

E-Payment System Adoption in Nigerian Ministries, Departments and Agencies (MDAs): Gains and Challenges

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Abstract - ICT is a fast developing technology; its application typically involves the introduction or enhancement of systems or technology to meet a particular business need. An example of such application is the e-Payment system, a subset of e-Government that enables us to perform financial transactions electronically. A survey was conducted in the federal government of Nigeria's Ministries, Departments and Agencies (MDAs) to examine the gains and challenges of the e-Payment system commenced on January 1st, 2009. Non-parametric tests were used to establish the rank orders of gains from e-Payment and the challenges, based on median values for each variable, as well as the number of valid answers. The result revealed the most appreciated gains and most encountered challenges of the new system. The t-Test result for the gains of e-Payment shows that the mean number of positive response was significantly different ($P < 0.01$) from that of the negative response for each of the gains. Also, the t-Test result for the challenges of e-Payment shows that the mean number of positive response was significantly different ($P < 0.01$) from that of the negative response for each of the challenges.

Keyword: e-Payment, ICT, MDAs, Gains, Challenges

I. INTRODUCTION

Globalisation and technological change - processes that have accelerated in tandem over the past two decades - have created a new global economy "powered by technology, fuelled by information and driven by knowledge." One major deciding factor in the globalisation and technological change is the information and communication technology (ICT). ICT is a fast developing technology; its application typically involves the introduction or enhancement of systems or technology to meet a particular business need. ICT has a catalytic impact in three key areas: productivity and innovation (by facilitating creativity and management), modernization of public services (such as health, education and transport) and advances in science and technology (by supporting cooperation and access to information). Though the first commercial computer was produced in the early 1950s, the widespread use of computers and the consequent ICT, especially the Internet, did not come into common use till about 1980s. The Internet came into public use only in the 1990s. But, once it puts out its roots in the key domains of our collective life such as academia, government and business, there was no stopping of its tentacles reaching into every aspect of our life.

The changing communication and data transfer technologies of the Internet today are affecting the way people and many companies do business. The Internet has dramatically impacted the business world in the last two decades and this trend will certainly continue to the future [1]. One of the notable impacts of the Internet on business world, and indeed the government, is the introduction of electronic commerce (e-Commerce). The emergence of e-commerce has created new financial needs that in many cases cannot be effectively fulfilled by traditional payment systems. As payment is an integral part of mercantile process, electronic payment system is an integral part of e-Commerce [9].

There are several definitions for electronic payment (e-Payment). In a simple context, e-Payment may be defined as any payment in which monetary value is transferred electronically or digitally between two entities as compensation for the receipt of goods and services [10]. An entity refers to a bank, business, government and individual consumers. Furthermore, it is payment that is initiated, processed and received through the means of electronic, interactive communication channels and other technological infrastructure. Based on these definitions, one characteristic of e-Payment system is that the payment is executed by the payer himself, whether the latter is a consumer or a business, without the intervention of another natural person. Also, the payment is made from distance, without the physical presence of the payer and naturally it does not include cash. By providing such definitions for the e-Payment system, experts include the transfer of information concerning the accounts of the parties involved in the transactions, as well as the technological means of distribution channels through which the transactions is executed.

Virtually all interested parties (i.e. academics, government, business community and financial service providers) are exploring various types of electronic payment system and issues surrounding electronic payment system and digital currency. Some proposed electronic payment systems are simply electronic version of existing payment systems such as cheques and credit cards, while others are based on the digital currency technology and have the potential for definitive impact on today's financial and monetary system. Popular developers of electronic payment system predict fundamental

changes in the financial sector because of the innovations in electronic payment system [4].

II. OVERVIEW OF E-PAYMENT SYSTEM

The e-Payment systems have been in operations since 1960s and have been expanding rapidly as well as growing in complexity [9]. The electronic means of payment is considered to be a worthwhile step in a long line of changes in payment clearing systems. The electronic settling of accounts, for example, has long been an integral part of payment systems using credit cards, debit cards, automatic teller machines (ATMs) and prepaid cards. What enables any payment mechanism to be processed electronically is the fact that unlike currency, bills or coins which carry monetary values, non-cash mechanisms are promises or contracts of payments. Based on the information transmitted following a transaction the appropriate accounts representing notational money are adjusted between banks and financial institutions. Cheques are a primary example where an intrinsically worthless piece of paper, which nonetheless conveys important information, is exchange for settlement.

To get the clearer understanding of electronic payment process, it is better to understand the processing of conventional or traditional payment system. A conventional method of payment and settlement involves a buyer-to-seller transfer of cash or payment information (i.e., cheque and credit cards). The actual settlement of payment takes place in the financial processing network. A cash payment requires a buyer's withdrawals from his bank account, a transfer of cash to the seller, and the seller's deposit of payment to his account. Non-cash payment mechanisms are settled by adjusting (i.e. crediting and debiting) the appropriate accounts between banks based on payment information conveyed via cheque or credit cards. Non-cash payment requires three separate elements. The buyer must have an agreed means of payment authorisation and instructing his bank to affect a transfer of funds. The seller's bank and buyer's bank need an agreed method of exchanging payment instructions. This is referred to as payment clearing. Figure 1 shows the cash and non-cash transactions between the government and the workers, contractors, consultants or the Ministries, Departments and Agencies (MDAs).

Cash moves from the buyers' bank to sellers' bank through face-to-face exchange in the market. If a buyer uses a non-cash method of payment, payment information instead of cash flows from the buyer to the seller, and ultimate payments are settled between affected banks, who notationally adjust accounts based on payment information. In real markets, the clearing process involves some type of intermediaries such as cheque clearing companies or credit card services. Structurally then, most payment systems are based on similar processes. The "information" sent to settle payments can be one of the following:

- Information about the identities of the seller and the buyer and necessary instructions to settle payments without revealing financial information (i.e. payment clearing systems);
- Financial information such as bank accounts or credit card numbers (i.e. notational funds transfer);
- Actual values represented by digital currency (i.e. digital currency payment systems).

As suggested by Choi, Stahl and Whinston [2], electronic payment systems should be broadly classified into three

groups: payment through an intermediary, payment based on Electronic Fund Transfer (EFT) and payment based on electronic (digital) currency. In the intermediary-based e-Payment system, the intermediary not only settles payments, it also takes care of such needs as confirming seller and buyer identities, authenticating and verifying ordering and payment information and other transactional requirements lacking in virtual interactions. The key benefit of this system is that it separates sensitive and non-sensitive information and only non-sensitive information are exchanged online.

EFT-based payment system was the first electronic-based payment system, which does not depend on a central processing intermediary. It is a financial application of EDI (Electronic Data Interchange) which sends credit card numbers or electronic cheques via secured private networks between banks and major corporations. To use EFT to clear payments and settle accounts, an online payment service will need to add capabilities to process orders, accounts and receipts. But a landmark came in this direction with the development of digital currency.

The nature of digital currency or electronic money resembles that of paper money as a means of payment. As such, digital currency payment systems have the same benefits as paper currency payment, namely anonymity and convenience. As in other electronic payment systems (i.e. EFT based and intermediary based), security during the transaction and storage is also a concern, although from the different perspective. For digital currency systems double spending, counterfeiting and storage are critical issues, whereas eavesdropping and the issue of liability (when charges are made without authorizations) is important for the electronic funds transfer.

III. E-PAYMENT'S RELEVANCE TO E-GOVERNMENT INITIATIVE

Electronic payment is a subset of electronic government (e-Government), which is the application of electronic means in the interaction from government to citizens (G2C) and government to businesses (G2B). Therefore, it is believed that e-Payment should go in *pari pasu* with e-Government, where records of everything and everyone are available and intact. As part of the Nigerian government's e-Government initiatives, President Umaru Musa Yar'adua in the last quarter of 2008 directed that payments from the fund of the federal government be made electronically. Following the presidential directive, a treasury circular, Reference No TRY/A8 and B8/2008 was issued on October 22, 2008 prescribing a broad guideline for the implementation of the e-Payment system [6]. The concept was a welcome novelty.

The new payment system, commenced in all Federal Ministries, Departments and Agencies (MDAs) on January 1st 2009, was to introduce cashless regime in all government's transactions with the aim of hastening and quickening payments to the beneficiaries. According to the directive, the e-Payment regime covers all payments with particular emphasis to payments to contractors and consultants and to service providers like the Power Holding Company of Nigeria (PHCN). It also covers all payments to government workers and to other government agencies like the Federal Inland Revenue Service [3].

The e-Payment system has a very important role to play in e-Government. This system has made it possible for

government to send citizens information of payment via an electronic channel, and payment also done by the use of this electronic mean. However, citizens can do such payment by phone or SMS and by means of using Internet banking system to pay bills. Companies and others business institutions can do their payment transaction to governments through the use of the Internet. Moreover businesses and various institutions could pay their council taxes through the e-Payment system while citizens and other industries could pay mortgages to government via the system. International financial institutions and major donor organisations could also do their financial transaction for good governance through e-Payment. Government uses e-Payment to pay contractors, sub contractors, other suppliers and operators of public services contracts. However, the government needs to protect personnel information and data of their citizens, and to provide security to the system.

IV. RESEARCH

From the foregoing, a theoretical framework was developed and a survey was conducted. The purpose of the research was to determine the gains derived from the e-Payment system since it was introduced as well as the challenges confronting the new payment mechanism.

A. Research Location and (Target) Population

The study was carried out at the ancient city of Ibadan, Oyo State, South Western Nigeria. The city, which is the headquarters of the defunct Western Region, is home to several federal government establishments which are the focus of this study. Federal government establishments were chosen because of the implementation of the e-Payment system in the MDAs. The randomly selected establishments are the University of Ibadan, National Horticultural Research Institute (NIHORT), Federal College of Agriculture, Power Holding Company of Nigeria (PHCN), University College Hospital (UCH) and Federal College of Animal Health and Production Technology. The research (target) population for the study are the staff of the Account and Computer/ICT departments of the selected establishments (six in number), being the people directly involved in the e-Payment application and/or knowledgeable about how it operates. This was done in order to give credence to the results obtained from the study.

B. Research Methodology

A series of interview, not discussed in this paper, was conducted with some e-Payment system experts. The case study data was used to refine the list of gains and challenges from e-Payment system which formed the basis of the structured questionnaire designed and used as the data collection instrument to elicit primary data from the population. Questions posed relate directly to the personal characteristics of the respondents as well as the information about the organisation and sought to explore the gains and challenges from the e-Payment system.

The data gathered on the gains and challenges from e-Payment from the questionnaire responses are ordinal and presented on a Likert Scale. The Likert Scale, commonly used in business research [7], was used because it enables participants to respond with degrees of agreement or disagreement [5]. Respondents were asked to rate the anticipated and identified gains from e-Payment in their

establishments, as well as the encountered and identified challenges. The purpose was to examine what e-Payment subsequently turned out to be since its introduction. The rating was on a scale from 1 (least important) to 4 (most important).

Since the data were measured in an ordinal scale, non-parametric statistical tests were used [8]. Non-parametric tests are statistical procedures that use nominal or ordinal-scaled data [11], [5]. The benefits of using non-parametric statistical tests are that they typically need fewer assumptions about the data and they are much easier to learn and to apply than parametric tests. Also, they are capable of analysing the data inherently in ranks as well as analysing data whose seemingly numerical scores have the strength of ranks [8]. Also, to establish if there is a significant difference in the anticipated and encountered gains and challenges of e-Payment in the government's MDAs, the t-Test was performed. The collated data were analysed using the data analysis tool of the Microsoft Excel 2007.

C. Response Rate

A total of sixty (60) questionnaires were administered to the respondents. Out of these, forty-four (44) were completed correctly and this forms the sample size. The useable responses represent a very good response rate of 73.3%.

V. RESULTS AND DISCUSSION

To establish the rank order of gains from e-Payment system as well as the challenges in the government establishments, the medians were computed. Table 1 and Table 2 present their rank and percentile results, showing their Rank orders based on median values for each variable, as well as the number of valid answers.

Table 1 indicates that the most commonly identified gains associated with e-Payment system include easy and quick transaction, reduced transaction and operation cost and 24hrs service, while the least identified gains were improved transaction and enhancement of cashless society.

From Table 2 it can be concluded that the frequent challenges encountered in the course of e-Payment application include delay in bank and inter-bank transactions, risk of online data theft and Internet fraud, corruption, inexistence of legal and regulatory framework and frequent Internet connectivity failure, while low Internet bandwidth, peculiar problem like loan deductions and people's resistant to change were the least challenges of the e-Payment system.

The t-Test was employed to compare whether there is significance difference in the mean positive and negative responses to each of the nine identified gains of e-Payment system as well as the twelve considered challenges. The results are presented in Table 3 and Table 4.

For the nine gains of the e-Payment system considered in this research, the t-Test result shows that the mean number of positive response was significantly different ($P < 0.01$) from that of the negative response for each of the gains.

Also, for the twelve challenges of the e-Payment system considered in this study, the t-Test result shows that the mean number of positive response was significantly different ($P < 0.01$) from that of the negative response for each of the challenges, except for the risk of online data theft and Internet fraud.

VI. CONCLUSION

Information and Communication Technology (ICT) has inarguably made our lives easier. It has cut across distance, space and even time. One of the technological innovations in e-Government is the e-Payment, a technological breakthrough that enables us to perform financial transactions electronically, thus avoiding long lines and other hassles.

To maximise the potential of e-Payment system, government and other stakeholders must be aware of the gains and challenges of paying electronically. This research examined these factors in the federal government’s Ministries, Departments and Agencies (MDAs). According to the respondents, other gains that are associated with the e-Payment are:

- Reduction of robbery
- Encouragement of safe financial practice
- Nation-wide connectivity of Nigerian banks
- Enhancement of productivity

In addition, the expected and current gains from the e-Payment system in the government’s Ministries, Departments and Agencies (MDAs) and the associated challenges might have been subjected to the readiness of the government as at the time the new payment mechanism was introduced. According to the survey, about 45.5% of the respondents thought that the MDAs were not ready to practice e-Payment when it was introduced, about 47.7% thought otherwise while about 6.8% were undecided.

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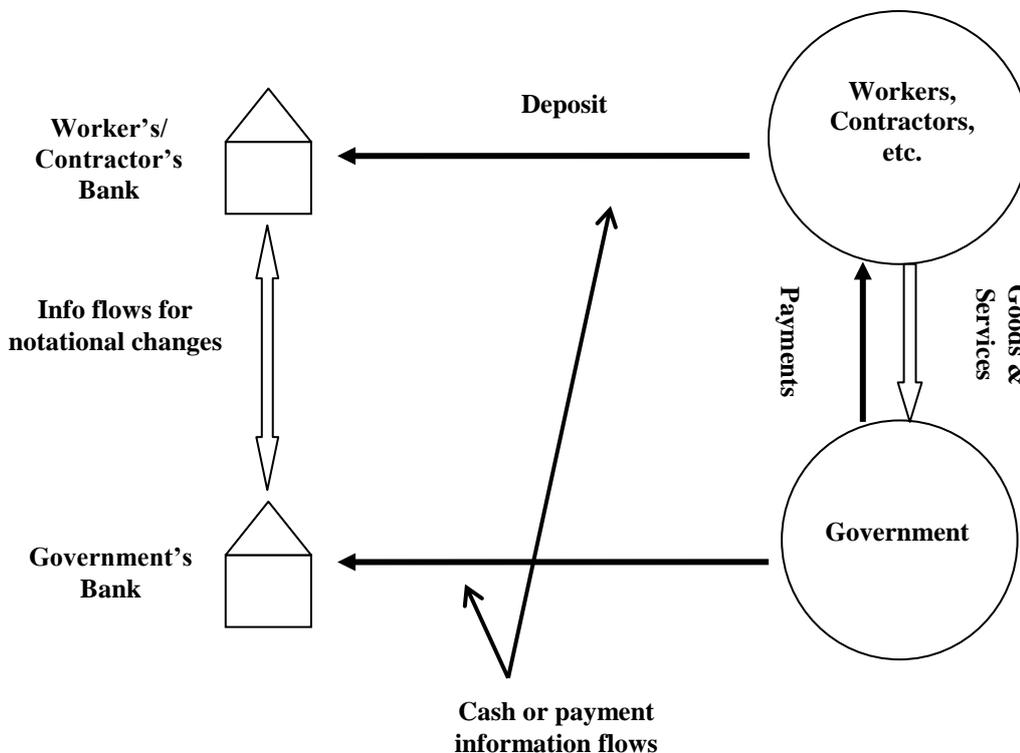


Figure 1: Simplified Model of Transaction

Table 1: Rank and Percentile for Gains from e-Payment System

Rank	Gains	Median	No of Cases	Percent
1	Easy and quick transaction	12.0000	44	75.00%
	Reduced transaction and operation costs	12.0000	44	75.00%
	24 hrs service (transaction anytime, anywhere)	12.0000	41	75.00%
4	Quicker and convenient payment	11.0000	44	62.50%
5	Improved transparency	10.0000	44	25.00%
	Improved accountability	10.0000	44	25.00%
	Increased efficiency	10.0000	44	25.00%
8	Improved accuracy of transaction	9.0000	43	0.00%
	It enhances cashless society	9.0000	41	0.00%

Table 2: Rank and Percentile for Challenges of e-Payment System

Rank	Challenges	Median	No of Cases	Percent
1	Delay in bank and inter-bank transactions	12.0000	42	100.00%
2	Risk of online data theft and Internet fraud	10.5000	42	81.80%
	Corruption	10.5000	43	81.80%
4	Inexistent of legal and regulatory framework	10.0000	39	72.70%
5	Frequent Internet connectivity failure	9.5000	42	63.60%
6	Epileptic power supply	8.5000	42	45.40%
	Inefficient telecommunication/ICT system	8.5000	41	45.40%
8	Low level of ICT awareness	8.0000	42	9.00%
	High cost of Internet access	8.0000	42	9.00%
	Low Internet bandwidth	8.0000	40	9.00%
	Peculiar problems (such as loan deductions, etc.)	8.0000	43	9.00%
12	People's resistance to changes (e.g. e-Payment)	6.5000	41	0.00%

Table 3: Result of the Test of Difference Between Mean Values Per e-Payment Gain

	Mean	t	df	Sig. (2-tailed)
Pair 1 Positive1 – Negative1	10.00	5.000	1	0.126
Pair 2 Positive2 – Negative2	13.00	2.600	1	0.234
Pair 3 Positive3 – Negative3	5.50	3.667	1	0.170
Pair 4 Positive4 – Negative4	14.00	1.750	1	0.330
Pair 5 Positive5 – Negative5	18.00	9.000	1	0.070
Pair 6 Positive6 – Negative6	16.00	4.000	1	0.156
Pair 7 Positive7 – Negative7	14.00	1.400	1	0.395
Pair 8 Positive8 – Negative8	13.50	1.174	1	0.449
Pair 9 Positive9 – Negative9	14.50	1.706	1	0.338

Table 4: Result of the Test of Difference Between Mean Values Per e-Payment Challenge

	Mean	t	Df	Sig. (2-tailed)
Pair 1 Positive1 – Negative1	10.00	1.667	1	0.344
Pair 2 Positive2 – Negative2	12.00	0.000	1	0.000
Pair 3 Positive3 – Negative3	0.50	-0.111	1	0.930
Pair 4 Positive4 – Negative4	6.50	0.619	1	0.647
Pair 5 Positive5 – Negative5	17.00	4.250	1	0.147
Pair 6 Positive6 – Negative6	17.00	2.833	1	0.216
Pair 7 Positive7 – Negative7	11.50	1.095	1	0.471
Pair 8 Positive8 – Negative8	13.00	1.857	1	0.314
Pair 9 Positive9 – Negative9	12.00	1.500	1	0.374
Pair 10 Positive10 – Negative10	15.00	1.667	1	0.344
Pair 11 Positive11 – Negative11	6.50	0.619	1	0.647
Pair 12 Positive12 – Negative12	17.50	2.059	1	0.288