Determinants of Adopting Mobile Banking in Nigeria: A Logistic Regression Approach

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Abstract: *Access to financial services is one of the policy thrusts of sustainable development goals especially in developing economies like Nigeria. It is against this that this study examined the determinants of adopting mobile banking in Nigeria where the World Bank global financial inclusion data set from 2021 was used and analyzed using logistic regression analysis. The sociodemographic determinants of mobile banking adoption in Nigeria, it was found that variables such as age, female literacy, and urbanization have a significantly positive relationship with mobile banking while employment status have negative relationship with mobile banking adoption in Nigeria. It was also revealed that savings and borrowings have a positive relationship with mobile banking adoption in Nigeria while for objective three variables such as remittances, mobile owner, internet access, and pay utilities have a negative relationship with mobile banking adoption in Nigeria. The study recommends that more effort and awareness be created by both regulatory agencies and financial institutions on the effectiveness cost and time-saving importance of mobile banking adoption in Nigeria to improve the structure of financial inclusions and suitable financial system. The number of mobile banking users is increasing every year with different figures, especially in urban areas where technologies are highly developing quickly. Technologies have taken the traditional banking system into the modern banking system with different services such as internet banking and mobile banking.*

Keywords: *Mobile Banking, Financial Inclusions, logit Regression, Savings and Borrowed.*

Introduction

The use of mobile devices has expanded beyond their original purpose to include financial transactions like bill payments, fund transfers, person-to-person transfers, point-of-sale services, and payments for distant purchases of goods and services. this is in addition to the delivery of location-based services using contactless technology, such as mobile marketing, tickets, discounts, or coupons (Abbas, Hassan, Asif, Fahad, & Haider, 2018).

Through the provision of services like payments for health care, education, commerce, financial services, employment, and social protection to people who were previously underserved by the formal financial system, mobile money accounts have been seen as a way to improve the welfare of the masses (Global System for Mobile Communication Association, 2018). Mobile money encourages financial inclusion and makes way for more financial integration. It also increases the underserved population's access to and use of financial services that are accessible both within and outside of an economy (Ignacio, 2009).

Mobile banking offers unparalleled convenience, enabling users to access a wide array of banking services, such as fund transfers, bill payments, and account management, anytime and anywhere (World Bank, 2020). However, the adoption of mobile banking varies among different regions and states in Nigeria, necessitating a localized examination to uncover the specific determinant factors at play.

Literature Review

Waweru & Kamau (2017) conducted a study on the effect of mobile banking on saving and money transfer practices for low-income earner in Kenya, using 750 households across Kenya. Their study revealed mobile money to be associated with increase in the number of low-income earners savings with formal banks and significantly reduce the traditional method of keeping money in the house thus improving financial intermediation and investment fund mobilization.

Onakoya, Olojede, and Olumide (2019) used a mixed-methods approach to investigate the role of trust, perceived risk, and perceived usefulness in mobile banking adoption in Nigeria. They found that trust and perceived usefulness were positively associated with mobile banking adoption, while perceived risk was negatively associated with adoption. Andre, et. al, (2019), use logit model in Indonesia, reported that perceived risk, cost of mobile banking services and societal factors other than attitude significantly influence decision to use mobile banking services.

Chaouali & Hedhli (2019), used logistic regression model and has identified factors such as physical access to financial services, availability of financial products, cost of financial services, mobile banking and internet facilities to have significance influence on adoption of mobile banking. These studies have failed to consider factors such as savings, borrowing, account ownership of mobile phone and pay utilities; this study will consider the variables that can play a critical role in accelerating the rate of mobile money with modifications attach to it.

Akinwale and Adebiyi (2020) studied the effect of consumer attitudes on mobile banking adoption in Nigeria. They found that positive attitudes towards mobile banking, such as perceived convenience and security, were significant predictors of adoption.

Akinyomi and Falola (2021) examined the impact of social media on mobile banking adoption in Nigeria. They found that social media has a significant positive effect on mobile banking adoption, as it enhances awareness and trust in mobile banking services. The studies suggest that trust, perceived usefulness, perceived ease of use, consumer attitudes, and social media are important factors that influence mobile banking adoption in Nigeria. Understanding these factors can help financial institutions and policymakers develop effective strategies to promote mobile banking adoption and financial inclusion in the country.

Uche (2023) investigated the determinants of internet banking adoption in Nigeria, as case study of union bank of Nigeria, using descriptive qualitative, quantitative research methods. The target population of the study comprised of 3700 corporate account holders from Union Bank of Nigeria, which consist of 200 corporate customers. The study further revealed that culture, and customers' perceptions of internet banking usage indicated that most customers are not influenced much by culture. The study also revealed that the perception security has the stronger impact on customers' attitude, which in turn influences customers' intention to use electronic banking services. The static panel data model used is not efficient because it does not address the problem of autocorrelation and indigeneity, hence, system generalized method of moment should have been employed.

Methodology

Data and Source.

Given the objectives of the study, secondary data specifically cross-sectional data were used for the study. The data were sourced mainly from the World Bank global financial inclusion survey index 2021 in Nigeria.

Model Specification.

Based on the literature reviewed, the study adapted Chaouali & Hedhli (2019) model used to study the determinants of mobile banking adoption in Qatar with some modification base on scope and socio-economic characteristics of the study area the structural form of the models is specified as follows;

Model 1

As mentioned above, with some modifications attached to it:

Performance of mobile banking =f (gender, marital status, rural settlement, voluntariness of use, urbanization)

The structural form of the model based on the first objective is specified as follows;

$MobileBank_i = f(age_i, female_i, employment\ status_i, literacy_i, Urban,)$ *(3.1)*

The empirical form of equation 3.1 is specified as:

Given the characteristics of the data, the binary logit model is specified in its binary form as follows:

$$Log\left[\frac{Pr\ (MobileBan)}{1 - Pr\ (Fin)}\right] = \alpha_0 + \alpha_1 * age + \alpha_2 female + a_3 emlpoyment\ status + a_4 literacy + a_5 urban + V_I \quad (\mathbf{3,2})$$

Where pr(MobileBan) is the probability of an individual using mobile banking and 1-pr(MobileBan) is the probability of an individual not using mobile banking.

Model one was used to achieve objective 1

The structural form of the model based on the second and third objective is specified as follows;

$MobileBank_i = f(Saved_i, Borrowed_i,$ *remittance, mobile owner, internet access, pay untilities)*……*.(3.2)*

The empirical form of equation 3.2 is specified as:

$$MobileBan_i = \alpha_0 + \alpha_1 * Saved + \alpha_2 Borrowed + a3 mobilephone + \alpha_4 * internet\ access_i + \alpha_5 * remittance_i + \alpha_6 * pay\ utilities_i + Vi \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{3.2})$$

Where α_0 is the intercept, α_i is the slop parameters to be estimated $V_i$is the error term.

Given the characteristics of the data, the binary logit model is specified in its binary form as follows:

$$\text{Log}\left[\frac{\text{Pr}\ (MobileBan)}{1 - \text{Pr}\ (Fin)}\right] = \alpha_0 + \alpha_1 * Saved_i + \alpha_2 * Borrowed_i + \alpha_3 * Mobilephones_i + \alpha_4 * internet\ access_i + \alpha_5 * Remittance_i + \alpha_6 * Pay\ utilities_i + Vi \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{3})$$

Where *pr(MobileBan)* is the probability of an individual using mobile banking and *1-pr(MobileBan)* is the probability of an individual not using mobile banking.

Model 2 was used to achieve objectives 2 and 3 respectively.

Definition of Variables and Measurement

The study is concerned with the determinants of mobile banking and to achieve the objective of the study, the dependent variable of the study is:
***Mobile Banking*:** A dummy that takes the value of 1 if the respondent is using mobile banking and 0 if otherwise.

The independent variables include:
Age: This is the respondent's age in years.
female: dummy that takes the value 1 if the respondent is a female and 0 otherwise.
Employment status respondent level of rank of employment, if the respondent is fully employed or not with 1 donating yes and 0 if otherwise.
Literacy (0/1): dummy that takes the value of 1 if the respondent can read and write, and 0 if otherwise.
Urban (0/1); a dummy that takes the value of 1 if the respondent lives in urban city donating yes and 0 if otherwise.
Savings (0/1): if the respondent has saved or set aside some money in the past 12 months using a formal account in a formal financial institution such as a bank, credit union, cooperative, or microfinance institution.
Borrowed (0/1): if the respondent has borrowed from a formal financial institution using his account. it takes the value of 1 if he/she has borrowed and 0 if otherwise,
Mobile phone Ownership: the respondent's response to owning a mobile phone, with 1 denoting yes and 0 if otherwise.
Access to Internet: *a* dummy of weather the respondent has access to internet facilities or not, with 1 meaning having access and 0 otherwise.
***Remittance*:** If the respondent transfers money from either migrant worker to their families or individuals in their home country. It takes the value of 1 if he/she sends money home using the account and 0 if otherwise.
Pay Utilities: respondent response on if he/she send money through account to settle payment. It takes a value of 1 if he/she performs such transactions and 0 otherwise

Data Analysis

Table 4.1 Logistic Regression Results of Sociodemographic determinants of adopting Mobile Banking in Nigeria on the Growth of Financial inclusions

Independent Variables	Mobile Banking	Marginal Effects
Age	0.025	0.0061
	(2.90)**	(0.00211)**
Female	0.208	0.0512
	(4.38)**	(0.0117)**
empl_stat	-0.691	-0.1702
	(11.78)**	(0.0144)**
Literacy	0.621	0.1531
	(15.47)**	(0.0099)**
Urban	0.255	0.0628
	(5.24)**	(0.0120)**
_cons	-1.398	
	(6.54)**	
N	8,004	
Log Likelihood	-5177.8695	
LR Chi2	(6) 644.09	
Prob>Chi2	0.000	
Pseudo R2	0.0586	

Note (*) and (**) signifies significance at 5% and 1% respectively and standard errors in parenthesis
Source: Authors computation using stata 17.

Table 4.1 shows the logistic regression result. Not like in ordinary least square regression that the parameter estimates can be interpreted, here only the nature of the relationship between the covariates and the dependent variable can be explained. All the variables in the model: Age, Agesquare, Female, Employment Status, Literacy, Urban and Cons are statistically significant with individual probability of less than 0.01 (1% level of significance). The Pseudo R^2 of 0.0586 shows that 05.86 of variation in mobile banking is explained by the model. The Prob> chi2 is 0.0000 which shows absolute fitness of the model with explanatory variables as against the model without these variables. Age, Agesquare, Female, Literacy, Urban and cons have positive relationship with mobile banking. While, Employment status has negative relationship with mobile banking.
The interpretation of the coefficient is possible in a logistic regression, after a marginal effect. Therefore, the result of the marginal effect is presented as follows;

increase in age of people by years, will bring about 0.006% increase in mobile banking usage. Female i.e. women has a positive coefficient of implying women participation in mobile banking tends to improve the sociodemographic status of mobile banking. That is to say the likelihood of women participation in financial literacy and digital skills programs increases mobile banking by 0.051%. However, increase in employment i.e. securing job by 1% will lead to a 0.170% decrease in mobile banking. This can be attributed to the schedules that the employee is engaged with during his working hours, which in turn can decrease the number of his transactions. However, literacy showed the next largest impact, with having 0.153% higher adoption odds than those with only who cannot read or write. This coefficient positive is because people little or more education use mobile banking in other to make transaction, whereas, those without any education are been discourage to send or received remittance in addition to poor internet connection in Nigeria. Among the sociodemographic determinants of mobile banking is urbanization, with a small positive marginal effect. The larger the number of people living in urban cities will lead to 0.063% increase in mobile banking. Being located in a rural area reduces the odds of adopting mobile banking compared to urban locations.

Table 4.2 Logistic Regression Results of adopting Mobile Banking in Nigeria

Independent Variables	Mobile Banking	Marginal Effects
Saved	0.637	0.1512
	(10.63)**	(0.0138)**
Borrowed	0.400	0.0963
	(7.02)**	(0.0135)**
Remittances	-0.386	-0.0937
	(24.65)**	(0.0038)**
Mobileowner	-0.874	-0.2118
	(10.52)**	(0.0199)**
Internetaccess	-0.711	-0.1724
	(12.77)**	(0.0135)**
pay_utilities	-0.209	-0.0507
		(0.0055)**
	(9.30)**	
_cons	2.970	
	(20.93)**	
N	8,014	
Log Likelihood	-4141.5439	
LR Chi2	2730.73	
Prob>Chi2	0.000	
Pseudo R2	0.2479	

Note (*) and (**) signifies significance at 5% and 1% respectively and standard errors in parenthesis
Source: Authors computation using Stata 17.

Table 4.2 Shows the logistic regression result. Not like in ordinary least square regression that the parameter estimates can be interpreted, here only the nature of the relationship between the covariates and the dependent variable can be explained. All the variables in the model for both objectives 2 and 3: Saved, Borrowed, Mobile owner and Internet access owner are statistically significant with individual probability of less than 0.05 (5% level of significance). The Pseudo R^2 of 0.2479 shows that 24.79 of variation in mobile banking is explained by the model. The Prob> chi2 is 0.0000 which shows absolute fitness of the model with explanatory variables as against the model without these variables. Saved and Borrowed have positive relationship with mobile banking. Mobile owner and Internet Access have negative relationship with mobile banking.

The interpretation of the coefficient is possible in a logistic regression, after a marginal effect. Therefore, the result of the marginal effect is presented as follows;
Saved has the largest positive coefficient which indicates that the more people are engage in savings, the more they will need mobile banking in performing day to day transactions. indicating higher savings is associated with greater likelihood of using mobile banking with marginal effect of 0.12% This indicate that savings has a greater influence on mobile banking. The coefficient is insignificant due low income and high rate of consumption, as the little income earned is often spend to meet up daily need. Also, borrowing has a positive coefficient which increases mobile banking by 0.96% that means the more people borrow the more increase in mobile banking. The effect of borrowing is insignificant due high and unstable cost of borrowing, which entails both interest and on line charges that has discourage people. this suggests that when loanable funds and low interest rate loans are available for people then such incentives in turn becomes an influence to people to use mobile banking are given out to people. Mobile owners also have the highest negative coefficient with lower usage among owners resulting to a decrease of 0.21% in mobile banking. Shared and subsidized ownership models like device libraries, leasing, installment plans, and rent-to-own options can expand transitional access until personal ownership is affordable. Community partnerships with local organizations and employers can establish these access points. Efforts must also enhance device accessibility features for visually, hearing, or mobility impaired individual. This indicates the need for role of technology access in driving mobile banking adoption. Internet accounts similarly have a negative coefficient which have impact on the economic determinant of mobile banking resulting to a decrease of 0.2%(exp(-0.7)) in banking. In some countries internet facilities played a vital role in the decision to use mobile banking such as Saudi Arabia and Ethiopia. Whereas, in the casa of Nigeria, the negative sign is due to the high cost of data and poor connectivity.

Discussion of Findings

The findings of this study offer valuable insights into examined the determinants of adopting mobile banking adoption in Nigeria. To achieve the objectives of the study, logistic regression technique of analysis was employed and applied, in other to examine the determinants of mobile banking in Nigeria.

It is found out that from table 4.1 The logistic regression results underscore the importance of age, gender (female), literacy, and urban residence in driving mobile banking adoption. On the other hand, employment status, is a barrier that need to be address to enhance mobile banking adoption among older individuals, employed and rural populations. This is justified by the result of marginal effects in model 2, which shows that gender is more likely to influence an individual decision to use mobile banking. This in line with the findings of Mahari (2019), who reported that gender, has positive impact on the decision to mobile banking services in Ethiopia.

Also, from table 4.2 independent variable such as savings and borrowed increases the use of mobile bank. As people make savings and also borrow, for day to day transactions of such influenced the use of mobile banking in Nigeria. In the case of objective 3 variables such as remittances, utility bills, internet access, mobile owners diminish the use of mobile banking in Nigeria thereby slowing the acceptance of financial inclusions.

Conclusion and Policy Recommendation

From the findings of the result, It was found that factors such as savings, Account ownership, desire to borrow access to internet, and significantly influence mobile banking. On the other hand, factors such as mobile owners, pay utilities, internet accounts are less likely to influence mobile banking. While other, factors such as mobile owners, pay utilities, internet accounts and the desire to send or received remittance are less likely to influence mobile banking. The analysis conducted shows highlights the multifaceted nature of mobile banking adoption in Nigeria, influenced by economic, demographic, and social factors. To promote financial inclusion, it is essential to implement policies that address these barriers, particularly those that disproportionately affect potential users of mobile banking. The study recommend cross-border mobile remittances may require improved customer-data sharing on both local and international bases by central banks, regulators, and law enforcement organizations, as money transfer businesses are established in multiple geographic and legal jurisdictions. The study adopted a cross-sectional research approach, where data was collected from respondents at a snapshot and then such responses may be influenced by pertaining conditions of the individual at that particular point in time. The use of different approach such as longitudinal may provide a significant difference in the findings that will boast adoption financial inclusions in Nigeria. The issue of mobile phone as the main ingredients of mobile banking in Nigeria, Community partnerships with local organizations and employers can establish these access points. Efforts must also enhance device accessibility features for visually, hearing, or mobility impaired individual. This recommend the need for role of technology access in driving mobile banking adoption. Shared and subsidized ownership models like device libraries, leasing, installment plans, and rent-to-own options can expand transitional access until personal ownership is affordable.

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