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Determinants of Automated Teller Machine Usage in Lagos State, Nigeria

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Abstract. Research has shown that ATMs provide an extremely useful service to customers but the machine is characterized by several service quality inadequacies, and at times it can be very frustrating to use. Consequently, this study investigated socio-demographic factors and service quality dimensions as determinants of ATM usage in Lagos State, Nigeria. A questionnaire was used to collect data from bank customers who use ATM and the data were analysed using General Linear Model (GLM) and multiple regression. The results from the analyses reveal that socio-demographic factors, such as age, education, and income, influence ATM usage, while gender and occupation do not influence ATM usage. The study also revealed that all the service quality dimensions identified in the study have a significant positive influence on ATM usage. When the joint effect of socio-demographic factors and service quality dimensions on ATM usage was assessed, it was found that service quality had a greater influence on ATM usage than socio-demographic factors.

Keywords: automated teller machine, socio-demography, service quality, usage, self-service
JEL Classifications: M19, M39

1. Introduction

The emergence and growth of information technology have revolutionized operations in business organizations and the way businesses and customers interact in both developed and developing countries (Adelowo, 2015). This paradigm shift prompted several industries to align their service delivery with

electronic channels (e-channels). One of the industries that have experienced significant changes and development in the use of e-channels to render services to customers is the banking industry (Onyesolu, Asogwa, and Chukwuneke, 2016). Banks use technology to provide self-service to customers through various e-channels (Sindwani & Goel, 2015). Apart from branch banking, banks offer e-banking services such as Automated Teller Machine (ATM), Internet Banking, Mobile Banking, and Point-of-Sale (POS). Among these technology-based service options, ATM appears to be the most popular one (Oghojafor, Muo, and Alaneme, 2013). ATM is a technological innovation developed to offer diversified financial services and to provide 24 hours a day, 7 days a week (24/7) service to customers, without human interaction or bank teller (Odusina, 2014).

Nigerian banks have been investing huge sums of money in the deployment and maintenance of e-channel platforms, especially in ATMs (Ayo, Oni, Adewoye, and Eweoya, 2016). To encourage customers to use the e-channels effectively and efficiently, banks and the Central Bank of Nigeria (CBN) have been promoting strategies and practices aimed at increasing usage. Onyesolu et al. (2016) noted that banks persuaded their customers to subscribe to ATMs. Some banks have placed restrictions on over-the-counter withdrawals, such that customers are not encouraged to withdraw below a certain amount across the counter. Also, some banks debit the account of customers whose ATM card has expired before requesting for a new one. On the part of CBN, there have been some efforts to encourage an increased use of e-channels. In 2003, CBN stipulated guidelines on electronic banking for banks to ensure the security of e-channels and to promote customers' trust in the various e-channel platforms (CBN, 2003). The regulatory body also introduced cashless policy in 2012 (CBN, 2012) and guidelines on operations of electronic payment channels in 2016 to encourage bank customers to actively utilize e-channels for payment (CBN, 2016). Despite these efforts, it has been observed that bank customers are not making full use of ATMs.

For ATMs to champion the cause of a cashless society in Nigeria, it is important to identify the factors influencing usage. Gelderman (1998); DeLone and McLean (2003) assert that technology usage is an important success measurement in e-marketing especially, when customers' use is voluntary but essential to the desired outcomes. Mohammed (2012) noted that in the study of ATM usage, two factors need to be considered. Firstly, factors that have to do with the individual bank customer in terms of socio-demography and, secondly, factors that have to do with the bank in terms of service quality dimensions. This implies that service quality is not sufficient to determine ATM usage. One of the ways to understand how different customers interact with technologies is to segment customers based on their demographic profiles (Chan & Chong, 2013). Socio-demographic factors have been widely used in consumer research to distinguish between segments of customers with regard to adoption and usage of e-banking (Joshua & Koshy, 2011;

Mohammed, 2012; Bishnoi, 2013). The authors are of the opinion that there is a relationship between socio-demographic factors and usage pattern and that there are important differences in acceptance and usage of e-banking across customers. Several researchers (Mohammed, 2012; Onyedimekwu & Oruan, 2013; Sindwani & Goel, 2015) have noted that the most relevant socio-demographic factors in the banking industry are gender, age, education, income, and occupation. As ATM continues to redefine how customers interact with banks, there is need to provide deeper and better understanding of the influences on usage.

Consequently, the objectives to be achieved in this study are to:

i. determine the socio-demographic factors (gender, age, education, income, and occupation) that affect ATM usage in Lagos State, Nigeria;
ii. ascertain the influence of service quality dimensions (reliability, convenience, ease of use, security, fulfilment, and responsiveness) on ATM usage in Lagos State, Nigeria;
iii. assess the joint effect of socio-demographic factors and service quality dimensions on ATM usage in Lagos State, Nigeria.

The paper is organized into 6 main sections. Besides the introduction, which is Section 1, Section 2 provides a literature review for the study, issues of methodology are discussed in Section 3, while Section 4 deals with results and the discussion of findings. Section 5 presents the conclusion based on the findings, while the final section, which is Section 6, offers limitations and directions for future research.

2. Literature Review

2.1. The Nigerian Banking System

Banking operations started in Nigeria between 1892 and 1894 when the African Banking Corporation and the Bank of British West Africa were established by the colonial masters (Ajayi & Sosan, 2013). The first indigenous bank in Nigeria, called Industrial and Commercial Bank, was established in 1929. Over the years, several banks came on board, and as at 2004 there were 89 banks operating in Nigeria (Adesina & Ayo, 2010). During this period, the banking system was mainly branch banking. In recent years, there has been a shift from the branch banking process of delivering banking services to electronic means. This revolution started in 2003 with the introduction of Guidelines for Electronic Banking by the Central Bank of Nigeria. This was accompanied by a bank reformation exercise in June 2004. The reformation exercise left Nigeria with 25 strong and reliable banks as opposed to 89 banks previously in existence (Adesina & Ayo, 2010). The Nigerian banking system currently consists of 21 commercial banks. The surviving banks

of the recapitalization exercise have enormously engaged in the use of ICT as a platform for effective and efficient delivery of banking services (Onyedimekwu & Oruan, 2013). The most commonly used e-banking platforms include:

ATM: This is a computerized machine that provides the customers of banks the facility of accessing their accounts for dispensing cash and to carry out other financial transactions without the need of actually visiting a bank branch (Asabere, Baah, and Odediyah, 2012).

Telephone Banking: This is a service provided by a financial institution, which allows its customers to perform some banking transactions over the telephone. Most telephone banking services use an automated phone answering system with phone keypad response or voice recognition (Onyedimekwu & Oruan, 2013).

Mobile Banking: This is also referred to as M-Banking or mbanking. This is a service that enables bank customers to perform balance checks, account transactions, payments, credit applications, and other banking transactions through a device such as a mobile phone or Personal Digital Assistant (PDA) (Agwu & Adele-Louise, 2014).

Internet Banking: This is also known as online banking, web banking, or virtual banking. It is a system that enables bank customers to access accounts and general information on bank products and services or perform account transactions directly with the bank, using the Internet as the delivery channel. It allows customers of a financial institution to conduct financial transactions on a secure website operated by the institution. To access a financial institution's online banking facility, a customer having personal Internet access must register with the institution for the service and set up some password under various names for customer verification (Imola & Claudia, 2014).

Point-of-Sale (PoS) Terminal: This is an electronic device that is used for verifying and processing credit card transactions. They are connected via highly reliable telephone wired connections and they require rapid dial-up time, low power, and reliable performance capability (Onyedimekwu & Oruan, 2013).

Among these e-banking options, ATM appears to be the most popular one (Oghojafor, Muo, and Alaneme, 2013; Alma & Tedis, 2014; Adelowo, 2015; Onyesolu et al., 2016). This may be due to the nature of the e-banking channels. Unlike the other channels, ATM can dispense cash. Consequently, the focus of this study is on ATM.

2.2. Theoretical Framework

The theory underpinning this study is the attribution theory proposed by Fritz Heider in 1958 (Heider, 1958) and developed by Weiner (1974, 1986). Attribution is the inference one makes about the causes of other people's behaviour (McLeod, 2012). Attribution theory explains how individuals interpret events and how

it relates to their thinking and behaviour. It explains how and why people do things as they do. An individual seeking to understand why another person did something may attribute one or more causes to that behaviour. Through this theory, Heider (1958) explained the inferences on individual behaviour and noted that the way a person understands an event is related to the person's thinking process. In the view of Swanson and Kelley (2001), attribution theory is a collection of several theories that are concerned with the assignment of causal inferences and how these interpretations influence perceptions and behaviour.

The general attribution approach recognizes that man tries to make sense of their surroundings and themselves and that explanations or the finding of meaning to a phenomenon is an integral part of investigation (Bertram, 2003). As noted by Heider (1958), a person can make two attributions: internal attribution and external attribution. Internal attribution is the inference that a person is behaving in a particular way because of something about the person, while external attribution is the inference that a person is behaving in a certain way because of something about the environment or some event outside a person's control. Internal attributions are driven by the motives and emotional attitudes of an individual, while external attribution is driven by external events. In this study, an attempt is made to determine the inference that could be made with respect to ATM usage. In this case, the internal attribution is the socio-demographic factors, while the external attribution is the service quality dimensions. The issue here is whether usage behaviour can be attributed to internal characteristics of ATM users in terms of socio-demographic characteristics or to external factors in terms of service quality dimensions or both.

2.3. Empirical Review

Some studies have examined the influence of demographic factors and service quality on ATM usage. Rugimbana (1995) conducted a study in Australia to predict Automated Teller Machine usage by examining the importance of perceptual and demographic factors. Six demographic factors as well as five perceptual variables were investigated. Using factor analysis and logistic regression; age, occupation, and education were found to be significant predictors of ATM usage, while all the perceptual factors, which include convenience, ease of use, compatibility, reliability, and accuracy, were significant. It was concluded that perceptual factors predict ATM usage significantly better than demographic factors. Mohammed (2012) conducted a study to determine the factors influencing ATM usage in India. He identified demographic factors as internal factors and banking attributes as external factors. The demographic factors examined are gender, education, occupation, and income, while the banking factors are bank type, account type, convenient accessibility, number of services offered, and cost of services. Using

binary logistic regression, it was found that all the demographic factors significantly influence ATM usage, while the banking attributes were not significant. Ayimey, Awunyo-Victor, and Somuah (2012) carried out a study in Ghana to determine if ATMs met the expectations of the customers and what limits their use by the customers. The results indicated that poor ease of use as a result of inadequate education given to users of ATM and other limitations with the machine were cited as factors contributing to customers' unpleasant experiences with ATM.

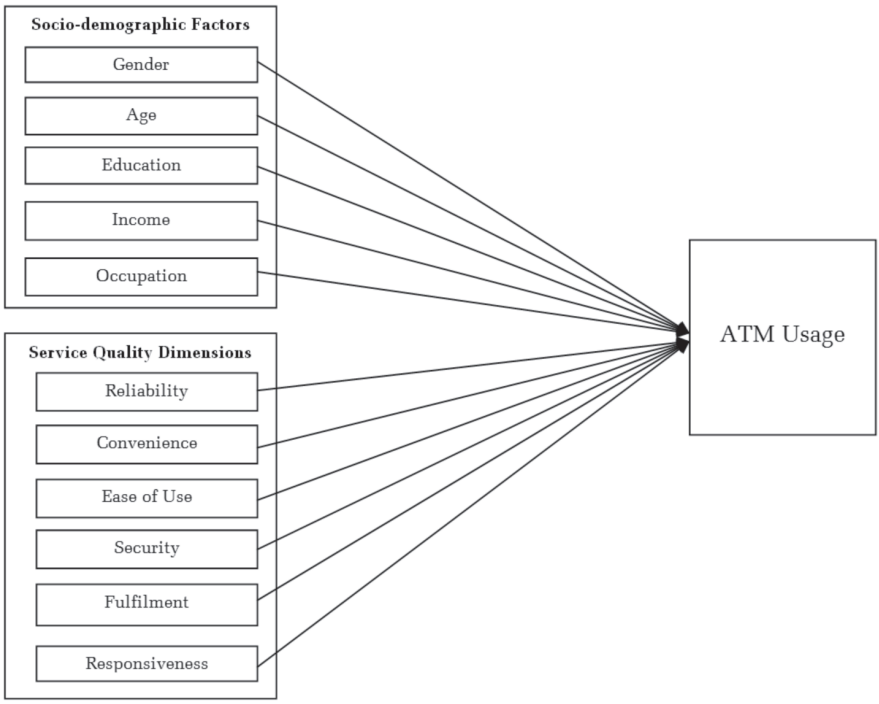
Bishnoi (2013) examined seven demographic variables (gender, education, sector, occupation, income, age, area of residence) and ATM services in the Indian banking sector. Data were collected through a structured questionnaire, and the analysis was carried out using t-test and ANOVA. It was found that there were no significant differences between gender, age, and the dimensions of ATM banking transactions, while significant differences were found with respect to education, occupation, income, and area of residence. Similarly, Yazeed, Yazidu, and Ibrahim (2014) studied ATM operation features and usage in Ghana. The study is on the operational features of ATM using queuing model and probit model. The factors identified as determinants of customers' usage of ATM include gender, education, location, ATM number, convenience, security, efficiency, breakdown, denominations, charges, and account type. The result indicated that higher educational attainment, number of ATMs per bank, convenience, security features, efficiency, and low transaction charges have a significant effect on the use of ATM. Alma and Tedis (2014) conducted a study on the usage of electronic banking services by individual clients of banks in Albania. They examined the influence of demographic characteristics of clients and bank factors on electronic services usage. The results of descriptive analysis indicated that the most commonly used electronic banking service is ATM. The results of chi-square test indicated that education and income have a statistically significant relationship with the use of e-banking, while no significant relations were found between age, gender, marital status, and residence and the use of e-banking. The results of one sample mean comparison test also indicated that the bank factors influencing the use of e-banking were poor bank measures taken to raise customers' awareness, inadequate awareness of e-banking products, while regular breakdown of ATM, lack of privacy and confidentiality as well as unreliability of ATM were not significant.

In another study by Abdulrahman and Premalatha (2014) on the level of ATM usage by bank customers in Sokoto, Nigeria, it was revealed that the use of ATM depends on the positive or negative perception that bank customers develop towards trust in ATM. They also found that perceived ease of use and perceived usefulness have a significant and positive effect on customers' trust in the use of ATM service. The study of Adelowo (2015) on the perception and use of electronic banking revealed that ATM is the most popular and widely used e-channel globally. The two demographic variables that significantly affect

the use of e-channels identified in the study are gender and education. It was also found that the respondents are of the opinion that e-banking is easy to use, useful, and convenient. They noted that the service quality of e-banking should be improved so that customers can have increased confidence in e-banking.

2.4. Conceptual Framework

Based on the foregoing discussion, this study developed a conceptual framework to guide this study, as illustrated in *Figure 1*:



Source: developed by the researchers for this study (2017)

Figure 1. *Conceptual framework for Determinants of ATM Usage*

The conceptual framework in *Figure 1* depicts the variables in this study and their relationships. It shows that socio-demographic factors and service quality dimensions have direct influence on ATM usage. The model proposes that when customers use ATM they experience service quality dimensions, and, coupled with their socio-demographic characteristics, they manifest a particular usage behaviour. The variables and their relationships are discussed below:

ATM Usage: DeLone and McLean (2003) noted that usage has to do with the extent, nature, appropriateness, and quality of a technology's use in terms

of assessing the extent to which the technology is being used for the intended function. In this study, ATM usage is conceptualized as the degree and manner in which ATM users utilize the machine in terms of regularity of use, time of use, purpose of use, and continuity of use.

Socio-Demographic Factors: This refers to the grouping of customers into segments. In this study, it is measured on the basis of gender, age, level of education, monthly income/allowance, and nature of occupation of the respondents.

Service Quality Dimensions: This refers to the set of features that describe customers' experience with ATM. It is measured by reliability, convenience, ease of use, security, fulfilment, and responsiveness.

3. Methodology

3.1. Population

The target population comprised individual bank customers who use ATM in Lagos State, Nigeria. Lagos State was chosen because it is one of the most cosmopolitan States in Nigeria. It is also the most commercialized and industrialized state.

3.2. Sampling

Since the exact population size of ATM users is difficult to estimate as some bank customers have more than one ATM card, the sample size formula proposed by Godden (2004) was used to determine the minimum number of respondents to include in the sample that will ensure representativeness of the population. It is given as:

$$n = \frac{Z^2\{P(1-P)\}}{C^2}$$

$$n = \frac{1.96^2\{0.50(1-0.50)\}}{0.05^2}, \quad (1)$$

$$n = 384.16 \quad n \approx 385$$

where:

n = Minimum Sample Size

Z = Z-value (95% confidence level, which is 1.96)

P = Population Proportion of 50% (0.50)

C = Confidence interval or margin of error allowable in the sample estimate of population, which is estimated to be 5% (0.05)

Saunders, Lewis, and Thornhill (2009) posited that the actual sample size should exceed the minimum sample size to accommodate for cases of non-response. To achieve this, the formula in equation (2) was suggested.

$$n^a = \frac{n(100)}{re\%}$$

For this study,

$$n^a = \frac{385(100)}{70}, \quad (2)$$

$$n^a = 550$$

where:
n^a = actual sample size required
n = minimum sample size derived from the first formula above (385)
re% = estimated response rate expressed as a percentage (70%)

The actual sample size is five hundred and fifty (550). Therefore, the sample size for this study is put at five hundred and fifty (550) bank customers who use ATM in Lagos State, Nigeria.

Due to the inability to obtain a sampling frame of ATM users, two-stage sampling technique was adopted to select respondents for the study. First, cluster sampling was used to select the three (3) senatorial districts in Lagos State. The senatorial districts are Lagos Central, Lagos East, and Lagos West. In the three divisions, there are twenty (20) Local Government Areas (LGAs), and the number of LGAs in each division comprises Lagos Central (5), Lagos East (5), and Lagos West (10). On the basis of the number of LGAs in each division, the total number of respondents (550) as calculated above was proportionately distributed to each division. Thereafter, purposive sampling technique was employed to select the respondents who had used ATM for a minimum period of one year and who had volunteered to participate in the study.

3.3. Data Collection Instrument

A structured questionnaire was used to collect data for the study. The questionnaire consists of forty-seven (47) items categorized into three sections. Section A consists of five (5) items on socio-demographic factors, which include gender, age, level of education, monthly income/allowance, and nature of occupation. Section B comprises thirty-six (36) items on service quality dimensions. Section C consists of six (6) items on ATM usage. The respondents were required to indicate their degree of agreement or disagreement with each statement in Sections B and C on a five-point Likert scale in the order as follows: strongly agree (SA), agree (A), fairly agree (FA), disagree (D), and strongly disagree (SD).

The validity of the instrument was established using content validity and face validity, while the reliability was tested using Cronbach's alpha. Cronbach's alpha coefficients for each of the constructs in the study are as shown in *Table 1* below:

Table 1. Test of reliability of the constructs

Constructs	Number of Items	Cronbach's Alpha Coefficient
Reliability	5	0.893
Convenience	6	0.782
Ease of Use	5	0.811
Security	7	0.736
Fulfilment	6	0.754
Responsiveness	7	0.729
ATM Usage	6	0.817

Source: field survey (2017)

Pallant (2010) noted that Cronbach's alpha coefficient of 0.7 or higher denotes a good internal consistency. Based on the Cronbach's alpha coefficients in *Table 1* above, the constructs in the research instrument can be deemed reliable and suitable for the research.

4. Data Analyses

4.1. Analysis of Questionnaire Distribution

Five hundred and fifty (550) copies of the questionnaire were administered to bank customers who use ATM in Lagos State but only four hundred and fifty-two (452) were returned fully completed. Forty-seven (47) copies of the administered questionnaire were eliminated due to incomplete responses, while fifty-one (51) were not returned. The analysis of the copies of the questionnaires administered and retrieved is depicted in *Table 2*:

Table 2. Copies of the questionnaires administered and retrieved

Senatorial District	Copies of the Questionnaires Distributed	Copies of the Usable Questionnaires Retrieved	Percentage (%)
Lagos Central	138	105	76.09
Lagos East	138	122	88.41
Lagos West	274	225	82.12
Total	**550**	**452**	**82.18**

Source: field survey (2017)

Table 2 shows the distribution of questionnaires in the three (3) senatorial districts in Lagos State. One hundred and thirty-eight (138) copies of the questionnaire were administered in Lagos Central and Lagos East each, while two hundred and seventy-four (274) copies of the questionnaire were administered in Lagos West. In all, five hundred and fifty (550) copies of the questionnaire were administered. The usable copies of the questionnaire retrieved from each senatorial district are as follows: Lagos Central (105), Lagos East (122), and Lagos West (225). Overall, four hundred and fifty-two (452) copies of the questionnaire were retrieved. This represents a response rate of 82.18 percent.

4.2. Socio-Demographic Profile of Respondents

The socio-demographic characteristics of the respondents are summarized in *Table 3*:

Table 3. Socio-demographic characteristics of respondents

	Variable	**Frequency**	**Percentage (%)**
Gender	Male	237	52.4
	Female	215	47.6
	Total	452	100
Age	Below 21	51	11.3
	21–30	113	25.0
	31–40	147	32.5
	41–50	107	23.7
	51 and above	34	7.5
	Total	452	100
Level of Education	No formal education	Nil	0.0
	Primary	Nil	0.0
	Secondary	126	27.9
	Graduate	186	41.1
	Post-graduate	140	31.0
	Total	452	100
Monthly Income/ Allowance	Below N100,000	198	43.8
	N100,000 – N300,000	135	29.9
	N300,001 – N500,000	67	14.8
	N500,001 and above	52	11.5
	Total	452	100
Nature of Occupation	Government Service	124	27.4
	Private Service	144	31.9
	Self-employed	99	21.9
	Student	85	18.8
	Others	Nil	0.0
	Total	452	100

Source: field survey (2017)

As shown in *Table 3*, the sample consists of both genders, all age-groups, income and occupation except for level of education, which did not have respondents with no formal education and primary education. Despite this, the other categories of the level of education were adequately represented. The diversity across respondents can be considered reflective of the socio-demographic characteristics employed in this study. Therefore, the data collected can be said to be balanced and reliable for the purpose of this study.

4.3. Analysis of Objective One

Objective one of this study is to determine the socio-demographic factors (gender, age, education, income, and occupation) that affect ATM usage in Lagos State, Nigeria. General Linear Model (GLM) analysis was conducted to determine the socio-demographic factors that influence ATM usage in Lagos State, Nigeria. The result is summarized in *Table 4* below:

Table 4. Summary of GLM Analysis of Socio-demographic Factors with ATM Usage

Source	Type III Sum of Squares	Df.	Mean Square	F	B	T-value	P-value	R^2
Corrected Model	41.777	5	8.355	18.339			0.000	**0.171**
Intercept	15.311	1	15.311	33.605	1.255	5.797	0.000	
Gender	0.651	1	0.651	1.429	-0.077	-1.195	0.233	
Age	19.470	1	19.470	42.733	-0.272	-6.537	**0.000**	
Education	32.775	1	32.775	71.937	0.380	8.482	**0.000**	
Income	1.419	1	1.419	3.114	-0.054	-1.765	0.078	
Occupation	0.477	1	0.477	1.047	0.033	1.023	0.307	
Error	203.203	446	0.456					
Total	1728.361	452						
Corrected Total	244.981	451						

Source: field survey (2017)

The result in *Table 4* shows the GLM analysis of the determination of the influence of socio-demographic factors on ATM usage. The analysis indicates an R-Square value of 0.171, meaning that socio-demographic factors explain 17.1 percent of the variation in ATM usage. Results also reveal that age ($F = 42.733$, $\beta = -0.272$, $t = -6.537$, $p = 0.000 < 0.05$) and education ($F = 71.937$, $\beta = 0.380$, $t = 8.482$, $p = 0.000 < 0.05$) have a statistically significant influence on ATM usage, while gender ($F = 1.429$, $\beta = -0.077$, $t = -1.195$, $p = 0.233 > 0.05$), income, ($F = 3.114$, $\beta = -0.054$, $t = -1.765$, $p = 0.078 > 0.05$) and occupation ($F = 1.047$, $\beta = 0.033$, $t = 1.023$, $p = 0.307 > 0.05$) have no statistically significant influence on ATM usage. Results in *Table 4* further show that age has a negative while education a positive relationship with ATM usage. This implies that the higher

the age of a customer, the lower the ATM usage. The positive sign of education reveals that the higher the level of education of a customer, the higher the ATM usage. This seems to suggest that young bank customers with a high level of education are more likely to use ATM regularly for different ATM services than older and less educated customers.

4.4. Analysis on Objective Two

Objective two of this study is to ascertain the influence of service quality dimensions (reliability, convenience, ease of use, security, fulfilment, and responsiveness) on ATM usage in Lagos State, Nigeria. Multiple regression was employed to determine the weight that each of the service quality dimensions contributes to the prediction of ATM usage. The results are presented in *Table 5* below:

Table 5. Summary of regression analysis of service quality dimensions with ATM usage

Model 1	B	T-value	P-value	R	R^2	F-value	F-sig
Constant	0.505	5.120	0.000	0.769	0.592	107.482	0.000
Reliability	0.136	2.620	**0.009**				
Convenience	0.349	8.635	**0.000**				
Ease of Use	0.131	2.919	**0.004**				
Security	0.122	3.076	**0.002**				
Fulfilment	0.211	4.582	**0.000**				
Responsiveness	0.267	6.695	**0.000**				

Model 1: Predictors: (Constant), reliability, convenience, ease of use, security, fulfilment, responsiveness
Dependent Variable: ATM Usage *Source: field survey (2017)*

Multiple regression results in *Table 5* show goodness of fit of the model because the F-value (F = 107.482, p = 0.000 < 0.05) is statistically significant at 5 percent level of significance. It indicates a statistically significant relationship between service quality dimensions and ATM usage. This means that reliability, convenience, ease of use, security, fulfilment, and responsiveness jointly determine ATM usage. The R-Square value (coefficient of determination) of 0.592 indicates that service quality dimensions explain 59.2% of the variation in ATM usage. All the service quality dimensions were found to have a statistically significant positive influence on ATM usage. Comparatively, the dimensions of service quality that significantly influence ATM usage are convenience (b_2 = 0.349, t = 8.635, p = 0.000 < 0.05), responsiveness (b_6 = 0.267, t = 6.695, p = 0.000 < 0.05), fulfilment (b_5 = 0.211, t = 4.582, p = 0.000 < 0.05), reliability (b_1 = 0.136, t = 2.620, p = 0.009 < 0.05), ease of use (b_3 = 0.131, t = 2.919, p = 0.004 < 0.05), and security (b_4 = 0.122, t = 3.076, p = 0.002 < 0.05).

4.5. Analysis on Objective Three

Objective three of this study is to assess the joint effects of socio-demographic factors and service quality dimensions on ATM usage in Lagos State, Nigeria. The General Linear Model was employed to assess the joint effect. In this case, both sets of variables (i.e. socio-demographic factors and service quality dimensions) were combined. *Table 6* illustrates the individual and simultaneous influence of socio-demographic characteristics of ATM users and service quality dimensions on ATM usage.

Table 6. Summary of GLM analysis of socio-demographic factors and service quality dimensions with regard to ATM usage

Source	Type III Sum of Squares	Df.	Mean Square	F	B	T-value	P-value	R^2
Model 1a	41.777	5	8.355	18.339			0.000	**0.171**
Intercept	15.311	1	15.311	33.605	1.255	5.797	0.000	
Gender	0.651	1	0.651	1.429	-0.077	-1.195	0.233	
Age	19.470	1	19.470	42.733	-0.272	-6.537	**0.000**	
Education	32.775	1	32.775	71.937	0.380	8.482	**0.000**	
Income	1.419	1	1.419	3.114	-0.054	-1.765	0.078	
Occupation	0.477	1	0.477	1.047	0.033	1.023	0.307	
Error	203.203	446	0.456					
Total	1728.361	452						
Corrected Total	244.981	451						

Source	Type III Sum of Squares	Df.	Mean Square	F	B	T-value	P-value	R^2
Model 1b	144.956	6	24.159	107.482			0.000	**0.592**
Intercept	5.893	1	5.893	26.218	0.505	5.120	0.000	
Reliability	1.543	1	1.543	6.864	0.136	2.620	**0.009**	
Convenience	16.760	1	16.760	74.565	0.349	8.635	**0.000**	
Ease of Use	1.916	1	1.916	8.522	0.131	2.919	**0.004**	
Security	2.127	1	2.127	9.461	0.122	3.076	**0.002**	
Fulfilment	4.718	1	4.718	20.991	0.211	4.582	**0.000**	
Responsiveness	10.076	1	10.076	44.828	0.267	6.695	**0.000**	
Error	100.025	445	0.225					
Total	1728.361	452						
Corrected Total	244.981	451						

Source	Type III Sum of Squares	Df.	Mean Square	F	B	T-value	P-value	R^2
Model 1c	166.229	11	15.112	84.432			0.000	**0.679**
Intercept	0.111	1	0.111	0.620	0.114	0.787	0.432	
Gender	0.225	1	0.225	1.254	-0.045	-1.120	0.263	
Age	15.224	1	15.224	85.061	-0.251	-9.223	**0.000**	
Education	10.298	1	10.298	57.535	0.225	7.585	**0.000**	
Income	5.458	1	5.458	21.560	-0.131	-5.600	**0.000**	
Occupation	0.144	1	0.144	0.806	0.018	0.898	0.370	
Reliability	3.157	1	3.157	17.640	0.173	4.200	**0.000**	
Convenience	10.992	1	10.992	61.415	0.281	7.837	**0.000**	
Ease of Use	3.568	1	3.568	26.415	0.171	5.140	**0.000**	
Security	1.929	1	1.929	14.280	0.140	3.779	**0.000**	
Fulfilment	9.127	1	9.127	50.992	0.265	7.141	**0.000**	
Responsiveness	7.385	1	7.385	41.262	0.267	6.424	**0.000**	
Error	78.751	440	0.179					
Total	1728.361	452						
Corrected Total	244.981	451						

Source: field survey (2017)

Table 6 shows the individual and joint effects of socio-demographic variables and service quality dimensions on ATM usage. Results indicate that the R-Square value for socio-demographic variables is 0.171, for service quality dimensions is 0.592, while the joint R Square value is 0.679. This means that socio-demographic factors explain 17.1 percent of the variation in ATM usage, while service quality dimensions explain 59.2 percent of the variation in ATM usage. This implies that service quality dimensions have a greater influence on ATM usage than socio-demographic factors. The results indicate that three of the socio-demographic variables, that is, age (β = -0.251, t = -9.223, p = 0.000 < 0.05), education (β = 0.225, t = 7.585, p = 0.000 < 0.05), and income (β = -0.131, t = -5.600, p = 0.000 < 0.05) as well as all the service quality dimensions have significant influence on ATM usage. Convenience (β = 0.281, t =7.837, p = 0.000 < 0.05) has the highest weight on ATM usage. This was followed by responsiveness (β = 0.267, t = 6.424, p = 0.000 < 0.05), fulfilment (β = 0.265, t = 7.141, p = 0.000 < 0.05), reliability (β = 0.173, t = 4.200, p = 0.000 < 0.05), ease of use (β = 0.171, t = 5.140, p = 0.000 < 0.05), and security (β = 0.140, t = 3.779, p = 0.000 < 0.05).

4.6. Discussion of Findings

The first objective of this study was to determine the socio-demographic factors (gender, age, education, income, and occupation) that influence ATM usage in Lagos State, Nigeria. The results of the analysis indicate that ATM usage is significantly influenced by age and education. Contrary to the expectations of

this study that the selected socio-demographic factors will significantly influence ATM usage, gender, income, and occupation do not have a significant influence thereupon. The relationship between age and ATM usage was found to be negative, while the relationship between education and ATM usage was found to be positive. The findings of this study that age and education are significant socio-demographic factors influencing ATM usage support the findings of Rugimbana (1995) that ATM usage is high among young and educated people because e-banking usage pattern tends to decrease with age. Also, Yazeed et al. (2014) noted that to use ATM adequately and appropriately the customer needs some level of education. Contrary to the finding of Joshua and Koshy (2011) and Mohammed (2012) that gender significantly influences ATM usage, this study did not find gender to be significant. However, it is in agreement with the finding of Bishnoi (2013) and Yazeed et al. (2014) that gender does not influence ATM usage. The finding that gender does not influence ATM usage may be attributed to the change in the role of women. Currently, most women are working, and so they have bank accounts which necessitate ATM usage. Also, due to the increase in the level of education of women, the gender divide seems to be disappearing. Moreover, in this study, income and occupation were found to be non-significant, but Mohammed (2012) and Bishnoi (2013) found income and occupation as significant factors influencing ATM usage.

The second objective was to ascertain the influence of service quality dimensions (reliability, convenience, ease of use, security, fulfilment, and responsiveness) on ATM usage in Lagos State, Nigeria. Results indicated that all the service quality dimensions have a significantly positive influence on ATM usage. In order of importance, the dimensions are convenience, responsiveness, fulfilment, reliability, ease of use, and security. Contrary to previous studies (Ayimey et al., 2012; Abdulrahman and Premalatha, 2014) that ease of use is the most important service quality dimension influencing ATM usage, this study found convenience to be the most significant service quality dimension influencing ATM usage. This indicates that the location of ATMs, the range of services provided through the ATMs, as well as the waiting time at ATM points influence ATM usage more positively than any other service quality dimension. Generally, the findings seem to suggest that when customers believe that ATM services are convenient, responsive, reliably meet the needs of customers, easy to use, and secured, they tend to use more of the ATMs than others who think otherwise. This implies that an improvement in the service quality dimensions of ATM will lead to an improvement in ATM usage.

The third objective was to assess the joint effects of socio-demographic factors and service quality on ATM usage in Lagos State, Nigeria. Results indicated that service quality influences ATM usage to a significantly greater degree than socio-demographic factors. This supports the finding of Rugimbana (1995) that

perceptual factors have a greater influence on ATM usage than socio-demographic factors. However, it contradicts the findings of Mohammed (2012) that socio-demographic factors influence ATM usage more than banking attributes do. Service quality dimensions were found to have a strong positive relationship with ATM usage. This seems to suggest that an increase in ATM service quality may likely give rise to an increase in ATM usage. In the study of Petter, DeLone, and McLean (2008), it was found that service quality positively influences usage. In addition, age, education, and income were found to influence ATM usage. In the analysis of the influence of socio-demographic factors on ATM usage, income was not significant; however, when socio-demographic factors were combined with service quality, income became significant. This seems to suggest that the influence of income on ATM usage may be due to customers' perception of service quality.

5. Conclusions

This study examined the influence of socio-demographic factors and service quality dimensions on ATM usage. Based on the analyses and the results obtained, it can be concluded that there is some level of association between socio-demographic characteristics of ATM users and ATM usage. The analyses revealed that age, education, and income influence ATM usage. Therefore, the socio-demographic characteristics of ATM users, especially age, level of education, and income should not be overlooked when designing and implementing ATM marketing strategies. This could be an important part of a bank's strategy in attracting and retaining older customers, less educated customers, and high-income earners.

Despite the relevance of socio-demography in the usage pattern of ATM, service quality was found to influence ATM usage more than socio-demographic factors. Therefore, an improvement in service quality will have a positive effect on ATM usage in terms of how often it is used, the banking transactions it is used for, and commitment towards its use. Banks need to see ATM service quality from the customer's perspective so as to meet or exceed their expectations. The findings from this study can be used by bank managers to better understand the sources of customers' perceived service quality and address them appropriately. The findings of this study also suggest that there is need to develop customer-related strategies that can fulfil customer requirements according to their expectations so as to increase customers' perceptions of ATM service quality and usage.

The banking system in Nigeria can improve ATM service quality if the ATMs are made more reliable, convenient, easy to use, with adequate security as well as increased fulfilment and responsiveness to the challenges faced by ATMs. The six service quality dimensions identified in this study (reliability, convenience, ease

of use, security, fulfilment, and responsiveness) can provide practical leverages for bank managers to improve customer experience with ATMs. The weight of the factors identified in the study can also provide managers with a guide as to the most important factors to focus on in order to improve ATM service quality and usage. As indicated in the findings, to maintain a high level of ATM service quality and usage, banks should pay attention to all the dimensions identified in this study. They should ensure that ATM service is always available, convenient, and easy to use. The security of ATM should be improved, customers should have a sense of fulfilment for using ATM, and attention should be paid to customers' complaints when problems occur.

6. Limitations and Directions for Future Research

In the banking system, there are currently several e-banking platforms that bank customers use to carry out banking transactions. However, this study investigated only ATMs. Future research may examine other e-banking options such as Internet banking, mobile banking, and POS. Future studies may also focus on customer satisfaction, motivation of consumer's decision, and the factors influencing it.

References

Abdulrahman, B. B.; Premalatha, K. (2014). Factors influencing customers' trust in the use of Automated Teller Machine (ATM) services in Sokoto State, Nigeria. *Advanced Review on Scientific Research* 3(1): 29–45.

Adelowo O. T. (2015). The perception and use of electronic banking among business executives in Lagos State, Nigeria. *Greener Journal of Business and Management Studies* 5(2): 47–56.

Adesina, A. A.; Ayo, C. K. (2010). An empirical investigation of the level of users' acceptance of e-banking in Nigeria. *Journal of Internet Banking and Commerce* 15(1): 1–13.

Agwu, E. M.; Adele-Louise, C. (2014). Mobile phone banking in Nigeria: Benefits, problems and prospects. *International Journal of Business and Commerce* 3(6): 50–70.

Ajayi, T.; Sosan, M. (2013). *The Evolution of Nigerian banking system, supervision and current challenges*. Retrieved from: http://dx.doi.org/10.2139/ssrn.2286200.

Ayimey E. K., Awunyo–Victor, D.; Somuah, R. O. (2012). Are customers satisfied with Automated Teller Machines services in Ghana? A study of a Universal Bank. *Journal of Asian Business Strategy* 2(12): 262–271.

Ayo, C. K.; Oni, A. A., Adewoye, O. J.; Eweoya, I. O. (2016). E–banking users' behaviour: E-service quality, attitude and customer satisfaction. *International Journal of Bank Marketing* 34(3): 347–367.

Alma, S.; Tedis, R. (2014). Electronic banking usage in Albania: A statistical analysis. *International Journal of Research in Business Management* 2(12): 1–10.

Asabere, N. Y., Baah, R. O.; Odediyah, A. A. (2012). Measuring standards and service quality of Automated Teller Machines (ATMs) in the banking industry of Ghana. *International Journal of Information and Communication Technology Research* 2(3): 216–226.

Bertram, F. M. (2003). Attributions as behaviour explanations: Towards a new theory. Retrieved from: http://cogprints.org/3314/1/Explanation_theory_03pdf.

Bishnoi, S. (2013). Demographic variables and ATM services: An empirical survey. *GMJ* VII(1–2): 34–53.

Central Bank of Nigeria (CBN). (2003). *Guidelines on electronic banking in Nigeria*. Retrieved from: http://www.cbn.gov.ng/out/publications/bsd/2003/ebanking.pdf.

Central Bank of Nigeria (CBN). (2012). Cashless Nigeria. Retrieved from: http://www.cenbank.org/cashless/.

Central Bank of Nigeria (CBN). (2016). *Guidelines on operations of electronic payment channels in Nigeria.* Retrieved from: https://www.cbn.gov.ng/out/2016 /bpsd/approved %20guidelines.pdf.

Chan, F. T. S.; Chong, A. Y. L. (2013). Analysis of the determinants of consumers' m-commerce usage activities. *Online Information Review* 37(3): 443–461.

DeLone, W.; McLean, E. (2003). The DeLone and McLean Model of information system success: A ten-year update. *Journal of Management Information System* 19(4): 9–30.

Gelderman, M. (1998). The relation between user satisfaction, usage of information systems and performance. *Information & Management* 34(1): 11–18.

Godden, W. (2004). *Sample size formula*. Retrieved from: http://williamgodden.com/samplesizeformula.pdf.

Heider, F. (1958). *The Psychology of Interpersonal Relations.* New York: Wiley.

Imola, D.; Claudia, I. (2014). E-banking services – Features, challenges and benefits. *Annals of the University of Petroşani, Economics* 14(1): 49–58.

Joshua, A. J.; Koshy, M. P. (2011). Usage patterns of electronic banking services by urban-educated customers: Glimpses from India. *Journal of Internet Banking and Commerce* 16(1): 1–12.

McLeod, S. (2012). *Attribution theory*. Retrieved from: http://www.simplypsychology.org/attribution–theory.html.

Mohammed, S. (2012). Factors affecting ATM usage in India: An empirical analysis. *UTMS Journal of Economics* 3(1): 1–7.

Odusina, A. O. (2014). Automated Teller Machine usage and customers' satisfaction in Nigeria. *Elite Research Journal of Accounting and Business Management* 2(3): 43–47.

Oghojafor, B. E. A, Muo, I. K.; Alaneme, G. C. (2013). Managing social change: The case of Central Bank of Nigeria's 'cashless' policy. *Journal of Applied Finance & Banking* 3(2): 75–87.

Onyedimekwu, O.; Oruan, M. K. (2013). Empirical evaluation of customers' use of electronic banking systems in Nigeria. *African Journal of Computing & ICT* 6(1): 7–20.

Onyesolu, M. O.; Asogwa, D. C.; Chukwuneke, C. I. (2016). Automated Teller Machine (ATM) and customer traffic behaviour in Nigerian banks: An investigative study. *International Journal of Emerging Technology and Advanced Engineering* 6(1): 1–6.

Pallant, J. (2010). *SPSS survival manual. A step by step guide to data analysis using SPSS* (4th ed). Berkshire: McGraw-Hill Companies.

Petter, S.; DeLone, W.; McLean, E. (2008). Measuring information systems success: Models, dimensions, measures and interrelationships. *European Journal of Information Systems* 17: 236–263.

Rugimbana, R. (1995). Predicting Automated Teller Machine usage: The relative importance of perceptual and demographic factors. *International Journal of Bank Marketing* 13(4): 26–32.

Saunders, M.; Lewis, P.; Thornhill, A. (2009). *Research methods for business students.* Harlow: Pearson Education Ltd.

Sindwani, R.; Goel, M. (2015). Technology-based self-service banking service quality evaluation: A Graph Theoretic Approach. *International Journal of Advanced Science and Technology* 80: 1–18.

Swanson, S. R.; Kelley, S. W. (2001). Attribution and outcomes of the service recovery process. *Journal of Marketing Theory and Practice* 9(4): 50–56.

Weiner, B. (1974). *Achievement motivation and attribution theory*. Morristown, N. J.: General Learning Press.

Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York: Springer-Verlag.

Yazeed, A. M., Yazidu, U.; Ibrahim, Y. (2014). Automated Teller Machine (ATM) operation features and usage in Ghana: Implications for managerial decisions. *Journal of Business Administration and Education* 5(2): 137–157.

Research Questionnaire

Section A: Customers' Socio-Demographic Characteristics

Instruction: Please, tick (√) the appropriate box where applicable.

1. **Gender:** Male [ ] Female [ ]
2. **Age in years:** Below 21 [ ] 21–30 [ ] 31–40 [ ] 41–50 [ ] 51 and above [ ]
3. **Highest Completed Level of Education:** No formal education [ ] Primary [ ] Secondary [ ] Graduate [ ] Post-graduate [ ]
4. **Monthly Income/Allowance:** Below N100,000 [ ] N100,000-N300,000 [ ] 300,001–N500,000 [ ] N500,001 and above [ ]
5. **Nature of Occupation:** Government Service [ ] Private Service [ ] Self-employed [ ] Student [ ] Other, please specify----------

Please evaluate the following service quality dimensions according to your experience of using ATM and indicate the extent to which you agree or disagree with the statements based on the response scale:

SA = Strongly Agree
A = Agree
FA = Fairly Agree
D = Disagree
SD = Strongly Disagree

Section B: Service Quality Dimensions

S/N	STATEMENT	SA	A	FA	D	SD
	(a) Reliability					
6	ATM service is always available.					
7	Cash is always available in the ATM.					
8	ATM provides consistent services.					
9	ATM transactions are always accurate.					
10	ATM gives instant money all the time.					
	(b) Convenience					
11	ATMs are conveniently located.					
12	ATM saves me time.					
13	ATM saves me money.					
14	ATM provides a different range of services.					
15	ATM can be used at any time of the day.					
16	ATM maximum withdrawal limit per day is convenient.					

S/N	STATEMENT	SA	A	FA	D	SD
	(c) Ease of Use					
17	ATM provides clear instructions on how to use it.					
18	ATM is easy to use for transactions.					
19	ATM language is easy to understand.					
20	I can use ATM without assistance from anybody.					
21	I use other bank's ATM with my bank ATM card easily.					
	(d) Security					
22	I feel safe during ATM transactions.					
23	I fear for the security of my personal information.					
24	The location of ATMs is secure for transaction.					
25	Security guard is always present at every ATM.					
26	ATMs provide privacy during transactions.					
27	ATMs protect information about my card.					
28	ATMs protect information about my transactions.					
	(e) Fulfilment					
29	ATM gives quality bank notes.					
30	ATM charges are reasonable.					
31	ATM provides feedback after transactions are completed.					
32	ATM returns my card after completing the transaction.					
33	ATM provides receipt to confirm my transactions.					
34	I receive alerts on my ATM transactions.					
	(f) Responsiveness					
35	ATM provides me with convenient options to cancel transactions.					
36	ATM returns my card if the machine did not accept it.					
37	ATM does not tell me what to do if my transaction is not processed.					
38	The bank quickly resolves problems I encounter with ATM.					

S/N	STATEMENT	SA	A	FA	D	SD
39	ATMs credit me when my transaction is not completed but deductions were made.					
40	Jammed ATM cards are not returned promptly.					
41	Expired or lost ATM cards are replaced quickly.					

Section C: ATM Usage

Please indicate the extent to which you agree or disagree with these statements:

	STATEMENT	SA	A	FA	D	SD
42	I use ATM regularly.					
43	I use ATM for withdrawal and balance inquiry only.					
44	I prefer to use ATM during banking hours.					
45	I can use the ATMs of any bank.					
46	I cannot stop using ATM.					
47	I expect my use of ATM to continue in the future.					