above that the ICT Sector contributed immensely to the growth of the Nigerian economy over the study period (2012-2019). Its contribution to the Nigerian economy is therefore impressive throughout the study periods.
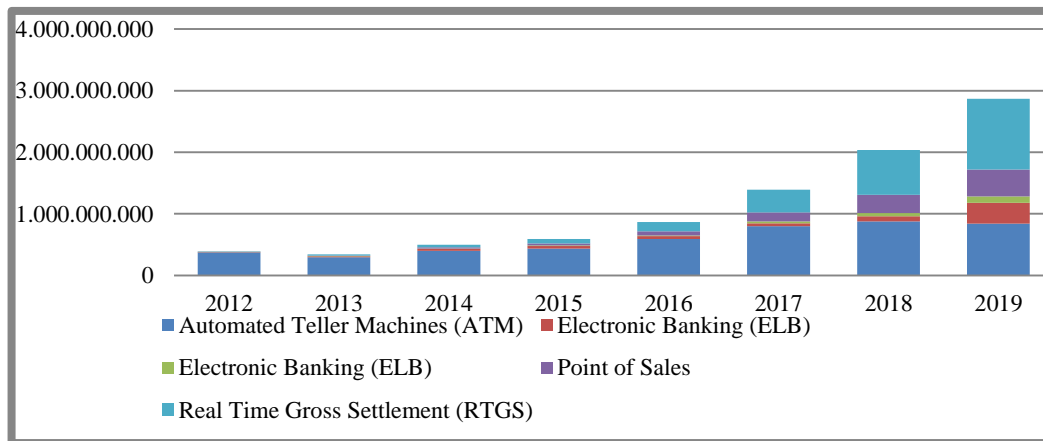

Figure 3. Stylized (trend) analysis of 21st century payment channels from 2012 to 2019

The analysis above clearly revealed that the volume of real tie gross settlement outnumbered every other payment channel in the study. This was followed by the volume of Automated Teller Machines (ATM); followed by Point of Sales and then Mobile Banking. Meanwhile, the least of them all is Electronic Banking (ELB).

Regression result: hypothesis testing and discussion

Given that the basic assumptions of OLS are satisfied, our regression result is presented thus:

Table 1
Model Summary

Model	R	R Square	Adjusted R Square	Std. The error of the Estimate	Durbin-Watson
1	.988[a]	.977	.919	1.77120	2.159

a. Predictors: (Constant), NIP, ATM, MOB, ELB, POS
b. Dependent Variable: ICTP
Source: SPSS Output, 23.0 (2021)

Table 2
ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	264.078	5	52.816	16.836	.057[b]
	Residual	6.274	2	3.137		
	Total	270.352	7			
a. Dependent Variable: ICTP						
b. Predictors: (Constant), RTGS, ATM, MOB, ELB, POS						

Source: SPSS Output, 23.0 (2021)

Table 3
Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	166.613	361.330		.461	.690
	ATM	-36.435	48.777	-1.065	-.747	.533
	MOB	-12.692	11.427	-1.267	-1.111	.382
	ELB	50.889	13.686	4.854	3.718	.065
	POS	124.752	56.664	15.312	2.202	.159
	RTGS	131.525	57.410	17.547	2.291	.149
a. Dependent Variable: ICTP						

Source: SPSS Output, 23.0 (2021)

The result which emanated from the model summary above (i.e. table 3) estimated the correlation of association otherwise known as R-value to be 0.988 (99%). This, therefore, depict that there exists a strong correlation between all the independent variables (ATM, MOB, ELB, POS, and RTGS) and the dependent variable (ICT Sector's Performance) since it correlates with an associated value of 99%. That is a value that is near perfection. Again, the R^2 stood at 0.976 (97.6%). This implies that the regressor accounts for 97.6% while the remaining 2.4% accounted for other factors not included in the model due to some financial errors. Further, the adjusted R square has high explanatory power also (Matousek & Solomon, 2018; Simon, 2021; Sylvester & Ade, 2018). More so, the Durbin Watson is estimated at 2.141. By the rule of thumb, since the D-Watson is greater than 2, the absence of serial autocorrelation in the series is established`. This shows that the model is accurate and fit for prediction. Finally, the Coefficient table above shows the level of significance for the independent variables.

On the whole, the result shows a positive statistically insignificant relationship between financial innovation and the financial performance of deposit money banks in Nigeria. This is because the p-value of the f-statistics is greater than the 5% significance level. The individual results are tested below:

Table 4
Summary of hypotheses testing

Variables	Beta Coefficient	P-Value	Decision
ATM	-36.435	.533	Accept $H0_1$
MOB	-12.692	.382	Accept $H0_1$
ELB	50.889	.065	Accept $H0_1$
POS	124.752	.159	Accept $H0_1$
RTGS	131.525	.149	Accept $H0_1$

Source: Researcher's Compilation from SPPS 23.0 (2021)

Discussion of Result

The Ordinary Least square test reveals the individual significance of each independent variable using the t-test and their respective values. The individual results are presented below:

- Automated Teller Machines (ATMs) and ICT Sector's Performance (ICTP)
  The regression analysis in table 1c above revealed that Automated Teller Machines (ATMs) have a negative and insignificant relationship with ICT Sector's Performance (ICTP). This indicates that a 1% increase in ATMs leads to a 36.435 decrease in ICT Sector's Performance (ICTP) in Nigeria. Overall, an increase in ATM leads to a proportional decrease in Financial Performance (Aggregate ICTP). The result is in tandem with reality in that the introduction of the electronic machine (ATMS) has increased the crime rate in Nigeria. To further substantiate this claim, this finding meets the a priori expectation and the theory of diffusion of innovation. This finding is in line with the study of Cherotich et al. (2015); Ilo et al. (2014); Adeniran & Junaidu (2014), But it is at variance with the works (Muotolu & Nwadialor, 2019; Kashmiri & Brower., 2016; Ali, 2016; Makur, 2014; Simiyu et al., 2014).

- Mobile Banking (MOB) and Financial Performance (RGDP)
  The regression analyses in table 1c above revealed that Mobile banking (MOB) has a negative and insignificant relationship with financial performance (Aggregate ICTP). This indicates that a 1% increase in MOB value leads to a corresponding decrease of 12.692 in the ICT Sector's Performance (ICTP). An increase in MOB leads to a corresponding decrease in ICT Sector's Performance (ICTP). The negative and insignificant relationship between MOB and the ICT Sector's Performance (ICTP) is not surprising because it aligns with reality due to the fact the problem of perceived risk associated with internet fraud, financial risk, social risk, poor network system, unnecessary bank charges, illiteracy and ignorance coupled with the African man syndrome (I believe in what I see) is common among Nigerians. Consequently, most people prefer to hold can instead. Following this reasoning, one would expect an insignificant relationship between MOB and Aggregate ICTP. By way of a policy measure, the government should educate the masses on the possible impact and gain that money transfer can provide in a country's payment system. To further substantiate this claim, this finding did not meet the a priori expectation but supports the findings of Kamau & Oluoch (2016); Gakure & Ngumi (2013); Ongore & Kusa (2013), but contradicts the findings of Ngumi (2014); Gichungu & Oloko (2015).

- Electronic Banking (ELB) and ICT Sector's Performance (ICTP)
  The regression analyses in table 1c above also discovered that Electronic Banking (ELB) has a positive and insignificant relationship with ICT Sector's Performance (ICTP). This connotes that a 1% increase in ELB value leads to a corresponding increase of 50.889 in the ICT Sector's Performance (ICTP) in Nigeria. An increase in ELB leads to a corresponding increase in ICT Sector's Performance (ICTP). The finding supports the a priori expectation of a positive relationship between Electronic banking (ELB) and ICTP. Also, the theory of perceived risk further substantiates this claim. Consequently, deficiencies or malfunctions of internet websites and the breakdown of system serves or internet disconnections have resulted in a reduction of customer's willingness to use internet banking. Following this reason, one would expect an insignificant relationship between Electronic Banking and ICT Sector's Performance (ICTP) where these issues highlighted are not taking into cognizance. The result supports the findings of Abaenewe et al. (2013); Mwangi (2011); Farouk et al. (2013); Daneshvar & Ramesh (2012), but contradicts the works of Oyewole et al. (2013); Njogu (2014); Ezejiofor et al. (2014).

- Point of Sales (POS) and ICT Sector's Performance (ICTP)
  The regression analyses in table 1c above revealed that Point of Sales (POS) has a positive and insignificant relationship with ICT Sector's Performance (ICTP). This indicates that a 1% increase in POS leads to a 124.752 increase in ICT Sector's Performance (ICTP) in Nigeria. An increase in POS leads to an increase in financial performance (Aggregate ROE. The positive result is not surprising because customers can use their cards to affect withdrawals as many times as possible, even on weekends and during public holidays. They can even make impulse withdrawals while attending a ceremony with the use of their credit cards. Following the theory of perceived risk, individuals are sometimes afraid that most POS agents are not trustworthy individuals such that they after transaction may break into the account of individual's account. This account may lead to increased use of raw cash which negates a cashless society which in turn has the potential to increase the ICT Sector's Performance (ICTP). To further substantiate this claim, this finding negates the empirical results of Muia (2017); Morufu (2016); Ugwueze & Nwezeaku (2016), but contradicts the findings of Obiekwe & Anyanwaokoro (2017).

- Real Time Gross Settlement and ICT Sector's Performance (ICTP).
  The regression model in table 1c indicates that real-time gross settlement is not significant even at the 5% level. The coefficient of real-time gross settlement is 131.525 and substantial with a p-value of 0.149. This result indicates that there is a positive yet insignificant impact on the performance of the ICT Sector in Nigeria, and hence we accepted the null hypothesis. The study was in tandem with Makokha et al. (2015) who established that the use of RTGS does not affect the financial performance of the public institutions of higher education. However, the study contradicts the works (Muhoro & Mungai, 2015).

Conclusion and Recommendations

This study sought to investigate the impact of the 21st Century payment Channels on the ICT Sector's Performance (ICTP) in Nigeria from 2012-2019. The data for the study were sourced from the CBN Statistical bulletin for the various years under study. The study was regressed via the use of SPSS 23.0. Based on the findings of this study, we concluded that though the 21st Century payment Channels has helped to reduce the number of bills and notes circulating in the economy, yet its impact on the ICT Sector's Performance (ICTP) is still minimal. Arising from the findings in this research, the study recommends that:

- The regulatory agency should reduce their ATM booths or terminals.
- There should be an increase in the usage of POS.
- The Nigerian regulatory authorities should provide end-to-end digital onboarding.
- There should be public enlightenment on the benefit that is accruable from the usage of the Mobile transfer transaction.
- There should increase resilience in Real-Time Gross Settlement payment systems

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