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The Impact of the Mobile Money on People's Use of Financial Services in Sub-Sahara Africa

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Abstract: This paper details the impact of mobile money financial technology on financial inclusion in Sub-Saharan Africa. The research methodology used was descriptive research design with the use of secondary information sources to collect panel data. The research model had Financial Technology as the independent variable and the dependent variable was Financial Inclusion. The analysis of data was done using Stata 15. From the interpretation of the findings using the panel data on the 14 selected Sub-Saharan countries, it was found that the increase in the number of registered mobile money agents per 100,000 adults led to an increase in the total number of people using the financial services per 100,000 adults in Sub-Sahara Africa. Furthermore, the relationship between the registered mobile money agents per 100,000 adults and the total number of people using financial services was proven to be significant at a 5% level of significance.

Keywords: financial technology; financial inclusion; mobile money; automated teller machine; Sub-Sahara Africa.

Introduction

To start with, FinTech is an emerging industry that develops new technology in order to disrupt traditional financial markets for more improvement in its activities. Some of the technologies that aim to improve the access of financial services to the general public include mobile technology (which includes mobile money and mobile banking), investing services and cryptocurrency, ATMs, and so on. The two kinds of technological innovations this research focused on are mobile money and ATM services. To start with, mobile money users can perform financial transactions using either internet banking or the installed application on their mobile device (mobile phone, or tablet) such as receiving, sending, and storage of money. For instance, they can buy stuff from shops, pay for their bills, school fees, and so on.

Global profound changes have been seen in the financial sector mostly motivated by innovations in technology, new customer behavior, and transformations in regulations worldwide. FinTech Innovations has had an impact on the financial sector in terms of service delivery in so many ways such as increased consumer access, better services, improved efficiency, and effectiveness of the financial services provided. The current global financial infrastructure generally includes the a) banks, retail, commercial, and wholesale based structure; b) insurance and pension providers; and c) money, foreign exchange, and capital markets. All of these are supported by providers of payment systems and those providers of other financial markets, as well as central banks and regulators. It has been proven over the years that the efficiency and effectiveness of private and public sector functions can be improved through financial innovation.

Lately, in the past decade, the financial services penetration in Africa has been rising due to several factors which include the entry of disruptors, the banks, and mobile network operators' convergence, and the financial services dematerialization. One of these significant disruptors in African financial service provision is the M-Pesa mobile payment system which began in Kenya in the year 2007 but is already boasting of over

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30 million active mobile money users in just ten countries while its competitors like MTN Mobile Money and Orange Mobile money are having millions of active users around the region of Sub-Sahara. The M-Pesa Services are currently being offered in countries such as Tanzania, India, Kenya, Lesotho, Mozambique, Romania, D.R. Congo, Ghana, Egypt, and Albania. The use of mobile money financial services has hugely grown over the past ten years in the region of Sub-Sahara Africa (SSA) which has made the region become the global leader in mobile money innovations. The SSA currently has close to 10% of its GDP in transactions taking place through mobile money. The second region is Asia which has only 7% of its GDP and other regions have 2% of their GDP in transactions which occur via mobile money (Armadou, 2019).

The efforts put in place to ensure easy access to affordable financial products and services are referred to as Financial Inclusion. Nearly one-third of the adults in this world remain unbanked with more than half of these being women, members of the poor households in rural areas, or those not part of the workforce as of late 2018. According to this statistic, about 370 million people in Africa still remain unbanked and unserved out of the total population of 590 million. The major role which digital financial services play towards increasing financial inclusion in Africa is essentially impactful and cannot go unrecognized. There has been a rapid increase in the number of FinTech users by 250% in 2017 which is about 7.2 million from the baseline of 2012. This has led to the notable improvement in the financial inclusion growth from 23% in 2011 to 43% in 2017. For instance, there were more than 395.7 million registered mobile money accounts in the Sub-Saharan African region which is a 45.6% representation of the world total. The second-largest share was held by South Asia which had 33.2% and lastly 11% by the East & Pacific region (GSMA, 2018).

The SSA region market has witnessed several changes in the financial sector resulting from changes in legal, regulatory, and institutional framework in response to various financial changes. These changes in the financial sector include the fast-changing technology that has greatly positively influenced access to financial services and increased channels being used to provide various kinds of financial services. Therefore, the objective of this research is to analyze the impact of Mobile Money Financial Technology on Financial Inclusion in the financial sector of the SSA region.

Purpose of study

The introduction of Financial Technology in the provision of financial services undoubtedly has and will continue to have an impact on the way financial institutions around the world operate. In this paper, we analyze the extent to which mobile money financial technology has impacted people's access, availability, and use of financial services. This research aimed to analyze the impact of financial technology on financial inclusion in the Sub-Sahara Africa Region.

Research question

What is the impact of mobile money financial technology on people's use of financial services in Sub-Sahara Africa?

Literature review

Boro (2017), did a study to establish the effect of mobile banking on financial inclusion in Kenya based on the three independent variables which include several mobile money subscribers, mobile money agents, of mobile money transactions, and the value of mobile money transactions to represent the mobile banking while the dependent variable was deposit bank accounts which represented the Financial inclusion. The results revealed that all the independent variables affected deposit bank accounts

(dependent variable). According to these results, it can be concluded that there is a positive relationship between mobile banking and financial inclusion in Kenya.

Bongomin et al (2018) did a study to test the moderating effect of social networks in the relationship between mobile money usage and financial inclusion in rural Uganda. The results revealed that there is a significant and positive moderating effect of social networks in the relationship between mobile money usage and financial inclusion in rural Uganda. Besides, mobile money usage and social networks have direct and significant effects on financial inclusion in rural Uganda. Thus, the findings suggest that the existence of social networks of strong and weak ties among mobile money users promotes financial inclusion in rural Uganda.

The results of the research done by Kathuria, Uppal and Mamta (2009) to evaluate the impact of mobile penetration on economic growth in India revealed that the growth of those Indian states having higher mobile penetration rates was faster than those with less mobile penetration. It was also found that the most notable vital infrastructure than any other which was subject to network effects was the telecom networks where the threshold network size is only met when the growth impact is larger.

A study done by Ene et al (2019) in an attempt to examine the extent to which electronic banking impacts financial inclusion in Nigeria showed that there was a stronger positive relationship between financial inclusion and the number of POS facilities because of its ease of access and availability to the public. It was further found that the POS facilities were easier means of payments in Nigeria although they cannot work when there are network failures and power challenges. On the other hand, it was shown that the relationship between the number of ATMs and financial inclusion in Nigeria was insignificantly positive hence revealing the true picture of the Nigerian bank customers' experience when it comes to using automated teller machines both in the urban and rural areas which are coupled with numerous problems in using them. For instance, there is constant unavailability of cash in most automated teller machines. Moreover, these ATMs are time-wasting because of long queues, network problems, technical and they are also slow to process money.

Methodology

The descriptive research design was applied to collect Secondary data. The target population in this study for the panel data collected using secondary information sources was based on the 14 countries representing the entire Sub-Sahara Africa. In this research, the secondary data on the number of registered mobile money agents per 100,000 adults in the SSA Region was used to find out whether there was a relationship between the number of mobile money agent outlets and the financial inclusion.

Descriptive and inferential statistics were the two techniques that were used to analyze data for this study. Firstly, descriptive statistics were used to analyze data in terms of minimum value, maximum value, mean and standard deviation while inferential statistics were used to analyze data in terms of correlation analysis. The description of the data set was done using descriptive statistics while correlation analysis was used to determine the nature and the degree of the relationship between the study variables. The quantification of the strength of a relationship between two continuous variables (e.g., between an independent variable (Financial Technology) and dependent variable (Financial Inclusion) or between independent variables) was revealed using this analysis. Then the regression analysis was used to establish the existing relationship between the dependent and independent variables. Since we were interested in the relationship between two variables which are financial technology and financial inclusion, we used the functional form $y=g(x)$ to create an equation of the model to be used in determining this relationship. Where "y" is the dependent variable determined

by "x" which is the independent variable(s). Hence, the functional relationship between the dependent variable and independent variables is expressed as follows:

$$\text{FinInc} = g(\text{FinTech})$$

Where "**FinInc**" is the *Financial Inclusion* and "**FinTech**" is the *financial technology*

Financial Inclusion is the key dependent variable which was measured using number of people using financial services per 100,000 Adults. On the other hand, the key independent variable was the **Financial Technology** which was measured using the number of registered mobile money Agents per 100,000 Adults. The study was meant to ascertain if there is an impact on financial inclusion by the consumer financial technology use.

Since financial inclusion is represented by **Access** which is measured by the number of people using financial services per 100,000 adults while financial technology is represented by **MobileMoney** measured by the number of registered mobile money agents per 100,000 Adults and also **ATM** which is measured by the number of ATMs installed per 100,000 Adults. Hence the equation:

$$\text{Access}_{it} = \beta_1 \text{MobileMoney}_{it} + \beta_2 \text{ATM}_{it} + i.\text{year} + i.\text{country} + U_{it}$$

(Source: Author's own computation using the data collected)

Data analysis and interpretation of results

Descriptive statistics

The findings below are based on the panel data collected from 14 selected Sub Saharan countries using secondary information sources:

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
logAccess	98	11.079	0.768	9.228	12.432
logMobileM~y	98	4.983	1.369	1.391	7.678
logATM	98	1.857	0.908	-0.078	4.276
logEducation	86	4.206	0.197	3.865	4.593
logGDPperC~a	98	7.972	0.588	6.776	9.324
logPopulat~n	98	16.588	1.035	14.516	19.093

Source: Author's own computation using the data collected

Table 1 above is based on the Secondary data for the 14 Sub-Sahara African countries where we had 98 observations as our sample for this research. Each observation represented a study variable occurrence in a specific country of a given year of study and in our case we had years ranging from 2012 to 2018. Firstly, the mean (average) value of the number of people using the financial services per 100, 000 adults was found to be 11.1 (in the natural log) which means that on average there was 11.1 total number of people using financial services provided by financial institutions. As this stands it means that on average only about 11.1% of the population in Sub-Sahara Africa are using the financial products and services provided by various financial institutions of the financial system of the region. Therefore, about 88.9% of the population in this region is financially excluded. With reference to this, many people in the rural areas of the majority of the countries in this region are not having access to these financial services involuntary due to the scarcity of such.

Secondly, the average number of registered mobile money agents per 100,000 adults was 4.98 (in natural log). This number of mobile money outlets looks like a lot but in the

actual sense, it is smaller than the total number of people in need of the financial services provided by these agents hence there is still more demand for an increase in the number of these agents in all countries of the region to increase the percentage of those financially included. The mobile money agent network is relatively less costly to expand in all the areas including remote ones.

The standard deviations for the variables are shown in the third column of the table above. Firstly, the values of the number of people using the financial services per 100,000 adults are spread from its mean value by 0.77 as shown in the results above. Secondly, the values of the number of registered mobile money agents per 100,000 adults' data set were dispersed from its mean value by 1.37. From the standard deviation results, we observed that the data set of these five variables were close to their mean value hence giving a picture that the values were not so dispersed from the mean value apart from those of the number of registered mobile money agents per 100,000 adults showed that they were so dispersed from their mean value.

Inferential statistics

Inferential statistics contain the correlation analysis results, the regression analysis, and hypothesis testing based on the findings. The first step was an ordinary regression of the panel data where no model was applied and the results of the equation are presented in the table below:

Correlation analysis results

Table 2: Correlation Analysis Results Table

Variables	-1	-2	-3	-4	-5	-6
(1) Access	1					
(2) Mobilemoney	0.615	1				
(3) ATM	0.501	-0.2	1			
(4) Education	0.37	0.32	0.018	1		
(5) GDPPer capita	0.515	-0.1	0.936	0.207	1	
(6) Population	-0.048	-0.1	-0.06	0.288	0.145	1

Source: Author's own computation using the data collected

According to the correlation results in table 2, there was a strong positive relationship of 0.615 between the total number of people using financial services per 100,000 adults and the number of registered mobile money agents per 100,000 adults.

Hausman (1978) specification test

Table 3: Hausman Test Results

	Coef.
Chi-square test value	14.048
P-value	.007

Source: Author's own computation using the data collected

According to the Hausman test results, the "p-value" was less than 0.05 level of significance therefore the fixed effect model was chosen to be used over the random effect model.

Fixed effect model**Table 4: Fixed Model Results**

Access	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Mobilemoney	54.664	8.832	6.19	0	37.004	72.324	***
ATM	4610.592	965.663	4.78	0	2679.629	6541.556	***
Education	415.88	398.883	1.04	0.301	-381.737	1213.497	
GDP Per capita	7.748	13.29	0.58	0.562	-18.826	34.323	
Population	-0.002	0.001	-1.92	0.06	-0.004	0	*
Year2	4283.75	5669.07	0.76	0.453	-7052.262	15619.762	
Year3	13197.626	7048.32	1.87	0.066	-896.356	27291.607	*
Year4	20253.475	8059.76	2.51	0.015	4136.981	36369.969	**
Year5	25919.449	8857	2.93	0.005	8208.782	43630.115	***
Year6	32035.863	9859.43	3.25	0.002	12320.708	51751.019	***
Year7	31658.977	11583.1	2.73	0.008	8497.203	54820.751	***
Constant	-6983.905	39719	-0.18	0.861	-86400	72439.2	
Mean dependent var	77454.654		SD dependent var		55602.132		
R-squared	0.894		Number of obs		86		
F-test	46.76		Prob > F		0		
Akaike crit. (AIC)	1881.647		Bayesian crit. (BIC)		1911.099		
*** $p<0.01$, ** $p<0.05$, * $p<0.1$							

Source: Author's own computation using the data collected

$$Access_{it} = \beta_1 MobileMoney_{it} + \beta_2 ATM_{it} + \beta_3 Education_{it} + \dots + i.year + U_{it}$$

(Source: Author's own computation using the data collected)

Where; **Access** is the number of people using financial services per 100,000 adults,
MobileMoney is the number of registered mobile money agents per 100,000 Adults.
ATM is the number of ATMs installed per 100,000 Adults
Education is the rate of education in a country measured using the annual primary school completion rate for each country.
GDPperCapita is the annual GDP per Capita for each country.
Population is the annual total of the population for each country
i.year is representing the year dummies
U_{it} is the idiosyncratic error

To interpret the regression coefficients based on the regression results shown in table 4 above, the regression equation is written as:

$$Access_{it} = 54.7 MobileMoney_{it} + 4610.6 ATM_{it} + 415.9 Education_{it} + \dots + i.year + U_{it}$$

(Source: Author's own computation using the data collected)

Firstly, in the above equation, the coefficient of the number of registered mobile money Agents available per 100000 adults (MobileMoney) is 54.7 denoting that the total number of people using financial services per 100,000 adults increase by 54.7 for every one-unit increase in the number of registered mobile money agents available per 100,000 while holding all other factors constant.

According to the regression results in table 4 above, the “p-value” for the number of registered mobile money agents available per 100,000 adults (MobileMoney) was 0.000 which denotes that this variable has a significant and positive impact on the total number of people using financial services per 100,000 adults at 5% level of significance.

Discussion

From the interpretation of the study findings above, it is evident that the increase in the number of registered mobile money agents led to an increase in the number of people accessing the financial services hence increasing the financial inclusion percentage in the Sub-Sahara Africa countries. In addition, there is a 5% level of significance of the relationship between the number of registered mobile money agents per 100,000 adults and the total number of people using the financial services per 100,000 adults.

With increased mobile money outlet installation in the SSA region, the majority of the people in remote rural or urban areas will be able to access financial services using mobile money services and other related financial technology-based services. These financial technical services are not only for sending and receiving money but also for accessing other services which include insurance, credit, and savings. The mobile money account has in most African countries been less costly to maintain in terms of saving and transacting. The mobile money outlets are well distributed in both rural and urban areas which makes them be within reach in terms of accessibility regardless of the location. For instance, in Zambia, the rapid increase of mobile money outlets across the country has positively affected the number of mobile money subscribers and its usage.

The extent to accessing finances in form of loans is increasing rapidly with the introduction of better financial service packages in many countries of the SSA region. The third reason for choosing mobile money financial services over physical banking services is the former's easy access to loans than it is in the case of the latter. Many people mentioned recharge talk time to be the most accessible loan on mobile money services. Whenever they are faced with an urgent need to call someone using a phone but have insufficient credit, they can just get a small loan of talk time then pay back with very low interest when they have it. Others have access to microfinance packages which are small amounts of credit made available to ultimately give impoverished/disadvantaged people an opportunity to become self-sufficient.

Last but not least is that mobile money account opening requirements are easy to qualify than it is with the financial bank where so many requirements are put in place for one to open an account which largely disadvantages the majority of the potential customers to have a bank account. Fewer documents are required and a short approval process is involved in the mobile money account opening process which can take less than one hour to have one but with a bank account, it can take more than a day to open one account with most banks within in the SSA region countries.

There has been a gradual increase in the use of mobile banking over the years due to its increased access and awareness by the users on how secure and efficient this platform is when they need to access financial services. Hence this platform has been adopted by many people over the years as they learn more about the benefits of using this platform in accessing financial services.

Conclusion

There is greater proof that financial technology in its various forms such as Mobile services is on track to achieve greater integration in the financial habits of the population in most developing countries around the world. To a larger extent, the developing countries such as Zambia, Kenya, Tanzania, Nigeria, and many other countries in the SSA region have embraced mobile services at the same time as meeting a

real need for P2P transfer services. This shows that financial technology is playing a vital role in financial inclusion. This study further shows that mobile money not only is used for savings but also to influence loan requests. Many people in the SSA region especially the illiterates were unbanked until the evolution and emergence of mobile money services. Among the reasons for this were the long bureaucracies and complications involved in dealing with banks in the countries of this region. This has denied numerous Africans from accessing the benefits accompanying financial inclusion over the years. However, this is seen to be changing over the years as the evolution of mobile money expands in more remote areas of the countries within the SSA region which has caused the African population to become more financially inclusive.

As shown in the research findings presented above, the study concludes that there is a strong positive relationship between Financial Technology and financial inclusion in Sub-Sahara Africa Region. This could be attributed to the trends recorded in the relationship between each of the three independent variables and the dependent variable. One of the most effective financial technology platforms according to the results is mobile money (sometimes referred to as mobile banking). It has been a more reliable tool used by most financial institutions to expand their businesses to most parts of the country especially the remote areas where very few people have access to financial services but need to use them in their daily life.

There is a significant impact of financial technology on financial inclusion in the SSA region. Hence there is a relationship between financial technology and financial inclusion in this region. This relationship is seen to increase in the future as long as the challenges mentioned above can be overcome by the responsible institutions.

Policy suggestions

To start with, there is a need to pursue more synergistic operating models that facilitate information and experience sharing to develop a wider range of bank services that can be extended to mobile money users hence the study recommends that Mobile Money Network Operators (MNOs) and Banks should systematically work together for this to be achieved.

Secondly, the study recommends that the mobile money service regulations should also evolve quickly in most of the crucial aspects including the protection of users, guidelines for the use of personal data in the context of digital data sharing between Banks and MNOs, and the possibility for banks to access mobile data to increase the accessibility of financial services by low-income users. This could allow greater access to savings and credit options for a portion of current mobile money customers with the safety of user personal data.

This study thirdly recommends that the mobile money financial service prices should become lower than they are at the moment as they are very high for customers to afford even if they are potentially lower than those charged by traditional money transfer operators in the region. This could be achieved by promoting more mobile money financial service providers to increase the level of competition in this market that will likely lead to the fall of service charges. If this is achieved, then not only will the African population benefit from service cost reduction in both the national and international money transfers representing an important share of their income but also the world.

Last but not the least, there is generally poor network connectivity in most rural areas of the SSA region which has added to limited accessibility of mobile services and price structures of these services hence the study recommends that efforts should be put to improve the quality of the network coverage across the region and also the service costs.

Furthermore, the partnerships between banks, financial institutions, microfinance institutions, and mobile industry players should be recognized and promoted. There is a

need to promote a single integrated framework (between financial institutions and the mobile industry) to cut costs hence providing consumers with the convenience of banking from home, farm, or other remote areas. This will lead to the sustainable growth of mobile banking success stories and increased financial inclusion in the region.

It is so important for the Mobile money service providers (telecommunication companies) to make efforts to upgrade their technology to easily adopt the new mobile banking emerging technology and also seek user-friendly solutions which are easy to implement. And these MNOs should make available the most affordable mobile phones in stock so that more people can acquire them which would assist in easily providing mobile services that will cover a wide segment of the African population in the very near future.

Limitations of the study

Among the few notable limitations for this research was the small sample size that can potentially make researchers have challenges in performing different statistical analyses to come up with very accurate statistical results. This sample size is relatively small if compared to other empirical research studies about the financial technology impact on financial inclusion. Out of 46 countries that are members of Sub-Saharan Africa, only 14 of them were selected to represent the entire region. This was due to various challenges faced such as lack of data on the specific variables we were interested in to successfully carrying out the research.

Although the sample was relatively small in comparison with other empirical research studies, this size is still statistically acceptable to give us accurate and relevant statistical results. By increasing the number of countries as sample size the research study can be expanded to improve on the empirical model's statistical validity and predictive power.

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