



DOES FINTECH SERVICES ENHANCE FINANCIAL INCLUSION IN THE CITY OF BAMENDA

ACHAMOH VICTALICE NGIMANANG¹ AND FONDZE KINYUY HIHNDE²

¹*Department of Economics Science in the Higher Technical Teacher Training College (HTTTC), the University of Bamenda, Cameroon. E-mail: ngimanang@yahoo.com*

²*Department of Banking and Finance in the Faculty of Economics and Management Sciences, the University of Bamenda, Cameroon*

Received: 12 May 2026; Revised: 05 June 2026;

Accepted 15 June 2026; Publication: 08 October 2026

Abstract: This publication has as the objective to ascertain the role of financial technology services on financial inclusion in Bamenda. To attain these objectives, related conceptual, theoretical and empirical literature were explored. Purposive sampling techniques was used to collect data effective from 47 financial institutions adopting financial technology services such as ATM, mobile banking and online banking services in the area. Quantitative research design was adopted. Alpha Cronbach reliability test, VIF multicollinearity test, shapiro-wilk normally test was conducted, and their results necessitate the use of multivariate model verified of heteroscedasticity. The model was globally significant at 1% with adequacy rate of over 72 percent. Financial technology services including Mobile banking services, ATM services and online banking services were significant at 1, 5 and 10% as a in promoting financial inclusiveness among the population of Bamenda. The results suggest that, financial institutions can effectively boost financial inclusion by increasing the number of ATM dispensers at the different parts of the city, effectively implementing mobile devices, equally by educating and encouraging the use of online banking services.

Keywords: *Financial Technology service, Financial Inclusion, Bamenda*

JEL: G21, G29

To cite this paper:

Achamoh Victalice Ngimanang & Fondze Kinyuy Hihnde (2026). Does Fintech Services Enhance Financial Inclusion in the City of Bamenda. *Indian Journal of Finance and Economics*. 7(1-2), 55-80.

INTRODUCTION

Financial inclusion is considered as a key driver to enable financial institutions in operating their activities and economic growth. There is a growing international commitment to raise financial inclusion for women and men globally. Lewis, Villasenor and West (2017) confirmed this at the international level in 2017 while the G20 restate its pledge to advance financial inclusion worldwide especially among the vulnerable groups and Small and Medium sized Enterprises through its support for the work of the Global Partnership for Financial Inclusion. This is built on earlier international promises such as those made by the G7 which during its 2015 summit in Germany committed to achieve inclusive growth especially for women by fostering responsible financial inclusion. These commitments derived from the increasing recognition from policy makers, regulators and international development agencies of the importance of financial inclusion as an enabler of inclusive growth and poverty reduction as well as it contributed to women and girls' economic empowerment and welfare.

Bhatia and Singh (2019) argue that financial inclusion is considered as a critical indicator for development and well-being of the society around the globe. Providing inclusive financial services that are affordable for all has become a basic priority in many countries including developing countries. G-20 Nations has focus attention on financial inclusion as a facilitator for achieving gender equality and other sustainable development goals. Women empowerment is a radical approach concerned with transforming power relations in favour of female gender and considered essential for global progress. Internationally, the Alliance for Financial Inclusion (AFI), a global network of financial inclusion policy makers from developing countries, made a clear commitment in 2016 to close the gender gap in financial inclusion with the adoption of the Denarau Action Plan. According to Lewis et al. (2017) at a country level, many financial inclusion policy makers have been developing national financial inclusion strategies with sex-disaggregated quantifiable national financial inclusion goals and Maya Declaration commitments. Different studies have provided a solid ground in promoting financial inclusion universally for financial access by 2020 and in line with the United Nations SDGs 2030. The statement of the 2016 G20 summit in Hangzhou oversees the importance of financial inclusion in non-G20 countries. It reflects the fact that developed financial inclusion

has moved to the top of the policy agenda reflected establishment of financial inclusion units in Central Bank and Ministries of finance and specific financial inclusion targets Beck (2018).

Financial technology is at the forefront of overcoming costs incurred in the financial system. This process of reducing the cost of getting information, enforcing contracts, and making transactions resulted in the growth of financial contracts, markets and intermediaries. Financial inclusion through this can maintain financial and social stability by creating more inclusive opportunities and achieve other economic and social national objectives (Fanta & Makina, 2019; Gersheson, et al., 2021; Alshehadeh, 2022; & Goswami, et al., 2022). Financial technology being the need for financial transaction that applies new technologies and innovations to develop conventional operations through new software application, methods, products, or corporate models in the financial service industry (Schueffel 2017) can certainly play a major role in including those who are financially excluded in more secured, transparent and lower transaction cost with a variety of different financial services and products. The potentials of financial technology in facilitating financial inclusion have been closely discussed in international conferences such as the conference on Growth Agender held at Seoul in 2010 and the Maya declaration held 2012 where emphasis was put on the importance of financial inclusion in poverty reduction (Sahay, et al. 2020).

Despite the seemingly prominent role of financial technology in explaining financial inclusion, evidence from recent literature on the issue is still misunderstood and untested. Several studies have been done in areas of financial inclusion and performance such as the declarations of these authors Demirguc-Kunt et al. (2015), Mujeri (2015) and Barry (2018) but almost none of the study has empirically investigate the contributions of financial technology on financial inclusion especially at regional level with field collected data. With the paucity of such crucial research, one was motivated to intuitively examine the impact of financial technology products on financial inclusion in Bamenda municipality of Cameroon. Specifically,

- To investigate the effect of automated teller machines services on financial inclusion
- To ascertain the effect of mobile banking service on financial inclusion
- To assess the effect of online banking service on financial inclusion

Having gone through the first section on the introduction, section 2 is reserved for review of the literature, section 3 describes the variables, sources, and data set in detail while section 4 presents the findings then section 5 concludes the paper along with the policy implications.

LITERATURE REVIEW

Theoretical Review

Innovation Diffusion Theory (IDT)

The theory was popularised by Everett Rogers in his book *Diffusion of Innovations*, first published in 1962 and later developed in 1983 to explain how overtime a product gains momentum and spreads or diffuses through a specific population or social system Everett roger (1962). Hence, the theory states that new ideas and technologies spread through a population over time through a process of diffusion. This theory is built on the assumption that, individuals exposed to new ideas and technologies through social networks are more likely to adopt them if they perceive them as being beneficial. Lastly, individuals are more likely to adopt new ideas and technologies if they are compatible with their existing beliefs and values. That said, the transmission of technological innovation within a particular channel to the members of a social system over time is based on five critical factors: relative advantage (this means the innovation is better than the one it replaces), complexity (less difficult than the innovation it should replace), compatibility (how consistent the innovation is with the values of the adopters), trainability (the extent to which the recent innovation can be tested before being adopted) and observability (extent to which the innovation provides tangible results). A piece of equipment is user friendly when with little or no effort the equipment is seamlessly applied to work and deliver results. When such innovation is used continuously, value is created and as a consequence the user becomes satisfied and contented using the item going forward Everett Roger (1962).

Technology Acceptance Model (TAM)

The acceptance and the use of information technologies can bring immediate and long-term benefits at organisational and individual levels, stemming from improved performance to financial and time efficiency and convenience. TAM is a handy tool to examine the attitude of consumers towards technologies. An

individual's financial attitude is the approach he/she adopts towards financial matters. TAM was developed by Fred Davis (1989), TAM states that user acceptance of technology is based on two key factors: perceived usefulness and perceived ease of use. Hence TAM sheds light on the processes underpinning the acceptance of technology, in order to predict the behaviour of and provide a theoretical explanation for the successful implementation of technology.

Theory of Reasoned Action (TRA)

The idea of reasoned action was first initiated in the information integration theory by psychologists Martin Fishbein and Icek Ajzen, (1975). After making an effort to identify the distinctions between attitude and behaviour, Fishbein and Ajzen developed TRA in 1980. The theory states that people's behaviour is primarily driven by their intentions, which are shaped by their attitudes towards the behaviour and their subjective norms. It blends the ideas of innovation diffusion theory and the technology acceptance model.

Financial Intermediation Theory

The theory of financial intermediation was developed starting with the work of Gurley and Shaw in 1960. The financial intermediation theory is based on the theory of informational asymmetry and the agency theory. In principle, the existence of financial intermediaries is explained by the existence of the following categories of factors: high cost of transaction, lack of complete information in useful time; and the method of regulation. Information asymmetry argument constitutes the most used factors in financial intermediation studies. Asymmetry could be ex ante in nature generating the problem of adverse selection, be interim in nature generating moral hazard, and ex post in nature, resulting in auditing or costly state verification and enforcement. The informational asymmetries generate market imperfections of the market thereby deviating from the neoclassical framework (theory of perfect markets).

Empirical Review

Vincent and Evans, (2019) investigated the relationship between cryptocurrency, internet, mobile phones, financial inclusion, and financial sector development in China, India, Nigeria, and South Africa for the period 2009–2017. They used the fully modified ordinary least square (FM-OLS) and

causality analysis. Their empirical results revealed that crypto currency, internet usage, and mobile subscriptions have a significant positive relationship with financial inclusion and financial sector development, suggesting that countries with higher levels of crypto currency, internet usage, and mobile subscriptions have higher levels of financial inclusion and financial sector development. This finding is further buttressed by the causality analysis which shows that crypto currency, internet usage, and mobile subscriptions cause financial inclusion and financial sector development in the four countries.

Using the total number of ATMs and point-of-sale devices in Nigeria as a proxy for electronic banking and the ratio of banked adult population to total bankable adult population in Nigeria as a proxy for financial inclusion, Ene, Abba, & Fatokun, (2019) investigated the effect of electronic banking on financial inclusion in Nigeria. The study used computer-based multiple regression analysis to support correlational and ex post facto research approaches. In Nigeria, it was found that point-of-sale gadgets had a major influence on financial inclusion but automated teller machines had no discernible effect. According to the study's conclusions, deposit money institutions should work to achieve worldwide best practices and eliminate any obstacles to the operation of their automated teller machines. Also, more point-of-sale devices should be readily available and easily accessible by customers.

Kouladoun et al. (2022) examined the relationship between digital technology and financial inclusion in forty-three Sub-Saharan African countries between 2004 and 2019, using the Generalised Method of Moment (GMM) to account for country heterogeneity and double causality, as well as the IV-Tobit to account for the financial inclusions' narrow range. Digital technology has a beneficial and considerable impact on financial inclusion at all levels, as evidenced by ICT indicators such as the subscription rate of fixed and mobile phone users, fixed broadband users, internet users, and a composite indicator of digitalization. To verify the soundness of the approach, a composite indicator of financial inclusion is computed and its impact on digital technology is examined. The results show that as digital technologies advance, so does the rate of financial inclusion in Sub-Saharan Africa. There should be more investments in terms of promoting financial and technological infrastructures and also in the human capital sector since financial literacy can play an important part in promoting financial stability and inclusive finance in Africa.

The effect of financial technology (Fintech) on financial inclusion (FI) in rural India was examined by Goswami et al. (2022). It was a quantitative study that tested hypotheses using structural equation modelling and inferential statistics. Their findings suggested that behavioural intention to utilise management technology is positively impacted by social variables as well. An end-user habit of using financial technology systems and services has a positive relationship with behavioural intention. Factors affecting perceived ease of use towards using the financial technology are positively related to the system's usability. To them, the rise in digital transformation has fuelled financial technology projects, which are some of the most significant advancements in the financial industry. Fintech mobile money and digital wallets, for example, fill the gap in the economy's infrastructure with creative technological solutions, making it possible for users to conduct financial transactions reliably and affordably by removing physical barriers, and can be used to close the gap between the banked and the unbanked.

In their article from Odeleye and Oyeneye (2022) tested the link between financial technology and financial inclusion using quarterly time-series data from 2009 to 2019 in Nigeria. They did this by applying the ARDL approach. By controlling for real income growth as measured by the gross domestic product at 2010 constant price (RGP) and saving rate (r), they also used automated teller machine (ATM), point of sale (POS), web payment transaction (WEB), mobile money payment transaction (MOB), and data subscription for GSM from network providers (DSUB) to form the financial technology index. Financial inclusion was also measured by total private demand deposit. Their study's empirical findings indicated that financial technology has a substantial and detrimental influence on financial inclusion, suggesting that the nation's present level of financial technology will not, in the near term, lead to an improvement in financial inclusion. Furthermore, the data indicates that financial inclusion in Nigeria was impacted by economic growth both in the short and long term. Therefore, in order to maximise the long-term benefits of Fintech on financial inclusion in Nigeria, they suggested that all parties involved in the Fintech business, the Ministry of Science and Technology, the National Communication Commission, and conventional saving institutions work together in a novel way.

Al-Smadi (2023) investigated the relationship between digital finance and financial inclusion in the Middle East and North Africa (MENA) area. The

number of ATMs per 100,000 individuals used to assess digital finance, whereas a composite index that includes the three sub-indices of access, availability, and utilisation of financial services, used to measure financial inclusion. A system-generalized method of moments (sys-GMM) panel technique used on panel data gathered from 2004 to 2020 and for 12 MENA nations. Five more control variables were included in the research. The findings validate the contribution of digital finance to improving financial inclusion in the MENA region. The study's conclusions may be used by MENA countries' policymakers and digital financial service providers to increase the reach of financial inclusion in their nations.

According to the World Bank (2025) the expansion of digital financial service helped to reduce the population of the unbanked from 2.5 billion in 2011 to 1.4 billion in 2021, with a percentage of 76% of global adults owning an account in 2021. Despite these advancements, challenges persist. This is disparity in account ownership between poor and rich countries and demands the need for continued efforts to bridge the financial inclusion gap and ensure equitable access to financial services worldwide. The few studies conducted in Cameroon in this line were limited to particular sectors of finance such as banks or microfinance institutions. This article focuses on all forms financial institutions such as insurance, micro finance institutions, village meetings and “njangi” financing.

METHODOLOGY

The study was conducted in Bamenda which is the administrative seat of Mezam Division, Regional headquarters of the North West and the largest town in the two English-speaking Regions of Cameroon with the population of over 620,000 inhabitants. The city is made up of Mankon, Bamendakwe and Nkwen tribes with so many migrants from other tribes of the North West region predominantly due to the displacements as a result of the on-going Anglophone crises and the establishment of state university in the city among other reasons. This study adopts an explanatory research design and the population of the study consists of all the 12 Banks and over 203 micro finance institutions which are using ATMs, mobile money, debit and credit cards (Regional Service of Insurance for Monetary Affairs Bamenda, 2024). A sample of 47 financial institutions were selected using purposive sampling techniques

The multivariate model was inspired from the works of Tukey, (1977), in his paper titled “Exploratory Data Analysis,” published in 1977. Tukey discusses the use of multivariate analysis techniques to explore complex data sets. The different variables used here to come up with the model specification were (Automated teller machine, Mobile banking, and Debit & Credit cards), on the dependent variable Financial Inclusion and two control variables that controlled the independent variables; Gender (G), Level of Education (LoE). The econometric function is seen as: $FinI = F(ATM, MOB, ONL, LOF, GTM,)$ and the corresponding econometric model is expressed as in equation one below:

$$FinI_i = \beta_0 + \beta_1 ATM_i + \beta_2 MB_i + \beta_3 ONL_i + \beta_4 LOF_i + \beta_5 QUA_i + \beta_6 GEN_i + U_i \quad (1)$$

Financial inclusion is further decomposed into Accessibility of Financial services (AFS)

And Usability/ affordability of Financial services (UFS) with their respective econometric model specified as follows:

$$AFS_i = \alpha_0 + \alpha_1 ATM_i + \alpha_2 MB_i + \alpha_3 ONL_i + \alpha_4 LOF_i + \alpha_5 QUA_i + \alpha_6 GEN_i + E_i \quad (2)$$

$$UFS_i = \lambda_0 + \lambda_1 ATM_i + \lambda_2 MB_i + \lambda_3 ONL_i + \lambda_4 LOF_i + \lambda_5 QUA_i + \lambda_6 GEN_i + \varepsilon_i \quad (3)$$

Where:

AFS_i : Accessibility of Financial services

UFS_i : Usability of Financial services

$FinI$: Financial Inclusion index

ATM : Automated teller machine;

MOB : Mobile banking;

ONL : Online banking;

LOF : Longevity in offering Fintech services

QUA : Qualification of the top manager

GEN : Gender of the top manager

$\beta_0, \alpha_0, \lambda_0$: Constant

$\beta_1 - \beta_6$: Sensitivity of Fintech to Financial Inclusion index

$\alpha_1 - \alpha_6$: Sensitivity of Fintech to Accessibility of Financial services

$\lambda_1 - \lambda_6$: Sensitivity of Fintech to Usability of Financial services

U : error term

Description of Variables

Dependent Variables

Financial Inclusion: financial inclusion According to Dienillah, Anggraeni and Sahara, (2018) is the process of ensuring access to financial services in a timely, and adequate credit manner where needed by poor such as the weaker sectors and low-income groups at a reduced cost. Sarma and Pais (2008) on his part describes financial inclusion as the ease with which financial services could be available, access, and used in an affordable way.

Accessibility of financial services is the supply side of the financial service which measure the outreach of the services. It measures of financial availability in terms of the extent to which individual households and institutions can access formal financial services, using randomized or quasi-experimental settings (Bruhn & Love, 2014). In Dienillah et al. (2018) accessibility of financial services is captured using the proportion of adults that have accounts. Accessibility to financial services is used in this dissertation to capture the supply side of financial inclusion and data are gotten from questionnaires.

Usability of financial services measures financial inclusion from the demand side which has to do with the consumption of financial services by households and firms. Financial inclusiveness can be demonstrated by the use of financial services such as credits, deposits, payments, remittances, and transfers. Usability of financial services which requires that the services has to be affordable is an important indicator of financial inclusion measured by Sarma and Pais (2012) as the proportion of outstanding loans/ deposits from commercial banks (% to GDP). In the ongoing research, questionnaires administered to administrators of various financial institutions is used to build an index which will be used to capture the index of Financial usability.

Independent Variables

Automatic Teller Machines (ATM) service: An automated teller machine or automatic teller machine (ATM) is an electronic computerized telecommunications device that allows a financial institution's customers to directly use a secure method of communication to access their bank accounts, order or make cash withdrawals (or cash advances using a credit card) and check their account balances without the need for a human bank teller/cashier.

An ATM is simply a device used by bank customers to process accounts transactions. The ATM service is one of the most popular widely used fintech services in Cameroon and numerous financial institutions are increasingly investing heavily in its services. Automatic Teller Machines (ATM) service is hypothesized to be one of the most significant promoters of financial inclusion

Mobile Phone Banking Services

Mobile Phone Banking is the conduction of transactions and bank account management between bank and clients through phone. However, due to technological advancements in smart phones most bank customers around the world utilize Mobile Bank Apps offered by their corresponding banks. Customers scan then use these mobile applications to check their account balances, check account flow and remaining, pay bills and manage their accounts. Mobile Phone Banking service is anticipated to have a positive impact in promoting financial inclusion.

Online Banking Service

Online banking services simply refers to conducting the banking transaction (online payments and electronic funds transfer (EFT) and direct email feedback). via the financial institutions' websites. These online banking services offered most financial institutions is hosted on a secured site with end-to-end encryption for customer security (Bicec.com, 2017). Online banking may be conducted in the form of the U-Direct service that allows customers to conduct financial transactions via the World Wide Web from their home, office or on the move with high level of security (Ubagroup.com, 2017). Afriland First Bank launched its E-first platform in 2016 where customers can access, operate, consult, pay, transfer and customize their accounts real time online securely and the platform is made available 24/7. For competitive reasons most prominent financial institutions in Cameroon with Bamenda inclusive are offering online banking service which are expected to enhance financial inclusion in the municipalities.

Control variables

Longevity is usage of fintech services: Longevity in usage of fintech services captured using the number of years the financial institutions have been using

the services. The variable for experience in implementation of the financial technology service is obviously hypothesized to have a positive effect in promoting financial inclusion

Qualification of the top manager: Qualification is measured in terms of the level of education attained by the top manager. Given that more educated and skilful managers can efficiently implement financial technology services than the less skilful colleagues, the variable is hypothesized to have a positive effect in fostering financial inclusion

Gender of the top management: The general conception is that most female managers shy away from risky venture and financial technology are very convenient, efficient, but insecure. Coupled with the fact that Bamenda is stocked with a good number of youths who constantly research and hack bank accounts (scammers) frequently. We strongly believe that institution head by men may venture more intensively into fintech services than those headed by women indicating that gender is an important determinant of financial inclusion.

4. RESULTS

Respondents' profile presented in table 1, reveals that out of the 47 questionnaires effectively used in this study, 16 respondents are within the age range 41-45 years, making up about 34.04%. This is strictly followed by those respondents within the age range of 36-40 years who make up 27.66% of the total 47 respondents and least by those within the age range of 60 and above, who made up only 3.33% of the total 150 respondents. Also, of the 47 respondents, 19 were males making up about 52.67% while 71 were females, completing the remaining 47.33%. In addition, 80 of the 150 respondents were married, making up 53.33% while single was 70 making up 46.67%.

Concerning the Level of Education, 96 of the 47 respondents were of the tertiary level of education who constituted about 64.15%, strictly followed by those of the secondary education who were 42 in number and constituted 27.99% and the remainder being respondents of the primary level of education who made up only 7.86%.

Finally, taking a glance at how long respondents have been using e-banking products, we discover that a bulk of the respondents has been using e-banking products between 1 and 5 years, represented by 38.99%, followed by

between 5 and 10years which constituted 33.96%. While those above 10years constituted 22.96% of the respondents and least by those less than 1year. This clearly indicates that a majority of those selected are conversant with electronic banking services and can therefore appraise their level of satisfaction.

Table 1: Demographic profile of respondents

<i>Age range of respondents</i>	<i>N</i>	<i>% of Total</i>
25-30	02	4.26%
31-35	05	10.64%
36-40	13	27.66%
41-45	16	34.04%
45 +	11	23.40%
Total	47	100.0%
Gender of respondents		
Male	36	76.6%
Female	11	23.4%
Total	47	100.0%
Marital status		
Married	44	93.62%
Single	03	6.38%
Total	47	100.0%
Educational level		
Secondary	01	2.1%
Tertiary	46	97.9%
Total	47	100.0%
How long has your institution been offering Fintech services?		
1-5 yrs.	06	12.77%
5-10 yrs.	07	14.9%
10-15 yrs.	09	19.15%
15-20 yrs.	14	29.77%
> 20 yrs.	11	23.4%
Total	47	100.0%

Source: Research Survey (2025)

Results of respondents' perception presented in table 2 indicate that the mean value for Automatic Teller Machine (ATM) is 4.1745 with a standard deviation of 0.36740, while the minimum and maximum values are 3.2 and 4.8 and this indicates a low deviation of ATM services from the mean and some level of stability. Also, the mean is closer to the maximum value than to

the minimum thus indicating that ATM services was relatively high during the period under study. The mean value of Mobile Banking services stands at 4.3050 with a standard deviation of 0.53762, while the minimum and maximum values are 3.0 and 5.0 and this indicates a moderate deviation of mobile banking services from the mean and equally that, the mean is closer to the maximum value than to the minimum signifying that mobile banking services was also relatively high during the period under study. The mean value of online banking services stands at 4.3050 with a standard deviation of 0.639, while the minimum and maximum values are 2.6 and 5.0 and this indicates a moderate deviation of online banking services from the mean and equally that, the mean is closer to the maximum value than to the minimum implying that online banking services was also relatively high during the period under study. Similar results were obtained for all the dependent variables.

Table 2: Summary of descriptive statistics

	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
ATM services	47	3.20	4.80	4.1745	0.36740
MOB services	47	3.00	5.00	4.3050	0.53762
ONL services	47	2.60	5.00	4.1447	0.63889
GEN	47	.00	1.00	0.8085	0.39773
LOU	47	2.33	5.00	3.3050	0.73172
QUA	47	0.00	1.00	0.6383	0.48569
UFS	47	3.40	5.00	4.5851	0.23473
AFS	47	2.00	5.00	4.1277	0.99164
IFI	47	3.25	4.88	4.3564	0.48200
Valid N (listwise)	47				

PRETESTING RESULTS

Results of Reliability Test

Reliability Statistics following Cronbach’s Alpha was 0.835 for all the nine variables and for the individual variable is summarised below

Table 3: Cronbach’s Alpha reliability test

<i>Cronbach’s Alpha</i>	<i>Cronbach’s Alpha Based on Standardized Items</i>	<i>N of Items</i>
0.835	0.837	5

Source: computed by author (2021) using SPSS

According to Bonnet and Wright, (2015) an Alpha level of 0.7 and above is considered acceptable indicating that the data collection instrument is reliable. Accordingly, all our variables have Cronbach’s Alpha coefficient exceeding 60 percent. Thus, the questionnaire is significant for collecting the data

Results of Normality Test

Two normality testing procedure were conducted to verify which analysis to be use whether parametric or non-parametric technique. In the ongoing study, the number of observations (respondent) was below 100, Shapiro-Wilk test Test were used.

Results of Kolmogorov-Smirnov and Shapiro-Wilk test of Normality

Shapiro-Wilk test of normality is used in the presence study instead of Kolmogorov-Smirnov, simply because the numbers of observation are less than 100.

Table 4: Results of Kolmogorov-Smirnov and Shapiro-Wilk Tests of Normality

	ShapiroWilk		
	Statistic	df	Sig.
ATM services	.920	47	.203
MOB services	.780	47	.310
ONL services	.817	47	.231
LOU	.911	47	.402
QUA	.609	47	.121
GEN	.481	47	.203
UFS	.793	47	.311
AFS	.787	47	.411
IFI	.882	47	.145

Source: Computed by author (2025) using SPSS

The results of the test of normality used indicate that the data are normally distributed. This implies that parametric techniques can be used for analysis of the data. Specifically, this study adopts two parametric methods which include the multivariate linear regression analysis and Pearson product moment correlation.

Results of Multicollinearity based on Variance Inflation Factor

The tolerance result associated with each independent variable ranges from 0 to 1 and the variance inflation factor are between 1 and 4 indicating absence of multicollinearity.

Table 5: Results of multicollinearity based on variance inflation factor

Model		Collinearity Statistics		
		Tolerance	VIF	1/ VIF
1	ATM services	.686	1.4580	0.6859
	MOB services	.167	5.9830	0.1671
	ONL services	.186	5.3870	0.1856
	LOU	.624	1.6040	0.6234
	QUA	.574	1.7430	0.5737
	GEN	.788	1.2700	0.7874
	Average	0.5042	2.9075	0.5039
a. Dependent Variable: Index of Financial Inclusion				

Source: Computed by author (2025) using SPSS

This shows that there is a weak positive correlation relationship among the constructs of the independent variables used in predicting the dependent variables.

Table 6: Multicollinearity test based on correlation matrix

	ATM services	MOB services	ONL services	GEN	LOU	QUA
ATM services	1.000					
MOB services	.368	1.000				
ONL services	.276	.181	1.000			
GEN	.654	.004	.401	1.000		
LOU	.515	.100	.607	.474	1.000	
QUA	.760	.008	.656	.612	.604	1.000

Source: Computed by author (2025) using SPSS

Observation from the correlation matrix in the table above shows a bi-variance of each pair of the variables exhibits a low (weak) positive correlation coefficient relationship amongst the variables for financial technology services thereby complementing the results of VIF.

RESULTS INFERENTIAL STATISTIS

The strength of financial inclusion model was tested using Analysis of Variance (ANOVA). ANOVA summarizes the relationship between regression mean square and error mean square. The F statistics were 4.408, 19.596 and 21.208 respectively for the AFS, UFS and IFI models. Fisher statistics was reported to very significant at 99% confidence level and 1% significant level as the calculated F-value is greater than the critical value implying that the three models are significant in explaining the relationship between the variables for financial technology services and financial inclusion in Bamenda municipality. Given that the models are globally significant, there is need to precede with the presentation of the regression results.

Adequacy test results of the model captured by the adjusted coefficient of determination (Adjusted R²) reports that all the indicators financial technology services (the exogenous variables) included in the models were capable of explaining 72.5 percent of the variations in financial inclusion in Bamenda municipality. However, 27.8% of variations in financial inclusion are explained by variations in other variables different from financial technology services (influence of the extraneous variables). This is known as the coefficient of non – determination. The Fisher’s F test used to determine the risk of rejecting the null hypothesis when it is true stood at 0.0001, signifying that the risk in assuming that the null hypothesis (financial technology services do not have a significant effect on financial inclusion) is wrong is barely 0.01%. Therefore, we can conclude with confidence that the six independent variables used in this study bring a significant amount of information in predicting the financial inclusion in Bamenda, Cameroon.

Table 7: Multiple Regression Results of the model of financial inclusion

Variables	AFS		UFS		INDEX of FI	
	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Intercept	4.139 (0.464)	.000	3.675 (1.272)	.006	.232 (.600)	.702
ATM services	0.111 (0.086)	.204	.470 (.236)	.054	.291 (.112)	.013
MOB services	0.404 (0.097)	.000	.612 (.267)	.027	.508 (.126)	.000
ONL services	.357 (.084)	.000	.774 (.230)	.002	.209 (.108)	.061

Variables	AFS		UFS		INDEX of FI	
	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
LOF	.057 (.049)	.248	.036 (.134)	.793	.011 (.063)	.864
QUA	.086 (.072)	.237	.378 (.197)	.062	.232 (.093)	.017
GEN	.040 (.081)	.622	.153 (0.222)	.497	.056 (.105)	.595
R-squared	0.398		0.746		0.761	
Adjusted R-squared	0.308		0.708		0.725	
F (5,41)	4.408		19.596		21.208	
Prob >F	0.002		<0.001		<0.001	
Root MSE	0.195		0.535		0.253	
Durbin Watson stat	1.802		1.655		1.578	

Values in parentheses are the standard errors

Source: Research survey 2025

The regression results are presented in Table 4.9. The coefficient, standard deviation, beta coefficient, t-statistics, P-values and confidence interval are presented in the respectively columns. The intercept (constant term) is the expected mean value of financial inclusion when all independent variables are set to zero. Everything else constant, financial institutions in the town of Bamenda will make a positive financial institution in the absence of financial technology services. Furthermore, financial institutions in Bamenda will make a positive but insignificant progress in enhancing financial inclusion when Automatic Teller Machines, Mobile Banking, online Banking, and Level of education and Duration of offering fintech services are held constant, as given by the significance of the t - statistic of 0.702% which is not lower than the level of significance of 0.05.

Automatic Teller Machines service has a positive coefficient. This implies that an increase in Automatic Teller Machines (ATM) services is associated with an increase in financial inclusion. An increase in ATM by one point will result to increment in financial inclusion by 0.291 point. Inferring from the significance of the t statistic of 2.604, it implies that we will be taking a 0.05% risk in assuming that the Automatic Teller Machines service have a statistically significant effect on the financial inclusion at 5% level of significance. The results equally indicated that ATM banking service is also significant (at 10%) in promoting accessibility

of financial services and also at significant at 10% in easing the usability of the financial services. We therefore conclude that Automatic Teller Machines service has a positive effect which is consistent with the a priori expectation and has important implications in fostering financial inclusion.

Mobile Banking has a positive and significant effect on financial inclusion all other variables being constant. This implies that an increase in mobile banking service as the product of financial is associated with an increase in financial inclusion. For each point increase in the service for Mobile Banking service, Customer Satisfaction increases by 0.508 point. Inferring from the significance of the t statistic of 4.028, we will be taking a 0.00% risk in assuming that Mobile Banking service has a statically significant effect on financial inclusion. at 1%. We therefore conclude that Mobile Banking service has an important positive effect on financial inclusion., which is consistent with the theoretical expectation. The results equally reported that mobile Banking service is more significant (at 1%) in enhancing accessibility of financial services than in facilitating the usability of the financial services.

Online Banking has a positive and significant effect on financial inclusion, all other variables being constant. For each unit increase in the quality of service for online Banking, financial inclusion increases by 0.209 point. Inferring from the significance of the t statistic of 1.925, we will be taking a 10% risk in assuming that online banking facilities has a significant effect on financial inclusion which is lower than the level of significance of 10%. We therefore conclude that online Banking service quality has a positive and significant effect on the financial inclusion as it was hypothesized. The results further revealed that online Banking service is more significant (at 1%) in enhancing accessibility of financial services and usability of financial services.

Longevity is offering financial technology services has a positive but insignificant effect on financial inclusion all other variables being constant. For each unit increase in the period of offering financial technology services, financial inclusion increases by 0.201 point. Inferring from the significance of the t statistic of 0.173, we will be taking a 86% risk in assuming that the Longevity is offering fintech services have a significant effect on financial inclusion which is greater than the level of significance of 5%. We therefore conclude that Longevity is offering financial technology services has a positive but insignificant effect on financial inclusion.

The level of education has a positive and significant effect on financial inclusion all other variables being constant. For each unit increase in the qualification of the top management personality, financial inclusiveness increases by 0.322. Inferring from the significance of the t statistic of 2.495, we will be taking a 17% risk in assuming that the Level of education have a significant effect on financial inclusion which is lower than the level of significance of 5%. We therefore conclude that the Level of education has a positive and significant effect on financial inclusion

At a 95% gender of the top management personality has a positive but insignificant effect on financial inclusion all other variables being constant. For each unit from a female to male manager, financial inclusiveness increases by 0.56. Inferring from the significance of the t statistic of 0.535, we will be taking a 59% risk in assuming that the choice of male manager over a female have a significant effect on the financial inclusion which is greater than the level of significance of 5%. We therefore conclude that the gender has a positive but insignificant effect on the financial inclusion.

Using the above results, we can therefore establish the regression equation as:

$$IFI_t = 0.233 + 0.111ATM_t + 0.404 MOB_t + 0.357ONL_t + 0.057LOF_t + 0.086 QUA_t + 0.041 GEN_t$$

Where IFI is the dependent variable (financial inclusion). AMT_t is Automated Teller Machine services and MOB_t is Mobile banking services and ONL_t is online banking services.

ROBUSTNESS TESTS

Results Pagan Breusch Heteroscedasticity Test

Heteroscedasticity is said to be a systematic change in the spread of the residuals over the range of the measured values and was considered to be a disturbing factor because, the ordinary least square regression assumes that all residuals are drawn from a population that has a constant variance (homoscedasticity). Therefore, in order to satisfy the regression assumptions and to trust the results, the residuals are expected to have a constant variance. To test for heteroscedasticity, the residual term was regressed on the independent variables and the results of ANOVA was used to assess the variation of the error term.

Pagan Breusch LM Heteroscedasticity Test was used to verified the problem of Heteroscedasticity of the error term. Given that the f-statistic in ANOVA table and t-statistics in subsequent table are not significant ($p > 0.05$)0. it follows that there is no problem of heteroscedasticity. This implies that the model is in correct functional form.

Table 8: Test for heteroscedasticity

Models	ANOVA (F) statistics		
	Model I (AFS)	Model II (UFS)	Model III (IFI)
Residual of the regression	0.982 (0.405 ^b)	1.421 (0.405 ^b)	0.793 (0.405 ^b)

Values in brackets are the respective P-Values

Source: Computed by author (2025) using SPSS

Assumptions of heteroscedasticity going by the Goldfield-Quandt test of 1965, a probability value less than 5% ($p < 0.05$) is considered a problem, that is indicating the presence of heteroscedasticity. Therefore, going by the results of the analysis of table 4.21 above, the probability value for both AFS, UFS and IFI which are the dependent variable, have p-values greater than 5% indicating the absence of heteroscedascity.

This can be pictured from the scattered plot of the model stochastic term as shown on in the following figure. The result has therefore proven from every indication that, each of the variable can be used to explain their individual prediction of the dependent variable in the linear regression calculation for this study.

CONCLUSION AND RECOMMENDATIONS

Financial technology services explained over 72 percentage of variation in Financial inclusion. Automated Teller machine services has a positive and significant effect in promoting financial inclusiveness. The effect of Mobile banking services on financial inclusion in Bamenda was positive and highly significant. Online banking service was also significant in enhancing the financial inclusion in Bamenda. The results of the findings have shown that financial technology facilities adopted by financial institutions are very important instrumentals to use in promoting financial inclusion in Bamenda. To ensure effective financial inclusion, financial institutions should increase

the number of ATM dispensers at their bank branches, effectively implement mobile devices, education and encourage the use of online banking service.

References

- Alshehadeh, A. R., & Al-Khawaja, H. A. (2022). Financial Technology as a Basis for Financial Inclusion and its Impact on Profitability: Evidence from Commercial Banks. *International Journal of Advances in Soft Computing & Its Applications*, 14(2).
- Al-Smadi, M. O. (2023). Examining the relationship between digital finance and financial inclusion: Evidence from MENA countries. *Borsa Istanbul Review*, 464-472. Retrieved from <https://doi.org/10.1016/j.bir.2022.11.016>
- Beck, T. (2018). Finance, fintech and financial inclusion. Tilburg University, European Banking Center Discussion Paper
- Bhatia, A., & Singh, S. (2019). Determinants of financial literacy: A study of young adults. *Journal of Financial Economic Policy*, 11(3), 333–345.
- Bonnet, C., & Wright, J. (2015). Consumers' use of cash and cards: A study of payment choice. *Review of Network Economics*, 14(2), 1–36.
- Bruhn, M., & Love, I. (2014). The real impact of improved access to finance: Evidence from Mexico. *Journal of Finance*, 69(3), 1347–1376.
- Demirguc-Kunt, L, Klapper D. singer, p.Van oudheusden. (2015) The Global Findex Database 2014, Measuring Financial Inclusion Around The world (policy research working paper No. 7255)
- Dienillah, A., Anggraeni, L., & Sahara, S. (2018). Impact of Financial Inclusion on Financial Stability based on Income Group Countries. *Buletin Ekonomi Moneter Dan Perbankan*, 20(4), 429-442. Retrieved from <https://doi.org/10.21098/bemp.v20i4.859>
- Ene, E. E., Abba, G. O., & Fatokun, G. F. (2019). The impact of electronic banking on financial inclusion in Nigeria. *American Journal of Industrial and Business Management*, 9(6), 1409-1422.
- Everett R. (1962). Diffusion of innovations. Free Press.
- Fanta, A. B., & Makina, D. (2019). The relationship between technology and financial inclusion: Cross-sectional evidence. *In Extending financial inclusion in Africa*, 211-230.
- Fred D. Davis (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.

- Gersheson, D. Herrera, L.Lambert, F., Ramos,G. Rousset, Mand . Torres, 2021,” FinTech and financial inclusion in Latin America and the Caribbean”, IMF working paper WP/21/22.
- Goswami, S., Sharma, R. B., & Chouhan, V. (2022). Impact of Financial Technology (Fintech) on Financial Inclusion (FI) in Rural India. *Universal Journal of Accounting and Finance*, 10(2), 483 - 497. doi:10.13189/ujaf.2022.100213
- Gurley, J. G., & Shaw, E. S. (1960). Money in a theory of finance. Brookings Institution.
- Icek Ajzen (1975). Belief, attitude, intention, and behavior: An introduction to theory and research. Addison-Wesley.
- John W. Tukey (1977). Exploratory data analysis. Pearson.
- Kouladoun, J.-C., Wirajing, M. A., & Nchofoung, T. N. (2022). Digital technologies and financial inclusion in Sub-Saharan Africa. *Telecommunications Policy*, 46(9). Retrieved from <https://doi.org/10.1016/j.telpol.2022.102387>
- Lewis R. J. Villaseñor, J., & West, D. M. (2017), the 2017 Brookings financial and digital inclusion project report. The Brookings Institution.
- Mileva, G. (2023). *11 of the Best Crypto Fintech Companies*. Influencer Marketing Hub.
- Odeleye, A. T., & Oyeneye, I. (2022). Impact of financial technology (Fintech) on financial inclusion in Nigeria. *Fuoye Journal of Finance and Contemporary Issue*, 2 (1), 72-86.
- Sahay, R, Von Allmen, U., Lahreche, A--, Khera, P., Oguwa, s., Bazar bash M., and K... Beaton, 2020, “The promise of FinTech; Financial inclusion in the post covid-19 Era” IMF DEPARTMENT PAPER NO.20/09
- Sarma, M., & Pais, J. (2008). Financial Inclusion and Development: A Cross country Analysis. *Berlin (GE): Berlin Working Papers on Money, Finance, Trade and Development*
- Schueffel, P. (2017). Taming the beast: A scientific definition of fintech. *Journal of Innovation Management*, 4(4), 32–54.
- Vincent, O., & Evans, &. O. (2019, July 09). Can cryptocurrency, mobile phones, and internet herald sustainable financial sector development in emerging markets? *Journal of Transnational Management*. doi:10.1080/15475778.2019.1633170.
- World Bank. (2025). Global Financial Development Report 2021: Financial inclusion. Washington, DC.

APPENDICES

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin Watson
1	.631 ^a	.398	.308	.19530	1.802

a. Predictors: (Constant), Gender of the manager, Mobile banking services, Automated Teller machine services, Longevity of using fintech, Qualification of the Manager, Online financial services

b. Dependent Variable: Accessibility to Financial service

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.009	6	.168	4.408	.002 ^b
	Residual	1.526	40	.038		
	Total	2.535	46			

a. Dependent Variable: Accessibility to Financial service

b. Predictors: (Constant), Gender of the manager, Mobile banking services, Automated Teller machine services, Longevity of using fintech, Qualification of the Manager, Online financial services

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.139	.464		8.924	.000
	Automated Teller machine services	.111	.086	.174	1.291	.204
	Mobile banking services	.404	.097	.925	4.147	.000
	Online financial services	.357	.084	.972	4.268	.000
	Longevity of using fintech	.057	.049	.179	1.172	.248
	Qualification of the Manager	.086	.072	.178	1.200	.237
	Gender of the manager	.040	.081	.068	.497	.622

a. Dependent Variable: Accessibility to Financial service

Regression

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin Watson
1	.864 ^a	.746	.708	.53578	1.655

a. Predictors: (Constant), Gender of the manager, Mobile banking services, Automated Teller machine services, Longevity of using fintech, Qualification of the Manager, Online financial services

b. Dependent Variable: Usability and afortability of Financial service

ANOVA^a

<i>Model</i>		<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
1	Regression	33.752	6	5.625	19.596	.000 ^b
	Residual	11.482	40	.287		
	Total	45.234	46			

a. Dependent Variable: Usability and affordability of Financial service

b. Predictors: (Constant), Gender of the manager, Mobile banking services, Automated Teller machine services, Longevity of using fintech, Qualification of the Manager, Online financial services

Coefficients^a

<i>Model</i>		<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>	<i>t</i>	<i>Sig.</i>
		<i>B</i>	<i>Std. Error</i>	<i>Beta</i>		
1	(Constant)	3.675	1.272		2.889	.006
	Automated Teller machine services	.470	.236	.174	1.986	.054
	Mobile banking services	.612	.267	.332	2.289	.027
	Online financial services	.774	.230	.499	3.372	.002
	Longevity of using fintech	.036	.134	.026	.264	.793
	Qualification of the Manager	.378	.197	.185	1.917	.062
	Gender of the manager	.153	.222	.061	.686	.497

a. Dependent Variable: Usability and affordability of Financial service

Model Summary^b

<i>Model</i>	<i>R</i>	<i>R Square</i>	<i>Adjusted R Square</i>	<i>Std. Error of the Estimate</i>	<i>Durbin Watson</i>
1	.872 ^a	.761	.725	.25278	1.578

a. Predictors: (Constant), Gender of the manager, Mobile banking services, Automated Teller machine services, Longevity of using fintech, Qualification of the Manager, Online financial services

b. Dependent Variable: Index of Financial Inclusion

ANOVA^a

<i>Model</i>		<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
1	Regression	8.131	6	1.355	21.208	.000 ^b
	Residual	2.556	40	.064		
	Total	10.687	46			

a. Dependent Variable: Index of Financial Inclusion

b. Predictors: (Constant), Gender of the manager, Mobile banking services, Automated Teller machine services, Longevity of using fintech, Qualification of the Manager, Online financial services

Coefficients ^a						
<i>Model</i>		<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>	<i>t</i>	<i>Sig.</i>
		<i>B</i>	<i>Std. Error</i>	<i>Beta</i>		
1	(Constant)	.232	.600		.386	.702
	Automated Teller machine services	.291**	.112	.221	2.604	.013
	Mobile banking services	.508***	.126	.567	4.028	.000
	Online financial services	.209*	.108	.276	1.925	.061
	Longevity of using fintech	.011	.063	.017	.173	.864
	Qualification of the Manager	.232*	.093	.234	2.495	.017
	Gender of the manager	.056	.105	.046	.535	.595

a. Dependent Variable: Index of Financial Inclusion