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The Impact of Information Technology in the Nigerian Banking Industry [A Perspective of the Automated Teller Machine (ATM)]

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ABSTRACT

This research investigates the impact of Information Technology (IT) on the Nigerian banking industry, with specific reference to the Automated Teller Machine (ATM). The study adopted a descriptive survey design. The population consisted of all bank customers in Calabar Metropolis, Cross River State, Nigeria. A sample of one hundred (100) respondents was selected based on awareness of and access to ATM facilities. Data were collected using a questionnaire, which demonstrated a reliability coefficient of 0.85 through the test-retest technique. The instrument comprised 29 items designed on a 5-point Likert scale, with both positively and negatively worded items. Data collected were analyzed using frequencies, percentages, and the Chi-square statistical tool. One research question and a corresponding hypothesis guided the study.

The findings revealed a statistically significant difference in customers' perception of the positive impact of ATMs on the banking industry. The study concluded that ATM usage in the Nigerian banking sector is vital to improving the efficiency of banking services. It therefore recommended that banks and payment service providers should continue to meticulously observe the Central Bank of Nigeria's (CBN) protective, control, and security measures to minimize ATM-related fraud.

Key words: *Automated teller machine, information technology, banking industry, and customers.*

Introduction

The evolution of Information Technology (IT) has influenced almost every sphere of life, with the banking sector being one of the most affected. Continuous advances in IT, characterized by a complex and competitive environment, have significantly impacted business operations and brought about a paradigm shift in banking practices. In an effort to align with global best practices and reduce transaction costs, the application of IT concepts, techniques, policies, and implementation strategies in banking services has become a fundamental prerequisite for both local and global competitiveness.

Over the past decade, banks have transitioned from manual to automated systems, utilizing various electronic banking (e-banking) and electronic payment (e-payment) platforms to deliver a wide range of value-added products and services.

The Automated Teller Machine (ATM) is a device that allows customers to complete basic transactions without the assistance of bank representatives. ATMs were the first widely recognized machines to provide electronic access to customers. The ATM was invented by John Shepherd-Barron in 1960 and was first introduced in 1961 by the City Bank of New York.

Adeoti (2011) reported that in Nigeria, the first bank to introduce the ATM was the defunct Societe Generale Bank of Nigeria (SGBN) in 1989, under the trade name "Cash Point 24." Among the first-generation banks, First Bank of Nigeria Plc. introduced its own ATMs in December 1991, branded "First Cash." With the introduction of ATMs, banks were able to serve customers beyond the banking hall. ATMs were designed to perform several banking functions such as cash withdrawals, balance inquiries, and fund transfers using a plastic magnetic-stripe card and a Personal Identification Number (PIN) issued by the financial institution.

The ATM replaced traditional instruments such as cheques, personal attendance at the bank, restricted banking hours, and paper-based verification. It authenticates the card by reading and verifying the magnetic strip, card number, expiration date, and pre-selected PIN. In Nigeria, ATM technology has become increasingly widespread; however, its adoption varies, as public perceptions of the technology differ, which in turn affects customer decisions on whether to use ATMs.

The success, profitability, and performance of the banking sector depend largely on the effective management of technologies such as the ATM. Efficiency, effectiveness, and overall performance are measured on this basis. Like most technological innovations, however, ATMs also have vulnerabilities that criminal-minded individuals exploit to perpetrate fraud. Common challenges include ATM card theft, technical complications, PIN compromise, unauthorized account deductions, network failures during urgent cash needs, lack of awareness about ATM services, and long queues at ATM points.

As technology continues to evolve, efforts are being made to ensure ATM transactions remain seamless and convenient for customers. This is particularly valuable in situations such as making payments at odd hours, for example, at 2:00 a.m., when access to cash may be urgently needed.

Table 1

Electronic Card Transactions for Second Half of 2014

Payment Channels	**No of Terminals**		**Volume of Transactions**		**% Change (Volume)**	**Value of Transactions**		**% Change (Value)**
	June 2014	**Dec. 2014**	**June 2014**	**Dec. 2014**		**June 2014 (NBillion)**	**Dec. 2014 (NBillion)**	
ATMs	14,764	15,935	175,596,932	224,595,575	27.97	1,636.41	2,043.47	24.88
POS	121,856	134,561	8,971,501	11,845,522	32.04	137.72	174.35	26.60
Mobile	-	-	12,575,523	16,041,466	27.56	139.69	184.71	32.23
Internet	-	-	2,230,353	3,337,083	49.62	30.74	43.47	41.41
Total			199,284,309	255,820,046	28.37	1,944.56	2.446.00	25.79

Source: CBN Financial Stability Report, December, 2014.

Data on various e-payment channels for the period under review indicated that Automated Teller Machines (ATMs) remained the most patronized payment mode, accounting for 88.07% of the total volume, followed by Mobile payments, which accounted for 6.31%, and Point of Sale (POS) terminals, which accounted for 4.50%. The internet was the least used, accounting for only 1.12% of the total. Similarly, in value terms, ATMs accounted for 83.54%, POS 7.13%, Mobile payments 7.55%, while internet transactions accounted for 1.70% (Table 2).

Table 2

Proportion of E-payment Channels Usage in the Second Half of 2014

Payment channels	Volume	Volume (%)	Value (N Billion)	Value (%)
ATMs	224,595,575	88.07	2,043.47	83.54
POS	11,845,922	4.50	174.35	7.13
Mobile	16,041,466	6.31	184.71	7.55
Internet (Web)	3,337,083	1.12	43.47	1.78
Total	255,820,046	100.00	2,446.00	100.00

Source: CBN Financial Stability Report, December, 2014.

Electronic card (e-card) transactions, excluding cash withdrawals at ATMs, increased in both volume and value from 31.22 million and ₦402.53 billion at the end of December 2014 to 37.03 million and ₦432.73 billion at the end of June 2015, respectively. In contrast, the volume and value of ATM transactions declined from 224.60 million and ₦2,043.47 billion in the second half of 2014 to 206.61 million and ₦1,900.39 billion in the first half of 2015. This decline could be attributed to the growing awareness among customers of other available e-payment channels.

Table 3

Electronic Card Transactions Highlights

Payment Channels	No of Terminals		Volume of Transactions		% Change (Volume)	Value of Transactions		% Change (Value)
	Dec. 2014	June 2015	Dec. 2014	June 2015		Dec. 2014 (NBillion)	June 2015 (NBillion)	
POS	82,549	102,855	11,845,922	14,924,041	25.98	174.35	200.88	15.22
Mobile	-	-	16,041,466	18,773,872	17.03	184.71	192.04	3.97
Internet	-	-	3,337,083	3,328,020	-0.27	43.47	39.81	-8.42
Sub-total	-	-	31,224,471	37,025,933	18.58	402.53	432.73	7.50
ATMs	15,935	15,699	224,595,575	206,605,285	-8.01	2,043.47	1,900.39	-7.00
Total			255,820,046	243,631,218		2,446.00	2,333.12	

Source: CBN Financial Stability Report, June, 2015.

Adesina and Ayo (2010) discovered that network security, particularly issues relating to privacy, remains a major concern for users and serves as a hindrance to potential ATM users. This finding was also supported by Ezeoha (2005), who revealed through investigation that customers are generally apprehensive about security risks associated with ATMs. Similarly,

Ogbuji, Onuoha, and Izogo (2012), in their study titled "Analysis of the Negative Effects of the ATM as a Channel for Delivering Banking Services in Nigeria", reported that the proliferation of ATMs has contributed to an increase in crime across the country.

According to the Nigerian Inter-Bank Settlement System (NIBSS) 2014 fraud report, the Nigerian financial system lost ₦6.2 billion to fraud in 2014, compared to a loss of ₦485 million in 2013. A significant proportion of these losses was attributed to electronic fraud, with ATMs alone accounting for 43.25% of the total value - representing a 47.89% increase from the previous year.

Table 4

Fraud Actual Loss Amount Trend by Channels in Terms of Percentage between 2013 and 2014

Channels	2013 Loss Amount (N)	2014 Loss Amount (N)	% Change
ATM	54,999,829	2,688,669,292	4789%
POS	5,851,443	157,610,831	2594%
Web	109,298,898	1,031,239,284	844%
Across Counter	13,851,780	140,813,927	917%
Internet Banking	271,762,696	2,120,881,512	680%
E-Commerce	13,948,390	56,994,920	323%
Mobile	6,787,544	13,328,957	96%
Cheques	8,693,770	4,448,600	-49%
Total	485,194,350	6,215,987,323	

Source: NIBSS Report-2014 E-payment Fraud Landscape in Nigeria.

The Central Bank of Nigeria (CBN), in its effort to minimize ATM-related fraud, directed banks and payment service providers to adopt the following protective, control, and security measures:

- Two-factor authentication
- Migration of all banks to EMV chip and PIN technology
- Customer education
- Deployment of anti-fraud monitoring solutions
- Resolution of all ATM transaction disputes within 72 hours
- Establishment of an effective help desk dedicated to handling card-related complaints
- Issuance of debit cards only upon the express written request of the account holder

- Implementation of mandatory daily limits on ATM cash withdrawals
- Installation of cameras at all ATM points
- Restriction on ATM deployment: according to CBN guidelines, banks may only deploy ATMs within their premises; all other ATMs must be installed by vendors in CBN-vetted and approved consortia
- Regular penetration and vulnerability testing
- Conformance to industry standards
- Ensuring end-to-end encryption
- Incorporation of prevention, detection, investigation, recovery, and deterrence into fraud management strategies.

Purpose of the Study

- The study seeks to determine the impact of information technology on the Nigerian banking industry, with a specific focus on Automated Teller Machines (ATMs).

Specific Objective

- To examine customers' perceptions of the positive impacts of ATMs in the Nigerian banking industry.

Research Question

One research question guided the study:

- What are the significant differences in customers' perceptions of the positive impacts of ATMs on banking?

Null Hypothesis

One null hypothesis was formulated to guide the study:

- There is no statistically significant difference in customers' perceptions of the positive impacts of ATMs on banking.

Methodology

This study adopted a descriptive survey design. The study population consisted of all bank customers in Calabar Metropolis, Cross River State, Nigeria. The sample comprised one hundred (100) respondents. Respondent selection was based on awareness of, and access to, ATM facilities.

The data collection instrument was a questionnaire consisting of 29 items, designed on a 5-point Likert scale with both positively and negatively worded statements. Face and content validation of the instrument was ensured by the supervisor and an expert from the Department of Information and Communication Technology, Cross River University of Technology, Calabar. They assessed the appropriateness of the items in measuring the expected knowledge and the correctness of the questions. Based on their feedback, the instrument was revised and refined to meet validity requirements.

To ensure reliability, a test-retest technique was employed. The instrument was administered twice at a two-week interval. A reliability coefficient of 0.85 was obtained using Cronbach's Alpha formula. After the trial test, the finalized instrument was administered directly to respondents by the researcher and retrieved upon completion. All responses were duly marked.

The collected data were analyzed using frequencies, percentages, and Chi-square statistics at the 0.05 level of significance.

Results

This section presents the results of data analysis based on the research question and the hypothesis that guided the study.

Table 5

Customers' ATM operational Culture

		Responses									
S/N	**Variable**	**SA**		**A**		**N**		**D**		**SD**	
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1	Operate more than one account	49	49	26	26	5	5	12	12	8	8
2	Subscribe to the use of ATM	60	60	27	27	4	4	7	7	2	2
3	ATM as most preferred mode of transaction	38	38	30	30	11	11	17	17	4	4
4	Is ATM user friendly?	30	30	50	50	11	11	4	4	5	5
5	Hold ATM card(s) often	25	25	28	28	14	14	27	27	6	6
6	Share ATM card with second party	10	10	7	7	10	10	24	24	49	49
7	ATM ease bank operations	45	45	45	45	5	5	3	3	2	2
8	Observe ATM card/PIN security during transactions	10	10	7	7	10	10	24	24	49	49
9	Experienced ATM service outages	36	36	36	36	11	11	10	10	7	7
10	Has the ATM increased the ability to hold cash	26	26	37	37	15	15	15	15	7	7
11	Change ATM PIN frequently	7	7	10	10	12	12	43	43	28	28
12	ATM cause more spending than before the introduction of ATM	40	40	34	34	8	8	15	15	3	3

Source: collected data

Table 5 shows customers' ATM operation culture. From the table, 75% (SA & A) operated more than one bank account, compared to 20% who did not, while 5% were neutral. Similarly, 87% use ATMs, 9% do not, and 4% remain neutral. These findings are consistent with Adepoju and Alhassan (2010), who noted that the adoption of ATMs in Nigerian banks continues to grow as people increasingly recognize the convenience of using them.

Furthermore, 68% of respondents indicated that the ATM is their most preferred mode of transaction, compared to 20% who prefer other modes and 11% who were neutral. Eighty percent of respondents find the ATM user-friendly, 11% were

neutral, while 9% disagreed. In addition, 53% of respondents often carry their ATM card(s), 30% do not, and 14% were neutral.

Regarding ATM card security, 73% (D & SD) stated that it is not advisable to share an ATM card with a second party, while 17% agreed to share, and 10% were neutral. This supports the view of Adesina and Ayo (2010) that network security and system privacy are major concerns for users and serve as barriers to potential ATM adoption.

The table also shows that 90% (SA & A) believe ATM usage eases banking operations, 5% were neutral, and another 5% (D & SD) disagreed. This aligns with the position of Adesuyi, Adepoju, Robert, and Alabi (2013), who argued that the adoption of ATMs in Nigerian banking has been crucial for improving efficiency and overall service delivery.

Additionally, 63% of respondents reported that ATMs have increased their ability to hold cash, compared to 22% who disagreed and 15% who were neutral. Seventy percent (SA & A) indicated that they observe ATM card/PIN security measures during transactions, 5% were neutral, and 25% (D & SD) did not. Also, 71% (D & SD) reported that they rarely change their PIN, 12% were neutral, while 17% (SA & A) frequently change it. Finally, 74% of respondents agreed that ATM usage leads to more spending, 8% were neutral, and 18% (D & SD) disagreed.

Table 6

Banks Performance Rating on ATM Services

		Responses									
S/N	**Variables**	**SA**		**A**		**N**		**D**		**SD**	
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1	Banks compliance with CBN standard on ATM	22	22	33	33	37	37	5	5	3	3
2	Receive alerts on competed ATM transactions	54	54	28	28	7	7	7	7	4	4
3	Receive alerts as prompt as possible	38	38	37	37	7	7	13	13	5	5
4	Has ATM service charge reduced ATM patronage?	10	10	27	27	16	16	31	31	16	16

Source: collected data

Table 6 shows that 55% of the respondents (SA & A) believe that banks comply well with CBN regulations on ATM operations, while 8% (D & SD) disagreed, and 37% remained neutral. Furthermore, 72% of respondents reported that they receive alerts on completed ATM transactions from banks, 11% disagreed (D & SD), and 7% were neutral. In addition, 75% of the respondents indicated that they receive alerts promptly, while 18% disagreed and 7% remained neutral. Encouragingly, the results also reveal that the introduction of ATM service charges has not reduced ATM patronage, as 47% (D & SD), 16% neutral, and 37% (SA & A) responded respectively.

Table 7

Functional and Security Credence of ATM Operations

		Responses									
S/N	**Variables**	**SA**		**A**		**N**		**D**		**SD**	
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1	Victim of ATM card theft	16	16	9	9	8	8	30	30	37	37
2	Is ATM usage complicated	10	10	15	15	14	14	49	49	12	12
3	ATM PIN authentication provide adequate security	28	28	44	44	13	13	13	13	2	2
4	Short-changed on your bank account(s)	26	26	30	30	11	11	23	23	10	10
5	Cases of irregularities on bank account(s)	17	17	29	29	11	11	32	32	11	11
6	Cases of irregularities resolved	21	21	39	39	25	25	9	9	6	6
7	Aware that ATM cards can be cloned	45	45	38	38	9	9	4	4	4	4
8	Aware of the existence of biometric ATM	29	29	31	31	18	18	16	16	6	6
9	Biometric more secured to PIN	27	27	28	28	31	31	9	9	5	5
10	Recommend biometric ATM	32	32	26	26	24	24	13	13	5	5

Source: collected data

As shown in Table 7, 25% (SA & A) of the respondents reported being victims of ATM card theft, compared to 67% (D & SD) who had not, while 8% remained neutral. Regarding ATM security, 72% of respondents stated that PIN authentication provides adequate protection, 15% disagreed, and 13% were neutral. Furthermore, 83% acknowledged that ATM cards can be cloned by fraudsters, 8% were unaware, and 9% were neutral.

On biometric technology, the table indicates that 60% (SA & A) of respondents are aware of the technology, 22% (D & SD) are not, and 18% remain neutral. Additionally, 55% agreed that adopting biometric technology in ATMs would provide better security than PIN authentication, 14% disagreed, and 31% were neutral. On a positive note, 58% of respondents expressed willingness to embrace biometric technology as a superior security measure, while 18% would not, and 24% were neutral.

Hypothesis

There is no statistically significant difference in customers' perceptions regarding the positive impact of ATMs on banking.

Table 8

Result of calculated expected frequencies based on observed frequencies on the response that ATM eases bank operations

Response	Observed Frequency	Expected Frequency	Row Total
SA	45	20	65
A	45	20	65
N	5	20	25
D	3	20	23
SD	2	20	22
Column Total	100	100	200

Table 9

Summary of Chi-square Analysis on the response that ATM eases bank operations

Response	O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
SA	45	20	25	625	31.25
A	45	20	25	625	31.25
N	5	20	-15	225	11.25
D	5	20	-17	289	14.45
SD	2	20	-18	234	16.20
Total	100	100	0	2088	$X^2 = 104.40$

At df = 4 and 5% level of significance, the critical X^2 value is 9.48. Since the calculated X^2 value (104.40) is greater than the critical X^2 value (9.48), H_0 is rejected. This implies that there is a statistically significant difference in customers' perception of the positive impact of ATMs on banking.

Discussion of Findings

The analysis of the data shows that 87% of the respondents use ATMs compared to 9% who do not, while 5% remain neutral. In addition, 90% believe that ATM usage eases banking operations. Encouragingly, the introduction of ATM service charges has not reduced patronage of the platform. The results further indicate that 58% of the respondents would welcome the adoption of biometric ATMs as a better means of enhancing system security. A Chi-square test of the null hypothesis reveals a statistically significant difference in customers' perception of the positive impact of ATMs in the banking industry.

Conclusion

The usage of ATMs and related services within the Nigerian banking sector has been vital in improving the efficiency of banking services. The findings of the study indicate a positive impact of ATM usage in the Nigerian banking environment. Results also show that ATMs increase customers' ability to access their accounts to make withdrawals for their needs and reduce the volume of customers physically transacting business in banking halls. However, ATMs also encourage increased spending. The study further reveals that customers perceive ATM PIN authentication as providing adequate security, while also indicating that the adoption of more secure and reliable technologies, such as biometric ATMs, would be welcomed.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Banks and payment service providers should continue to meticulously observe the Central Bank of Nigeria's protective, control, and security measures to minimize ATM-related fraud.

2. The adoption of ATMs in the Nigerian banking industry should be fully institutionalized in order to maximize the benefits of ATM technology.

3. More secure authentication methods, such as the deployment of biometric ATMs by banks and other financial institutions, should be adopted.

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