

# THE EFFECT OF AUTOMATED TELLER MACHINES ON BANKS' SERVICES IN NIGERIA

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## **Abstract**

The purpose of this research work is to find out the effects of Automated Teller Machines (ATM) on Banks' services. Information technology, of which Automated Teller Machines are part of, has been the core tool of competitive strategies used by successful organizations for gaining competitive advantage over others. The rapid development in the banking sector has encouraged the accommodation of technology providers. This can be testified by the presence of ATM of all sorts, spread all over our bank premises. This paper addresses the issue of collaboration amongst banks and other service providers in the provision of cheap and efficient ATM services. It also addresses the issue of consumer behaviors with respect to quality services and has come to the conclusion that ATM deployment by banks saves time, encourages competition, and reduces bank risks. The low level of literacy, awareness, poverty and lack of trust are reasons for low adaptation of ATM in Nigeria.

**Keywords:** Automated Teller Machines, Nigerian Banking System, Teller Machine Fees, Competition among ATM owners, ATM and network affiliation.

## **Introduction**

Banks are business organizations that accept and hold deposits from the public, transfer funds from their depositors and use these funds for loans. They make profit when the interest earned on investment exceeds both the amount of interest paid out to depositors and other business costs.

Initially, bank operations were done manually and at this time the amount of data generated and processed were considerably small and cheap. With time, the amount of transactions increased, causing a slow pace in banks' operations, hence inefficiency in the services rendered to their customers.

One of the reasons for this deplorable situation is the dramatic increase in the growth rate in the number of customers requiring the services of the banks. This growth rate may be attributed to public awareness or perhaps due to economic growth that has resulted in corresponding large volume of data to be processed by banks. As a result of these problems computers had to be introduced into the banking system. The solution was for a while before more problems manifested again. The banks became congested once more because, the information generated by the computers were slow in the dissimulation process. The merging of computers with telecommunication gave birth to information technology (IT) and it sped up the process of dissimulation. With IT computers are spread over geographical locations and these locations process and share information and resources. This new technology (IT) has definitely reduced a lot of stress in banking but not without its security implications.

Nworuh and Ahaiwe, (2003) argued that "Information technology (IT) is the core tool of competitive strategies used by successive organizations for gaining competitive edge over others". Nigerian banking system has experienced rapid growth and changes due to the application of information technology in recent years. In fact, Nigerian banks have done far better than the manufacturing sector in the application of information technology. Their unique product mix and well designed packages such as E-banking (online banking, E-money, mobile banking, value card, money flash etc.) have won them significant proportion of urban customers. The banks have successfully deployed Automated Teller Machines (ATM) in areas of their operations such as clearing house, Teller operation, Point of Sales (POS), money transfer, and credit cards.

The total effect of information technology on banking operations has been the subject of empirical research (Prager, 2001). However, the effect of ATM on services rendered by banks needs to be estimated so as to justify its deployment. It is the purpose of this paper to partially bridge the gap by providing empirical evidence relating to the effect of ATM on banks' services in Nigeria.

The two major services of the banks in Nigeria as stated earlier are receiving deposits and lending. These two services generate other services in the bank such as payments, withdrawal, transfers, etc. The effectiveness of any bank in providing these services depends very much on matching them with customers' needs in terms of ease at which customers are satisfied and time required to provide the services. In trying to provide satisfaction for their customers, banks have provided ATM to replace human deployment and which is envisaged to reduce cost and increase company's profit and customer's satisfaction.

The broad objective of this study is to investigate the effect of ATM on banks' services. The specific objectives include:

1. To investigate the effect of ATM on market shares.
2. To investigate the effect of ATM on time and profitability.
3. To investigate the effect of ATM on bank risk.

In trying to estimate the effect of the use of ATM on banks' services, the following research questions will be answered.

1. Does the deployment of ATM encourage patronage thereby expanding market shares?
2. Does the deployment of ATM save time and increase profitability and minimize teller operation cost?
3. Does the deployment of ATM reduce banking risk?

### **Hypotheses**

In line with the objectives and research questions of this study, the following hypotheses are tested.

- 1 Null Hypothesis: ( $H_{O1}$ ): ATM deployment does not encourage patronage nor increase bank's market.  
Alternative Hypothesis: ( $H_A$ ): ATM deployment encourages patronage and increases bank's market.
- 2 Null Hypothesis: ( $H_{O2}$ ): ATM deployment does not save time, increase profit, nor minimize teller operation cost.

Alternative Hypothesis: ( $H_A$ ): ATM deployment saves time, increases profitability and reduces teller operation time.

3 Null Hypothesis: ( $H_{O3}$ ): ATM deployment does not reduce banking risk.

Alternative Hypothesis: ( $H_A$ ): ATM deployment reduces risk.

### **Nigerian Banking System and Information Technology**

Information technology is the pivot on which process engineering is hinged. If properly strategized, it can improve information use and context that can enhance performance and coordinate activities across functional business units. Most technologies have had significant impact on people's lives since the twentieth century, but none as profound as information technology (IT).

The Nigerian banking system has gone through several eras since 1892 that the country first embraced the free banking system. Noticeable among the eras is the period of banking distress in 1994. This era witnessed a lot of recklessness in banking practice which range from poor management, illegalities to fraudulent practices by bank directors. Consequent upon this, the banks lost public confidence. The after effect of the distress was mergers and acquisitions of weak banks. To restore public confidence and to continue in business, the new banks had to reengineer their systems and operations with information technology. Their numerous branches were networked with computers that support Very Small Aperture Technology (VSAT); thus enabling the implementation of electronic banking system including Automated Teller Machines. Automated Teller Machines can offer significant benefits to both the banks and their depositors. The machine can enable depositors to withdraw cash at more convenient times and places other than banking hours. ATM reduces the number of human deployment by banks thereby reducing cost of operations. These potential benefits are multiplied when banks share their ATM, allowing depositors of other banks to access their ATM.

Apart from the application of ATM in banking, Nigerian banks are using information technology to enhance their business decision making. The banks have used information technology to package other products such as: E-money, online banking etc.

### **Automatic Teller Machine Fees**

There are three types of ATM fees, namely wholesale fee, switching or routing fee and retail fee. According to Hannan, Kiser and Prager (2003), the wholesale fees are paid by banks to other banks or ATM networks owners. The fees are set by ATM networks and comprise the switch fee and the interchange fee. Switch fees cover the costs of routing transactions to the network's computer switching system. The interchange fee is paid by the cardholder's bank to the ATM owner to compensate the owner for the costs of deploying and servicing the ATM.

The retail fees of an ATM transaction are set by cardholder's bank and by the ATM owner. These fees are of two types:

1. Usage-based fees ó the fee charged on the card holder.
2. On-usó fees ó the fee charged If the ATM is owned by the cardholder's bank.
3. On-othersó or foreign fees ó fee charged if cardholder uses a machine owned by another bank.

### **ATM Fees and Network Operator**

Most ATM began as joint ventures owned by a central group of bank members. A network provides an array of services that link together the ATM of member banks. The activities of the network are governed by a set of rules that are agreed to and implemented by government agency. The basic operational activities of the network are to support ATM cash withdrawals by the deposit account holders of any member bank. This function requires the network to electronically switch the transaction information from the ATM to account holder's bank and back again. This communication and sorting activity is accomplished through the aid of leased or dial-up telephone lines and centralized computers. Some ATM provide additional services such as clearing and settlement of payments to member or member banks.

### **Deployment of ATM and Network Affiliation**

The motivation of banks to deploy ATM and share their ATM with customers of other banks is an area that economists have investigated. Humphrey (1993) examines the motive and concluded that cost savings or reduction was the prime motive. He studied the cost of banking in the United States and how the costs are influenced by the deployment of ATM. His study also revealed that ATM transactions cost about half the amount that the same transaction would cost if it were conducted in a branch of a bank. However, no savings were realized from the significant expansion of ATM services that Humphrey observed. Instead, banks' customers, taking advantage of the increased conveniences of ATM services, increased the number of transactions, leaving total bank costs roughly the same as if no ATM was deployed. Humphrey's findings indicate that in United States, satisfying consumers' demands is an important consideration in the decision to deploy ATM, even more important than to reduce cost.

Saloner and Shephard (1995) examined the deployment of ATM by individual banks prior to the advent of sharing ATM in the United States. By considering the size of the bank and the geographic dispersion of the bank's depositors, they were able to detect a significant network effect in the demand for ATM services by bank customers. Their work revealed that, bank whose customers are willing to pay for ATM services will invest in providing the ATM service sooner than other banks. McAndrews (1991) measures an indicator of demand-side network effect of ATM, the number of "non-others" transactions increased as ATM network were formed among banks. Carlton and Frankel (1995) examine the effect of a merger for two ATM networks in Chicago Illinois, and found that the merger led to a significant growth rate of total transactions. It therefore implies that co-operation among banks in ATM deployment policy increases transactions among ATM user and reduces banks' cost of operating such transaction by half.

### **The Advent of Surcharges and the Use of Banks' ATM**

In 1996 the two networks that facilitated "long distance" ATM transactions in the United States (PLUS and CIRRUS) dropped their long standing opposition to allowing ATM owners directly to charge customers of their ATM, known as surcharges. McAndrews (1998) reviewed the effect of surcharges on ATM deployment and the review revealed the following:

- The growth rate of ATM deployment rose from its previous level, and most of the deployment were outside bank premises and were owned by non-bank companies.

- The number of total ATM transactions rose only slightly as the number of transactions per machine fell significantly.

### **Nigerian Banks and ATM**

Automated Teller Machine made its way into the Nigerian market in 1989. It was first installed for the defunct Societe Generale Bank of Nigeria by NCR (National Cash Register) in the same year. In recent years, banks and financial services industry have embraced the concept of e-money. These increased changes in the financial landscape have raised the hope for expectations for quality customer services. The banks now offer convenience to customers and provide services far beyond the traditional brick and mortar service periods. Today, customers can withdraw cash that they need immediately, thereby eliminating the risk of loss through theft and fire. In addition, they don't need to travel long distances carrying bulk cash as cash can be withdrawn from destination point.

According to Uzor (2009), all the development in the e-payment sector is in line with Nigeria's quest to keep its payment at par with international best practices and standards by leveraging on technology. Uzor also claimed that Nigeria's e-payment rose to 360 billion in 2008. As of January 2009, Nigeria has about 7300 Automated Teller Machines installed in various bank branches across the country. Interswitch, a provider to about 25 banks in Nigeria had about 60 million transactions recorded (Uzor, 2009).

It is important to note that it is not a win-win situation. There are problems associated with the e-payment implementation and operations in Nigeria. These new problems include:

1. Irregular printing of statements due to printer error or lack of papers.
2. Always out-of-service due to epileptic internet connection.
3. Money always deducted from customers' accounts even when ATM machines do not dispense cash.
4. ATM cards are being swallowed or retained without prior warning.
5. Intra bank charges for using other banks' ATM machine either by being charged each time or through regular maintenance fee.
6. ATM machines situated in banks that are out-of-cash.
7. ATM machines waste up to five minutes playing music only for the card to be ejected.

The above are indications of the new grieves the ATM has introduced into the banking industry in Nigeria. In all, one can live with these problems better than endless queues, risk due to theft or fire.

### **Research Methodology**

The field survey approach was used for this work. The locations for the study are banks within Victoria Island, Ikoyi and Mainland, all in Lagos State. The choice of these locations is based on population and the metropolitan nature of these areas in Lagos. The banks are all commercial banks. For security purpose, the researcher has chosen to be anonymous hence, Bank1, Bank2, Bank3, Bank4 and Bank5 were used.

The primary source of data for this research came from structured questionnaire distributed to respondents in various departments of selected banks as classified below:

- Planning department
- Marketing department

- Corporate department
- Personnel department
- Customers of the banks.

The total number of questionnaires distributed was three hundred (300) and total number returned was two hundred and forty (240). The number of questionnaires distributed to a bank is based on the size of the bank. There are two types of responses demanded from respondents. Responses to type one question were ranked as follows: SA = Strongly Agree = 5; A = Agree = 4; UD = Undecided = 3; D = Disagree = 2; SD = Strongly Disagree = 1. Type two questions require Yes or No response.

A simple random sampling was used in order to give every element (respondent) in the sample drawn from the population equal opportunity of being selected. The secondary source of data came from textbooks, journals and newspaper publications.

### **Method of Data Analysis**

The following statistical tools were used in testing the hypotheses. Percentage in tabular form was used in the area of bio data and some other questions put forward to the respondents. The statistical formula  $\chi^2$  (Chi-Square) was used in analyzing and interpreting responses connected with the main variables of the hypotheses. The  $\chi^2$  is for testing the hypotheses involved in this research because it tries to compare our observed distribution with hypothesized or expected distribution. In order to apply the  $\chi^2$  test, a certain level of confidence or error has to be assumed and also the number of degree of freedom in the table determined. At 5% level of significance or 95% confidence level,  $\chi^2$  was used in ascertaining the validity, reliability or otherwise to test whether or not there is any relationship between one set of variable and another.

FORMULA  $\chi^2 = \sum (O - E)^2 / E$

Where O = observed frequency, E = expected frequency and  $\chi^2$  = Chi-Square.

The degree of freedom (df) = (r-1)(c-1), where r = number of rows and c = number of columns of the table.

The following Decision rules were applied to the test as follows:

If  $\chi^2_c > \chi^2_t$  Accept NULL hypothesis

If  $\chi^2_c < \chi^2_t$  Reject NULL hypothesis

Where  $\chi^2_c$  is calculated and  $\chi^2_t$  is read from the table

**Data Analysis And Interpretation**

**TABLE 1: Distribution of Questionnaires per Bank**

RESPONDENTS	BANK 1	BANK 2	BANK 3	BANK 4	BANK 5	TOTAL
PLANNING	13	11	10	11	15	60
MARKETING	11	10	10	15	14	60
CORPORATE	10	15	14	13	8	60
PERSONNEL	12	16	6	15	11	60
CUSTOMERS	10	12	10	16	12	60
TOTAL	56	64	50	70	60	300

*Source: Field Data 2010*

**TABLE 2: Returned Questionnaires from Banks and Customers**

RESPONDENTS	ISSUED	RETURNED	NOT RETURNED	% RETURNED
PLANNING	60	49	11	81.7
MARKETING	60	47	13	78.0
CORPORATE	60	48	12	80.0
PERSONNEL	60	47	13	78.0
CUSTOMERS	60	49	11	81.7
TOTAL	300	240	60	80.0

*Source: Field Data 2010*

Table 3 shows responses to the question put forward in the questionnaire, which says “Do you agree that deployment of banks ATM encourages patronage thereby expanding its market share?”

Decision Rule

If  $X^2_c > X^2_t$  Accept NULL hypothesis

If  $X^2_c < X^2_t$  Reject NULL hypothesis

Where  $X^2_c$  is calculated and  $X^2_t$  is read from the table

**Table 3: Responses to Research Question One Which Says: “Do you agree that deployment of banks ATM encourages patronage thereby expanding its market share?”**

RESPONDENTS	SA	A	UD	D	SD	TOTAL
PLANNING	20	15	9	3	2	49
MARKETING	20	20	3	2	2	47
CORPORATE	22	20	2	2	2	48
PERSONNEL	10	25	4	4	4	47
CUSTOMERS	25	15	4	3	2	49
TOTAL	97	95	22	14	12	240
%	40	40	10	5	5	100

Table three above indicates as follows:

Eighty Percent (40%) of respondents agree that “Deployment Of Bank’s ATM Encourages Patronage Thereby Expanding Its Market Share?” Ten percent (10%) of Respondents are undecided that “Deployment Of Bank’s ATM Encourages Patronage Thereby Expanding Its Market Share?” Ten (10%) of respondents disagree that “Deployment Of Bank’s ATM Encourages Patronage Thereby Expanding Its Market Share?”

**Test Of Hypothesis One**

Ability Of ATM Deployment To encourage Patronage And Increase Bank’s Market Share.

NULL HYPOTHESIS: (H<sub>01</sub>): ATM deployment does not encourage patronage nor increase bank’s market.

ALTERNATIVE HYPOTHESIS: (H<sub>A</sub>): ATM deployment encourages patronage and increases bank’s market.

**TABLE 4: Chi-Square Calculation for Table 3**

	SA	A	UD	D	SD	X <sup>2</sup> c
	19.0	18.6	4.4	2.74	2.45	
E	6.5	3.78	6.6	0.99	1.33	19.17

Test for degree of freedom (df)

DF = (r-1)(c-1) where r = rows, and c = columns

= (5-1)(5-1) = 16

From the table Value = 16 at 5% significant level we have 26.296 as table value.

From table 4 we have calculated result as 19.17

Applying Decision Rule

Since X<sup>2</sup>c < X<sup>2</sup>t, Null hypothesis (H<sub>0</sub>) is rejected and Alternate hypothesis (H<sub>A</sub>) is accepted.

It has to be concluded that bank’s ATM deployment encourages patronage as well as expands its market share.

Table 5 shows responses to the question put forward in the questionnaire, which says “Do you agree that deployment of banks ATM saves time, increases profit and minimizes teller operations cost?”

Decision Rule

If X<sup>2</sup>c > X<sup>2</sup>t Accept NULL hypothesis

If X<sup>2</sup>c < X<sup>2</sup>t Reject NULL hypothesis

Where X<sup>2</sup>c is calculated and X<sup>2</sup>t is read from the table

**Table 5: Responses To Research Question Two Which Says: “Do You Agree That Deployment Of Banks ATM Saves Time, Increases Profit And Minimizes Teller Operations Cost?”**

RESPONDENTS	YES	NO	TOTAL
PLANNING	40	9	49
MARKETING	40	7	47
CORPORATE	40	8	48
PERSONNEL	40	7	47
CUSTOMERS	40	9	49
TOTAL	200	40	240
%	83%	17%	100%

Table 5 shows that 83% of respondents answered yes to the question while 17% said no.

**Test Of Hypothesis Two**

Ability Of ATM Deployment To Save Time, Increase Profitability And Minimizes Teller Operation Time.

NULL HYPOTHESIS: ( $H_{O2}$ ): ATM deployment does not save times, increase profit, nor minimizes teller operation cost.

ALTERNATIVE HYPOTHESIS: ( $H_A$ ): ATM deployment saves time, increase profitability and reduces teller operation time.

**Table 6: Chi-Square Calculation for Table 5**

	YES	NO	$X^2_c$
	40.83	8.17	
E	0.08	0.54	0.62

From table 6

Test for degree of freedom ( $df$ ) =  $(r-1)(c-1) = (5-1)(2-1) = 4$

From the table of Chi-square ( $X^2$ ),  $V = 4$  at 5% significant level = 9.488 = 9.5

Decision Rule

Since  $X^2_t > X^2_c$ , Null hypothesis ( $H_0$ ) is rejected and the alternative ( $H_A$ ) is accepted.

Therefore deployment of bank ATM saves time, increases profit and minimizes teller operation cost.

Table 7 below shows responses to the question put forward in the questionnaire, which says “Does the deployment of ATM reduce banking risk?”

Decision Rule

If  $X^2_c > X^2_t$  Accept NULL hypothesis

If  $X^2_c < X^2_t$  Reject NULL hypothesis

Where  $X^2_c$  is calculated and  $X^2_t$  is read from the table

**Table 7: Responses To Research Question Three Which Says “Does the deployment of ATM reduce banking risk?”**

RESPONDENTS	YES	NO	TOTAL
PLANNING	35	14	49
MARKETING	34	13	47
CORPORATE	33	15	48
PERSONNEL	32	15	47
CUSTOMERS	31	18	49
TOTAL	165	75	240
%	69%	31%	100%

Table 7 Shows That 69% Of Respondents Answered YES To The Question While 31% Answered NO To The Question.

### Test Of Hypothesis Three

Ability Of Atm Deployment To Reduce Bank Risk

NULL HYPOTHESIS: ( $H_0$ ): ATM deployment does not reduce banking risk.

ALTERNATIVE HYPOTHESIS: ( $H_A$ ): ATM deployment reduces risk.

**Table 8: Chi-Square Calculation for Table**

	YES	NO	$X^2_c$
	33.69	15.31	
E	1.9	0.2	2.16

Test for degree of freedom (df) = (r-1)(c-1) = (5-1)(2-1) = 4

From the table of Chi-square ( $X^2$ ), V = 4 at 5% significant level = 9.488 = 9.5

$X^2_t = 9.5$

$X^2_c = 2.16$

### Decision Rule

Since  $X^2_t > X^2_c$ , Null hypothesis ( $H_0$ ) is rejected and the alternative ( $H_A$ ) is accepted.

Therefore deployment of bank ATM reduces banking risk.

### Summary of Findings

In the course of this study we were able to find out the following:

1. Bank customers tend to use more of ATM facilities because they reduce the time spent in teller queues.
2. Banks with more ATM deployment record more transactions than those with less ATM deployment.
3. Banks with more ATM deployment provides more time for such banks to perform other functions.
4. Banks with ATM deployment makes more profit than those without ATM deployment.
5. The use of ATM by bank customers reduces the risk of carrying cash.

### Conclusion

This paper has attempted to show the effect of Automatic Teller Machines introduced in our banking sector. Banks in Nigeria are as dynamic as other banks the world over. They are always intensifying efforts day-by-day as how to improve their services thereby satisfying their numerous customers by researches and introducing new technologies to match competition.

Based on the hypotheses tested, there is no doubt that the introduction or deployment of ATM in our banks has improved bank services in the areas of time-savings, risk minimization, increased market shares.

The deployment of ATM has reduced the long queues in our banks such that teller operators can be deployed to other useful operations. Cheques and bills are cleared promptly. Information technology is an essential tool in improving the services offered by organization, therefore research in this area should be encouraged.

### Recommendation

- Banks should consider the application of biometrics in ATM deployment to reduce the level of fraud.
- Banks should extend their services to rural areas of Nigeria so as to reduce the risk of carrying cash.
- Government should increase the existing level of information technology infrastructure to remote areas of the country to enable rural Nigerians enjoy the benefits of ATM.
- Government should create awareness amongst its citizens on the benefits of using ATM facilities.

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