

The Impacts of Introducing Biometric Verification Numbers in the Banking Sector of Nigeria: A Critical Analysis

Chief Ajugwe, Chukwu Alphonsus PhD.

Ajugwe Chukwu Associates

Abstract: One of the core mandates of Central Bank of Nigeria (CBN) is to promote a sound financial system in Nigeria, to this end; CBN is making consistent and well-focused policy thrusts to deepen and broaden financial system through ensuring a safety, efficient, and effective payment system. However, in performing this important task the CBN is confronted with many challenges which bedevil the banking system, more especially in the area of insider related frauds and other external ones; these have cost the banking industry billions of Naira. These fraudulent activities were exacerbated with the emergency of Information technology that revolutionaries the banking industry and ushered in electronic banking (e-banking) and electronic payment systems (e-payment) which have reduced the cost of banking transactions and increased the speed and the efficiency of transfer of funds and making payments.

It is germane to mention that e-payment has brought in a hydra-headed problem in the form of cyber related crimes. And one of the CBN initiatives to tackle this problem is the introduction of Biometric Verification Number (BVN) which will be effective parameter to alleviate the problem of cybercrimes in the banking landscape.

The paper will highlight different measures introduced in the banking sector by CBN through circular policy statements and directives to the banks with the aim to reduce to the barest minimum fraudulent activities in the banking sector, then analyze the positive impacts of BVN on the sector, the challenges being faced to implement the policies, furthermore to incisively pinpoint some of the strategic weapons deployed by CBN and other stakeholders to tackle the challenges.

I. INTRODUCTION

One of the major challenges facing the banking sector is fraudulent activities; in the form of forgeries and cybercrimes which seem to bedevil the sector, worse still the fraudsters seem to always be ahead of the regulators in the perpetuation of their nefarious activities in the banking industries. The Central Banks (CBN) has introduced so many policies whose main thrusts were to curb fraudulent activities in the banking sector and foster a sound banking industry that will ignite, retain and reinforce the confidence of their customers.

The emergence of the information and communication technology (ICT) has ushered in electronic banking as means of delivering banking products to the customers with the attended risks. Nevertheless to state, that the introduction of

the (ICT) has enhanced the quality of banking, because of its speed and convenience, also cutting down considerable extent the cost of operations, however increased the risk of operations in the sector. As noted by Bamidele, (2005) major attraction of the system include the speed and convenience it offers to consumers and bankers in effecting banking and other financial transactions round the clock, he went to state that further utility is derivable from reduction in the cost of operation on the part of the bank.

Emphatically stated, e-banking ushered in its own peculiar problems as it was rightly pointed out by Bamidele, A. (2005) "it is not only susceptible to, but could aggravate, some of the risks inherent in traditional banking such as operational, corporate governance, legal reputational and those associated with security and market." But there are also some deep rooted challenges associated with e-banking such as cyber-crimes, obsolescence, and audit trail as well as money laundering.

The CBN has assiduously introduced many policies especially targeted to curb the cyber-crimes and other financial related crimes which are suffocating the financial systems. Panel Nduka Eluhalwe (2016) noted that CBN is empowered to ensure a seamless transmission of financial resources to critical sector of the Economy. Presently, policies specifically aimed to tackle the challenges presented by introduction of e-banking have been formulated and implemented by the CBN. In addition to ensure "a more developed payment system that will instill more confidence on the public accordingly to CBN Bullion (1976 -2016) it went further to stress " A poor financial infrastructure imposes a considerable constraint upon financial institutions in many developing countries, hindering their efforts to offer financial services to underserved segments of the populations and the economy. It also creates risks that can threaten the stability of the financial system." Some of these financial infrastructures aimed to increase the efficiency of the payment systems and curb the financial crimes and create a more resilient and fraud-resistant financial system are analyzed below.

II. EARLIER POLICIES ADOPTED BY CBN TO CURB FRAUDS IN THE BANKING INDUSTRY

In 1991 Magnetic Character Ink Recognition (MICR), this payment technology introduced, enhanced the efficiency in

the payment system, and increased the volume of the payment transactions but lack of cheque standard among the banks increased incidence of the MICR frauds.

Another milestone was the introduction of Nigeria Interbank Settlement System (NIBSS) in 1993, which ushered in major development in the payment system that played a vital role to reduce the incidence of fraud in the sector. NIBSS is a shared financial infrastructure among all the licensed banks and was equally owned by CBN and Deposit Money Banks (DMBs.) the major function was the processing of paper based financial instruments in the country.

Nigeria Automated Clearing System (NACS) was established in 2002 and was set up in NIBSS to automate the processing of paper based instruments. It however enhanced the reduction of clearing cycle to T+3 and T+5 for local and upcountry financial instruments respectively. In 2008, the clearing cycles were harmonized to T+2 and with the introduction of cheque truncation in 2013; it was reduced further to T=1, it helped to reduce the incidence of issuance of fraudulent cheques being experienced in the banking system.

There was, however, a breakthrough in the standardization of cheques in the country in 2005, the Cheque Standard and Cheque Printer Accreditation Scheme were introduced to enhanced the security, and standardize the process of printing paper based financial instruments, Printer were restricted to only CBN accredited companies.

Another proactive policy taken by the CBN to tackle the problem of fraudulent activities in the banking sector and instill enhanced due diligence is Know Your Customers (KYC). In view of the fact, the CBN published a circular on May 22, 2012 on KYC program, directing the banks to adopt KYC; which is the process of identifying and verifying the identity of the banking customers. The obvious advantage of this policy is to enable the banks to understand their customers and their financial dealings very well. In fact, one the objectives of the CBN following international best bank practice is to prevent banks from being used by criminal agents and politicians for money laundering activities. It is mandatory to the banks to follow and investigate money trail to see where it starts and where it ends. Therefore banks must have accurate, reliable and update KYC of each customer to enable them to track down any person who is perpetuating criminal activities in the banking landscape. It is not arguable that the KYC is the key to track down the source, movement and the destination of the money trail but it has not the ability to check the multiple opening of accounts by one individual with different names, hence the introduction of the BVN with a view to put a stop to it.

The banking sector is a driving force of multiple economic activities, through the transmission functions by allocating funds from the surplus sector to the deficit sector of the economy, this is very crucial in saving and investment mechanism in the economy. According to CBN bullion (1976-2016) Banking business focuses on financial intermediation

through the mobilization of funds from surplus sector to deficit economic agents, which makes banking sector a crucial sector. Although, contrary to above theoretical framework, the traditional theory of resource allocation; the Arrow-Debreu model held that economic agents interacts through markets and there is no role for financial intermediaries and hence intermediation (CBN Occasional paper 2013.) Contrary to the view held by the traditional economists, Diamond and Dybvig (1983) posited that banks for example are able to act as coalition of insurance depositors that provides households with insurance against idiosyncratic shocks that adversely affect their liquidity positions.

However, another important role is that banks are deposit taken money Institutions and they create money through lending and by the process they stimulate credit delivery to all critical sectors of the economy which encourages investment in the real sector and act as catalyst to economic development.

The CBN is however has been formulating and implemented policies in the banking sector to foster a safe, sound, vibrant and efficient financial system, noting the fact that one of the core mandates of CBN according to Central Bank of Nigeria Act 2007 “is to promote a sound financial system in Nigeria”. Therefore, it is argued that the CBN should adopt strategic agenda that will invigorate and foster vibrant and sustainable economic development though efficient financial system that will deepen and promotes a more reliable banking sector which will stimulate the confidence of the customers. In view of the fact, there is a nexus between a sound financial system and economic growth and development.

III. ANALYSIS OF BIOMETRIC IDENTIFICATION SYSTEMS

The application of Biometric Verification System (BVS) may have stated in the early 1891 though collection of the finger prints for prisoners in Argentina. However, in Africa facial characteristics has been a key for identifications and was applied mostly in Nigeria, where some tribes gave facial marks as a mode of identifications of those who belonging to the same tribe, the tribal marks, therefore, served as means of inclusiveness and exclusiveness as well. This is largely practiced by some tribes in Nigeria such as Yorubas, Igalas, Tivs, Biroms and even Jikums etc. The facial marks served a very useful purpose during the inter-tribal wars between the various tribes, the marks were used to differentiate foes from comrades. However, this continued to be practiced even now in some selected societies in Nigeria, although is gradually being faced out because of the emergence of HIV. However, recently more sophisticated biometrics systems which do not depend on facial and finger prints alone, but based on brains (electroencephalogram) and heart (electrocardiogram) signals have emerged as noted by Palaniappan, Re (2006). The research group at University of Kent led by Ramaswamy Palaniappan has shown that people have certain distinct brain and heart pattern that are specific for each individual. The advantage of such futuristic technology is that is more fraud

resistant compared to conventional biometric like fingerprints etc. However, such technology is having some issue, as is more cumbersome to operate.

Biometric Verification System (BVS) may be referred as unique characteristics or traits a person may be identified, which may be made possible by evaluating unique biological traits such as fingerprints, hand geometry, retina, and its iris patterns, voice waves, DNA, odor/scent and even signatures. Wikipedia (2016) noted that biometrics is the technical term for body measurement and calculation. It refers to metrics related to human characteristics. The distinctive nature of biometric makes it fit to accurately label and describe individuals and pinpoint them very accurately through their various characteristics which relates to their pattern of behaviors, including not limited to typing rhythm, gait and voice.

Traditionally, biometric verification seems to be better than the traditional ones including token-based identification, driver's licenses, passport, password and personal identification number such as pin numbers. However, the merits of biometric identifications are those characteristics are unique to individuals and more reliable in verifying individuals than token based ones.

Jain et al. (1999) noted that many different aspects of human physiology, chemistry of behavior can be used for biometric authentication. The selection of a biometric for use in a specific application involves a weighting of several factors, and identifying such factors to be used when assessing the suitability of any trait for use in biometric authentication.

- i. Universality means that every person using a system should possess the trait.
- ii. Uniqueness means the trait should sufficiently different for individuals in the relevant population such as the can be distinguished from one another.
- iii. Permanency relates to the manner in which a trait varies over time. More specifically, a trait with 'good' permanence will be reasonably invariant over time with respect to specific matching algorithm.
- iv. Measurability (collectivity) relates to the ease of acquisition or measurement of the trait. In addition, acquired data should be a form that permits subsequent processing and extraction of relevant feature sets.
- v. Performance relates to the accuracy, speed, and robustness of technology used.

It is observed that identification system of biometric can be used either for 'positive recognition' so that the user does not have to provide any information about the template to be used or 'negative recognition' of the person where the system establishes whether the person is who he 'implicitly or explicitly' denies to be. The later function can only be achieved through biometrics since other methods of personal recognition such as password, PIN or keys are quite ineffective. Therefore, Biometric system is a technique which

uses the unique behavioral or physical features of an individual in order to identify him. For example, when a biometric device scans fingerprints, it can compares it with every authorize user's fingerprints in the data base, the way an investigator compares fingerprints. If the scanned fingerprints match in authorized uses, that person is then granted access to the device.

We have different biometric verifications systems such as Adaptive Biometric Systems which are used to update the templates, the most important advantages are its ability to solving of limited training data and tracking the temporal variations input data through adaptation. Again is no longer necessary to re-enroll or retrain the system from the scratch in order to cope with the changing environment. The convenience can significantly reduce the cost of maintaining a biometric system.

It is note worthy, the CBN has compelled the banks to key into the use of the Biometric Verifications Systems which is termed Biometric Verification Number (BVN), according to the policy paper issued by CBN it stated that each Bank must issue each customer biometric verification number as means of identification and any customer that resists that, his account should be closed. Many critics have pointed out the such policy will conflict with the financial inclusion policy of the CBN, which was an attempt to bring into all the unbanked segments of the society into opening accounts with banks and bringing them into banking system. The CBN has maintained its stand because (BVN) system is seen to be one of the potent tools to eliminate fraudulent activities of the criminals in the banking system.

It should be noted that after the CBN discovered that the mandatory policy; "Know Your Customers" (KYC) issued to the banks are not achieving the desired goals and is neither effective nor a potent too to preventing banking frauds plaguing the system, specifically fraudsters, scammers and criminals who use multiple accounts in different banks with different identities to perpetuate frauds. These are the compelling reasons that stimulated the CBN decide to introduce the policy of Biometric Verification Number (BVN). "The inability to effectively ascertain the identity of bank customers has been exploited to perpetrate various criminal and malpractice by organizations, bank customers, bankers, resulting in huge losses to banks , their customers and the economy" Babajide Komolafe (2014). Therefore the policy of biometric identification number (BVN) was conceived to address the problem of identifications. The fingerprints and the pictures of the bank customers are captured and the information is saved with numbers known as the verification numbers and saved in the data base. However, the number can now be used to verify the identity of the customer. According to Babajide Komolafe (2014) the biometric (fingerprints and facial features) of each customer is captured and a number called Biometric Verification Number (BVN) is attached, These are stored in BVN database created

by banking industry in custody of Nigeria Interbank Settlement System (NIBSS).

IV. THE ADVANTAGES OF BIOMETRIC VERIFICATION SYSTEM ON BANKING SECTOR

The development of biometric verification system has created positive impacts on many sectors of the economy of which banking industry is inclusive, this is due to catalogue of advantages the biometrics verification offers, more especially in identification management security operations. And some of these merits are mentioned below;

Accountability: One of the advantages of biometric systems is the ability to ensure accountability in the organizational set up; more especially in the banks where accountability is a key to creating and retaining customers' confidence. Accordingly to Ramaya Raju (2014) who posits that biometric log-ins means a person can be directly connected to a particular action or event. He went further to point out that biometric creates a clear, definable audit trail of transactions or activities. This is quite handy in case of security breaches because you can exactly know who is responsible for it. The biometric system ensures efficient and effective complete accountability which cannot be duplicated and creating clear and logical means of establishing accountability. Buoyed by the fact, that every action of a transaction will be recorded and clearly documented by the individual associated with it; which reduces the possibility of system misuse and fraud and foster high level of identity security.

Accurate Identification: One of the major advantages of biometric system, it gives a significant boast for accurate identification; this is more practicable in the banking system where it is possible for a responsibility to be pinned down to a particular employee in case of any fraudulent action being perpetuated by any of the employees. Biometric applications seem to be effective than the traditional systems that rely on password, personal identification numbers (PIN), smartcards and tokens; these have been proved to be less accurate, but biometric systems have shown a measure of significant accuracy. The effectiveness lies on the fact that they make use of biological characteristics such as fingerprints, iris scan, etc. which offer unique and accurate methods. These features cannot be easily duplicated, which means only the authorized person gets access and this ensures high level of security thereby eliminating key risk factors.

In addition to the above, the biometric identification ensures that the information is unique for each individual and that can identify the individual in spite of variations in the time. Biometric is a technique that can provide this entire requirement with quite a lot of reliability and provide a platform that makes it difficult for information to be falsified. Fundamentally, no one can falsify the biometric data of a particular customer unlike his signature which can be done easily by the scammers and hackers. However, we must acknowledge the fact that digital signature is very difficult to

falsify since is encrypted by complicated mathematical operations.

Again password method is the cheapest and simplest technology, because it only requires elementary software resources but the problem is that, it is easily attackable by the scammers, in view of the fact that it can be very easy to obtain the authentication data from the person by extracting the information from the intended victim using deceit or attacking the software of the system. The smart cards are very useful since it can easily be combined with other system for authentication but the demerit is that it can easily be stolen or lost.

However, biometric system has the advantage of ensuring that the information is unique for each individual and can identify the person in spite of the time variations, in short no matter how long, the person must be identified. It can be seen that is the pillar of e-learning authentication and privacy (data confidentiality) authentication (access control) data integrity and non-repudiation. Emphatically, it can be seen that biometric is the system that can provide all these with quite a lot of reliability.

Biometric system ensures accurate identification of an individual because each person has unique physiological features that cannot be easily shared, stolen, swapped. It is very difficult to fault the system or the biometric system to make mistake, therefore, biometric identification system has the potential to accurately identify someone without a shadow of a doubt nearly 100% of the time. It is noted that the system attributes are difficult to forge or duplicate, even if he manages to forge biometric attributed such as fingerprints, modern biometric devices are equipped with aliveness detection and have the capability to identify a fake from the original.

Therefore, the most crucial benefit of the BVN is that it helps the bank to ascertain the identity of any customer and this has gone a long way to eliminate the use of fictitious names and fake documents to open bank accounts for criminal purposes.

Security: The biometric system offers absolute security which other identification systems cannot ensure. The reason for these unique characteristics is that it cannot be copied or stolen as it is made up from the individual characteristics such as fingerprints, DNA, facial etc. these are particular to an individual and these make a complete security solution for the banks and other financial institutions where such is needed. The traditional ones such as the password, token and PIN they have their unique problems which cannot ensure absolute security as they involved the risk of being shared and the real user may be difficult to be identify. For example no matter how efficient password system is, it may be very difficult to remember always because of the sequence of numbers, letters, and symbols that constitute identification problems. While token also presents its own problems as it can easily be stolen or lost. However, biometric system offered more than that, as

it has completely removes the problems of sharing, duplication and fraud.

On the contrary, password requires simple technology but it can easily be attacked by scammers, since it is quite simple to obtain the data from the person, either extracting the information from the person itself using deceit, or attacking the software of the system. Again, a program that can stimulate the users name and password can easily be installed in the computer. Therefore, is not the safest system, if complete security is to be ensured?

One of the major benefits of the BVN is that it offers both the banks and the various customers some measure of security in the operations of bank accounts. Prior to the emergence of the BVN many customers and sometimes in connivance with bank staff opened various accounts with the intention to defraud the banks and the customers as well. As noted by Nigeria Deposit Insurance Corporation (NDIC) 2017 the banking system lost to the tune of N1.8 billion to the fraudsters.

The BVN makes it extremely easy for the fraudsters to be identified, arrested and even blacklisted from banking industry.

Easy and Safe to use: This important advantage was noted by Ramya Raju (2014) when he stated that the good thing about using biometrics for identification is that modern system are built and designed to be easy and safe to use. Biometric technology gives accurate results with minimal invasiveness as a simple scan or photograph is usually normally required. And more importantly the software can easily be used and installed without extensive training. And for the user biometric identification is very convenient without the need to carry around ID card or remember complicated passwords. Due to the fact that password can be forgotten or easily guessed and the fact that ID cards can be damaged, swapped, or even shared, biometric are more convenient because individual physiological attributes are always with you.

Time saving: Another advantage of biometric is time saving, it is very easy for the bank officer to certify if a person is a customer to the bank or not through his biometric identification number which is personal to him. This can be done in a matter of second. Therefore, biometric identification is noted to be easy and quick in identifying the customer when one compares it with the traditional security ones. Therefore in banking work place this can be very beneficial in cutting cost and saving time, it will surely lead to increase in revenue, continuously increasing productivity, eliminating fraud and fostering robust internal control. This is very beneficial to the banking sector that is being infested with fraudulent activities by the staff and the outsider or in collusion with the outsider. It also eliminates expensive password administrators and enhances the quality of detecting fraud.

Biometric scanner can be used by the banks at the security check points including entrances, exits, doorways and more.

Therefore, Biometric Identification System can be used as a solution to determine who can access certain networks and pinpoint who actually access them. And with multi-modal application, the level of identification and its accuracy of the biometric system can be enhanced.

Biometric reduces the need for intense training and ongoing management costs, generates cost saving for IT by eliminating the consuming of the resources through training needs to rest password. In addition, biometric identification management helps to save cost incurred through issuance of new ID cards.

High return on investment: According to Ramya (2014) he argued that biometric system ensures a high return on investment. It is definitely high because you can avoid fraud including ‘**buddy punching**’ besides lowering payroll costs, accurate calculation of work hours, and reduced management time. He went further to posit, while the security is improved you can easily applied consistent policies and procedures at the same time. All you have to think about is the initial cost of biometric system.

It leads to improved Return on Investment (ROI). Biometric identification management offers enhanced accuracy, improved accountability, and a reduction in opportunities for misuse, compared to traditional identification system that may rely on password, ID cards, etc. Needless to say that ROI is much higher when biometric identification system is applied in company as it ensures high value creation.

V. THE DEMERITS OF BIOMETRIC AUTHENTICATION

The Biometric authentication may not actually be very accurate, it is noticed that it can produce some errors; more specifically the False Reject (FR) error, which is the rejection of authorized person trying to access the system. And the other one may be described False Accept (FA) error, which is the acceptance of a person which is not in fact who he or she claims to be. This is very dangerous in the banking environment because it may lead to acceptance of non-staff who may have the Intention to perpetuate fraud. As noted above biometric identification machines are not always entirely accurate, for example an individual with cold may not be able to identify himself using a voice identification device, and even people who gain or loss weight may suddenly lose access to a place protected by system analyzing facial features.

Instructively, these two type of can be controlled because they are inversely proportional and in general can be controlled by confidence threshold, to increase the security of system, the threshold can increase, which decreases FA errors and increase FR errors noted by Mustafa Erden (2016).

Curiously enough among other things that environment and usage can affect measurement, although it is noted that biometric authentication ensures accurate measurement but if the necessary inputs such as the fingerprints etc. are not accurately captured and the machine is not kept in the

required environment, it will affect the measurement and therefore, the net result.

Face recognition also has the disadvantages that come along with it. The face can be obstructed by hair, glasses, hat scarves etc., also changes in lighting or facial expression can throw off the device. Worst still, people face can change from time to time due to sickness or old age. In order for face recognition to be accurate “images are most accurate when taken facing the acquisition camera and not sharp angles. The user face must be lit evenly, preferable from front (SANS Institute) (2003). A person’s voice can easily be recorded and used for unauthorized PC work. And retinal scanning is very intrusive; it has the stigma of consumer’s thinking and is potentially harmful to the eyes.

It is instructive to note that Mustafa Erden (2016) pointed out that the biometric authentication requires interaction and /or additional hardware which may entails additional costs. It also noted that biometric identification machines are more costly to buy than traditional ones. It needs to use different devices that have range of different cost, sometimes it needs a lot of memory for the data to be stored and this entails additional cost.

While scanning the fingerprints some people look at it to be too intrusive, as it can be used for criminal purposes. There may be mistake on the dryness or the dirty of the skills as well as the age because the size of the skill or the fingerprints changes quickly and that may not guarantee accuracy. It is also noted by Reynolds (2004) “some users cannot be enrolled because of unreadable fingerprints”

Again it is time consuming when capturing the finger prints or facial recognitions, initially people have to wait for hours in lines to get scanned or finger printed to be stored on the central data base. It is also observed that it cannot be reset once it has been compromised.

VI. RECOMMENDATIONS

The application of biometric system should not be limited to the assignment of verification numbers to the customers alone if the full potentials would be realize in the banking sector. They should move a step further to apply it in the encashment of funds from the ATM points, instead of using ATM card which has caused so many frauds and deprived the customers of their hard earned money. The ATM machine can be built to scan the face of the customer or the use of the finger prints as means of identification before money will be released by the machine. In majority of cases the ATM card can easily be lost or stolen by unauthorized user or the pin number may be forgotten and scammers can even cloned the ATM cards and use it to defraud the bank and their customers; using Biometric Identification System (BIS) can go a long way to solve the problems.

Biometric can even safe the banks from inside frauds, when accurately employed in the banking environments, this absolutely necessary to foster confidence in the banking

system. For example, it was reported by Nigeria Deposit Insurance Corporation (NDIC) that the total inside fraud in the banking sector as 2017 is N3.5bn; this is quite a huge amount. The use of biometric system as means of authorization and identification of the employee to perform their task will therefore go a long way to eliminate the fraudulent activities in the banking sector.

The CBN should also encourage the banks to use and extend the services of the biometric system to other services the banks offer to their customers such as encashment of fund, transfer of funds, and application of loans. Although such projects may entail high level of initial capital outlay from the banks, the CBN can advise them to enter into agreement of Share Services by jointly financing the purchase of the machines and share the services together, that will reduce the initial costs for all the banks.

It is quite pertinent to state the bank customers must be encouraged to give accurate bio-data when they are being captured by the biometric system, because such information once captured cannot be changed nor can it be reset.

VII. CONCLUSION

Nevertheless to state that one of the most strategic policy thrust of the CBN is to promote the safety, vibrancy, soundness and efficiency of financial system, because of its positive impact in the banking sector. We noted a sound financial system is a bed rock for effective e-banking and e-payment system that reduces the cost of banking operations and offer convenience and the fastest means of payment to the customers and between the banks as well. Therefore, it becomes mandatory for the CBN to issue policies and regulations to curb fraudulent practices in the banking landscape and reduce to its barest minimum the actions of the scammers in the banking sector and to ensure this critical sector gets the requires boost. The strategic vision of the CBN to tackle the problem is the introduction of Biometric Verification Numbers (BVN) which has been effective in fostering a sound banking sector.

REFERENCES

- [1]. Bamadele, A (2005) “The Imperative of E-Banking for Monetary Policy in Nigeria” Central Bank of Nigeria Economic and Financial Review. (Volume 43, March 2005),
- [2]. Babajide Komolege “Biometric Verification Number: Reality and Benefits” Vanguard December1, 2018. www.vanguard.com.
- [3]. Bank Intermediation in Nigeria: Growth, Competition, and Performance of the Banking Industry, 1990-2010. Research Department, Central Bank of Nigeria Occasional Paper, Number 48, November 2013, page 36.
- [4]. “Biometric Overview” Biometric cse.msu.edu. September 6, 2007. Retrieve 2012-06-10.
- [5]. “Development in the Payment System” Bullion Publication by Central Bank of Nigeria Volume (1-40) 1976 -2016.
- [6]. Diamond, D.W and Philip H. Dgbvig “Bank Runs, Deposits Insurance and Liquidity” the Journal of Political Economy. Vol. 91. No 3, (June 1983) pp401-419.
- [7]. Jain. A.K. Bollic, R. Pankent, S. “Biometric Personal Identification in Networked Society” Kluwar Academic Publication ISBN 878-7923-8345-1.

- [8]. Mohammed Shahnewaz (2016) M2SYS (blog) <http://www.2sys.com/blog/workforce-management>.
- [9]. Mustafa Erden (SESTEK.BLOG). [www.sestek](http://www.sestek.com) 2016
- [10]. Panel NdukaEluhwalwe. "How Micro Small and Medium Enterprises (MSMEs) Can Leverage on Central Bank of Nigeria's Real Sector Initiatives" Bullion Publication of CBN Vol. 40 No.2 April – June 2016.
- [11]. ProfessorChukwuma C. Soludo, "Strategic Agenda for Naira" being speech delivered on August 14, 2007.
- [12]. RamayaRaju (2014)- a freelancer M2sys/ (blog)/ "Biometric Hardware/Advantages".
- [13]. R. Palaniapan "Electroencephalogen signals from Imaged Activities: A Novel Biometric Identity for Small population" published in E. Corchado et. al. (ed.) Intelligent Data Engineering and Automated learning – IDEAL2006, lecture notes in computer science vol 4224.
- [14]. SANS Institute (2003) [goggle](http://www.goggle.com).
- [15]. "The History of Fingerprints" (<http://11.com/fp/fphistory.html>)
- [16]. "What is Biometric" (<http://biometric.cse.msu.edu/info/index.htm>). Biometric Research Group. Michigan State University (retrieved November 10, 2017.)