




## FINANCIAL INCLUSION INDEX IN NIGERIA: AN EXPLORATORY ANALYSIS



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### ABSTRACT

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This study aims to develop a financial inclusion index for Nigeria. Analysis of secondary data on composite value of demand, time, saving and foreign deposits of deposit money banks in Nigeria (DTSFD), number of branches (BBR), deposit in rural branches (DRB), loans granted to customers in rural areas (LRA), volume of transactions via ATM (VATM), volume of transactions via mobile bank (VMP), volume of transactions via POS (VPOS), and volume of transactions via webpay (VWBP) obtained from the Central Bank of Nigeria Statistical Bulletin, 2018 using the Principal Component Analysis (PCA) identified number of bank branches, deposits in bank branches in rural areas, volume of transactions via POS, volume of transactions via the ATM, loans to account holders in rural areas and volume of transactions via webpay as the determining variables for measuring the level of financial inclusion in Nigeria. Efforts by monetary authorities at improving financial inclusion in Nigeria should focus on the variables in this index.

**Contribution/ Originality:** This study contributes to existing literature on financial inclusion. The study identified the index for measuring financial inclusion in Nigeria using the Principal Component Analysis (PCA).

## 1. INTRODUCTION

Financial inclusion according to Hannig and Jansen (2010) is making available to the unbanked public financial services (deposits, withdrawals and credit facilities). Increasing these services to the unbanked may be through point of sales (POS), mobile banking and insurance. Financial inclusion brings into the GDP “basket” excluded individuals and small businesses hitherto excluded from the calculation of a country’s economic growth. Identification and inclusion of economic units in the informal financial sector into the formal financial sector, and provision of financial empowerment to them increases the production of goods and services, employment, income and economic growth. The exclusion of some economic units from the formal financial system excluded the counting of their contribution to economic growth. This suggests that where the level of financial inclusion is high, economic growth (measured by GDP) may be higher than reported as contributions to GDP of the excluded groups and micro businesses are not included in the GDP measurement, indicating that reported values of GDP of these countries are understated. According to Sethy (2016) financial inclusion is a promising tool for improving economic growth, poverty reduction and income inequality as it mobilizes savings and provides the urban and rural poor, and micro businesses improved access to finance for capacity enhancement and business growth. Sethy (2016) noted that

financial inclusion is a “key enabler of economic and social development”, but acknowledged that the development of an encompassing financial inclusion index seems not to have been achieved. For financial inclusion to positively affect economic activities, the indices need to be identified and used by economic planners.

Efforts at developing country-specific and cross-country indices are documented in finance literature (Beck and Torre, 2006; Honohan, 2007; Sarma and Pais, 2008; Kumar, 2011; Goel and Sharma, 2017). Pioneering effort at financial inclusion index development was by Beck and Torre (2006). This was accomplished using deposits, payments and loans (access, eligibility and affordability). Camara and Tuesta (2017) separated determinants of financial inclusion into demand-side and supply-side factors. Supply-side factors include number of accounts, loan volumes to customers, number of ATMs, access to Webpay services and other internet banking, and factors inhibiting voluntarily inclusion (distance and lack of necessary documentation, lack of trust in the country's financial system and affordability) which promote usage of financial services. Nigeria with its diversities in development across states and geopolitical zones makes necessary the development of a multivariate index to reflect the multi-levels and states of financial penetration in the country. Identification of these indices will aid development planners in developing potent policies at increasing economic development through improved financial inclusion.

Mishra *et al.* (2015) developed a financial inclusion index from India with values ranging from zero to infinity, with zero indicating complete financial exclusion using Principal Component Analysis (PCA). A similar study by Piñeyro (2013) for Mexico employed the Principal Component Analysis. The starting point of developing a financial inclusion index for a geographical area according to Gupte *et al.* (2012) is the identification of indicators that measure the level of accessibility to financial services of the country. El-Zoghbi and Scotta (2014) added that an index gives a summary of an array of complex variables into a manageable, measurable and comparable few. Mehrotra *et al.* (2009) developed a financial inclusion index using aggregate rural offices, volume of rural deposit, credit from banking data and number of rural deposit accounts. Indicators for measuring financial inclusion according for Sarma (2008) are the number of bank accounts per 1000 adults, the amount of bank credit, amount of bank deposit, and the number of bank branches. Using individual indicators to determine financial inclusion according to Sarma (2008) provide results which are partial and misleading. El-Zoghbi and Scotta (2014) noted that available indices aims to direct decision making, stir competition to instigate reforms in any economy. El-Zoghbi and Scotta (2014) observed that indices drive competition and efforts to excel and improve performance. Benchmarking and comparative analysis of performance in made feasible using indices. Indices are built towards the behaviour they intend to influence. Research results by Goel and Sharma (2017); Kumar (2011); Charkravarty and Pal (2010); Arora (2010); Honohan (2007) and Mehrotra *et al.* (2009) shows that each country has its unique financial inclusion index developed using variables unique to the country. These indices identifies the effective means for transmission of financial inclusion programmes of the central and deposit money banks (DMBs), which in turn improves financial education, access to formal credit, increased economic production and growth. Countries with identified indices have successfully channeled economic programmes using these indices with results showing reduction in poverty and unemployment, with positive effects on economic growth. This study aims to develop an effective financial inclusion index for Nigeria.

### 1.1. Objectives and Justification for the Study

Researches in developing and emerging economies have provided evidences on effective financial inclusion indices in groups within and across different countries. Conscious efforts at financial inclusion in Nigeria commenced in August 2012. A cursory look at financial literature on financial inclusion in Nigeria shows only policy statements of the financial and monetary sector regulators with no empirical study and evidences on the index for measuring this inclusion. Goel and Sharma (2017); Kumar (2011); Charkravarty and Pal (2010); Arora (2010); Honohan (2007) and Mehrotra *et al.* (2009) has conducted in-depth studies on financial inclusion indices.

Results therefrom are currently used by financial and monetary policy makers for developing effective policy frameworks to achieve their financial inclusion targets. Of the identified financial inclusion indicators globally, which of them are potent at achieving financial inclusion targets? Identification and ranking of financial inclusion index for Nigeria is essential for financial inclusion policy development and implementation to achieve set financial and monetary policy targets. This study aims to develop an effective financial inclusion index for Nigeria which is currently lacking.

## 2. THEORETICAL FRAMEWORK

The financial interrelation ratio propounded (Goldsmith, 1975) is the foundation for modern day studies in financial inclusion. Using this ratio, Goldsmith (1975) explained that financial system penetration is achievable through increased customer base. The four identified theories of financial inclusion: welfare, monetary, regulatory and development theories (Nwidobie, 2019) are each based on measuring indicators for ascertaining and measuring the level of financial inclusion of each country. The indicators under these theories arise from both the supply and demand sides of financial inclusion. Thus, these four theories are the foundation upon which this study is based as the financial inclusion indicators under these theories are brought under study to develop a financial inclusion index for Nigeria.

### 2.1. Review of Literature

Evidences abound in finance literature of regional, country-specific and cross-country financial inclusion indices developed using region-unique, country-unique and country-group-unique variables. Goel and Sharma (2017); Kumar (2011); Sarma and Pais (2008) and Honohan (2007) concluded studies on the level of financial inclusion using socio-economic factors as literacy, inequality, income and urbanization, and physical infrastructure and information. Mehrotra *et al.* (2009) employed credit advanced by DMBs to rural dwellers and urban poor, rural deposit accounts, number of bank branches in rural areas and deposits in branch banks in rural areas. Charkravarty and Pal (2010) in their study adopted the above indices in addition to ease of transaction and cost of these transactions. Arora (2010) captured both geographic penetration and demographic penetration indices. Other authors identified these factors as either demand or supply-side factors. Demand-side index according to Sethy (2016) are banking penetration, usage of banking services and availability of banking services, while supply side factors are bank risk, access to saving and insurance. Relying on the demand and supply-side information to ascertain the level of financial inclusion in 82 less-developed and developed countries, Camara and Tuesta (2017) applied the Principal Component Analysis (PCA) on 11 variables to identify the financial inclusion index for these countries. Research results showed that financial inclusion is associated with GDP per Capita, efficiency of the financial system, education and financial stability. Camara and Tuesta (2017) contended that financial inclusion is multi-dimensional and cannot be captured accurately by a single indicator. Camara and Tuesta (2017) attributed this to the complex and heterogeneous nature of a financial system. Sarma (2008); Sarma (2012) and Charkravarty and Pal (2010) identified financial institution indices from the supply side using data on usage and access. On the negatives of indices, El-Zoghbi and Scota (2014) argued that focusing on a few number of indicators for measuring of a phenomenon may discourage innovation and identification of emerging potent factors.

Contrasting the demand and supply sides indicators of financial inclusion in India, Laha *et al.* (2011) concluded these exists a significant difference in indicators' magnitudes, and suggested an integrated approach to improving financial inclusion. This they added will promote appropriate strategies that are germane to achieving complete financial inclusion in India. Avoiding the draw backs of previous studies, Gupte *et al.* (2012) constructed an improved financial inclusion index, contributed to by indicators on the demand side. Using the principal component analysis on data from 32 states of Mexico, Piñeyro (2013) found that education is a major determinant of financial inclusion. On the level of financial inclusion in Mexico, Piñeyro (2013) noted that 29 percent of the populace was

financially excluded. Using six demand side factors of financial inclusion, [Thakkar \(2014\)](#) concluded that the level of financial inclusion in India is low. Adopting the axiomatic approach to financial inclusion matrix development, [Charkravarty and Pal \(2010\)](#) identified eight indicators of financial inclusion. Investigating the effectiveness of selected financial inclusion strategies in Zimbabwe, [Gambe and Sandada \(2018\)](#) concluded that national microfinance policy, post office savings, bank loans, mobile financial services are statistically significant determinants of financial inclusion in developing countries (Zimbabwe in particular) as these increases accessibility to financial services by the urban and rural poor. [Gambe and Sandada \(2018\)](#) argued that a developed financial system excluding none, minimizes transaction and information costs, influences investment decisions savings rate, long-run growth rates and technological innovations. A panel data analysis of variables influencing financial inclusion on Latin America by [Mejia and Gil \(2018\)](#) showed that income positively affects financial inclusion and debt financial increases financial exclusions.

Research results by [Piñeyro \(2013\)](#) showed that municipalities in Mexico with higher incomes and better education have access to banking services while majority of the population in the urban and rural poor areas are financially excluded. The [Sarma \(2008\)](#) financial inclusion index for India was computed using the normalized inverse Euclidean distance of weighted observed values to the ideal point with the upper limit, the 4th quartile. To measure financial inclusion index, [Piñeyro \(2013\)](#) advised that data used must be measurable and quantifiable. Variables employed by [Piñeyro \(2013\)](#) were access, usage, consumer protection financial and education. [Korynski and Pytkowska \(2016\)](#) proposed the use of the Data Envelopment Analysis (DEA) in which the financial inclusion index for a country is calculated as a relative measure of ranking of a country's financial system comparative to other countries. [Amidzic et al. \(2014\)](#) employed the UNDP approach to financial inclusion measurement which requires the calculation of the Human Development Index (HDI). [Charkravarty and Pal \(2010\)](#) employed and applied the axiomatic financial inclusion measurement approach. noted that parametric and non-parametric models are available for determining financial inclusion indices. The parametric analysis according to [Camara and Tuesta \(2017\)](#) are the Principal Component Analysis and the Factor Analysis.

[Goel and Sharma \(2017\)](#) noted that each individual index explains different dimensions of financial inclusion. Assessing financial inclusion index, [Banerjee and Newman \(1993\)](#) noted that access to finance enables and empowers the hitherto excluded groups from the formal financial system to enhance their productivity and exit poverty. [Eastwood and Kohli \(1999\)](#) concluded that granting of credit to the urban and rural poor and branch expansion (financial inclusion indices) also enhances small-scale industrial output. [Charkravarty and Pal \(2010\)](#) used [Beck et al. \(2007\)](#) data to identify 8 indicators of financial inclusion for their study of the efficacy of financial inclusion in West Bengal. [Chattopadhyay \(2011\)](#) noted that financial inclusion in rural West Bengal areas was very low. A comparative analysis of the penetration of financial inclusion across regions in Turkey by [Yorulmaz \(2013\)](#) and [Sarma and Pais \(2008\)](#) showed that high income regions performed better than low income regions using established financial inclusion index. Looking at cross-country indices, [Goel and Sharma \(2017\)](#) and [Kempson and Atkinson \(2004\)](#) concluded that financial inclusion indices (FII) identified in literature seems not to be exhaustive and may differ across countries and across segments within the same country.

[Goel and Sharma \(2017\)](#) showed evidences that economic growth is the composite contribution of all groups in the country: large businesses, medium-size businesses, micro businesses, the rich, the urban poor and the rural poor. The urban and rural poor ([Goel and Sharma, 2017](#)) added, are usually excluded creating a gap in the country's economic growth with negative multiplier effect on economic growth drive of the country. Financial inclusion brings into the GDP measuring basket excluded individuals and small businesses hitherto excluded from the calculation of a country's economic growth. Thus, economies with high levels of financial inclusions may have levels of economic growth (measured by GDP) higher than reported as contributions to GDP of the excluded groups and microbusinesses must have been excluded from the GDP measurement, indicating that reported values of GDP of these countries are understated. [Goel and Sharma \(2017\)](#) argued that the pace of growth in an economy can be

accelerated by using financial inclusion. Financial inclusion (Goel and Sharma, 2017) added, enlarges the contributors to include the rural poor and micro businesses. They asserted that since this was feasible for India, it is also feasible with any developing or emerging economy. Sethy (2016) noted that financial inclusion can be a veritable tool for fostering labour and organizational formalization. This Sethy (2016) added may boost government revenues and improve society safety nets. Camara and Tuesta (2017) sees financial inclusions as the maximization of usage and access to financial services and reduction in voluntary financial exclusion.

How can the urban and rural poor contribute to a country's economic growth when they are ignorant of the government, its financial policies, and seen as ignored by the society? Goel and Sharma (2017) opined that harnessing the contributions of these groups will "shore up" the country's economic growth and block all leakages to the growth. Goel and Sharma (2017) see financial inclusion as a veritable financial policy tool at bringing the hitherto excluded groups from the formal financial system into the system. The World Bank (2014) noted that increasing financial services to the excluded rural and urban poor, and micro businesses enables countries attain 7 of the 17 sustainable development goals.

Relating financial inclusion with human development and its use in determining the level of financial inclusion Sarma and Pais (2008) used data from 49 companies. In conclusion, Sarma and Pais (2008) noted that improved financial inclusion improves living standard and reduces poverty. Thus, financial inclusion results in higher income. In their study, Mehrotra *et al.* (2009) related financial inclusion to economic growth. This conclusion is based on the finding that increased financial inclusion through access to formal financial services increases the confidence of the included in the formal financial system and increases deposits in the system with higher multiplier growth effect on the economy.

Various countries have introduced laws aimed at increasing financial inclusion. South Africa established the low costs bank account, the "Mzansi" to cater for the excluded. The United States established the Community Reinvestment Act, 1997 which mandates financial institutions to grant credit to all requesting bank credit. The Financial Inclusion Law in France grants everyone right to have a bank account. The Microfinance Act of 2006 in Kenya was geared at improving financial inclusion in the country to advance financial literacy. Gambe and Sandada (2018) noted that the Zimbabwe National Inclusion Strategy of 2016 to 2020 aims to achieve a high level of financial inclusion with positive effects on societal welfare through reduction in inequality and poverty, promotion of economic growth and enhancement of financial system stability.

On financial exclusion, Camara and Tuesta (2017) observed that this may be voluntary (self-exclusion) and involuntary indicating the behavioural aspect of financial inclusion. Self-inclusion according to Camara and Tuesta (2017) is attributable to cultural factors, lack of money and lack of awareness of the existence of the financial services and its benefits. Non-behavioural reasons, they added are the pricing of the financial services, lack of access and inappropriate product range which may account for involuntary financial exclusion. The Global Findex data set shows that 20% of the unbanked population worldwide is caused by distance from the financial service provider. Findings by Demingue-Kunt and Klapper (2013) support this report. Lack of required documentation according to the Global Findex data set causes exclusion of 20% of the unbanked population, affordability 25% and lack of trust in the financial system 13%.

According to the United Nations (2003) financial inclusion should provide:

- (i) Access to financial services at a reasonable cost for all enterprises and household;
- (ii) Sound institutions whose activities are guided by proper internal management systems;
- (iii) Institutional and financial sustainability; and
- (iv) Multiple providers of needed financial services.

Constraints to financial inclusion according to the United Nations (2003) may be individual-specific (lack of awareness, cultural barriers, psychological barriers, low-level of income and literacy) or system-specific (which hinders the system from providing the needed financial services). Gupte *et al.* (2012) noted that policies at

improving financial inclusion, addresses these systems institutions-specific and individual hindrances. Combating financial exclusion may be by policy directions by the Central Bank (Gupte *et al.*, 2012) or an agreed code of banking practice (Kempson and Atkinson, 2004).

The G20 Leaders' Global Partnership for Financial Inclusion GPFII (2011) agreed on a financial inclusion framework measure using the quality of financial services and usage of financial services. In addition to the measures identified by Sarma (2008) the GPFII (2011) identified percentage of adults with at least one loan outstanding in any financial institution, number of insurance policy holders per 1000 adults, number of retail cashless transactions per capita, percentage of adults using mobile devices to make payments, percentage of adults with high frequency of use of formal account, percentage of adults receiving domestic and international remittances, savings at a financial institution in the past years, percentage of SMEs with an account at a formal financial institution, percentage of SMEs with outstanding loans, number of POS terminals per 100,000 inhabitants, number of e-money accounts for mobile payments, combined index of interoperability of ATMs and POS terminals, average cost of credit transfers, average cost of maintaining a basic bank current account and percentage of SMEs required to provide collateral on their last bank loans.

### 3. METHODOLOGY

Data variables used in this study composite data for all deposit money banks in Nigeria are demand, time, saving and foreign deposits (DTSFD) of deposit money banks, number of branches (BBR), deposit in rural branch (DRB), loan granted to customers in rural areas (LRA), volume of transactions via ATM (VATM), volume of transactions via mobile bank (VMP), volume of transactions via (VPOS), and volume of transactions via webpay (VWBP). These are similar to the variables employed by Sethy (2016); Piñeyro (2013); Gupte *et al.* (2012) and Sarma (2008). The more branches available, the more the populace will have access to formal financial services, deposit their funds in the banks, seek credit, use financial products and channels of the DMBs, ATM, VPAY, mobile banking and internet banking services. The composite data on the above variables for the period 2012 to 2017 are analysed using the Principal Component Analysis (PCA). The PCA has been used in similar studies (Gupte *et al.*, 2012; Piñeyro, 2013; Mishra *et al.*, 2015; Sethy, 2016; Camara and Tuesta, 2017) making its use in this study apt.

### 4. DATA PRESENTATION AND DESCRIPTION

Composite value demand, time, savings and foreign deposits of DMBs (DTSFD) in Nigeria at Q3 of 2012 was N12,387.07 billion increased to N13,767.40 billion in Q4 of 2013, and N21,614.30 billion in Q4 of 2014. It declined to N17,344.00 billion in Q4 of 2015, increasing to N18,521.90 billion in Q4 2016, and increased marginally to N19,146.90 in Q4 of 2017 Figure 1. Deposits in rural branches of DMBs (DRB) was N20.8 million in Q3 of 2012, declined marginally to N20.5 million in Q4 of 2013, increased significantly to N480.7 million in Q4 of 2014, N90,374.1 million in Q4 of 2015, before declining marginally to N87,931 million and N82,400 million in Q4 of 2016 and 2017 respectively Figure 1. Loans granted to customers in rural bank branches (LRA) was N24.081 million in Q3 of 2012, increased to N739.9 million and N988.60 million in Q4 of 2013 and 2014 respectively. It increased sharply to N29,170 million, N42,440 million and N530,990 million in Q4 of 2015, 2016 and 2017 respectively Figure 1. Number of branches of DMBs (BBR) stood at 5564 in Q3 of 2012, rising marginally to 5639 in Q4 of 2013, declining to 5526 in Q4 of 2014 and further to 5470 at Q4 of 2015, increasing again in Q4 of 2016 and 2017 to 5570 and 5714 respectively Figure 1.

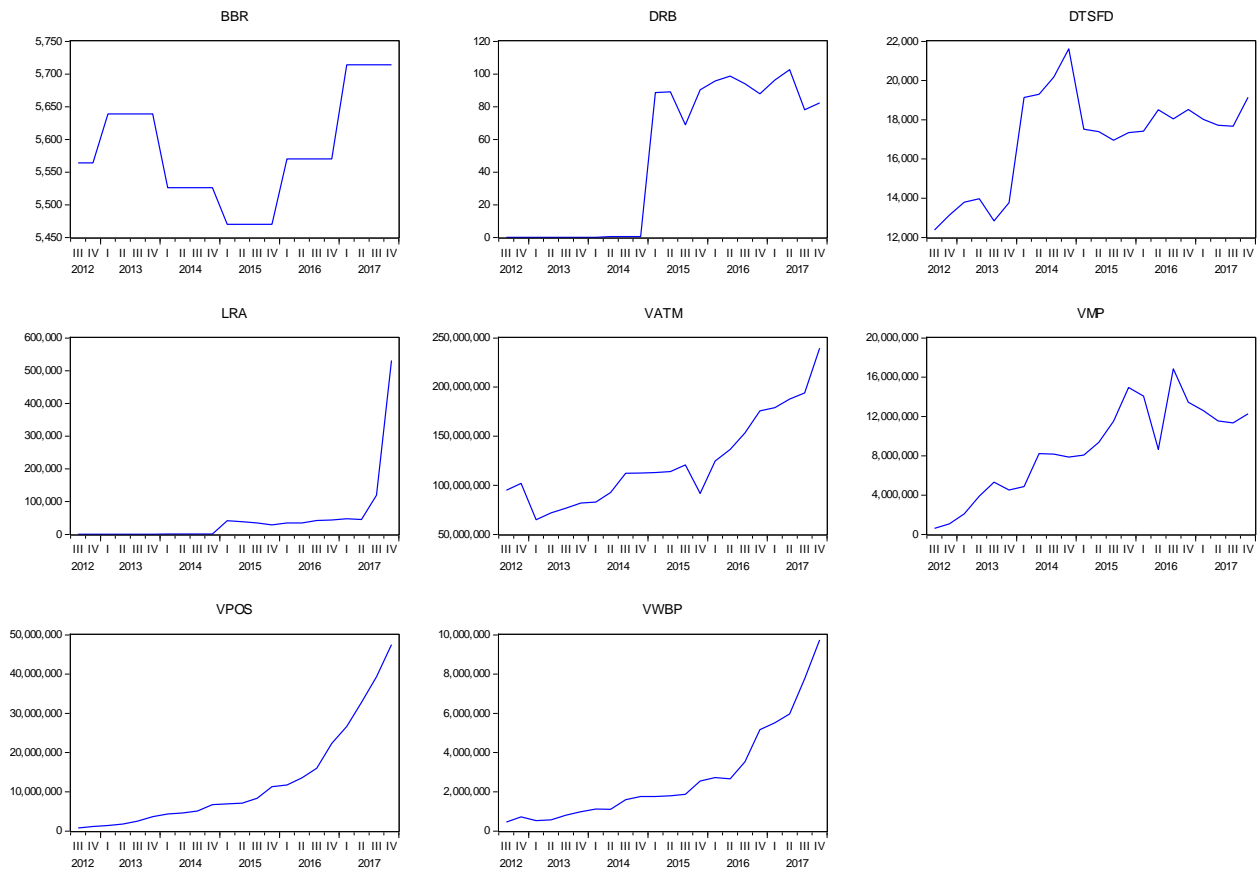


Figure-1. Values of variables from September 2012-December 2017.

Source: Central Bank of Nigeria Statistical Bulletin, 2018.

The volume of transactions via ATM (VATM) was 94.99 million in Q3 of 2012, declining to 81.93 million in Q4 of 2013, increasing to 112.4 million in Q4 of 2014 and declining to 91.8 million in Q4 of 2015. It increased sharply to 175.9 million and 239.7 million in Q4 of 2016 and 2017 Figure 1. Volume of transactions via POS (VPCS) increased throughout the study period from 767,858 in Q3 of 2012 to 3.7 million, 6.7 million, 11.32 million, 22.34 million and 47.53 million in Q4 of 2013, 2014, 2015, 2016 and 2017 respectively Figure 1. Volume of transaction via Web Pay, internet banking (VWBP) followed a similar trend increasing from 456,286 in Q3 of 2012 to 981,289, 1.76 million, 2.55 million, 5.17 million and 9.74 million in Q4 of 2013, 2014, 2015, 2016 and 2017 respectively Figure 1. Similarly, the volume of transactions via mobile pay (VMP) increased from 608,574 in Q3 of 2012 to 4.5 million, 7.86 million, and 14.96 million in Q4 of 2013, 2014, and 2015 respectively. The volume declined marginally to 13.45 million in Q4 of 2016 and further to 12.273 million in Q4 of 2017 Figure 1.

#### 4.1. Data Analysis

The Principal Component Analysis is used to examine the factors, which are sensitive to demand, time, saving and foreign deposits (DTSFD) of deposit money banks. The factors identified for this purpose are number of branches (BBR), deposit in rural branch (DRB), loan granted to customers in rural areas (LRA), volume of transactions via ATM (VATM), volume of transactions via mobile bank (VMP), volume of transactions via (POS), and volume of transactions via webpay (VWBP). The computed Eigen values for these variables, which are shown in Table 1.

Table-1. Eigen Values for Variables of Interest.

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	5.806731	4.478658	0.7258	5.806731	0.7258
2	1.328072	0.901698	0.166	7.134803	0.8919
3	0.426375	0.10345	0.0533	7.561177	0.9451
4	0.322924	0.271525	0.0404	7.884102	0.9855
5	0.051399	0.011155	0.0064	7.935501	0.9919
6	0.040244	0.018563	0.005	7.975745	0.997
7	0.021681	0.019106	0.0027	7.997426	0.9997
8	0.002574	-	0.0003	8	1

Note all the variables have been log transformed before conducting the experiment.

As noticed above the maximum Eigen value is approximately 5.81. This is the value associated with demand, time, saving and foreign (DTSF) deposits. The next Eigen value is 1.33, which associates with number of bank branches (BBR). All other variables have Eigen value less than 1. Since the Eigen value must be 1 or greater than 1, therefore, the variables that have optimum Eigen values are DTSF and BBR.

Table-2. Factor Loading for Variables of Interest.

Variable	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8
LNDTSFD	0.30936	-0.36437	0.733794	-0.32211	0.210061	0.221928	0.16589	0.091793
LNBBR	0.071266	0.826793	0.299153	0.237887	0.294461	0.119949	0.231372	0.10307
LNDRB	0.382629	-0.1494	-0.45527	-0.01002	0.783358	-0.0773	0.03292	0.056484
LNLRA	0.397124	-0.06169	-0.32278	0.165359	-0.35746	0.622194	0.414726	0.141605
LNVATM	0.362739	0.269566	-0.13117	-0.60317	-0.26024	-0.461	0.342882	-0.13008
LNVMP	0.364991	-0.20872	0.195291	0.654544	-0.16153	-0.54599	0.170021	0.059586
LNVPOS	0.409175	0.10924	0.072406	0.100152	-0.04468	0.180573	-0.40207	-0.78045
LNVWBP	0.403587	0.171358	0.001821	-0.09967	-0.17868	-0.0052	-0.66161	0.57283

Note all the variables have been log transformed before conducting the experiment

The loadings for the principal component (PC) factors are shown in columns for PC1, PC2, PC3, PC4, PC5, PC6, PC7 and PC8. Where PC1, PC2, PC3, PC4, PC5, PC6, PC7 and PC8 are the loadings for DTSFD, BBR, DRB, LRA, VATM, VMP, VPOS and VWBP respectively. From the table, the most loaded factor is PC1, followed by PC2, and so on Table 2.

Table-3. Determining the Most Sensitive Factors to DTSFD.

Factor	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8
PC1	1							
PC2	-0.6893	1						
PC3	-0.4515	-0.03009	1					
PC4	-0.1399	-0.00933	-0.00611	1				
PC5	-0.3261	-0.02173	-0.01423	-0.00441	1			
PC6	-0.0627	-0.00418	-0.00274	-0.00085	-0.002	1		
PC7	-0.3363	-0.02241	-0.01468	-0.00455	-0.011	-0.00204	1	
PC8	-0.1307	-0.00871	-0.00571	-0.00177	-0.004	-0.00079	-0.0042	1

Note, in line with the objective of this study, our preference column is PC1, which is the factor loadings for DTSFD. While PC2, PC3, PC4, PC5, PC6, PC7 and PC8 are the factor loadings for BBR, DRB, LRA, VATM, VMP, VPOS and VWBP respectively.

As shown in the Table 3, PC1 has perfect positive association with itself. PC2 has inverse correlation with PC1, meaning that the strength of the relationship between PC1 and PC2 is -69 percent. PC3 has correlation coefficient of -45 percent, PC4 -13 percent, PC5 -33 percent, PC6 -0.06 percent, PC7 -34 percent and PC8 -13 percent. There is common evidence that all these factors have negative impact on PC1. However, the most sensitive factor is PC2, followed by PC3, PC7, PC5. The least sensitive factor is PC6.



#### 4.2. Research Results and Policy Implications of Findings

With an Eigen value of 1.328072 Table 1 for the number of bank branches (BBR), it is evident that the major determinant of the level of financial inclusion in Nigeria is the number of bank branches. The low level of knowledge of the use of online and internet banking platforms, poor internet and communication networks has made the public to rely on the use of physical banks and banking ATM and POS facilities at bank premises and cash points. The attachment of the public to physical presence at the point of making banking transactions due to failed transactions via online and internet platforms makes necessary the deployment of financial inclusion activities to the physical banking transaction points for maximum effect of financial inclusion promotion programmes. Further results show that the number of bank branches is a strong measuring variable for financial inclusion in Nigeria with a factor loading of -0.69 Table 3. Deposit in rural bank branches is the second major variable for measuring financial inclusion in Nigeria with factor loading of -0.45. Other potent financial inclusion (PC5), measuring variables in Nigeria are volume of transactions via POS (PC7), volume of transactions via ATM loans to rural account holders (PC3) and volume of transactions via webpay (PC 8) with factor loadings of -0.34, -0.33, -0.13 and -0.13 respectively. This findings necessitates that efforts at improving financial inclusion in Nigeria by the Central Bank of Nigeria and deposit money banks should target programmes aimed at altering the number of bank branches in Nigeria, volume of deposits by rural dwellers in rural bank branches, volume of transactions via POS, ATM, loans to rural account holders and volume of transactions via webpay.

## 5. CONCLUSIONS

From the findings of this study, we conclude that financial inclusion in Nigeria can be effectively measured using the number of bank branches, volume of deposits in rural banks, volume of transactions via POS, volume of transactions via ATM, loans and advances to account holders in rural areas and volume of transaction via webpay. Also the relationship between these variables and financial inclusion is negative. Volume of transactions via other mobile platforms has an insignificant factor loading and thus a poor variable for measuring financial inclusion in Nigeria.

#### 5.1. Recommendations

To improve the level of financial inclusion in Nigeria, the Central Bank of Nigeria and deposit money banks (DMBs) in Nigeria should concentrate on adjusting the number of deposit money banks in Nigeria, initiating policies at increasing the deposits in bank branches in rural areas, improving the volume of transactions via POS and ATMs and other webpay platforms. In addition, financial services to the “unbanked” should be improved by extending formal financial services through the provision of loans to the urban and rural poor, and micro businesses to bring them into the formal financial system.

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