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Optimizing the Use of Information and Communication Technology (ICT) in Nigerian Banks

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Abstract

The study identified various Information and Communication Technology (ICT) in use and determined how they could be utilized for optimal performance on business transactions in the banking industry. The selected transactions for the study are deposit, withdrawal, enquiries, reference letters, opening and closing of accounts, funds transfer, special bills, loans and overdraft. The study covered 24 banks stratified into old and new generations. In all there were 14 old generation banks and 75 new generation banks as at December 2005. Proportional sampling technique was used to select samples from the two groups using ratio 1:5. Random sampling technique was then used to select on the basis of this ratio. Consequently, 4 'old' and 20 'new' generation banks were randomly selected. One thousand and two hundred customers were observed (Fifty customers from each of the selected banks) for the identified transactions. The Queuing model was thereafter used to measure the service standard and analyse the capacity utilisation in the studied banks.

About half of the respondents (48.08%) in the studied banks came to withdraw while 34.75% came to make deposits. Special bills ranked least among the activities of customers in the studied banks. Only 23 out 1200 customers observed engaged in transfer of funds while 33 came for loan and overdraft. It was discovered that design of (ICT) in banking has not been adequately focused on deposit and withdrawal which are activities that directly impact on customer services. Products such as ATM, Electronic Data Interchange, Electronic Home and Office Banking and Telephone Banking that could have hastened these activities were the least fully adopted technologies. The rate of adoption of ATM was 16.7%, Electronic Home and Office Banking was 16.7% and Telephone Banking was 20.8%.

The new generation banks appeared to be more efficient in utilising ICT to enhance performance. The traffic intensities in 50% of the old generation banks where ICT was not efficiently utilised were between 0.89 and 0.95 as against the theoretical limit of 0.80 thus making the queue of infinite length. The traffic intensity for all the new generation banks was less than 0.8. On the average, customers spent 23.01 minutes in the old generation banks as compared to 7.50 in the new generation banks. Similarly, average number of customers in the system in the old generation banks was 8.39 as compared to 2.56 in the new generation banks. The idle times in banks 3, 6, 12, 16, 17, 19, 21, 23 and 24 seemed to be too high, an indication of over-utilization or inappropriate allocation of products.

The study concluded that banks should incorporate ICT into their strategic plans for effective performance in payment and delivery systems. Adoption and allocation of ICT should be based on proper analysis to determine the type, nature and extent of products required for effectiveness and efficiency.

Keywords: **Banking, information and communication technology**

INTRODUCTION

One of the greatest concerns of every business organization is customer satisfaction. In the banking industry, most customers are motivated by accuracy of records and

timely provision of services. Particularly, most of them measure the service standard of banks on how timely transactions are completed. A lengthy queue may lead to loss of good will or/and profit, either of which is an unhealthy situation for banks. A lot of managerial efforts are directed towards ameliorating this situation.

Most managers attempt to solve queuing problems by hiring more workers or procuring additional facilities to reduce the waiting time. These options must be considered with proper analysis of the queuing situation to prevent increase in the staffing cost and/or idleness of both human and material resources. Another strategy considered by most managers for efficient time management to improve banking services and reduce the waiting time is the application of information and communication technology (ICT). Again most managers have come to terms with the reality of proper analysis of the queuing situation to determine the type, nature and extent of ICT products required for effectiveness and efficiency.

Application of ICT in banks is done through the power and connectivity of personal computers which have linked banks and their operations locally and globally. Woherem (2000), claims 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. Harold and Jeff (1995) contend 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. Consequently, they believe that financial service providers should modify their traditional operating practices to remain viable in the industry. *Laudon & Laudon* (2001) state that knowledge and information are becoming the foundation for many services and products. *Leonard – Barton (1995)* confirms that ICT products have become critical and strategic assets for managers. They are needed to optimize the flow of information and knowledge within the organization and to help management maximize the firm's knowledge resources. Woherem (2000) advises organizations that want to survive 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. Adetayo, et. al., (1999) and Boyett (1995) maintain that in order to succeed (or even to survive) in this dynamic world, organizations must keep pace with the ever changing capabilities of ICT.

ICT is a combination of 'Information Technology' and 'Communication Technology'. It merges computing with high speed communications link carrying data, sound and video (Alabi, 2005). Information Technology (IT) deals with the collection, storage, manipulation and transfer of information using electronic means. 'Communication Technology' refers to the physical devices and software that link various computer hardware components and transfer data from one physical location to another (Laudon and Laudon; 2001).

Various Information and Communication Technology devices have emerged to enhance the speed and quality of service delivery and radically change how banking services are being handled worldwide. Shokan (2005) identified Electronic Fund Transfer, Electronic Fund Transfer at Point of Sale, Electronic Cheque. Electronic Letter of Credit, Electronic Card, Debit Card, Electronic Cash, Electronic Billing, Automated Teller Machine. Agboola et al (2002) summarises ICT products relevant to banks into three groups:

(i) Bankers Automated Clearing Services: Automated Clearing Services involve the use of Magnetic Ink Character Reader (MICR) for cheque processing. MICR is a

system that provides for encoding of cheques and documents with characters in magnetic ink so that they can be electronically read. MICR is capable of encoding, reading and sorting cheques for timely clearing.

(ii) Automated Payment Systems: Automated Payment Systems include products such as Automatic Teller Machine (ATM), Plastic Cards and Electronic Funds Transfer. ATM is a remote cash dispenser that assists customers to have access to withdrawal outside the banking hall. Electronic cards are microchips that store electronic cash to use for online and off line micro payments. They include credit cards, debt cards, and store value cards. Electronic fund transfer (EFT) is an electronic oriented payment mechanism. That is, an electronic tool that is used to effectively transfer the value of exchange process for goods and services, ideas or information from one bank account to another account in another bank (Shokan, 2005). Electronic Letter of Credit, Electronic Cheque and Electronic Cash fall under automated payment system

(iii) Automated Delivery Channels: These include interactive television and the Internet. They offer an excellent environment for banks to experiment with the delivery of Electronic Home and Office Banking (Bill,1996). This technology provides for exchange of data between computer applications supporting the process of business partners by using agreed-to, standardized, data format. This device enables customers to carry out transactions with their banks through connection between the customer's terminals in their homes and/or offices and the bank's computer system. VSAT (Very Small Aperture Terminal) is a satellite communications system that serves home and business users. Customers with such terminals are able to contact the bank for any form of information required. Information on bank balances, deposits into and withdrawals from accounts may be gotten through this medium.

Application of ICT is capable of enhancing optimal performance in banking services if appropriately carried out. Proper queuing analysis will assist to determine the type, nature, extent and spread of ICT products required in banks. Optimal utilization of facilities might be achieved if the design is done based on clear understanding of how the service is to be measured. Such measurements include arrival rate of customers, service rate, traffic intensity, the average time a customer spends in line, the average time a customer spends in the system, average number of customers in the system and average number of customers in the queue. All these will assist to make decisions on the level at which information and communication technology can be applied for an optimal performance in banking operations.

METHODOLOGY

Twenty four banks were selected to evaluate the standard of service in the banking industry in Nigeria. This sample was representative of all the 89 banks in the country as at December 2005. A two-stage sampling technique was used to select the 24 banks. In the first stage, all the banks were stratified into old and new generation banks. The banks established before 1986 were classified as old generation banks while those established since the deregulation of the banking sector in 1986 constituted the new generation banks. In all there were 14 old generation banks and 75 new generation banks as at December 2005. Proportional sampling technique was thereafter used in the second stage to select samples from the two groups in stage one using ratio 1:5. Random sampling technique was then used to select 4 'old' and 20 'new' generation banks. One thousand and two hundred customers were observed (Fifty customers from each of the selected banks) for the identified transactions. The first fifty customers to enter in each of the studied banks were

observed starting from 8.am in the morning in all the banks but ending at different times depending on the mode of arrival and speed of operation of each bank. Observation in some banks spilled over to the next day. The selected transactions for the study are deposit, withdrawal, enquiries, reference letters, opening and closing of accounts, funds transfer, special bills, loans and overdraft. The arrival rate of customers, service time, and number of service channels (servers) were obtained through personal observation. The existing ICT products used for customer services were also observed noting their effects on the timeliness of service. Queuing model was then used to measure the service standard and analyse the capacity utilisation of ICT in the studied banks. The result of the measurement was used to determine the readiness, compliance and intensity of utilisation of ICT products in the studied banks.

Queuing model was used to evaluate the standard of service in Nigerian banks. Queuing or waiting-line problem arises whenever the demand for customer service cannot be perfectly matched by a set of well defined service facilities. Proper assessment of the queuing situation assists in the proper utilisation of resources. Basic structure and components of a Queuing System include Input Source, Service System, Queue and Queue Discipline (Loomba, 1981). The input source generates customers into the service facilities. The characteristics of the input source are given by the size of the calling population, arrival size, arrival control, arrival distribution and the attitude of the customers. Proper understanding of these characteristics will assist in choosing or designing appropriate ICT products to facilitate optimal service.

The following queuing formulae were used to analyse the data collected:

Arrival rate = $\lambda = \dfrac{no.\ of\ customers}{total\ time\ involved}$ ……..3.1

Inter-arrival = $1/\lambda$

Service rate = $\mu = \dfrac{no.\ of\ customers}{total\ time\ involved}$ ……..3.2

Inter-service Rate = $1/\mu$ ……3.3

Average no of channels (servers) is C

Traffic intensity = P = $\lambda/C\mu$ ……3.4

This measures the Utilisation factor.

Idle time (I) = 1-p ……..3.5

P_0 = Probability of there being no units in the system

$$P_0 = \frac{C!(1-P)}{(PC)^C + C!(1-P)\left[\sum_{n=0}^{n=C-1} \frac{1}{n!}(PC)^n\right.}$$ ……3.6

Average time a customer is in system (queuing and service) =

$$\frac{(PC)^C}{C!(1-P)^2 C\mu} P_0 + \frac{1}{\mu}$$ ……... 3.7

Average no of customers in the system = $\dfrac{P(PC)^C}{C!(1-P)^2} P_0 + PC$ ……...3.8

Average time a customer is in the queue (including times when there

is no queue) = $\frac{(PC)^C}{C!(1-P)^2 C\mu} P_0$ ……3.9

Average number of customer in the queue = $\frac{P(PC)^C}{C!(1-P)^2} P_0$ ……3.10

Columns G,H,I,J,K,L,M find relevant values of 'n' for which iteration $\sum_{n=0}^{c-1}$ was computed. In columns where n > c-1 are stored zero while the value of n (0,1,2,3,4,5,6,7) were stored in columns where n<= c-1. The values of n were later used to compute P_0. AC-AK (hidden on the spreadsheet) computes the values of $\frac{1}{n!}(PC)^n$ for each of the values of 'n' stored in G,H,I,J,K,L,M. AL(hidden on the spreadsheet) stores summation of individual values computed in AC-AK (hidden on the spreadsheet) to arrive at $\sum_{n=0}^{c-1} \frac{1}{n!}(PC)^n$ used later in column W. V computes $(PC)^c$ and was used together with column W to find P_o shown in column X. W computes C!(1-P)

Pattern of arrival in the banks visited varied. At times customers entered singly and at times two or more customers entered simultaneously. On most cases, arrival to the banks did not form a regular pattern because customers did not arrive at constant intervals. The pattern of arrival of customers to the studied banks was not controllable as customers entered without any regulation and the arrival did not follow any specific pre-arranged plans. The distribution (pattern) of arrival was random and inter-arrival times were not constant. The inter-arrival times were approximated by exponential distributions. The results showed that the probability of long inter-arrival times was very small as only one bank had 15 minutes. Others ranged between 1 and 8 minutes. The overall average for all the studied banks was 4.35 minutes.

EXTENT OF ADOPTION OF ICT PRODUCTS

Table 1 shows the extent of adoption of ICT products in the studied bank. The most widely adopted technology is the Local Area Network (LAN). All the studied banks have fully networked their systems within the bank. This made communication of account information easy. MICR cheques were also highly utilized by the banks. Thirty four banks had fully adopted its use while the remaining two banks had partially adopted it. Findings revealed that one of the earliest developments in the use of computers in banking was based on the handling of cheques. It was borne out of the desperate need to overcome the problem of handling the growing volumes of cheque.

Program for Daily Calculation of Accounts, Wide Area Network (WAN) and Electronic Funds Transfer (EFT) also ranked high in adoption among the studied banks. Smart Cards, Point of Sales System and Computerized Credit Rating were not very popular as less than half of the studied banks had fully adopted them. Other ICT products such as ATM, Electronic Data Interchange, Electronic Home and Office Banking, Telephone Banking and Make Cheque Available Programs were yet to be adopted by most of the studied banks. The least fully adopted technologies were ATM with only 4 (16.7%), Electronic Home and Office Banking with 4 (16.7%) and Telephone Banking with 5 (20.8%). Low rate of adoption of these technologies might be due to

cost, fear of fraudulent practices and lack of facilities necessary for their operation.

Manual calculation of bank statement, balances and interests is now done through electronic data processing method. Typists were replaced by computer operators and messengers were no longer required to sort files physically again. Banks now use electronic filing system which makes it easy to access records by a click of cursor. Manual verifications of signature and picture have been replaced by electronic scanning which can be done by a press of button. Money transfer via telex had become easier by SWIFT.

Table 1: Extent of Adoption of ICT Products

ICT Products	x	f	fx	$\bar{x}$
Automated Teller Machine				
Fully Adopted	3	4	12	
Partially Adopted	2	8	16	1.69
Not Adopted	1	12	12	
Electronic Funds Transfer		-		
Fully Adopted	3	16	48	
Partially Adopted	2	5	10	2.58
Not Adopted	1	3	3	
Electronic Data Interchange				
Fully Adopted	3	6	18	
Partially Adopted	2	7	14	1.83
Not Adopted	1	11	11	
Smart Cards				
Fully Adopted	3	11	33	
Partially Adopted	2	4	8	2.14
Not Adopted	1	9	9	
MICR Cheques				
Fully Adopted	3			
Partially Adopted	2	24	72	
Not Adopted	1	-		3
Local Area Network		-		
Fully Adopted	3			
Partially Adopted	2	24	72	
Not Adopted	1	-		3
Wide Area work		-		
Fully Adopted	3			
Partially Adopted	2	22	66	2.92
Not Adopted	1	2	4	
Point of Sales System		-	-	
Fully Adopted	3			
Partially Adopted	2	10	30	2.11
Not Adopted	1	6	12	
Electronic Home and Office Banking		8	8	
Fully Adopted	3			
Partially Adopted	2	4	12	
Not Adopted	1	8	16	1.93
Telephone Banking		12	12	
Fully Adopted	3			
Partially Adopted	2	5	15	
Not Adopted	1	8	16	2.07
Make Cheque Available Program		12	12	
Fully Adopted	3			
Partially Adopted	2	7	21	
Not Adopted	1	7	14	1.92
Computerized Credit Rating		10	10	
	3			

Fully Adopted	2	10	30	
Partially Adopted	1	6	12	
Not Adopted		8	8	2.11
Daily Calculation of Account s Program				
Fully Adopted	3			
Partially Adopted	2	22	66	
Not Adopted	1	2	4	
		-	-	2.92

Source: Research Survey

RATE OR ADOPTION OF ICT IN OLD AND NEW GENERATION BANKS

Table 2 shows that the rate of adoption between the old and new generation banks varied. Adoption of ICT products was higher among the new generation banks for all the products except MICR, Local Area Network, Wide Area Network and Daily Calculation of Accounts Program where all the studied banks have 100% rate of adoption. All the new generation banks have adopted Electronic Funds Transfer, Computerized Credit Rating and Daily Calculation of Accounts Program. None of the old generation banks has Electronic Home and Office Banking and Telephone Banking. Only 25% of them have Automated Teller Machine, Electronic Data Interchange, Smart Cards, Point of Sales System, Make Cheque Available Program and Computerized Credit Rating as against 50%, 60%, 60%, 80%, 60% and 100% respectively among the new generation banks.

Table 2: Rate or Adoption of ICT in Old and New Generation Banks

Identified Products	Old Generation Banks	% Rate Adoption	New Generation Banks	% Rate Adoption
Automated Teller Machine	10	50	1	25
Electronic Funds Transfer	20	100	4	100
Electronic Data Interchange	12	60	1	25
Smart Cards	12	60	1	25
MICR Cheques	20	100	4	100
Local Area Network	20	100	4	100
Wide Area work	20	100	4	100
Point of Sales System	16	80	2	25
Electronic Home and Office Banking	10	50	0	0
Telephone Banking	15	75	0	0
Make Cheque Available Program	13	65	1	25
Computerized Credit Rating	20	100	1	25
Daily Calculation of Accounts Program	20	100	4	100

Source: Research Survey

EVALUATION OF BANKS BY TYPES OF TRANSACTION

Fifty customers were observed in each of the studied banks for various transactions. The transactions were grouped into six and represented by T1, T2, T3, T4, T5, and T6. TheT1 stands for deposit; T2 for withdrawal, T3 for enquiries, reference letters, opening and closing of accounts; T4 stands for funds transfer, T5 for special bills while T6 stands for loans and overdraft.

Table 3 shows that about half of the respondents (48.08%) in the studied banks came to withdraw while 34.75 came to make deposits. This implies that the major activities of customers centred on withdrawal and payment. Special bills rank least among the activities of customers in the studied banks. Only 23 out 1200 customers observed engaged in transfer of funds. Loans and drafts also recorded low activity rate. Only 33 out of 1200 customers observed came for loan and overdraft. Similarly, the design of T_4 & T_5 did not record high rate of activity. IT in banking in terms of timeliness should be focused more on T_1 & T_2 to avoid unnecessarily long queues due to their high rate of activity.

Table 3 Evaluation of Banks by Types of Transaction as Claimed by the Customers

BANKS	T1	T2	T3	T4	T5	T6	No. Customers
1	12	34	4	_	_	_	50
2	23	27	_	_	_	_	50
3	20	27	3	_	_	_	50
4	21	25	_	_	_	4	50
5*	26	24	_	_	_	_	50
6	18	12	3	9	_	8	50
7	12	23	10	5	_	_	50
8	16	26	3	2		3	50
9*	16	25	8	_	_	1	50
10*	16	29	1	_	_	4	50
11	15	22	7	6	_	_	50
12	23	8	9	10	_	_	50
13	15	35	_	_	_	_	50
14	15	34	1	_	_	_	50
15	13	24	8	_	4	1	50
16	22	12	5	_	11	_	50
17	23	10	4	6	7	__	50
18*	5	39	_	_	_	6	50
19	18	10	4	12	_	6	50
20	15	29	4	2	_	_	50
21	22	28	_	_	_	_	50
22	9	32	9	_	_	_	50
23	18	23	2	6	1	_	50
24	24	19	7	_	_		50
Total	417	577	92	58	23	33	**1200**
Percentage	34.75	48.083	7.667	4.833	1.917	2.75	**100**

Source: Research Survey, 2004.

TIME SPENT BY CUSTOMERS ON EACH TRANSACTION

Table 4 shows that on the average, customers spend 21.58 minutes for loans and drafts. The reason for this length of time was due to the fact that most activities in these areas still relied on manual responses. There were lots of forms to fill and documents to go through to determine how credit worthy the customer was. Funds transfer relies on Wide Area Network to connect the recipient to the sender. On most cases there were low responses or complete absence of signal from where the funds

originate. ICT design that will reduce manual involvement and improve transmission of electronic signals should be integrated into funds transfer operations.

Table 4: Time Spent by Customers on each Transaction

Activities	No. Customers	Total Time System	Mean
T_1	417	2238	5.36
T_2	577	2999	5.20
T_3	92	684	7.43
T_4	56	648	11.57
T_5	23	70	3.04
T_6	33	712	21.58

Source: Research Survey, 2004.

EVALUATION OF THE TRAFFIC INTENSITY IN THE STUDIED BANKS

Table 5 shows that the traffic intensities of the studied banks. Banks represented by numbers 5, 9, 10 and 18 are old generation banks while the others are new generation banks. The traffic intensities in 50% of the old generation banks were between 0.89 and 0.95 as against the theoretical limit of 0.80 thus making the queue of infinite length. The traffic intensity for all the new generation banks was less than 0.8. On the average, customers spent 23.01 minutes in the old generation banks as compared to 7.50 in the new generation banks. Similarly, average number of customers in the system in the old generation banks was 8.39 as compared to 2.56 in the new generation banks. The new generation banks appeared to be more efficient in utilising ICT to enhance performance.

Table 5: Evaluation of the Traffic Intensity in the Studied Banks

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
BANK CODE	No. of Cust	Total Arrival Time (min)	Total time in system (min)	C	Arrival Rate Λ	Inter-arrival	Service Rate μ	Inter-ser Rate 1/μ (min)	Traffic Intensity P = λ/Cμ	Idle Time 1- P	P0	AVG TIM CUST. IN SYS (Minutes)	AVG. NO OF CUST IN SYS	AVG TIM CUST. IN QUE (Minutes)	AVG. N OF CUS IN QUE
1	50	154.20	274.80	3	0.32	3.125	0.18195(	5	0.59	0.41	0.151731	7.02	2.26	1.53	0.49
2	50	120.00	192.00	2	0.42	2.3809	0.26041(	4	0.81	0.19	0.104972	11.17	4.71	7.33	3.09
3	50	331.20	229.80	3	0.15	6.6666	0.21758(	5	0.23	0.77	0.500211	4.67	0.70	0.07	0.01
4	50	99.00	159.00	3	0.51	1.9607	0.31446!	3	0.54	0.46	0.182728	3.83	1.95	0.65	0.33
5*	50	103.80	138.00	2	0.48	2.0833	0.36231(	3	0.66	0.34	0.204819	4.89	2.34	2.13	1.02
6	50	852.00	772.20	4	0.06	16.666	0.06475(	15	0.23	0.77	0.398129	15.52	0.92	0.08	0.00
7	50	184.80	466.20	4	0.27	3.7037	0.10725(	9	0.63	0.37	0.071922	11.38	3.08	2.06	0.56
8	50	93.00	204.00	4	0.54	1.8518	0.24509(	4	0.55	0.45	0.104562	4.59	2.48	0.51	0.28
9*	50	171.00	490.20	3	0.29	3.4482	0.10199(	10	0.95	0.05	0.011754	69.09	20.08	59.28	17.23
10*	50	117.00	190.20	3	0.43	2.3255	0.26288(	4	0.55	0.45	0.176211	4.63	2.01	0.83	0.36
11	50	124.80	336.00	4	0.4	2.5	0.14880(	7	0.67	0.33	0.058848	8.67	3.46	1.95	0.78
12	50	250.20	160.20	4	0.2	5	0.31210(	3	0.16	0.84	0.527200	3.21	0.64	0.00	0.00
13	50	151.80	169.80	2	0.33	3.0303	0.29446(	3	0.56	0.44	0.282051	4.95	1.63	1.55	0.51
14	50	154.20	445.20	7	0.32	3.125	0.11230(	9	0.41	0.59	0.056517	8.97	2.89	0.07	0.02
15	50	217.20	370.80	3	0.23	4.3478	0.13484(	7	0.57	0.43	0.163663	9.24	2.13	1.82	0.42
16	50	205.80	286.20	4	0.24	4.1666	0.17470(	6	0.34	0.66	0.255100	5.84	1.39	0.12	0.03

17	50	208.20	178.80	4	0.24	4.1666	0.279642	4	0.21	0.79	0.431435	3.59	0.84	0.01	0.00
18*	50	73.80	196.20	3	0.68	1.4705	0.254842	4	0.89	0.11	0.027720	13.43	9.14	9.51	6.47
19	50	271.80	316.80	4	0.18	5.5555	0.157828	6	0.29	0.71	0.312577	6.41	1.17	0.07	0.01
20	50	354.00	519.00	3	0.14	7.1428	0.096339	10	0.48	0.52	0.225537	11.82	1.64	1.44	0.20
21	50	400.20	277.80	4	0.12	8.3333	0.179985	6	0.17	0.83	0.506498	5.57	0.68	0.01	0.00
22	50	109.20	138.00	2	0.46	2.1739	0.362318	3	0.63	0.37	0.226993	4.58	2.09	1.82	0.83
23	50	118.20	142.80	3	0.42	2.3809	0.350140	3	0.4	0.6	0.294117	3.08	1.29	0.22	0.09
24	50	357.00	166.20	3	0.14	7.1428	0.300842	3	0.16	0.84	0.618374	3.34	0.48	0.02	0.00
ALL	1200.00	4865.40	10195.80	3.2	0.25	4	0.117695	8	0.66	0.34	0.173836	16.21	4.08	7.71	1.94

Source: Research Survey
* Old Generation Bank

DISCUSSION OF FINDINGS

The traffic intensity in some banks was very high. For instance, banks 9 and 18 recorded 0.95 and 0.89 respectively. Theoretically, the traffic intensity should not be greater than 0.80 otherwise the queue will be of infinite length. The average time spent by customers in the two banks was also very high. On the average, customers spent 115 minutes (1 hour 55minutes) in bank 9, and 84 minutes (1hour, 24 minutes) in bank 13. Similarly, average numbers of customers in the two banks were 31 and 48 which are also on a high side. The idle times in banks 3, 6, 12, 16, 17, 19, 21, 23 and 24 seemed to be too much. Efforts should be made to address this to avoid lost costs of idle time. The banks may need to adopt the use of ATM to reduce the number of customers that come into the banking hall for services. ATM as remote cash dispenser can attend to quite a number of those that come for cash withdrawal without entering the bank. Electronic funds transfer at the point of sale vial the use of cards can also assist to reduce the length of queue without jeopardising the business interest of the banks. Tellers can be re-arranged to allocate more to areas of heavy transactions.

The traffic intensity in banks 5, 9, 10 and 18 which was between 0.89 and 0.95 should be improved upon. The banks should make efforts to keep the traffic intensity at a reasonable figure by providing better and adequate facilities if the arrival rate cannot be controlled. Tellers can be re-arranged to allocate more to areas of heavy transactions. Service time may be reduced by the adoption of more ICT products such as smart cards, telephone banking, ATM and electronic funds transfer in payment and delivery systems. Computer literacy programs can be arranged for the staff to improve their competence in handling ICT products for timely and efficient service. Information and Communication Technology should be designed to streamline the processes for cash lodgements (deposits) and withdrawals. Tellers should be equipped to issue receipts (deposit slips) for cash deposits.

Too much of idle time in banks 3, 6, 12, 17 and 18 should be addressed. Redundant or idle workers may be removed from the system's department to achieve productivity and efficiency with minimal resources. Those affected in this rationalisation can be trained and integrated as appropriate to make them relevant to the new ICT-driven operations in other departments.
The average time spent by customers for loans and drafts in some of the studied banks is too high because most activities in this area relied on manual operations. There is need for computer coded responses that can be analyzed without much recourse to manual methods in handling forms and documents to determine the credit worthiness of customers.

The area of funds transfer should also be examined for probable technological improvement. On most cases there were low responses or complete absence of signal from where the funds originate. Design that will make the interaction between the computers in the network arrangement smooth should be properly worked out. Banks in Nigeria should explore the Internet more intensely to avail themselves of the bountiful opportunities locally and globally. Internet has spawned powerful communication network that organisations can use to access vast storehouses of information from around the world and to coordinate activities across space and time. By eliminating many technical, geographic and cost barriers obstructing the global flow of information,

the Internet could accelerate the information revolution, inspiring new uses of information systems and new business models. Internet offers an excellent environment for banks to experiment with the delivery of home banking (Gandy, 1996). It allows customers to cheque account balances, transfer funds and apply for loans. It uses three-dimensional graphics to enable customers move into different rooms and communicate with virtual bank tellers, loan arrangers and financial advisers. Banks in Nigeria should improve the level of their participation on the web. Queuing problems might be better addressed when it is possible for banks to complete most transactions on-line.

Information and telecommunications technology (ICT) in banking in terms of timeliness should be focused more on deposit and withdrawal to avoid unnecessarily long queues. ICT should therefore be designed to ease these activities that directly impact on customer services. In other words, it should be designed to streamline the processes for cash lodgements (deposits) and withdrawals.

CONCLUSION

Banks should incorporate ICT into their strategic plans for effective performance in payment and delivery systems. This calls for proper analysis to determine the type, nature and extent of ICT products required for effectiveness and efficiency. It is imperative for bank management to intensify investment in ICT products to facilitate speed, convenience, and accurate services.

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