



MARGARET JOHNSON

OVERVIEW OF ELECTRONIC PAYMENT SYSTEMS IN NIGERIA: STRATEGIC AND TECHNICAL ISSUES

By

MARGARET JOHNSON*

1.0 Introduction

The most significant development of the millennium which has substantially influenced business operations in the world is the emergence of the information age. The remarkable progress achieved in Information and Communications Technology (ICT) has made it possible for information to be digitalized and transmitted faster and cheaper in mega or terra bytes.

Taking advantage of rapid technological progress and financial market development, a number of innovative products for making payments have been developed in recent years. Payment involves the transfer of monetary value from one person to the other, thus, a payment

system consists of mechanisms, which include institutions, people, rules and technologies that make the exchange of payments possible.

However, transactions made using these innovative products are accounting for an increasing proportion of the volume and value of domestic and cross border retail payments. Currency and notes are converted to data, which are transmitted through telephone lines and satellite transponders (Ovia, 2002). These new financial services created through electronic payments systems have resulted in a substantial reduction in financial costs and the ease of transfer of funds.

Electronic payment system otherwise called e-payment is a payment system consisting of electronic mechanisms, which make the exchange of payments possible. It

can simply be defined as payment or monetary transactions made over the internet or a network of computers (Kulkarni 2004). In other words, it involves the provision of payment services and transfers through devices such as telephones, computers, internet, Automated Teller Machine (ATM) and smartcards. It is a paperless system of payments that offers an alternative to the traditional system of payment, which involves the use of cash and cheques. E-payment system has the advantage of facilitating transactions more conveniently and is available round the clock independent of the customer's location.

Further, electronic payment system can be broadly classified into two groups namely, wholesale and retail payment systems. Wholesale payment system exists for non-consumer transactions, that is, large value payments initiated

*Margaret Johnson is the Assistant Economist in Research and Statistics Department, Central Bank of Nigeria

among and between banks, governments and other financial service firms. Examples include transactions handled by the Society for Worldwide Interbank Financial Telecommunications (SWIFT) and Nigerian Interbank Settlement Systems (NIBSS). Retail payment systems include those low value transactions involving consumers through the use of such payment mechanisms like Smartcards, ATMs, electronic money transfer and e-banking. This is also applicable to wholesale payments.

Given the importance of electronic payment system in an economy, Nigeria, in 1996 introduced the scheme with the approval of the Central Bank of Nigeria under the auspices of African Development Consulting Group (ADCG).

The objective of this paper is to provide an overview of electronic payment system as it currently exists in Nigeria, discuss the strategic and technical issues as well as the monetary policy implications of the system, with focus on the needs of consumers.

To achieve this, the paper is structured into five

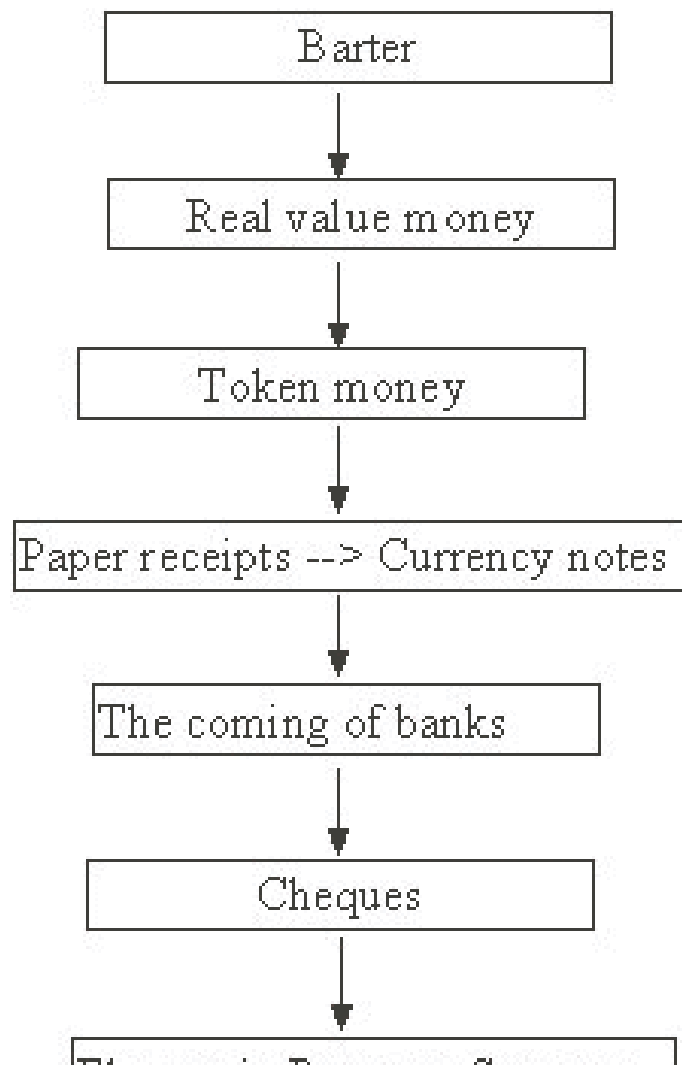
sections. Following the introduction is section II which discusses the motivation for electronic payment system. Section III presents an overview and development of electronic payment system in Nigeria. Section IV analyzes the various strategic and technical issues in electronic payment systems as well as the monetary policy implications, while Section V highlights the

policy recommendations and conclusion.

2.0. Conceptual Issues

2.1 Motivation for Electronic Payment System

2.1.1 Evolution of Money and Payment System



The basis for the emergence of the modern electronic distribution channels is the evolution of the concept of money. Each stage of money came into existence in order to facilitate transactions of goods and services. Each of the stages not only came with its advantages but also with its limitations. As the economy developed, a way around this problem was needed, which led to further evolution.

In the earliest human societies, goods were swapped or bartered. In other words, in barter trade, the ability to pay for goods and services was reflected in the physical existence of the goods, which could be used for exchange. Then, the hard cash in the form of coins made out of precious metals emerged. This was then followed by the advent of fiduciary money in the form of modern coins and paper notes. Today, an individual's ability to pay for goods and services is simply reflected in the accounting records of his or her bank. Thus, it is important to appreciate at the outset that money as it is defined today is just simply information, which can be electronically transmitted to facilitate economic transactions. It is this new

definition of money, which has resulted in the electronic revolution of financial institutions.

The most recent development in the Nigerian payment system is the venture into smart cards scheme, which involves prepaid and reloadable cards. Smart card technology is the latest payment technology positively impacting on the efficiency of the payments system. This electronic system has grown rapidly in developed countries over the last few years due to its effectiveness, high level of security and convenience.

2.2 Features of the Nigerian Payments System

Due to the unfamiliar nature of electronic payment system amongst the populace, majority of all transactions, in Nigeria are done with cash as this remains the only universally acceptable form of payment. Cash is simply bank notes and coins that are used and easily acceptable for transfer and exchange of goods and services in an economy (CBN briefs 2002-2003). The Nigerian economy therefore, can be described as cash driven economy.

However, there are other non cash payment systems that are available, which include, the bankers clearing or inter bank clearing system, the security clearing systems and electronic clearing systems. The inter-bank clearing system involves the active participation of Deposit Money Banks under the supervision of the CBN, which also handles the settlement process. To further ensure proper monitoring and efficiency, the CBN adopted the Magnetic Ink Character Recognition (MICR) technology to guarantee the speedy operation of the cheques clearing system as well as curtail forgeries. The Nigeria Inter-Bank Settlement System (NIBSS) provides automated clearing services to the banking sector by netting their credit or debit positions on inter bank transactions. Collateral in form of treasury bills is provided by banks to eliminate settlement risks. The security clearing system, concentrates on the transfer of securities that involves debt services and money market instruments, thus payments are made by cheques and drafts.

3.0 Development of Electronic Payment System in Nigeria

In the past few years, Nigerian banks and the financial services industry in particular, have embraced the concept of e-money. Changes are beginning to take place in the Nigerian financial landscape and customers are increasingly raising the hope of expectations for quality customer services.

In Nigeria, after the introduction of the scheme with six banks, it was later extended to nineteen. At the time of approval by the Central Bank of Nigeria (CBN), the All States Trust Bank Plc introduced a closed system electronic package called ESCA smart Card. This was followed in February 1997, with the introduction of a similar product called "Diamond Pay Card" by Diamond Bank.

In February, 1998 the scheme received a boost when a consortium of 19 banks floated a smart card company called Valucard Nigeria Plc with the mandate to produce and manage the distribution of cards (valucards) issued by

member banks of the consortium. Subsequently, in November, 1999, a consortium of more than 20 banks under the auspices of Gemcard Nigeria Limited obtained CBN approval to introduce the "Smartpay" scheme.

The CBN additionally granted approval to a number of banks to introduce international money transfer products, telephone banking and on-line banking via the internet, though on a limited scale. However, some banks have gradually introduced the use of Automated Teller Machines (ATM), which had further facilitated the use of cards. Some banks have also introduced electronic bill payment services.

Understandably, the electronic payment scheme is still at a relatively early stage of development in Nigeria, but the evolvement of electronic money provides an ample opportunity for banks to reduce the resort to cash transactions.

3.1. Features of Electronic Payments System

There are basically two generic methods of

making payments. The first is the Account Transfer System, which involves customers issuing instructions to banks to debit the account of the person making the payment, and credit the account of the person receiving it. Payment methods which fall into this category include cheques, debit cards, credit cards, and telephone banking. The second is the Direct Transfer or token system, where money is directly transferred from one person to another, without the direct involvement of any bank in the transaction. Cash, phone cards and gift token are the most widespread example of the token system. However, the development of "electronic purse" using smart cards and other network falls into both categories.

Payment Cards:

Payment cards consist of credit cards, debit cards and prepaid cards. Credit cards give indication that the holder has been granted a line of credit by the card issuing bank. The revolving credit on the card allows repayment to be made installmentally. The credit that is granted is settled either in full by the end of

the specified period or in part with the remaining balance extended as credit. International credit cards such as Visa and Master cards are known and accepted by customers. They are easily used on the internet. Debit Cards enables the holder to have access to his bank account. This and pre-paid cards - which incorporate a computer chip/integrated circuit on which value is loaded, either from the card holder's bank account or in return for cash. Value is then removed from the card as purchases are made, using special point of sale terminals.

There are two types of card-based schemes in Nigeria. These are the single and the multipurpose stored value cards.

Single purpose stored value cards

The service provider is responsible for issuing the cards. For instance, for some years now the Nigerian Telecommunications Limited NITEL, MTN, Econet, Globacom and other telephone service providers have been issuing this type of prepaid card, which is used exclusively for

purchasing airtime and making telephone calls.

Multi-purpose stored value cards.

The cards are used to pay for goods and services at any retail outlets that accept them. The smartcard is often used for this purpose.

Smart card/Valucard:

The Smart card is already operational in Nigeria. It is an electronic payment scheme that was introduced by a special purpose company, Smartcard Nigeria Plc now called Valucard Nigeria Plc, which was incorporated by a consortium of banks. The trial run commenced in some Nigerian cities in April 1999. Full and final implementation of the scheme began in 2000 and the cards are currently accepted by 4,207 retail outlets in most of the major cities in Nigeria. As at 2004, about 184,924 cards have been issued (see table 3). Valucard Nigeria Plc, which acts as the clearing institution for the card scheme, also coordinates the hardware and software procurement.

The participating banks serve as card issuers, while cardholders are required to maintain an account with the issuing

bank. The cards are PIN-protected and can be used for loading or withdrawal of funds at any of the participating banks, and for payment of goods and services. Smartpay is another multipurpose smartcard or electronic payment scheme that was introduced in November 1999 by Gemcard Nigeria Ltd now called Smartpay. It operates as the valuecard.

As at 2004, about 78,266 cards have been issued and are acceptable by more than 760 retail outlets spread over some 20 cities in Nigeria (BIS 2004:124).

Currently in Nigeria, 40 banks under the ValuCard consortium have joined the Visa International network, the largest e-payment service provider. Visa is a membership association owned by more than 21,000 financial institutions around the world that provides member institutions with global payment platform development. The banks became part of the Visa family following a partnership agreement between ValuCard and Visa International.

Vanguard (2004) findings showed that while about 500,000 Nigerians carry e-cards (300,000

Valucard and 200,000 SmartCard) only about 50,000 actually use them. The problem is basically in the area of interoperability, with the major challenge being how to facilitate the use of different cards on one terminal (Babajide and Emma, December 16 2004, pp. 4). Presently, a carrier of one card is mostly not able to use it on the terminal of another operator and this has greatly limited the use of payment cards.

Electronic Smart Card Account (ESCA)

This is another reloadable electronic payment system in a scheme operated by All States Trust Bank Ltd. The bank, which is the issuer, also serves as the clearing institution for ESCA. Bank teller machines were supplied by Verifone, the cards by Gemplus and the computers by Compaq. To date, over 17,500 cards have been issued and ESCA is accepted at over 58 locations including at the bank's 14 Automated Teller Machines.

Paycard

This is an electronic purse which was introduced by Diamond Bank. Access to the value on the card is PIN restricted. A maximum of N20,000 only can be withdrawn at

a time and not more than once a day. The security features include the encryption of transactions and processes.

Automated Teller Machines (ATMs)

These are electronic devices employed to withdraw funds automatically without the need to complete w i t h d r a w a l documentations. ATM works through an electronic system where an account holder is assigned specific code and identity that ensures access to the account for withdrawal by the account holder. One of the advantages of ATM is that it can be installed at any location outside the bank office, especially in supermarkets and other public places, ensuring withdrawal of funds at any time for immediate use without recourse to the bank that holds the accounts. ATM and credit card networks are linked in such a way that will enable credit cards holders of any bank that operates with similar protocol to use any machine.

To ensure growth as well as encourage the widespread use of Automated Teller Machine (ATM) cards in the country, many banks are

forming partnerships to jointly own switch network, which will electronically link all the various ATMs of the banks. By linking the respective ATM systems of these financial institutions through the switch, cardholders and member institutions of the consortium would be able to carry out transactions at the terminal of any of the other participating financial institutions.

MasterCard International Products

In 2003, approval was granted for some banks to serve as acquirers and issuers of MasterCard International products. Ecobank and STB issues Mastercard presently. Applications from other banks to serve as acquires and issuers are under consideration.

Internet and Mobile Payments Systems

The development of internet payment system in Nigeria is still in its early stages. However, between 2000 and 2003, some banks developed online banking, enabling customers to execute a wide range of simple banking transactions over the internet, including balance enquiries, viewing and downloading of statement of account,

confirmation of cheques, online shopping, request for cheques books, bank drafts, traveler's cheques, smartcards (Valucard, Smartpay etc), payment of bills, funds transfers and bulk payments such as salaries and monitoring of the trade and finance transactions. Thus far, many banks have offered internet banking in some form or the other.

To ensure security, most of the systems provide for user authentication, data encryption, user entitlement and authorization in securing transactions.

■ **Mobile Banking Payments**

Following the launch of Global Systems for Mobile (GSM) services in Nigeria in 2001, few banks in Nigeria have launched mobile banking services that enable customers to carry out simple transactions based on SMS technology with customers' mobile phones serving as the terminals. Such transactions include account balance enquiries, funds transfers between customers' own accounts and to other accounts with the same bank, transaction tracking and third party payments, such as bill payments, cheques book requests and balance

confirmation. As at 2004, over 10 banks have offered mobile banking/ payments services. The security controls used are PIN code and pass code identification (BIS 2004:125).

4.0 Strategic and Technical Issues for Central Bank of Nigeria

The likely interests of the Central Bank of Nigeria with respect to the new forms of electronic payments could be in two areas: the effect that this might have on the Central Bank's currency issue, and the possible implications for the safety and soundness of the financial system. These issues are discussed below:

Supervisory/Regulatory Issues

The Central Bank of Nigeria (CBN) in September 2003 issued comprehensive guidelines to cover all aspects of electronic banking. The guidelines required banks which serve exclusively as issuers of electronic money to submit separate statistical returns on their e-banking activities including all cases of fraud and forgeries to the appropriate regulatory authorities. In addition, the CBN constituted a joint committee comprising of staff of the

Bank and representatives from Valucard Nigeria Plc and Smartpay Nigeria Ltd to monitor the development of the Valucard and Smartpay projects. The card scheme operators were also obliged to supply statistical information to the regulatory authorities as and when required.

The introduction of electronic payment products in Nigeria though at a rudimentary stage, has brought a number of regulatory/ supervisory concerns to the fore; salient among which is who should issue the card base product?

The view of CBN, which is in consonance with international norms, is that multipurpose stored value cards should only be issued by licensed deposit taking institutions subject to CBN authorization and supervision. In line with this, the issuance of multipurpose stored valucards in Nigeria is strictly restricted to licensed banks, which require the prior approval of the CBN to issue e-money. However, single purpose stored value cards such as the prepaid telephone or fuel cards where the goods and services are provided only by the issuer of the cards should continue to be issued by NITEL, MTN,

ECONET and other telecommunications service providers.

However, to enhance efficiency of electronic payment system in the country, the Central Bank of Nigeria approved a card switching facility for the smooth operation of the system. The Bank also resolved to look into ways of deploying Automated Teller Machines (ATMs) that could be used by different banks. The apex Bank is currently working with the deposit money banks to put in place the system and procedures that will make it easy for people to pay for services through card payments.

Legal Issues:

Any arrangements for making monetary payments require satisfactory legal framework. It is important that all the parties to a payment – the payer, the recipient and any other parties such as banks or clearing agents who may be involved as intermediaries should clearly understand their rights and obligations. In this regard, the CBN in its existing legal framework had issued guidelines to also cover the issuance of electronic money by banks in Nigeria.

However, the distinctive characteristics of the new technologies require some new thinking and rules. In particular, where payments arrangements have significant cross border elements, it may become very difficult to establish clearly the rights and obligations of the various parties that are involved in a transaction, the forms of redress available when things go wrong and the jurisdiction which applies.

Security Issues

All e-money users must maintain adequate and reliable safeguards in order to prevent, protect and detect any possible threats to the security and integrity of the scheme, including the threats of counterfeits as well as unauthorized access or modification.

In this regard, the CBN warned that all banks offering services on Automated Teller Machines (ATM) would be held accountable for cases of fraud. In the Guidelines on Electronic Banking in Nigeria by the CBN sent to the banks, it states that “banks will be considered liable for fraud arising from card skimming and counterfeiting” (CBN: 2003 pp 3).

Worried about what the loss would be to the customers and the banking system, the Bank further directed that: “In view of the demonstrated weaknesses in the magnetic stripe technology, banks should adopt the chip (smart card) technology as the standard within five years. For banks that have not deployed ATMs, the expectation is that “chip based ATMs would be deployed.”

To ensure effective security of the customers as well as the scheme, the Apex Bank further directed that,

- All ATMs not located within bank premises must be located in a manner to assure the safety of the customer using them. Appropriate lighting must be available at all times and a mirror may be placed around the ATM to enable the individual using the machine to determine the locations of persons in their immediate vicinity.

- All ATM must be placed in a manner that passersby cannot see the key entry of the individual at the ATM directly or using the security devices.

- ATM should not be placed outside the building unless the machine is bolted to the floor and surrounded by

structures to prevent removal.

- ATM at bank branches should be situated in such a manner as to permit access at reasonable times. Access to the ATM should be controlled and secured so that customers can safely use them within the hours of operations.

- Banks were encouraged to install cameras at ATM locations.

- A d d i t i o n a l precaution must be taken to ensure that any network connectivity from the ATM to the bank or switch is protected to prevent the connection of other devices to the network point.

Law enforcement Issues

The issuing agency must ensure adequate protection against counterfeiting, tampering or fraudulent use, and money laundering activities. As such, there must be a complete audit trail of all transactions and the linking of card to a specific card (float) account containing the full account particulars of the card holder for the purpose of loading and unloading the cards. In addition, there should be an adequate provision for recovery in the event of any loss.

Privacy Issues

It is very necessary for issuers of e-money to define privacy rules since trails could pose other risks to consumers. The collection, re-use and i n s t a n t a n e o u s transmission of information can, if not carefully managed, diminish personal privacy. Therefore, privacy should be maintained against eavesdroppers on the network and against unauthorized persons.

Valucard is highly vulnerable to fraud. It could be stolen from their owners and then misused. The issuers must develop secure payments systems to curtail misuse and fraud.

Cross Border Issues

The existing Valucard, Smartpay, Esca and Paycard schemes have no cross border features since they function only in Nigeria and allow the use of only one currency, the Nigerian naira.

Standardization Issues

Standardization, which is the driving force behind the computer industry, holds the key to the long term benefits of electronic payment systems. The pros of standardization include technical efficiency, improved understanding, common understanding, lower risk

of errors and lower cost (Ledingham 1996).

Without standards, the linking of different payment users into different network and different systems is impossible and competition would be reduced. Standardisation facilitates inter-operability, giving users the ability to buy and receive information regardless of which bank is managing their money. Therefore, the recent introduction of the concept of transaction switching by companies such as Cards Technology Ltd is a welcome development, as this would promote inter-operability among the various smartcard schemes.

4.1 Implications of Electronic Payment Systems on Monetary Policy

4.1.1 Likely effects of widespread use of electronic money

The opinion of most central banks is that electronic money will not affect monetary policy-making in any significant way, given its present and most likely future form and prevalence. In Nigeria, due to the present state of development, electronic payment system is not expected to

have any significant impact on monetary policy implementation as the quantity involved is still low .

However, the issuance of e-money is likely to have significant implications for the conduct of monetary policy in the foreseeable future. Since electronic payment systems are based on new technologies, its rate of circulation might become faster due to its automated nature of payment mechanism. Consequently, there might be a reduction in the level of cash outside the bank since very few people will be holding cash. Therefore, it would be important for monetary authorities to monitor the circulation rate of real money more frequently. In addition, issuers should be required to submit promptly statistical information that includes the volume and value of transactions with a view to incorporating the data in the monetary statistics.

The widespread use of electronic money in the system may complicate the quality of information for central bank (monetary aggregates). This might affect the stability of money demand, since the velocity of money is affected and consequently reduce the

importance of monetary aggregates as guides for monetary policy making. However, if electronic payment systems function the way they currently do, it will pose no special threat for monetary policy. This is so because deposit money banks still have to settle their transactions in cash, which still allows the Central Bank to steer the money market with the various monetary policy instruments at its disposal. A positive implication will be the facilitation of qualitative statistical input to policy formulation if the money becomes prevalent since the system is automated.

5.0 Policy Recommendations

Although, it has been established that electronic money may not have any significant effect on the ability of the central bank to steer the monetary market, since various monetary policy instruments are available for the Bank to continue to do so. However, there are other likely effects as discussed above that could hamper the successful implementation of monetary policy, thus, the following recommendations are suggested on how the

central banks could handle them.

Redeemability Requirement

One of the monetary policy concerns relating to electronic payment system already identified is the risk of over use, which could jeopardize price stability. This risk can be restricted by a redeemability requirement, which implies that issuers must be ready to convert electronic money in to cash at the request of the holder.

Also, redeemability at par is essential in order to preserve the unit-of-account function of money. Without this requirement, a situation will arise where a retailer can accept electronic value below par. In such a case, the medium of exchange and store of value functions of money will no longer be consistent with the simultaneous unit of account function of money.

Expanding the definition of Monetary Aggregates

Since monetary aggregates are used as indicators for financial market analysis, broadening its definition becomes obvious. The Central Bank should

expand their definition of monetary aggregates to include electronic money and banks should be compelled to report the total amount issued during a stated period. Without this measure in place, the central bank could inevitably lose influence over the regulation of the flow of money in the domestic economy.

Conclusion

The Nigerian payment system is largely cash based. While the country lags behind compared with other industrial countries, its use of electronic payment systems is gradually gaining prominence. All major types of e-payments are trading upwards and some new electronic payment instruments are beginning to emerge. Clearly, cheques remain the preferred form of non-cash payment in Nigeria. From the consumer's standpoint, cheques possess several attractive features. They are familiar, widely accepted and are relatively convenient. Importantly, cheques like cash enable individuals to make payments to other individuals. Presently, no single competing electronic payments method offers the same mix of attributes.

In Nigeria, the use of multipurpose stored-value instruments, in particular have been low. The contributing factor to the slow growth can largely be due to uncertainty over security, standards and compatibility issues associated with the new technologies.

Looking ahead, it can be said that the trend toward greater use of electronic payments systems will continue given the continuous increase in commercial activities in the economy that has provided the thrust for increase on line transactions. Of course, it is difficult to foresee with any certainty how quickly and in what forms electronic payments systems will develop in Nigeria. However, monetary policy and stability concerns are not particularly disturbing, at

least in the foreseeable future as long as the issuers of electronic payment systems reports promptly to the Central Bank in a systematic and comprehensive way. Practically, this involves strict supervision by the monetary authority in order to maintain stability in the financial sector and the economy as a whole.

Table 1: Features of Different Payment Methods

Source: Ledingham (1996), Reserve Bank of New Zealand

Table 2: Design Features of E-Money Products in Nigeria

Name of Systems	Type of System	Value limit on card or consumer software (USD)	Transferability among end users	Adapt for netw payn
Valucard	Card based	Varies with each issuing bank but capable of carrying up to 16m	No	No
Smartpay	Card-based	Up to 16m	No	No
Esca	Cardbased	Up to 16m	No	No
Paycard	Cardbased	Up to 16m	No	No

Source: CPSS- Survey of e-money and mobile payments, March 2004

Table 3: Data on the Use of E-Money Products in Nigeria

Name of System	Number of Issuers	Number of Cards issued	Number of Merchant Terminals	Float outstan (USD)
Valucard	43	184,924	4,207	2,436.2
Smartpay	22	78,266	760	45.2021
Esca	1	17,500	58	Na
Paycard	1	na	22	Na

Source: CPSS- Survey of e-money and internet and mobile payments, March 2004

REFERENCES

- Adams, L et al (1999): Study on Electronic Payment Systems. Volume 1: Committee Main report. Institute for Prospective Technological Studies (IPTS), European Commission, Joint Research Centre, Seville, Spain
- Babajide and Emma (2004): 40 Banks Join International Network. Vanguard December 16, pp. 4.
- Bohle, Krueger, Hermann, Carat and Maghiros (2000): "Electronic Payment Systems – Strategic and Technical Issues" Electronic Systems Observatory (ePSO), Institute for Prospective Technological Studies, December
- Bank for International Settlement (2004): Survey of Developments in Electronic Money, Internet and Mobile Payments, pp. 123 – 125, March.
- Central Bank of Nigeria (2003): Guidelines on Electronic Banking in Nigeria, August
- Central Bank of Nigeria (2002/2003): Payment Systems in Nigeria, Briefs, Research Department: pp. 22- 23
- Gans and Scheelings (1999): Economic Issues Associated with Access to Electronic Payment Systems: University of Melbourne, February.
- Goldfinger (2003): "Secure Electronic Payments on the Internet". Position paper
- Krueger, Bohle, Carrat, Herrmann and Maghiros (2000): Electronic Payment Systems – Strategic and Technical Issues, December.
- Kulkarni A (2004): Legal Analysis of Electronic Payment systems: Asian school Of Cyber Laws
- Ledingham P. (1996): The Policy implication of Electronic Payments: Banking System Dept; Reserve Bank of New Zealand, Auckland
- Ovia J (2002): Payment Systems and Financial Innovation, a paper presented at the CBN Annual Monetary Policy conference, Abuja Nov 25-26
- Richardson (2004): Description and Evaluation of different types of E-payment systems: Canada
- Sanusi J (2002): Electronic Payment Systems in Nigeria, keynote address Presented at the Smart card Expo, July
- Schaechter A. (2002): Issues in Electronic Banking: An Overview. Policy Discussion Paper, International Monetary Fund, PDP/02/6
- Weiner S (2004): Payments System Research Briefing. Federal Reserve Bank of Kansas City. March