

IMPACT OF CARD SERVICES TECHNOLOGY ON FINANCIAL INCLUSION IN NIGERIA. A CASE STUDY OF KADUNA METROPOLIS

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Abstract

No nation will survive without financial inclusion, the survival of any nation economy depend on financial inclusion. The main objective of this research study is to find out the impact of the relationship between card services and financial inclusion and to propose mechanisms for strengthening financial inclusion. The research examines the impact of card services on financial inclusion using survey research approach and self-administered questionnaire. Data were source from 384 financially included people in Kaduna metropolis. The PLS- SEM analysis proclaimed that, card services significantly impact financial inclusion. This study recommends that, the financial included populace in Kaduna metropolis should be informed and enlightened about the positive impact of digital financial products and services, how to use the products and services, it economic benefit, and also to make the financial product and services more easily accessible and to increase quality of service so as to increase the usability of such product and services in Kaduna metropolis.

Keywords: *Financial inclusion, card services, Access, Usage, Quality, Wallets.*

Introduction

Worldwide, financial inclusion is very vital to the survival and development of any nation economy. However, financial inclusion is the process in which all individuals and investors have easy access to formal financial products and service World Bank (2022). Odumusor et al., 2024 opine that financial inclusion impact economic growth, reduce inequality and poverty rate in a country. Chude and Chude (2022) posited that provision of economical financial

products and services to all members of the society will boost up growth of small and medium scale business enterprise and increase households' welfare. This can be attributable to implementation of financial inclusion strategies such as increase in number of automated teller machines (ATMs), bank branches and mobile money and point of sale (POS) in different parts of the country (Odumusor, Acquah & Abiji, 2024, and FSS, 2020). Beside, (Kama *et al.*, 2013), suggest that giving financial access to the hundreds of millions of individual and investors all over the world who are currently financially excluded would provide the possibilities for the formation of a large depository of bank savings, investable capital, investment financing and hence global wealth creation. Furthermore, Sanusi Lamido (2010) opined that, economic growth and development would be achieved at a speedy rate if all portions of the individual populace and investors have access to digital financial products and services. Also Emefiele (2017) proclaimed that, digital financial services which includes card services has the potential to add about 46 million Nigerians into the formal financial system by 2025.

Card services is a plastic card that facilitate cashless payments at any time of the day, 24x7 access to funds by using ATMs, POS and purchases at merchant outlets, prompt settlement of bills payment, and integrated loyalty benefits (Cecilia and Kiran 2024). Card service provide individuals users with accessibility to access electronic payment to the wearer through e-payment services such as Alipay, Vcash, PayPal, Samsung Pay, and other platforms where users can safely perform any monetary transaction (Asira 2024 *et al*). Moreover, card service technology which is also called check cards or bank cards which used to buy products and Services, or to get cash from ATMs. Besides, debit cards are one of the prominents, most commonly used techniques for withdrawing cash, bills payments, transferring funds, and having easy access to other financial products and services conveniently (Cecilia and Kiran 2024). Moreso, Sanusi Lamido (2010) suggested that, economic advancement would be achieved at a speedy rate if all portions of the individual populace have access to digital financial services. Also Emefiele (2017) revealed that, DFS has the potential to add about 46 million Nigerians into the formal financial system by 2025. However, despite the several research studies on the impact of card services technology on financial inclusion nationwide, there is no research study done on the impact of card services technology on financial inclusion: A study on Kaduna metropolis. It is in light of the above that, this research study is set out to investigate the impact of card service technology on financial inclusion in Kaduna State metropolis. In order to achieve the objectives of this study the following research hypothesis were proposed;

Research hypothesis

H01: Card services (CS) has no significant impact on accessibility of financial products and services in Kaduna metropolis.

H02: Card services (CS) has no significant impact on usability of financial products and services in Kaduna metropolis.

H03: Card services (CS) has no significant impact on quality of financial products and services in Kaduna metropolis.

Literature Review

Financial Inclusion

Financial inclusion: is the process in which all individuals and investors have easy access to formal financial products and service World Bank (2022). Odumusor et al., 2024 opine that financial inclusion impact economic growth, reduce inequality and poverty rate in a country. Chude and Chude (2022) posited that provision of economical financial products and services to all members of the society will boost up growth of small and medium scale business enterprise and increase households' welfare. This can be attributable to implementation of financial inclusion strategies such as increase in number of automated teller machines (ATMs), bank branches and mobile money and point of sale (POS) in different parts of the country (Odumusor, Acquah & Abiji, 2024, and FSS, 2020). The dimensions/ characteristics that form financial inclusion are: Access, Usage and Quality of products and services.

Access: Refers to the use of accessible financial products and services from established or formal financial institutions (Serrao et al., 2012) and (Hannig et al., 2010)

Usage: is the effectiveness used of financial products and service (Serrao et al. 2012) (Jansen et al., 2010).

Quality: This refers to the creation of financial services to the lifestyle wants of the individual's users (Serrao et al. 2012) and (Hannig et al., 2010).

Card services (CS)

A card service technology is a plastic card that ease or facilitate cashless payments at any point in time, it facilitates 24x7 access to funds by using ATMs, POS and purchases at merchant outlets, prompt settlement of bills payment, and integrated loyalty benefits (Cecilia and Kiran 2024). Card service render individuals' users with accessibility to access electronic payment to the wearer through e-payment services such as Alipay, Vcash, PayPal, Samsung Pay, and other platforms where users can safely perform any monetary transaction (Asira 2024 et al). Moreover, card service technology which is also called check cards or bank cards which used to buy products and Services, or to get cash from ATMs. Besides, debit cards are one of the prominent, most commonly used techniques for withdrawing cash, bills payments, transferring funds, and having easy access to other financial products and services conveniently (Cecilia and Kiran 2024). In addition, card services refer to the technological innovation or creation which becomes the most common non-cash payment instrument in terms of transactions (Runnemark et al, 2015). However, card services are one of the banking technological innovations that have emerged in every society to facilitate retail payments (van der Cruisenet al, 2015). The dimensions/ characteristics that form card services are: mobile money wallet, E-wallet, and branchless banking

Mobile Money Wallets: refers to an application on a mobile device which is tightly relate with digital store of value Mobey Forum (2011). For instance, POS mainly consists of application that attaches to a card reader.

Electronic wallet: is a digital wallet which allows individual users to make electronic fund transactions easily, securely and quickly. Also, electronic wallet provides all of the functions of wallets on one smart card and when using e-wallet Identification is required for every debit/credit card payment and the card is equipped with a disabling device if the card should be tampered with Abhay Upadhayaya (2012).

Branchless banking: This is a technological innovation such as point of sales machines (POS), smartphone devices or mobile phones used by either third party intermediaries, phones or



computer devices or retail banking agent, to deliver financial services to individual firms out of the traditional bank branches for business dealings Consultative Group to Assist the Poor (United Nations). (2016).

Review of Empirical Studies

This research reviewed the empirical studies of several researchers that are carried out on the bases of the impact of card services on financial inclusion. For instance, Research conducted by (Abubakar&Lasisi2014), on an empirical research study of automated teller machine (ATM) and user satisfaction in Nigeria: A study of united bank for Africa in Sokoto metropolis. Data was analyzed by use of multiple logistic regression analysis. The findings revealed that, the impact of ATM services in terms of their perceived ease of use, transaction cost and service security is positive and significant. However, the result also indicates that the impact of ATM services in terms of availability of money is positive but insignificant. This study recommends among others that; the management of bank should ensure that officers in charge of ATMs should always made enough cash available so as to enable the machine dispense cash to customers whenever need arises. The identified gap in this research is that, the research talks so much on the perceived ease of use transaction cost and service security with reference to automated teller machine (ATM) without taken into considering the card services technology (CS).

Michael (2018) conducted a research on the nexus between internet penetration and financial inclusion in Nigeria. Data were analyzed using OLS regression method employing Stata 13 and data was tested for empirical evidence using Two-staged regression analysis in E-views 10. The findings revealed that, internet penetration has significant impact on financial inclusion in Nigeria. It was recommended that there is need for the adoption of highly internet based transactional policies that will ensure that the financially excluded populace are reached easily. The identified gap in this study is that, the study says much on internet penetration for online financial services without a regards to card services technology (CS)

Sunday (2018), conducted a research on the empirical assessment of the effects of cashless policy on financial inclusion in the Nigerian emerging economy. The study employs the ordinary least squares and correlation matrix as estimation methods. The findings reveal that, the cashless policy maintained a non-significant relationship with financial inclusion both in urban and rural areas of Nigeria. Also the findings show that the cashless policy had a significant effect on increasing customers' deposits in commercial banks of Nigeria. The study therefore recommends that more branches of commercial banks and ATM centers/outlets should be opened in rural and urban centers with efficient network systems and security in order to enhance banking penetration. The identified gap in this study is that, the study dwell so much on branches of commercial banks and ATM centers/outlets, POS and web base technique without regarding the card services technology (CS).

Research conducted by Kangni & Mihasonirina (2012), on Mobile Phones, Financial Inclusion, and Growth. Data were analyzed using multivariate regression approach employing Statistical Package of Social Sciences (SPSS). The findings of this paper underline the importance of mobile phone rollout for African countries. This research recommends among others that, Policies in African countries should encourage domestic and foreign investment in mobile phone development and more generally in the ICT sector. The identified gap in this research is that, the research talks so much on the economic growth through better financial

inclusion with reference to mobile phones without considering the card services technology (CS) device in the first instance.

Stephen & Sibert (2014) conducted a research on the impact of mobile banking on financial inclusion in Zimbabwe: A Case for Masvingo province. Data were analyzed using multivariate regression approach employing Statistical Package of Social Sciences (SPSS). The findings revealed that the low income people are willing to adopt mobile banking and the reasons are that, it is easily accessible, convenient, cheaper, easy to use and secure. The study recommends that, the Central bank to supervise non-bank led mobile banking models and manage their cash holding limits and cost structures. The identified gap in this research is that the research talks only about mobile banking without considering card services technology (CS).

Underpinning Theories

The theories and framework or models on innovation acceptance which improve this research are: Diffusion of Innovation Theory of Everett Rogers (2003) and transaction cost innovation theory of Hicks and Niehans (1983).

Diffusion of Innovation Theory

Diffusion of innovations theory was suggested by Everett Rogers in (2003). The theory tries to analyze why, how and at what grade new concepts and technology expands. According to Rogers (2003), diffusion is the means or procedures in which a creation or innovation is disseminated beyond the regular time among the players in a social process. Rogers (2003), proposed five characteristics in the theory of innovation which includes the followings: First characteristic which is relative advantage show the extension of technological innovation beyond the old, former or previous innovation. Second characteristic is compatibility. Compatibility is the fitness of technological innovation with the acceptance wants or needs, acceptance exposure, and acceptance value. The third characteristic is complexity which refers to the level of complication or difficulty of understanding and the use of technological innovation. The fourth characteristic is trialability which refers to the level in which financial innovation can be tested and trusted. The fifth characteristic is observability which means the level in which the outcome of acceptance of technological innovation is noticed and informed. Thus, accessibility, usability and quality are conceived from the five characteristics of the diffusion which can strengthen the relationship between the fintech and financial inclusion interactions.

The Transaction Cost Innovation Theory

The transaction cost invention or innovation theory's main innovators are: Hicks and Niehans in (1983). However, according to Hicks and Niehans (1983), argued that, the main cause of financial innovation is the cost reduction in transaction dealings and in reality, advancement in technology is the cause of financial technological creation or innovation and this innovation leads to cost reduction in transaction dealings in financial institutions. Thus, accessibility and quality are conceived from transaction cost innovation theory which can strengthen the relationship between card services technology and financial inclusion.

Methodology

Quantitative research method was used to test the conceptual framework for the research study. A survey research technique was adopted to gather data for the research study.



However, PLS-SEM application software was used to test the proposed hypothesis. The unit of analysis which is Kaduna metropolis have four LGAs which includes: chukun, Igabi, Kaduna North and Kaduna South. This unit hold 555,000 financial included person's which are the populations of this research study (EFInA 2020). The sample size of 384 respondents from Kaduna metropolis was chosen using Krejcie and Morgan sample/population determinant table (1970). The reason for chosen Kaduna metropolis is due to the high concentration of electronic banking services such as ATM, POS and internet banking services, as well as high population density in the Kaduna metropolis. Thus, according to the Krejcie and Morgan population/sample determinant table (1970), any research sample size equivalent to the population size of 555,000, the sample size must be 384.

The researcher asked the answers viewpoint on 5 point Liker scale score, ranging from 1 strongly disagreed to 5 strongly agreed on score such as "Do you have complete trust in making payments using card services". Items operationalized to measure card services were rated based on 5 points Liker scale. Here the respondents are require to voiced their level of disagreement, agreement or neither agree not that is (1 strongly disagreed and 5 strongly agreed) and questions Such as "Are you satisfied when making payment using card services" were asked.

The determination of the number of answers for each of the LGAs was done proportionately as follows:

$$\text{No of Answers} = \frac{\text{Population of each LGA} \times \text{sample size}}{\text{Total population of the 4 sample LGAs}}$$

Results and Discussion

This section shows the descriptive statistics involving minimum, maximum, mean, and standard deviation for items in the constructs. Respondents' responses were collected on Likert scale with supports from 1 to 5, where 1 is strongly Disagree and 5 is strongly Agree. However, Table 1 present the descriptive analysis for CS, QTY, ACC, and USG.

Table 1 Descriptive Statistics for CS, QTY, ACC, and USG.

		Minimum	Maximum	Mean	Std. Deviation
Card Services	CS	1	5	3.71	1.11
Quality	QTY	1	5	3.68	1.05
Accessibility	ACC	1	5	3.91	0.98
Usability	USG	1	5	3.98	0.92

Source: Researcher's computation

From the above Table 1, the mean score and std. deviation of the constructs or latent variables (CS, QTY, ACC, USG) range from 3.68 to 3.71 with a standard deviation ranging from 0.92 to 1.11 respectively. In specific, the independent variable CS had a minimum value of 1 and

maximum value of 5 with mean value of 3.71 which is the same with the scale of four (4) agree and std. deviation of 1.11 which depict variance of one (1) respectively. However, this shows that, majority of the respondents are of the opinion that CS is satisfactory. Furthermore, regarding the dependent variables, QTY, ACC and USG in Table 1, had a minimum value of 1 and maximum value of 5 with a given mean value of 3.68, 3.91 and 3.98 which are the same with the scale of four (4) agree and std. deviation of 1.05, 1.98 and 0.92 which depict variance of one (1) respectively. Though, this shows that, majority of the respondents are of the opinion that there is accessibility, quality, and usability of services.

Assessment of Measurement Model

Measurement of outer model analysis the relationships between the indicators and their respective latent variables (Sarstedt *et al.*, 2016)(Henseler *et al.*, 2016)(Hair *et al.*, 2014) . However, in this study, the measurement model has been appraised based on its reliability and validity. Using the PLS-SEM as statistical means for the present research study, the measurement scales accepted evaluates individual indicator reliability, internal consistency reliability, convergent validity and the discriminant validity of the indicator or construct relations. Figure 1 and Table 2 shows the measurement model.

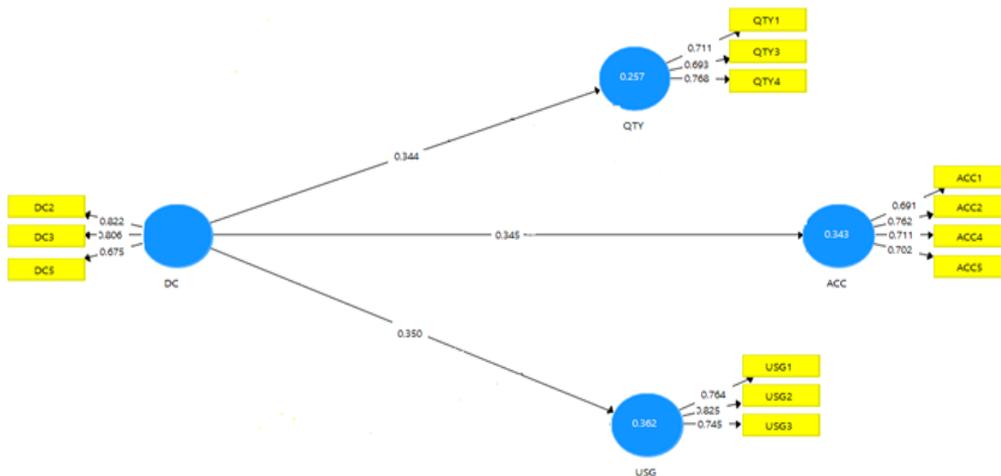


Figure 1 Measurement Model

Table 2 Measurement Model Results

Construct and Indicators	Loadings	Composite Reliability	Average Variance extracted (AVE)
Accessibility			
ACC1	0.691	0.809	0.515
ACC2	0.762		
ACC4	0.711		
ACC5	0.702		
ACC3	0.702		
Card Services			



CS1	0.822	0.813	0.594
CS2	0.806		
CS5	0.675		
Quality			
QTY1	0.711	0.768	0.525
QTY3	0.693		
QTY4	0.768		
Usage			
USG1	0.764	0.822	0.607
USG2	0.825		
USG3	0.745		

Source: Researcher’s computation

From Table 2 above, the individual indicator reliability was measured by studying the outer loadings of the construct or latent variable (Hair Ringle, & Sarstedt, 2014) Hulland (1999) Byrne (2004). The standard range values of 0.5 to 0.7 are the acceptable values for indicator reliability proposed by (Hair, et al., 2014) and Byrne (2004). Thus, from the above Table 2, the outcome of the loading of the 13 items fall between the range 0.5 and 0.8 this exceeded 0.7 as the standard which is satisfactory. Secondly, the standard for Cronback’s Alpha and composite reliability result is 0.70 or higher as suggested by Hair et al (2014) and Bagozzi (1988), in this study the composite reliability coefficient approach was used to evaluate the internal consistency reliability and the outcome of the composite reliability for each latent variable in the above Table 2 falls within the range 0.763 to 0.822, which is above the standard minimum benchmark of (0.70) which is satisfactory. Thirdly, Convergent validity was verified using the average variance extracted (AVE) Fornell & Larcker, (1981) hold that, the benchmark for AVE should be at least 50% (0.5) and in the above Table 2, all the AVE exceeded 0.5 which is satisfactory. Fourthly, this present research study used Fornell-Larcker Criterion (1981) to determine discriminant validity as seen in Table 3 below.

Table 3 Results of Discriminant Validity Test (Fornell-Larcker Criterion)

	ACC	CS	QTY	USG
ACC	0.717			
CS	0.510	0.771		
QTY	0.399	0.453	0.725	
USG	0.585	0.521	0.386	0.779

Source: Researcher’s computation

Discriminant validity as presented in the above Table 3 shows that, discriminant validity values were achieved, because the square root of the AVEs were greater and higher than the correlation between the constructs variables which is satisfactory.

Structural Model

After reviewing the benchmark of the measurement model, this section advanced to the assessment of structural model. Inner model or structural model as the name implies, shows the relationship among the theoretical latent variables (Sarstedt et al., 2016) Chin (1988). However, as revealed by the literature on PLS path modeling, the study shows the outcome of the results of the inner model through measuring the significance and relevance of the structural path coefficients and the level of R-square (coefficient of determination) (R²). Therefore, the below Figure 2 and Table 4 shows the conclusions of the full structural model for this study.

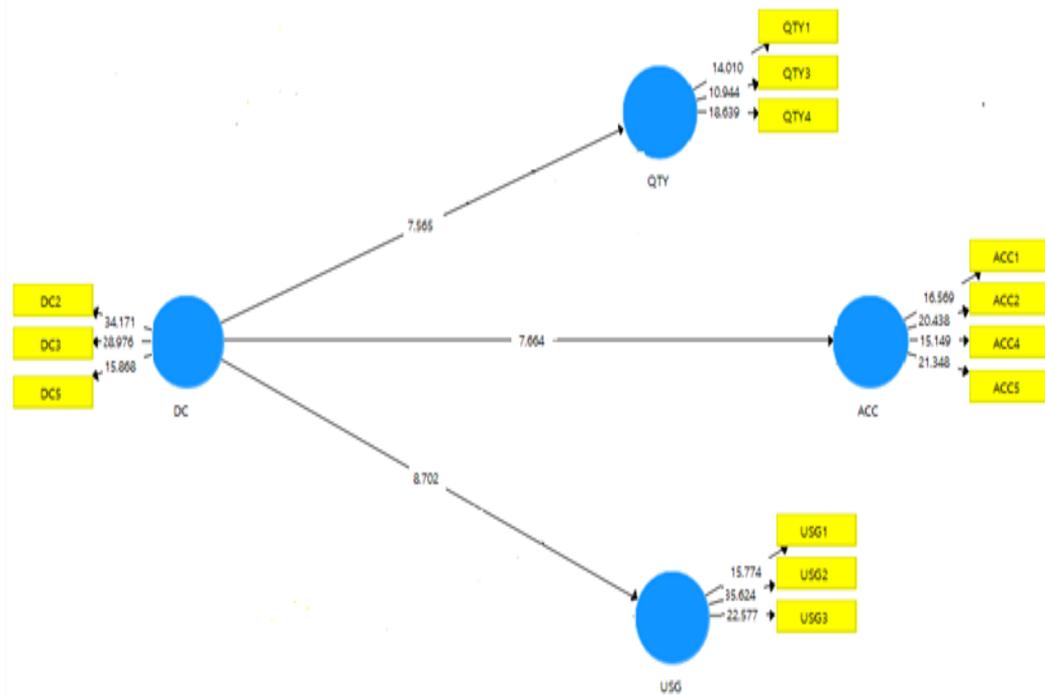


Figure 2 Structural Model

Significance and Relevance of the Structural Path Coefficients

The structural model, modeled the relationship i.e. the path coefficients represent the hypothesized relationship among the latent variables. The acceptable value of the path model is between -1 and +1 (Hair et al., 2014). From the above figure 2, the arrows value connecting the independent construct or latent variable to the dependent construct or latent variable (i.e. QTY, ACC and USG represent the T-values). The outcome of the result show significant relationship between all the variables based on the significance level of 5% (0.05) error probability and critical t-value of 1.96 in respect of two-tailed test. Thus, pointing out to significance of the structural path coefficients of hypotheses proposed for the study, the outcome of each significance and their findings are presented in Table 4 below



Table 4 Results of Structural Model

Hypothesis	Relationship	Beta	SE	t-value	p-value	Findings
H1	CS -> ACC	0.345	0.045	7.664	0.000	Not Supported
H2	DC -> QTY	0.344	0.046	7.565	0.000	Not Supported
H3	DC -> USG	0.350	0.040	8.702	0.000	Not Supported

Source: Researcher’s computation

Based upon the theoretical framework of the study, (3) Three hypotheses were proposed and are all statistically significant. It could be recalled at the starting point that, Hypothesis 1 predicted that, CS has no significant impact on ACC. Therefore, as indicated in Figure 2 and Table 4, there exist a significant impact between CS and ACC. That is, ($\beta = 0.345$, $t = 7.664$, $p < 0.000$). Consequently, Hypothesis 1 not supported. However, Hypothesis 2 predicted that, CS has no significant impact on QTY. Still, as indicated in Figure 2 and Table 4, there exist no significant impact between CS and QTY. That is, ($\beta = 0.0344$, $t = 7.565$, $p < 0.000$). Thus, Hypothesis 2 not supported. Finally, Hypothesis 3 predicts that, CS has no significant impact on USG. However, as indicated in Figure 2 and Table 4, there exist a significant impact between CS and USG. That is, ($\beta = 0.350$, $t = 8.702$, $p < 0.000$). Thus, Hypothesis 3 not supported.

Assessing the Level of R-square (R2)

Evaluating the R-square level also point out testing the coefficient of determination. The result of the variance is said to range between 0 and 1, with value closer to 1 indicating high level of predictive certainty and vise-versa. Falk and Miller (1992) advised that, for variance explained for a particular dependent (endogenous) constructs to be seen as sufficient research study, R-square value should be equal to or higher than 0.10. Thus, as shown in Table 5 below, the R-square value for the main outcome of the PLS model was 0.343, 0.257, and 0.362. However, this proposed that, the independent (exogenous) variables for this study collectively explained 34% (34% adjusted), 26% (25% adjusted), 36% (36% adjusted) of the variance in ACC, QTY and USG.

Table 5 Results of Variance Explained - Coefficient of Determination

	R Square	R Square Adjusted
ACC	0.343	0.338
QTY	0.257	0.251
USG	0.362	0.357

Researcher’s computation

Conclusion

The research study therefore recommends that, the financial institution in Kaduna State metropolis should plan a positive impact on digital financial services department in charge of enlightening and educating the financially included individuals in Kaduna State metropolis

about the digital financial products and services, its economic benefit, how to use it, and also to make the financial product and services more easily accessible and also to increase the quality of service so as to increase the usability of such product and services in Kaduna State metropolis. It is also suggested that, similar research studies should be carried out on other factors impacting financial technology, such as web banking, mobile banking, USSD banking.

The main objective of this research study is to find out the impact of the relationship between card services (CS) and financial inclusion (ACC, QTY, and USG) in Kaduna State metropolis. However, drawing from the itemized gaps in the review of literature, the research study finding reveals that (CS) significantly impacts the relationship between the identified card services (CS) and financial inclusion (ACC, QTY, and USG) in a specific manner, while the implications of the research study are significantly material to theory and practice. The financially included individuals should be informed, educated and enlightened about the digital financial products and services, its economic benefit to the state economy and also to make the financial product and services easily accessible and also to increase the quality of financial service so as to increase the usability of such product and services.

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