

**Information and Communication Technology (ICT) in Banking Operations in
Nigeria – An Evaluation of Recent Experiences**

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Abstract

The study is a comprehensive evaluation of the response of Nigerian banks to the adoption of ICT. Three categories of variables that relate to the adoption and implementation of information technology devices were used for the study. These include the nature and degree of adoption of innovative technologies; degree of utilisation of the identified technologies; and the impact of the adoption of ICT devices on banks operation. The study covered 36 out of the 89 banks in the country as at the end of 2005. A total of 216, 180 and 36 questionnaires were administered to the employees, customers and Head of Systems Units of the 36 selected banks respectively. Out of these, 90.28%, 77.78% and 97.22% were respectively retrieved.

The study revealed that the period between 1990 and 2005 was characterized by fundamental changes in the content and quality of banking business in the country. Technology has been discovered to be the main driving force of competition in the banking industry during the period of study. Whereas only one bank had ATM in 1998 by 2004, 14 of the studied banks had acquired the technology. EFT also increased from 3 to 14; Smart Cards from 1 to 11; Electronic Home and Office Banking from 3 to 9 and Telephone Banking from 3 to 12 within the same period. The adoption of ICT in

banks has improved customer services, facilitated accurate records, provides for Home and Office Banking services, ensures convenient business hour, prompt and fair attention, and enhances faster services. The adoption of ICT improves the banks' image and leads to a wider, faster and more efficient market. It has also made work easier and more interesting, improves the competitive edge of banks, improves relationship with customers and assists in solving basic operational and planning problems.

Introduction

Today's business environment is very dynamic and undergoes rapid changes as a result of technological innovation, increased awareness and demands from customers. Business organisations, especially the banking industry of the 21st century operates in a complex and competitive environment characterized by these changing conditions and highly unpredictable economic climate. Information and Communication Technology (ICT) is at the centre of this global change curve. Laudon and Laudon, (1991) contend that managers cannot ignore Information Systems because they play a critical role in contemporary organisation. They point out that the entire cash flow of most fortune 500 companies is linked to Information System.

The application of information and communication technology concepts, techniques, policies and implementation strategies to banking services has become a subject of fundamental importance and concerns to all banks and indeed a prerequisite for local and global competitiveness. ICT directly affects how managers decide, how they plan and what products and services are offered in the banking industry. It has

continued to change the way banks and their corporate relationships are organized worldwide and the variety of innovative devices available to enhance the speed and quality of service delivery.

Harold and Jeff (1995) contend that financial service providers should modify their traditional operating practices to remain viable in the 1990s and the decades that follow. They claim that the most significant shortcoming in the banking industry today is a wide spread failure on the part of senior management in banks to grasp the importance of technology and incorporate it into their strategic plans accordingly. Woherem (2000) claimed that only banks that overhaul the whole of their payment and delivery systems and apply ICT to their operations are likely to survive and prosper in the new millennium. He advises banks to re-examine their service and delivery systems in order to properly position them within the framework of the dictates of the dynamism of information and communication technology. The banking industry in Nigeria has witnessed tremendous changes linked with the developments in ICT over the years. The quest for survival, global relevance, maintenance of existing market share and sustainable development has made exploitation of the many advantages of ICT through the use of automated devices imperative in the industry. This study evaluates the response of Nigerian banks to this new trend and examines the extent to which they have adopted innovative technologies in their operations and the resultant effects.

Information and Communication Technology

Information Technology (IT) is the automation of processes, controls, and information production using computers, telecommunications, software and ancillary equipment such as automated teller machine and debit cards (Khalifa 2000). It is a term that

generally covers the harnessing of electronic technology for the information needs of a business at all levels. Irechukwu (2000) lists some banking services that have been revolutionized through the use of ICT as including account opening, customer account mandate, and transaction processing and recording. Information and Communication Technology has provided self-service facilities (automated customer service machines) from where prospective customers can complete their account opening documents direct online. It assists customers to validate their account numbers and receive instruction on when and how to receive their chequebooks, credit and debit cards. Communication Technology deals with the Physical devices and software that link various computer hardware components and transfer data from one physical location to another (Laudon and Laudon; 2001).

ICT products in use in the banking industry include Automated Teller Machine, Smart Cards, Telephone Banking, MICR, Electronic Funds Transfer, Electronic Data Interchange, Electronic Home and Office Banking.

Several authors have conducted investigation on the impact of ICT on the banking sector of the Nigeria economy. Agboola et al (2002) discussed the dimensions in which automation in the banking industry manifest in Nigeria. They include:

- (i) Bankers Automated Clearing Services: This involves the use of Magnetic Ink Character Reader (MICR) for cheque processing. It is capable of encoding, reading and sorting cheques.
- (ii) Automated Payment Systems: Devices used here include Automatic Teller Machine (ATM), Plastic Cards and Electronic Funds Transfer.

(iii) Automated Delivery Channels: These include interactive television and the Internet.

Agboola (2001) studied the impact of computer automation on the banking services in Lagos and discovered that Electronic Banking has tremendously improved the services of some banks to their customers in Lagos. The study was however restricted to the commercial nerve center of Nigeria and concentrated on only six banks. He made a comparative analysis between the old and new generation banks and discovered variation in the rate of adoption of the automated devices.

Aragba-Akpore (1998) wrote on the application of information technology in Nigerian banks and pointed out that IT is becoming the backbone of banks' services regeneration in Nigeria. He cited the Diamond Integrated Banking Services (DIBS) of Diamond Bank Limited and Electronic Smart Card Account (ESCA) of All States Bank Limited as efforts geared towards creating sophistication in the banking sector. Ovia (2000) discovered that banking in Nigeria has increasingly depended on the deployment of Information Technology and that the IT budget for banking is by far larger than that of any other industry in Nigeria. He contended that On-line system has facilitated Internet banking in Nigeria as evidenced in some of them launching websites. He found also that banks now offer customers the flexibility of operating an account in any branch irrespective of which branch the account is domiciled.

Woherem (1997) discovered that Nigeria banks since 1980s have performed better in their investment profile and use of ICT systems, than the rest of industrial sector of the economy. An analysis of the study carried out by African Development Consulting Group Ltd. (ADCG) on IT diffusion in Nigeria shows that banks have invested more on IT, have more IT personnel, more installed base for PCs, LANs, and WANs and

a better linkage to the Internet than other sectors of the Nigerian economy. The study, however pointed out that whilst most of the banks in the west and other parts of the world have at least one PC per staff, Nigerian banks are lagging seriously behind, with only a PC per capital ratio of 0.18 (Woherem, 2000).

This study carried out a more comprehensive evaluation of the response of Nigerian banks to the adoption of ICT. The study covered 36 out of the 89 banks in the country as at the end of 2005. A total of 216, 180 and 36 questionnaires were administered to the employees, customers and Head of Systems Units of the 36 selected banks respectively. Out of these, 90.28%, 77.78% and 97.22% were respectively retrieved. Three categories of variables that relate to the adoption and implementation of information technology devices were used for the study. These are:

- (i) Nature and Degree of adoption of innovative technologies
- (ii) Degree of utilisation of the identified technologies:
- (iii) Impact of the adoption of IT devices on banks operation

The first variable refers to how banks have made new products and services available to customers. These services include computerized credit ratings, programs that determine when cheques should be made available to customers and daily calculation of accounting balances. It also involves how various types of information technology devices are made available in each of the studied banks. A table was used to display the availability of the ICT in the studied banks.

The Likert-type rating was used to measure and analyse the degree of utilisation of identified technologies and the variations in their rate of adoption.

The responses were analysed on a 4-point itemized rating. Impacts of the adopted technologies were examined on specific areas of banking services. The impact analysis model developed by Agarwal and Tanniru (1992) was used to assess the effects of ICT on both the process generated (task performed) and the process dimensions. Both local and global impact criteria were considered. The impact is global when the resource used or released by a process impact other processes outside the main decision, but local if it affects only the generation of the product or task performed (Ugwu et al., 1999). Direct impacts of IT on local criteria such as time saving, error rate reduction, enhanced management decision making, and improved speed of service delivery as perceived by the bank workers and customers were examined. The impact on global criteria such as competitive advantage, market segmentations, high revenue and forecasting were also assessed. The impact assessment model looks at the performance (effectiveness and efficiency) and effect which the applications of systems have within an organisation. The performance assessment helps to determine whether to readjust or put more resources to improve performance of the system while applications assessment helps to determine how the implementation and use of introduced systems affects the organisation (Senn, 1982) The responses of customers on the impact of IT were measured on a 5-point Likert-type rating scale. Arithmetic mean and standard deviation of the local and global impact criteria were calculated to determine their levels.

Table 1 shows that the adoption of most of the ICT products in the studied banks took place within the last five years. Automated Teller Machine, Smart Cards and Telephone Banking were not available between 1990 and 1996 in any of the studied banks. Only one bank claimed to have Electronic Home and Office Banking within the same period. However striking exceptions were noticeable in the adoption of the MICR and LAN technologies where most of the banks had adopted the use before 1998. The reason for the early adoption of MICR technology was due to the mandatory stand of the apex bank (CBN) on a phased implementation of automation of clearing house scheduled to take place between 1990 and 1993. Since MICR cheques were central to the implementation of this policy most banks were forced to adopt its use. Early adoption of Local Area Network in the early 1990's was influenced by the advent of Micro Computers in the fourth generation which made connectivity feasible.

Table 1: Number of Banks that Adopted Various ICT Products at Different Periods

	1990-1992	1993-1995	1996-1998	1999-2001	2002-2004
Automated Teller Machine	-	-	1	4	14
Electronic Funds Transfer	4	1	3	10	14
Electronic Data Exchange	2	2	4	5	7
Smart Cards	-	-	1	12	11
MICR Cheques	-	20	10	4	1
Local Area Network	13	8	6	5	3
Wide Area work	5	3	7	13	5
Point of Sales System	2	1	3	9	10

Electronic Home and Office Banking	-	1	3	6	9
Telephone Banking	-	-	3	10	12
Make Cheque Available Program	1	1	3	7	10
Computerized Credit Rating	1	3	2	6	13
Daily Calculation of Accounts Program	19	2	4	6	3

Source: Research Survey, 2004

Rate of adoption increased progressively in all the studied banks between 1990 and 2004 because of the crucial roles it plays in the operations of banks. This agrees with Laudon, and Laudon, (1991) who contend that managers cannot ignore Information System because they play a critical role in contemporary organisation. Adetayo, et al, (1999) and Boyett (1995) also maintain that in order to succeed (or even to survive) in this dynamic world, companies must take not only traditional actions such as lowering cost, but keep pace with ever changing capabilities of IT. Harold et al (1995) contend that it has become axiomatic that to remain viable in the 1990s and the decades that follow, financial service providers must modify their traditional operating practices. Woherem (2000) claimed that only banks that overhaul the whole of their payment and delivery systems and operations and apply IT devices are likely to survive and prosper in the new millennium.

Table 2: shows the spread of ICT technologies between the headquarters and branches of each of the studied banks. The most widely adopted products were Wide Area Network (3.75), MICR (3.67), Local Area Network (3.67), DCB (3.50) and program for Daily Calculation of Accounts. This implies that the products were adequately spread from the headquarters to most of the branches. Direct observation by the researcher also confirmed the availability of the products in most of the branches visited. This shows a growing trend in the rate of adoption of ICT in banking operations. The spread of Electronic Funds Transfer (3.29) ranked next to four ICT products mentioned above. There was a growing trend in the use of electronic means of transferring funds both at the local branches and headquarters. Money is now being transferred at the press of button. This agrees with Ovia (1997) who states that the new technologies have created unparalleled wired economy and that the transfer of money from point 'A' to

Table 4.4: Spread of Innovative Technologies in the Studied Banks

		x	f	fx	\bar{x}	S	%
a.	Spread of ATM						
	Headquarters and most branches	4	4	16	2.15	1.92	11.8
	Headquarters and few branches	3	12	36			35.3
	Headquarters only	2	3	6			8.8
Not yet available	1	15	15	44.1			
b.	Spread of Electronic funds transfer						
	Headquarters and most branches	4	21	84	3.29	0.969	61.8
	Headquarters and few branches	3	4	12			11.8
	Headquarters only	2	7	14			20.6
Not yet available	1	1	2	5.9			
c.	Spread of Electronic Data Interchange						
	Headquarters and most branches	4	17	68	3.04	1.26	60.7
	Headquarters and few branches	3	1	3			3.6
	Headquarters only	2	4	8			14.3
Not yet available	1	6	6	21.4			
d.	Spread of Smart Cards						
	Headquarters and most branches	4	16	64	3.10	1.19	55.2
	Headquarters and few branches	3	6	18			20.7
	Headquarters only	2	1	2			3.4
Not yet available	1	6	6	20.7			
e.	Spread of MICR						
	Headquarters and most branches	4	27	108	3.67	0.73	81.8
	Headquarters and few branches	3	1	3			3.0
	Headquarters only	2	5	10			15.2
Not yet available	1						
f.	Spread of Local Area Network						
	Headquarters and most branches	4	27	108	3.67	0.73	91.7
	Headquarters and few branches	3	1	3			2.8
	Headquarters only	2	5	10			5.6
Not yet available	1	-	-				
g.	Spread of Wide Area Network						
	Headquarters and most branches	4	30	120	3.75	0.60	83.3
	Headquarters and few branches	3	3	9			8.3
	Headquarters only	2	3	6			8.3
Not yet available	1						
h.	Spread of PSS						
	Headquarters and most branches	4	10	40	2.83	1.07	33.3
	Headquarters and few branches	3	10	30			33.3
	Headquarters only	2	5	10			16.7
Not yet available	1	5	5	16.7			
i.	Spread of Electronic Home and Office Banking						
	Headquarters and most branches	4	6	24	2.72	1.11	18.8
	Headquarters and few branches	3	9	36			28.1
	Headquarters only	2	10	20			31.3
Not yet available	1	7	7	21.9			
j.	Spread of Telephone Banking						
	Headquarters and most branches	4	14	56	2.31	1.70	40.0
	Headquarters and few branches	3	6	18			17.1
	Headquarters only	2	12	4			34.3
Not yet available	1	3	3	8.6			
k.	Spread of MCAC						
	Headquarters and most branches	4	11	44	2.73	1.23	42.3
	Headquarters and few branches	3	4	12			15.4
	Headquarters only	2	4	8			15.4
Not yet available	1	7	7	26.9			
	Spread of Computerized Credit Rating						
	Headquarters and most branches	4	14	56	3.12	1.09	53.8
	Headquarters and few branches	3	4	12			15.4
	Headquarters only	2	5	10			19.2
Not yet available	1	3	3	11.5			
	Spread of DCB						
	Headquarters and most branches	4	27	108	3.5	1.0	79.4
	Headquarters and few branches	3	-	-			-
	Headquarters only	2	4	8			11.8
Not yet available	1	3	3				

Source: Field Survey, 2004

point 'B' has resulted in turning the actual money into bits and bytes through satellite transponders, fibre optic cables or regular telephone

The use of Computerized Credit Rating, Smart Cards and Electronic Data Interchange EDI, could also be found in the bank headquarters and very few branches. Other ICT products such as ATM, Electronic Home and Office Banking, Telephone Banking and Make Cheque Available Programs could only be found in the headquarters of most banks. In line with our findings in the period of adoption, ATM still ranked least in its spread while Telephone Banking, Make Cheque Available Program and Electronic Home and Office Banking follow in that order. Low rate of spread of these technologies might be due to cost, fear of fraudulent practices and lack of facilities necessary for their operation. Increase in the rate of adoption and the spread of ICT products, especially the use of cards has reduced the influence of cash on financial transactions. This agrees with the findings of (David 1982) that there has been a very modest move away from cash. Frazer (1985) also contends that the advantages of cash diminish as the value of transactions increases. Some payments are now being automated and absolute volumes of paper transactions have declined under the impact of electronic transaction brought about by the application of ICT to the payment system in Nigeria.

Tables 3 and 4 show the impact of local and global criteria on the adoption of ICT products in the banking industry. The criteria used for the local impact are time saving, error rate reduction, management decisions and speed of transaction while those considered for global impact are competitive strength, market segmentation, improved revenue, proper forecasting and modernisation. Respondents believe that ICT impacts positively on all the criteria. The calculated mean of 4.97 on the likert scale, which is close to 5 also supports that it saves time. It also reduces error (4.54), speeds

up transaction (4.54) and assists management to take quality decisions (4.54). Similarly, it improves competitive strength (4.86), enhances proper market segmentation (4.24), improves revenue (4.18), ensures modernisation (4.69) and proper forecasting (4.30).

The positive impact of ICT on the global criteria, especially improved revenue corroborates the findings Laudon, and Laudon, (1991) who studied the entire cash flow of most fortune 500 companies and linked their success to Information System. They concluded that Information Technology directly affects how managers decide, how they plan and what products and services are produced.

Table 3: Induced Impact of ICT Devices on Local Criteria

		x	f	fx	\bar{x}	%
a.	Influence of ICT on Time Saving					
	Very High	5	34	170	4.97	97.1
	High	4	1	4		2.9
	Moderate	3				
	Low	2				
	Very Low	1				
b.	Influence of ICT Devices on Error Rate Reduction					
	Very High					
	High	5	24	120	4.54	88.6
	Moderate	4	6	24		17.1
	Low	3	5	15		14.3
	Very Low	2				
c.	Influence of ICT on Management Decisions					
	Very High					
	High	5	21	105	4.54	60.0
	Moderate	4	12	48		34.3
	Low	3	2	6		5.7
	Very Low	2		-		
d.	Influence of ICT on Speed of Transaction					
	Very High					
	High	5	32	160	4.91	91.4
	Moderate	4	3	12		8.65
	Low	3		-		
	Very Low	2		-		
		1		-		

Source: Research Survey, 2004.

Table 4.: Induced Impact of ICT on Global Criteria

		x	f	fx	\bar{x}	%
a.	Need for Competitive Strength					
	Highly Responsible	5	30	150	4.86	85.7
	Responsible	4	5	20		14.3
	Fairly Responsible	3	-	-		
	Hardly Responsible	2	-	-		
	Not Responsible	1	-	-		
b.	Need for Market Segmentation					
	Highly Responsible	5	15	75	4.24	44.1
	Responsible	4	14	54		41.2
	Fairly Responsible	3	3	9		8.8
	Hardly Responsible	2	2	4		5.9
	Not Responsible	1	-	-		-
c.	Need for Improved Revenue					
	Highly Responsible	5	17	85	4.18	50.0
	Responsible	4	9	36		26.5
	Fairly Responsible	3	5	15		14.7
	Hardly Responsible	2	3	6		8.8
	Not Responsible	1	-	-		
d.	Need Proper Forecasting					
	Highly Responsible	5	17	85	4.30	51.5
	Responsible	4	11	44		33.3
	Fairly Responsible	3	4	12		12.1
	Hardly Responsible	2	-	-		-
	Not Responsible	1	1	1		3.0
e.	Need for Modernisation					
	Highly Responsible	5	26	130	4.69	72.5
	Responsible	4	7	28		20.0
	Fairly Responsible	3	2	6		5.5
	Hardly Responsible	2				2.5
	Not Responsible	1				

Source: Research Survey, 2004.

Some factors identified to show the effects of ICT products on customer services are shown in Tables 5 and 6. These factors include facilitation of accurate records, enhancement of convenient business hour, facilitation of prompt and fair attention, enhancement of faster services and availability of Home and Office Banking services. About 46 of the customers strongly agreed and 45 agreed that the adoption of ICT products in banking facilitates accurate records. The mean of 4.34 on the likert scale also supports this view. Similarly, the selected customers believed that the adoption enhanced convenient business hour, facilitates prompt and fair attention, enhances faster services, and makes Home and Office Banking available to customers.

The result of the interview conducted for the customers also showed their positive response towards the adoption of ICT. Customers were happy with great improvement on statement generation, accounts reconciliation and balance enquiry making. Manual recording system through the use of ledger, cash books have been replaced by computerized information system.

Table 5: Effects of the Adoption of ICT Products on Customer Services

		x	f	fx	\bar{x}	S	%
a.	Adoption of ICT Products Facilities Accurate Record						
	Strongly Agree	5	65	325	4.34	.75	46.4
	Agree	4	63	252			
	Hardly Agree	3	8	24			
	Disagree	2	3	6			
	Strongly Disagree	1	1	1			
b.	Adoption of ICT Facilities Convenient Business Hour						
	Strongly Agree	5	48	240	4.13	.85	34.5
	Agree	4	72	288			
	Hardly Agree	3	9	27			
	Disagree	2	9	18			
	Strongly Disagree	1	1	1			
c.	Adoption of ICT Enhances Prompt and Fair Attention						
	Strongly Agree	5	47	235	4.10	.82	33.6
	Agree	4	67	268			
	Hardly Agree	3	20	60			
	Disagree	2	5	10			
	Strongly Disagree	1	1	1			
d.	Adoption of ICT Enhances Faster Services						
	Strongly Agree	5	64	320	4.26	.91	47.8
	Agree	4	52	208			
	Hardly Agree	3	9	27			
	Disagree	2	7	14			
	Strongly Disagree	1	2	2			
e.	Ability to Access Accounts at Any Location						
	Strongly Agree	5	48	240	3.76	1.24	35.6
	Agree	4	40	160			
	Hardly Agree	3	21	63			
	Disagree	2	18	36			
	Strongly Disagree	1	8	8			
f.	Ability to Access Account at Any Point in Time						
	Strongly Agree	5	36	180	3.46	1.23	26.5
	Agree	4	33	132			
	Hardly Agree	3	31	93			
	Disagree	2	29	58			
	Strongly Disagree	1	7	7			
g.	Adoption of ICT Makes Enquiries on Accounts Faster						
	Strongly Agree	5	14	70	4.19	.78	10.6
	Agree	4	63	252			
	Hardly Agree	3	23	69			
	Disagree	2	26	52			
	Strongly Disagree	1	6	6			
h.	Adoption of ICT hastens Funds Transfer						
	Strongly Agree	5	57	285	4.23	.79	41.3
	Agree	4	61	244			
	Hardly Agree	3	16	48			
	Disagree	2	3	6			
	Strongly Disagree	1	1	1			
i.	Adoption of ICT Makes International Market accessible						
	Strongly Agree	5	34	170	3.80	1.01	26.0
	Agree	4	55	220			
	Hardly Agree	3	28	84			
	Disagree	2	10	20			
	Strongly Disagree	1	4	4			
j.	Adoption of ICT reduces in Interpersonal Relationships						
	Strongly Agree	5	14	70	3.40	1.06	10.6
	Agree	4	63	252			
	Hardly Agree	3	23	69			
	Disagree	2	26	52			
	Strongly Disagree	1	6	6			
k.	Adoption of ICT makes Communication Easy						
	Strongly Agree	5	43	215	4.12	8.0	30.9
	Agree	4	77	308			
	Hardly Agree	3	13	39			
	Disagree	2	4	8			
	Strongly Disagree	1	2	2			

Source: Research Survey, 2004.

Table 6: Attitude of Customers Towards the Adoption of ICT Devices

	N	Mean	Std. Deviation	Minimum	Maximum
Adoption of ICT devices in enhances accuracy of records	140	4.34	.75	1	5
Adoption of ICT devices in enhances convenient business ho	139	4.13	.85	1	5
Adoption of ICT devices in bank to more prompt and fair attention	140	4.10	.82	1	5
Adoption of ICT devices in banks to faster services					
Adoption of ICT devices in banks Enables customers to access a at any location	134	4.26	.91	1	5
Adoption of ICT devices in Enables customers to access a at their convenient time	135	3.76	1.24	1	5
Adoption of ICT devices in banks enquiries faster	136	3.46	1.23	1	5
Adoption of ICT devices in banks transfer of funds faster	139	4.19	.78	1	5
Adoption of ICT devices in enhances access to inter markets	138	4.23	.79	1	5
Adoption of ICT devices in reduces interpersonal relationship	131	3.80	1.01	1	5
Adoption of ICT devices in bank communication	132	3.40	1.06	1	5
	139	4.12	.80	2	5

Source: Research Survey, 2004.

Adoption of ICT has influenced the content and quality of banking operations. From all indications, ICT presents great potential for business process reengineering of Nigerian Banks. Investment in information and communication technology should form an important component in the overall strategy of banking operators to ensure effective performance. It is imperative for bank management to intensify investment in ICT products to facilitate speed, convenience, and accurate services, or otherwise lose out to their competitors. The banking industry in Nigeria presents ICT providers with great opportunity to market their innovations. Success in this area however depends on how they can customise their services to appeal to the ready minds of various stake holders in the industry.

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