

Research article

# THE DETERMINANTS OF AUTOMATED TELLER MACHINES (ATM), DEPLOYMENT IN NIGERIAN BANKS

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## ABSTRACT

The purpose of this paper was to examine the determinants of ATM deployment in Nigerian banks. The study was carried out on twenty two commercial banks quoted by Nigerian stock exchange market in the year 2012 out of which twenty was purposefully selected Secondary data were used in the study. These were obtained from the five years financial reports and internal operational records of the banks for the period 2007 to 2011. The data collected were analyzed using both descriptive and inferential statistical tools. The descriptive statistics used included tables, while multiple regression models were used as inferential statistics. The paper considered employee's salary level, Asset base, profitability, number of banks in existence reflecting the degree of competition and the value of ATM transactions. Three of the five variables were significant. These are: bank size, salary level and value of ATM transactions. The results showed that bank size, salary level and value of ATM transactions were key determinants of ATMs deployment by banks in Nigeria, given their elasticity values of 68.8768, 0.075788 and 0.12121 respectively. The  $R^2 = 0.8212$  and adjusted  $R^2 = 0.7219$  were indicative of the significance of the variables in ATMs deployment determinants. The results provide useful implications for banks, ATM firms and researchers to understand better the key drivers ATM deployment in Nigerian banks as well as assist banks management in ICT investment decisions making. **Copyright ©AJCTA, all rights reserved.**

**Key words:** Automated Teller Machines (ATM), Bank Size, Communication Technology, ICT Investments, Information Technology and ATM determinants.

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## INTRODUCTION

The Structural Adjustment Programme (SAP) initiated in 1986 by the Babangida Administration brought to an end the kind of banking services rendered by the first generation of banks described as "Arm Chair Banking" (Athanasoglou, Brissimis, and Delis 2005). The SAP changed not only the structure but also the content of banking business. Just as the number of banks grew tremendously from 40 in 1985 to 125 in 1991, the SAP made possible the licensing of more banks and which posed more threat to existing ones and the more aggressive the marketing

techniques adopted by them. In the process of the intense competition, adoption of electronic banking was seen as a necessity to maintaining a good competitive position.

Nigeria started the long and tortuous journey of e-banking in November, 1990 when Societe Generale bank launched their first Automated Teller Machine blazing the trail in November 1990 with ATM popularly referred to as "cash point 24" at their Broad Street and Apapa Branche. Idowu (2005) stated that the introduction of this machine serves as genesis and bedrock of electronic banking. She remarked that ATM is basically a cash dispenser with a 24/7 service facility, that is, the machine unattended to i.e. "stand alone" or "wall mounted" (outside or inside the banking hall) allows you to transact limited business without referring to any bank staff except in case of problem and difficulty round the clock. An ATM allows a customer to withdraw cash from his or her bank account by entering a Personal Identification Number (PIN) after the insertion of a card into the machine and having the amount of the withdrawal immediately debited to the account of the customer.

Automated Teller Machine (ATM) has become a major indicator of Information Communication Technology (ICT) investment by banks. Globally, Automated Teller Machines (ATM) have been adopted and are still being adopted by banks. They offer considerable benefits to both banks and their depositors. The machines can enable depositors to withdraw cash at more convenient times and places than during banking hours at branches. In addition, by automating services that were previously completed manually, ATM reduce the costs of servicing some depositor demands. These potential benefits are multiplied when banks share their ATMs, allowing depositors of other banks to access their accounts through a bank's ATM (McAndrews, 2003). Banks have become the principal deplorers of ATM because the cost of a single transaction performed at an ATM is potentially less than the cost of a transaction conducted from a teller, as ATM are capable of handling more transactions per unit of time than Tellers (Humphrey, 1994).

According to Olatokun and Igbinedion (2009), in Nigeria the deployment of ATM by banks and its use by bank customers burgeoned after the recent consolidation of banks, which has in all probability, made it possible for more banks to afford to deploy ATM or at least become part of shared networks (Fasan, 2007). Currently, the use of ATM cards has been widely promoted. Banks no longer appear to personal contact with their customers. Some banks have resorted to penalizing customers for not using ATM for a specific withdrawal, by debiting the account of such a customer for withdrawing below a certain amount of money across the counter. Anyanwaokoro(2001) indicated that although only a bank had an ATM in 1998, by 2004, 14 of them had acquired the technology.

Fanawopo (2006) opined that Nigeria's debit card transactions rose by 93 per cent between January 2005 and March 2006 over the previous years owing to aggressive roll out initiatives by Nigerian banks, powered by Interswitch Network. He also reported that the number of ATM transactions through the Interswitch Network had increased from, 1,065,972 in 2004, to 14, 448, 615 between January 2005 to March 2006. This is a rise of 92.6 percent with respect to the previous years. More than 800 ATM have been deployed on the network, while about 2 million cards have been issued by 23 banks as at March 2006 (Fanawopo,2006). A survey conducted by Intermerc Consulting Limited revealed that ATM services provided by banks and non-financial institutions stood as the most popular e-business platform in Nigeria (Intermerc Consulting Limited, 2007). CBN (2009) reported that the upsurge of ATM as a dominant payment channel with 84.51 percent and 80.08 percent in volume and value of transactions respectively had continued at the end of June, 2009. It reported also that the increased usage of ATM was attributed to the increase in number of ATM in the country, awareness and ease as well as convenience of operating system. So far, banks like Firstbank, Zenith, GTBank, Fidelity and UBA have been at the forefront of this innovative drive. However ,CBN (2011) revealed that ATM remained the most patronized, accounting for 98.09 percent with a transaction worth of 764.14 million naira. In the words of Amefrele (2012) come December 2011 about 40,000 ATM would be deployed per 100,000 persons in different parts of Lagos State. By June 2012, it would be increased to 75,000 ATM, and by December 2012, to 150,000 per 100,000 persons and finally by December 2015, it intends to meet the Brazilian experience and push it to about 275, 000 per 100,000 persons. Even though there has been inadequate ATM in the country, the number of e-payment cards have been on steady increase from seven millions in 2010 to eleven millions in 2011 and now twenty six millions in 2012( Accounting, Incorporating advances in International accounting 25,2009).

The drivers of ATM deployment in banks generally, have been of interest in some previous, though limited, studies. According to Retail Banking Research (RBR), 2008, the most notable ATM growth in the world in a space of two

years took place in Nigeria where the installed base expanded from only 581 terminals in 2005 to 3,676 at the end of 2007, which equates to a six fold growth. It stated that the growth is being driven in large part by the rapid increase in the bank branches and the ensuring influx of cash-hungry customers. The availability of low cost ATM and the introduction of ambitious non - deployers are also playing their role in Nigeria impressive growth.

Chin - S Ou, Shin -Yuan Hung, David C. Yen and Fang - Chun Liu (2009), examined the determinants of automatic teller machine (ATM), a kind of information technology (IT), in the Taiwanese banking industry. They indicated that operating scale, bank deposit and operating cost are all significant determinants of ATM investment. Hannan and Mcdowell (1984) observed that wage rate and firm size had positive effects on the decision to adopt ATM. In the Nigerian banking environment, there is a tremendous growth in the deployment of ATMs but without a clear vidence of the specific factors that drives it as there appear to be limited previous studies that have focused on this. This paper will therefore focus on examining the determinants of ATMs deployment in Nigerian banks to fill this existing gap.

In examining the determinants of ATM deployment, the paper provides answer to the research question ‘What are the determinants of ATMs deployment in Nigerian banks?’ proposing the hypothesis that the determinants of ATM have no significant effect on its deployment in Nigerian banks. It is expected to fill the research gap by ascertaining the determinants of ATM deployment in Nigerian banks in order to justify its investment. The findings can provide useful implications for banks, ATM firms and researchers to understand better the key drivers ATM deployment. It will therefore assist management in ICT investment decisions making.

## LITERATURE REVIEW

The determinants of banks ATM deployment have been scarcely studied theoretically and empirically. Those studies have focused on countries other than Nigeria. These studies are Hannan and Mcdowell (1984), [Thong and Yap \(1995\)](#), [Hwang et al. \(2004\)](#), and Chin et al (2009). Based on the findings of these studies, wage rate (salary level), firm size, competitive pressure, could be identified as the possible determinants of ATM investment. In addition to the above, value of ATM transactions and profitability of the bank could also drive ATM investment.

### Wage Rate (Salary Level)

The wage rate relates to salaries and wages of the employees of the banks exclusive of pension and retirement benefits. Hannan and Mcdowell (1984) in examining the relationship between the decision of new IT adoption and its determinants found out that wage rate had positive effects on deciding ATM adoption. That is, in regions of higher wage rates, banks tend to install more ATM to replace expensive labor. All this means that reducing operating cost is one of the important drivers for banks to invest in innovation IT such as ATM.

Chin *et al.*, (2009) in examining the determinants of automatic teller machine (ATM), a kind of information technology (IT), in the Taiwanese banking industry opined that the factors that are expected to have impact on IT investment in general and on ATM investment in particular identified salary expense as one of the determinants of ATMs investment. The results of their study indicated salary expense was among others the determinants of ATM investment in the Taiwan banking.

### Bank Size

The actual bank size has been found to have a positive effect in determining new IT such as ATM deployment.. Hannan and Mcdowell (1984) in examining the relationship between the decision of new IT adoption and its determinants found out that consistent with the economic scale theory; larger banks tend to introduce more ATM than small banks do. [Hwang et al \(2004\)](#) examined the critical factors influencing the adoption of data warehouse technology in the Taiwan banking industry and also found out that bank size affect the adoption of data warehouse technology. Chin *et al* (2009) opined that operating scale which was represented by total assets, number of branches as well as growth in branches was positive and significant. They posited also that larger banks invest more on ATM.

## Competitive Pressure

In Nigeria, it appears that the banks with more ATM appear to be more current, visible and likely to deliver better services on time, which might influence an adopter's decision to use an ATM; besides this, the stiff competition among banks trying to carve niches in the stock market, alongside the large size of potential customer patronage (as a result of the large population of the country) makes ATM adoption for banks crucial. Laudon D. and Laudon J. (1991) posit that banks cannot ignore information system because it plays a critical role in their competitive edge both locally and internationally, they pointed out that most fortune banks' cash flow is linked to their adoption of information system. Competitive pressure in the banking industry can be explained based on the number of banks competing in the market.

Thong and Yap, (1995) suggested that competitiveness of environment as an organizational characteristic among other factors is crucial in determining adoption of IT. Also, Hwang et al. (2004) found out that among other factors competitive pressure affect the adoption of data warehouse technology.

## Value of ATM Transactions

Fanawopo (2006) opined that Nigeria's debit card transactions rose by 93 per cent between January 2005 and March 2006 over the previous year's owing to aggressive roll out initiatives by Nigerian banks, powered by Interswitch Network. He also observed that more than 800 ATM have been deployed on the network, while about 2 million cards have been issued by 23 banks as at March 2006. A survey conducted by Intermarc Consulting Limited revealed that ATM services provided by banks and non-financial institutions stood as the most popular e-business platform in Nigeria (Intermarc Consulting Limited, 2007). The most notable ATM growth in the world in a space of two years took place in Nigeria where the installed base expanded from only 581 terminals in 2005 to 3,676 at the end of 2007, which equates to a six fold growth. This growth is being driven in large part by the rapid increase in the bank branches and the ensuring influx of cash-hungry customers.

CBN (2009) reported that, the increased usage of ATMs was attributed to the increase in number of ATMs in the country, awareness and ease as well as convenience of operating system. This suggests that the value and volume of ATM transactions were influenced by the number of ATM in the country. One would have expected the reverse suggesting that the deployment ATM should have been in response of the increase value and volume of ATM transactions.

## Bank Profitability

Profitability could be measured in terms of return of equity (ROE) or return on Assets. ROE measures the return to shareholders on a unit of their capital while ROA indicates income earned on each unit of assets. ROE is not an optimal measure of profitability since degree of capitalization is often established by the regulatory authority. In the opinion of Golin (2001), ROA is the key measure of profitability for banks. Hence in this paper ROA is used as the measure of profitability. It is expected a profitable bank would invest more in asset acquisition including ICT investment.

## METHODOLOGY

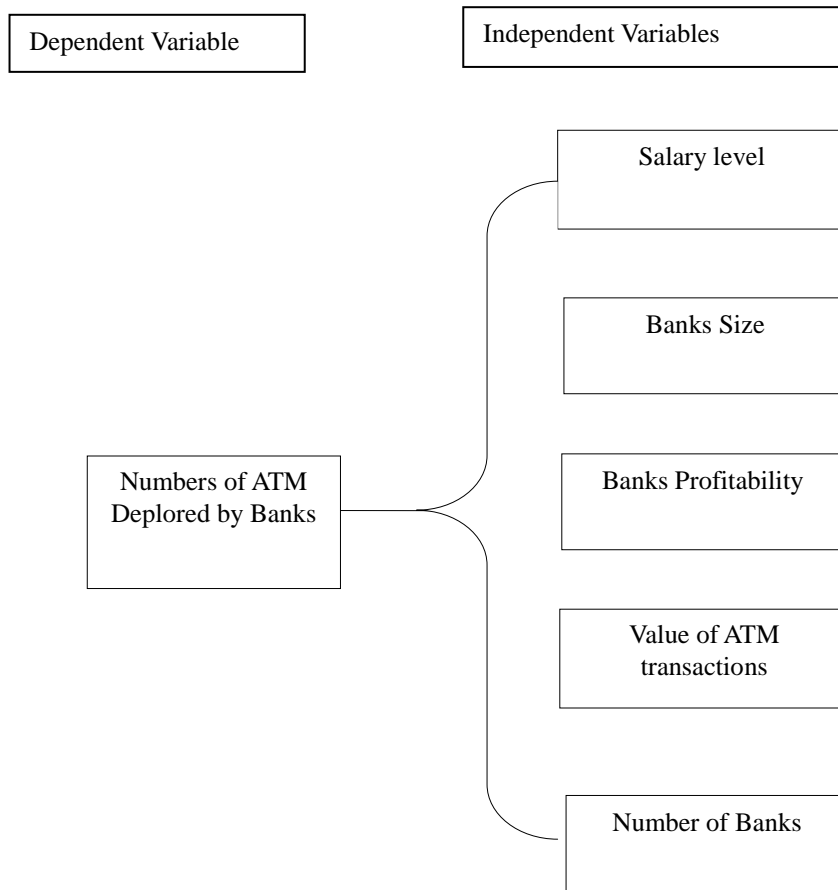
The paper used data from secondary sources as all relevant data were obtained from the published accounts and internal records of the banks. The secondary sources of data include the financial statements of all the selected 20 banks as reported in their annual published accounts covering the period 2007 to 2011. The selected banks were purposively out of the 22 commercial banks whose headquarters are in Lagos, the commercial nerve centre of

Nigeria based on the Banks licensed as Commercial banks, Commercial banks with headquarter in Lagos the economic nerve centre of the country and banks.

### Modeling the determinants of ATM deployment in Nigerian banks

The paper in examining ATMs determinants analyzed the data obtained using the least square regression model mathematical expression with dependent variable as the number of ATM deplored by banks while the independent variables are employee's salary level, banks size, banks profitability, value of ATM transactions and number of banks in line with Chin S et al., (2009), Hannan and Mcdowell (1984) and [Thong and Yap \(1995\)](#). The model is shown in figure 1 below.

**Figure 1:** Modeling the determinants of ATM deployment in Nigerian banks



**Source:** Compiled from Chin S et al., (2009), Hannan and Mcdowell (1984) and [Thong and Yap \(1995\)](#)

The economics model is constructed as:

$$Y_{iy} = \alpha_0 + \alpha_1 X_{1iy} + \alpha_2 X_{2iy} + \alpha_3 X_{3iy} + \alpha_4 X_{4iy} + \alpha_5 X_{5iy} + \epsilon_{iy}$$

Where:

$Y_{iy}$  = Number of ATM deplored by bank i in year y

$X_{1iy}$  = value of ATM transactions of bank i in year y

$X_{2iy}$  = Asset Base of Bank i in year y

$X_{3iy}$  = Salary level of bank i in year y  
 $X_{4iy}$  = profitability of bank i in year y  
 $X_{5iy}$  = Number of Banks i in year y  
 $\epsilon_{iy}$  = Error factor

## RESULTS

In order to achieve the purpose the paper which is to ascertain the determinants of ATM deployment in Nigerian banks a multiple regression analysis was employed. Five factors were considered in the model as determinants in line with the work of Chin S et al., (2009); they are bank size, bank profitability, salary level, number of banks during period of study and value of ATM transactions. The result is as shown below in table 2 below

**Table 2:** Summary of Regression Analysis

Variables	Coefficient	t (value)	p (value)
I. Constant	6259.792	1.25	0.242
II. Bank size (bsize)	68.87678***	0.33	0.752
III. Bank profitability (profit)	-139.0728	-0.61	0.559
IV. Salary level of banks (sallevel)	0.0757881***	2.14	0.061
V. Number of banks (nbanks)	-298.1285	-1.46	0.178
VI. Value of ATM transactions (atmtran)	0.1212075***	0.84	0.425

$R^2 = 0.8212$ , adjusted  $R^2 = 0.7219$ , \*\*\* significant at  $p < 0.05$

The multiple regression line is as written below:

$$NATM = 6259.792 + 68.8768bsize - 139.0728prof + 0.075788sallevel - 298.1285nbanks + 0.12121atmtran + \epsilon$$

## DISCUSSION

The adjusted R2 is 0.7219 which implies that 72.19 percent of the variation on number of ATM deployed by banks is being explained by the five variables considered in the model. Three of the five variables are significant. These are: bank size, salary level and value of ATM transactions. Specifically, the coefficient of bank size is 68.8768. It is positive and statistically significant at  $p < 0.05$ . This shows a significant effect of bank size on banks ATM deployment while the positive sign implies that a unit increase in bank size will tend to 68.88 unit increase in ATM deployment by banks. This is in line with the works of Hannan and McDowell (1984) which in examining the relationship between the decision of new IT adoption and its determinants found out that firm size has positive effects on deciding ATM adoption. In addition, consistent with economic of scale theory, larger banks tend to introduce more ATM than smaller banks do (Humphrey, 1994 and Chin S et al., (2009). This suggests that adopting ATM is likely to be more profitable for relatively larger institutions. Generally speaking, it is assumed that the firm size variable can capture the effect of scale. The coefficient of salary level of banks is 0.0757881 significant and positive at  $p < 0.05$  which implies that additional unit increase in salary level of the bank will tend to 0.076 unit increase in the number of ATM deployed by the banks. This is also in line with the works of Hannan and McDowell (1984) which in examining the relationship between the decision of new IT adoption and its determinants found out that wage rate has positive effects on deciding ATM adoption and stating that in regions with higher wage rates, banks tend to install more ATM to replace expensive labour. The coefficient of the value of ATM transactions is 0.1212075 is positive and significant at  $p < 0.05$  which implies that a unit increase in the value of ATM transactions will tend to 0.12 unit increase in the number of ATM deployed by banks. This is indicative of the response of the banks to the growing demands of ATM usage. The coefficients of bank profitability and number of banks are -139.0728 and -298.1285 respectively. They are negative and are not statistically significant at  $p < 0.05$ . The implication of these is that the extent of ATM deployment is not really dependent on the bank profitability and number of banks. It can be clearly stated from the result analyzed above that there are significant determinants of ATM deployment by banks in Nigeria.

## CONCLUSIONS

The following conclusions were drawn from the findings of this study:

The banks in the study area were majorly influenced by the ATM deployment by bank size, salary level and value of ATM transactions. This means that banks that can afford ATMs would invest in it. Also there is the desire of the banks to make ATM teller labour substitution. There is also clear evidence that banks response to growth in ATM transaction is not reflected in the ATM deployment. The competition among the banks has not also influenced the deployment of ATM.

## RECOMMENDATIONS

As a result of the above findings and conclusions, Banks in Nigeria should continue to deploy ATM as a strategic tool for improved efficiency. Banks should also respond to the growth in ATM transactions by deploying more ATM to minimize the problem of inadequacy in capacity.

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